EPA-660/2-74-024
April 1974

Environmental Protection Technology Series

Livestock and the Environment

Office of Research and Development
U.S. Environmental Protection Agency
Washington, D.C. 20460

RESEARCH REPORTING SERIES

Research reports of the Office of Research and Monitoring, Environmental Protection Agency, have been grouped into five series. These five broad categories were established to facilitate further development and application of environmental technology. Elimination of traditional grouping was consciously planned to foster technology transfer and a maximum interface in related fields. The five series are:

1. Environmental Health Effects Research
2. Environmental Protection Technology
3. Ecological Research
4. Environmental Monitoring
5. Socioeconomic Environmental Studies

This report has been assigned to the ENVIRONMENTAL PROTECTION TECHNOLOGY series. This series describes research performed to develop and demonstrate instrumentation, equipment and methodology to repair or prevent environmental degradation from point and non-point sources of pollution. This work provides the new or improved technology required for the control and treatment of pollution sources to meet environmental quality standards.

EPA-660/2-74-024
April 1974

LIVESTOCK AND THE ENVIRONMENT

A Bibliography with Abstracts

by

Ralph H. Ramsey, Ph.D.
Animal Wastes Technical
Information Center
School of Environmental Science
East Central State College
Ada, Oklahoma 74820

Project Officer

R. Douglas Kreis
Robert S. Kerr Environmental Research Laboratory
P. O. Box 1198
Ada, Oklahoma 74820

Grant No. R801454-01
Program Element 1BB039

Prepared for
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price $3.50

EPA Review Notice

This report has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

ABSTRACT

Management and research information on animal wastes has expanded rapidly in recent years. This material has appeared in diverse sources such as journal articles, papers published as conference proceedings, university or government publications, magazine articles, books or book chapters, and theses. This bibliography (an updated and revised extension of the BIBLIOGRAPHY OF LIVESTOCK MANAGEMENT EPA-R2-72-101 which was published by J. R. Miner, D. Bundy, and G. Christenbury at Iowa State University) was compiled in order to speed the flow of information on findings in one segment of the livestock industry to other segments that could benefit from this technology.

Included in this publication are the following indexes:
(1) title, (2) author, (3) keyword, (4) animal information categories. These indexes are followed by a section of abstracts of each reference entry found in the bibliography. Single copies of most articles can be obtained in hard copy or microfiche form at cost from the Animal Waste Technical Information Center, School of Environmental Science, East Central State College, Ada, Oklahoma 74820.

This report was submitted in fulfillment of Project Number R801454 by the School of Environmental Science, East Central State College, Ada, Oklahoma under the sponsorship of the Environmental Protection Agency. The work was completed as of January 31, 1974.

CONTENTS

Section		Page
I	Introduction	1
II	User's Guide	3
III	Bibliography	7
IV	Author Index	71
V	Keyword Index	79
VI	Animal Information Category Index	179
VII	Abstracts of Bibliography Entries	185
VIII	Acknowledgements	350
IX	References	351

SECTION I

INTRODUCTION

The evolving regulations and aims pertaining to the abatement and control of pollution have necessitated a timely and well-dispersed flow of pertinent information about the management and disposal of animal wastes. This is necessary so that capital investments in this area can be made on the basis of the most recent research and operational findings. Industry and manufacturing organizations or associations, in many activities, provide the linkage channels through which this information can flow. The wide range in operation sizes and makeup, the nation-wide dispersion of production units, the variations in climatic and geographical factors, and the dictates of the local or regional markets which are encountered in the production of animals or animal products make widespread dissemination of animal waste management information difficult. This occurs even though there exists an established communication network through publications from organizations such as breed associations, farm groups, or the popular agricultural press. Common properties and characteristics of animal wastes enable technological transfers to occur in the production operations from one species to another. Publicizing the existence of information on practices or findings in one segment of the livestock production industry can initiate new innovations or serve to spread the adoption of the new ideas to the other segments of the industry.

The objective of this project is to aid in the dissemination and technological transfer of information on the management and disposal of animal wastes throughout the livestock industry. Identification and location of pertinent information generated in the production operations of poultry, swine, cattle, fish, and other animals of economic interest raised in open or confined systems is accomplished through searches of technical journals, books, theses, reports from private, state and federal agencies, papers given at meetings of professional societies or symposiums, and articles appearing in the trade or production-oriented "farm" magazines.

The search topics of specific interest include the physical and chemical characteristics of animal wastes (manures and other material contaminated by manures); the operational and cost aspects of handling, collection, storage, transport, utilization, and disposal of animal manures; and the economic and legal impact of these wastes on the problems of air, water,

and solid waste pollution. The articles identified in the search are collected and reviewed to determine if the contents are relevant to the project objectives. Those articles that are considered to be of value for the livestock producer or research scientist engaged in animal waste activities are abstracted and added to the collection.

An annual updated bibliography of animal waste management information will be prepared. It will contain entries and abstracts for all items maintained in the collection at the Animal Waste Technical Information Center.

It is anticipated that the information contained in this bibliography will show most of those seeking information where this material can be found, since many potential users will have access to libraries through which they may obtain the actual text of the material. However, single copies of most publications (those for which copying approval has been obtained from the copyright owners) may also be obtained upon request in hard copy or microfiche form at a cost-only fee. Information on this service can be obtained by writing:

Mrs. Linda Merryman, Project Librarian
Animal Waste Technical Information Center
School of Environmental Science
East Central State College
Ada, Oklahoma 74820

SECTION II

USER'S GUIDE

The entries in this bibliography have been assigned a specific cross-reference code. The code number consists of nine digits (example 100-73-1069) arranged in the sequences of a three-digit class code, a two-digit number representing the year of publication, and a four-digit accession number. The first grouping identifies the class of the document according to the following format (1):

Code	Class
100	Technical journal paper
200	Conference proceeding paper
300	University or government publication
400	Magazine article
500	Book or chapter from a book
600	Unpublished paper
700	Thesis

The next two-digit number is the year of publication or presentation. The last number is a four-digit accession number which identifies each article brought into the animal waste information collection.

This publication consists of 5 sections: Bibliography, Author Index, Keyword Index, Animal Information Category Index, and Abstracts. An explanation of each section follows:

BIBLIOGRAPHY

This section lists the items by classes according to the code defined above. The articles within these classes are arranged first by year of publication and then by accession number.

Each entry in the bibliography includes the cross-reference code, the author(s), the title of the entry, a list of keywords which help identify the contents of the material, and the bibliographical citation. An example of the format is shown below.

300 71 1257	BUTCHBAKER A F GARTON J E EVALUATION OF BEEF CATTLE FEEDLOT W RNATIVES WASTE-TREATMENT-ALTERNATIV ROL BEEF-WASTE-MANAGEMENT WATER POLLUTION CONTROL RESEARCH SE OMA STATE UNIVERSITY STILLWATER

AUTHOR INDEX

This index lists all the authors cited in the bibliography in alphabetical order. To the right of each author entry is the cross-reference code of the article or articles with which he is identified. An example of the format is as follows:

DUFFER W R	200 70 0698
	300 71 1245
DUFFY M E	100 69 0265
DUGAN G L	100 72 0746
	100 73 1184
	300 70 0668

KEYWORD INDEX

This index consists of an alphabetical listing of significant words in an article or in the title of an article. To the right of the keyword are the first 85 characters contained in the title or the title and a listing of keywords, if the title is short. To the left of the keyword is the nine-digit cross-reference code of the article ascribed to by the keyword. The cross-reference code allows the user to enter the bibliography or look up the abstract for additional information about the title. An example of this index format is:

300 72 1157	DESIGN	CANADA ANIMAL WAST
600 69 1005	DESIGN	FACILITY DESIGN KE
600 71 0272	DESIGN	A DOSING-SIPHON FO
100 62 0499	DESIGN-CRITERIA	MANURE LAGOONS DES
100 65 0366	DESIGN-CRITERIA	LIQUID HANDLING OF
100 69 0353	DESIGN-CRITERIA	OXIDATION-DITCH TR
100 71 0266	DESIGN-CRITERIA	CAGED LAYER PERFOR

ANIMAL INFORMATION CATEGORY INDEX

To provide a quick entry into the abstract holdings of the collection, an animal information code was developed. This code utilizes an alphabetical entry to signify a broad interest area and a numerical digit to designate a more specific topic under the broad interest area. Each abstract in the collection was classified according to this code and could be listed under the five most relevant categories. This can provide the user an easy entry into the abstract holdings pertaining to his information needs. It is anticipated that some potential users, after reading some of the abstracts listed under these categories, may identify

some particular keywords of importance which can be utilized to enter the more comprehensive keyword index to identify abstracts which may pertain to his more specific information needs. The code utilized in this index is as follows:

CATEGORIES OF ANIMAL INFORMATION

Interest Area	Topic Area
A. Environmental Effects	
	1. General
	2. Surface Runoff from Animal Production Unit Operation
	3. Surface Runoff from Agricultural Watersheds
	4. Groundwater
	5. Odor
	6. Air
	7. Biocides
	8. Vectors
	9. Health
	10. Aesthetics
B. Management of Animal Production and Confinement Operations	
	1. General
	2. Liquid Systems
	3. Solid Systems
C. Characteristics of Animal Wastes	
	1. General
	2. Physical
	3. Chemical
	4. Biological
	5. Management's Impact On
D. Treatment Processes	
	1. General
	2. Physical
	3. Chemical
	4. Biological
E. Utilization and Disposal	
	1. General
	2. Land
	3. Reuse
	4. By-Product Recovery
F. General	
	1. Economics
	2. Legalities
	3. Institutional and Policy Needs
	4. Overviews, Trends and Projections
	5. Related Agricultural Operations

The entries in this index appear under the code number as in the following example:

C 1

0001
0010
0023
0041

ABSTRACTS

This section contains the abstracts of the information entries contained in the bibliography. The abstracts have been published in Selected Water Resource Abstracts published by the Water Resources Scientific Information Center (2-82). Each entry, therefore, includes the title of the informational material, the bibliographic citation, the author or authors, keyword identifiers and descriptors, and the abstract. The abstracts are arranged sequentially by an assigned accession number which specifically identifies the article in the collection. To the right of the accession number are the animal information category code numbers assigned to the abstract entry.

SECTION III

BIBLIOGRAPHY

100 55 0328 HUNGATE R E FLETCHER D W OYER I A
EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTATION FEEDS LABORATO
RY TESTS EFFECTS CHLORTETRACYCLINE RUMEN MICROURGANISMS
JOUR OF ANIMAL SCIENCE VOL 14 1955 PP997-1002

100 58 0580 HANSEN C M
ENGINEERING PRINCIPLES IN HANDLING LIQUID MATERIALS KEYWORDS PUMPS ENGINEERING LIQUID
AGRICULTURAL ENGINEERING V39 P546-51 SEPT 1958

100 59 0459 JEDELE D G
LIQUID MANURE FOR MIDWEST SWINE PRODUCTION KEYWORDS LIQUID MANURE MIDWEST
TRANSACTIONS OF ASAE V2 N1 PP9-10 1959

100 60 0059 HART S A
THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTING HOUSEFLY FERTILIZ
ER SANITATION MANAGEMENT
TRANS ASEA V 3 P 78-80 1960

100 60 1078 OVERBY L R FROST D V
EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS FEEDING POULTRY A
RSANILIC-ACID
JOURNAL OF ANIMAL SCIENCE VOL 19 NO 1 JAN 1960 P 140-144 2 TAB 9 REF

100 62 0292 HENDERSON J M
AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAINAGE STREAM
PROCEEDINGS AMER SOC CIVIL ENGRS SAN ENGR DIV SA6 V86 PP61-75 NOV 62

100 62 0382 GELDREICH E E BORDNER R H HUFF C B CLARK H F KABLER P W
TYPE DISTRIBUTION OF COLIFORM BACTERIA IN THE FECES OF WARM-BLOODED ANIMALS KEYWORDS COLIFORMS E COLI FE
CAL-POLLUTION DISTRIBUTION
J WATER POLLUTION CON FED 34 3 1962 P 295-301

100 62 0480 JAWORSKI N A HICKEY J L S
CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAGE KENNEL
JOUR WATER POLL CONTROL FED 34 1 P 40-43 JAN 1962

100 62 0499 EBY H J
MANURE LAGOONS DESIGN CRITERIA AND MANAGEMENT KEYWORDS FARM-LAGOONS DESIGN-CRITERIA SITE-SELECTION MAN
AGEMENT

100 65 0499 AGRICULTURAL ENGINEERING J VOL 43 DEC 1962 P 698-701
714-715

100 62 1220 WEBB H J
WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES FARM-WASTES PEST
ICIDES FARM-LAGOONS FERTILIZERS CHLORINATED-HYDROCARBONS NITRATES INSECTICIDES DDT SEWAGE-LAGOONS WASTE-D
ISPOSAL FERTILIZATION FARM-MANAGEMENT CROP-PRODUCTION LIME PHOSPHATES LIVESTOCK HOGS CONFINEMENT-PENS FIS
H FEED-LOTS
JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION VOL 54 NO 1 JAN 1962 P 83-87 2 TAB 10 REF

100 63 0289 GATES C D
TREATMENT OF LONG-ISLAND DUCK FARM WASTES KEYWORDS CHLORINATION COLIFORMS TREATMENT DUCK
JOUR WATER POLLUTION CONTROL FED V35 12 PP1569-79 1963

100 63 0338 HART S A
DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION STABILIZATION PH AL
KALINITY CARBON NITROGEN
JOUR WATER POLLUTION CONTROL FEDERATION 35 6 JUNE 1963 748-757

100 63 0436 KOON J HOWES J R GRUB W ROLLO C A
POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFECTS DUSTS ENVIRONMEN
TAL CONTROL COMPOSITION
AG ENGINEERING VOL 44 NO 11 NOV 1963 PP608-609

100 63 1064 DRUMMOND R D
TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS TOXICITY FARM-WAS
TES FEED-LOTS LARVAE INSECTICIDES HOUSE-FLIES-MUSCA-DOMESTICA HORN-FLIES-HAEMATOBIA-IRRITANS BAYER 22408
CO-RAL BUTONATE BAYER 37342 FAMOPHOS BAYER 37341 RHODIA-RP-9895 DIPTEREX V-C-13 GENERAL-CHEMICAL-4072 BAYE
R-29493 STAUFFER-R-1504 CHLORINATED-HYDROCARBONS U-S-DEPARTMENT-OF-AGRICULTURE-ANIMAL-DISEASE-AND PARASITE
-RESEARCH
JOURNAL OF ECONOMIC ENTOMOLOGY VOL 56 NO 3 JUNE 1963 P 344-347 2 TAB 6 REF

100 64 0072 PRYOR W J CONNOR J K
A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NITROGEN METABOLIZABLE
-ENERGY RATION UTILIZATION CHICKENS FAECES
POULTRY SCIENCE 43 1964 833-834

100 64 0333 LIVSHUTZ A
AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRESSURE-BLOWER C N RA
TIO MOISTURE COMPOSTING POULTRY-MANURE
WORLD S POULTRY SCI JOUR 20 1964 212-215

100 64 0343 OGELSBY W C
BOVINE-SALMONELLOSIS IN A FEEDLOT OPERATION KEYWORDS MUD ANTIBIOTICS STAGNANT-WATER SALMONELLA FEEDLOT
VET MED SMALL ANIMAL CLINICIAN 59 FEB 1964 172-174

100 64 0345 HIBBS C M FOLTZ V D
BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYWORDS SALMONELLA SEW
AGE DIARRHEA BOVINE CONTAMINATED CREEK-WATER INFECTION
VET MED SMALL ANIMAL CLINICIAN 59 NOV1964 1153-1155

100 64 0371 HART S A
THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PERCENT FLY-BREEDING B
ULK-DENSITY SLURRIED-MANURES
TRANS OF THE ASAE 7 1964 22-25 28

100 64 0474 TAIGANIDES E P HAZEN T E BAUMANN E R JOHNSON H P
PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP AUGER BOD PROPERTIES PUMPING HOG WASTES
TRANS ASAE V7 P123-124 127 129 1964

100 64 1200 GOULDEN C E
PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE WATER KEYWORDS MIDGES LAKES EUTROPHICATION POLLEN SEDIMENTS CLIMATES PRODUCTIVITY SHEEP HYPOLIMNION ANAEROBIC-CONDITIONS DAPHNIA ESTHWAITE-WATER-ENGLAND CLADOCERA ONTOGENY CHYDORIDAE DAPHNIIDAE BOSMINIDAE SIDIDAE POLYPHEMIDAE LEPTODORIDAE DEFORESTATION CHIRONOMUS SERGENTIA TANYTARSUS CERIODAPHNIA
VERHANDLUNGEN DER INTERNATIONALEN VEREINIGUNG FUR THEORETISCHE UND ANGEWANDTE LIMNOLOGIE VOL 15 1964 P 1000-1005 2 FIG 13 REF

100 65 0066 AL-TIMIMI A A OWINGS W J ADAMS J L
THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR MANURE DIGESTION-TANKS POULTRY KEYWORDS EFFECTS VOLUME ACCUMULATION SOLIDS INDOOR MANURE DIGESTION-TANKS
POULTRY SCIENCE 44 1965 112-115

100 65 0067 RUNDLE W T A
EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPING LABOR FIELD-SPREADING EFFLUENT DISPOSAL PROBLEM
JOUR AND PROC OF THE INST OF AG ENGRS 21 1965 134-139

100 65 0075 CLARK C E
HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGAE SHOCK-LOADING HOG-WASTE-DISPOSAL LAGOONING
JOUR SAN ENGR DIV ASCE 91 SA6 DEC 1965 27-41

100 65 0263 IRGENS R L HALVORSON H O
REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE TREATMENT DENITRIFICATION SLUDGE DIGESTION BIOCHEMICAL OXYGEN DEMAND REMOVAL NUTRIENTS STABILIZATION
APPLIED MICROBIOLOGY VOL 13 NO 3 MAY 1965 PP373-386

100 65 0331 JOHNSON C A
DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-WATER MANURE-SCRAPER DISPOSAL DAIRY-MANURE
TRANS ASAE 8 1965 110-112

100 65 0334 WITZEL S A MCCOY E LEHNER R
CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAGOONS BOD ANAEROBIC-BACTERIA ALGAE CHEMICAL BIOLOGICAL REACTIONS CATTLE
TRANS ASAE VOL 8, P 449-451, 1965

100 65 0344 FORSYTH R J
THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OXIDATION-DITCH COLLECTION MANURE HOUSED LIVESTOCK
JOUR AND PROC OF THE INST OF AG ENGRS 21 1965 129-133

100 65 0346 HART S A TURNER M E
LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INFILTRATION ODORS APPEARANCE LAGOONS
JOUR-WATER POLL CONTROL FED 37 11 NOV 1965 1578-1596

100 65 0366 JOHNSON C A
LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYCLING COSTS SEPTIC-TANKS STORAGE LIQUID HANDLING
TRANS ASAE, VOL 8, P 124-126 1965

100 65 0377 BUNTING A H
EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOIL-STRUCTURE N P K MOISTURE-CONTENT EFFECTS
PROC NUTR SOC 24 1 1965 29-38

100 65 0378 JEFFREY E A BLACKMAN W C RICKETTS RALPH
TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTION LAGOONS DIGESTION-TANKS HOGS LABORATORY
TRANS ASAE 8 1 1965 113-117

100 65 0470 MOORMAN R JR
CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEGAL-ASPECTS DISPOSAL NEIGHBORS CONTROLLING ODORS FEEDLOTS DEHYDRATION
AIR POLLUT CONTR ASSOC JOURNAL VOL 15, 1965 P 34-35

100 65 0503 SCHEFFERLE H E
THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATORY-TESTS TEMPERATURE MOISTURE MICROBIOLOGY POULTRY
J APPLIED BACTERIOLOGY, 28 3 P 403-411, 1965

100 65 0699 SCHEFFERLE HENRIETTA THE MICROBIOLOGY OF BUILT UP POULTRY LITTER
KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES POULTRY ODOR FUNGI AEROBIC-CONDITIONS LABORATORY-TESTS ALKALINITY ENTERIC-BACTERIS LACTOBACILLUS HYDROGEN-ION-CONCENTRATION TEMPERATURE MOISTURE-CONTENT
JOURNAL APPLIED BACTERIOLOGY VOL 28 NO 3 1965 P 403-411 5 TAB 7 REF

100 65 1079 BHATTACHARYA A N FONTENOT J P
UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS SHEEP NITROGEN FERTILIZERS PROTEIN FEEDS FARM-WASTES NUTRITION CHEMICAL-PROPERTIES SAMPLES METABOLISM RECYCLING DIGESTIBILITY NITROGEN-RETENTION POULTRY-LITTER PEANUT-HULLS CRUDE-PROTEIN SOYBEAN-PROTEIN
JOURNAL OF ANIMAL SCIENCE VOL 24 1965 P 1174-1178 4 TAB 28 REF

100 65 1091 EVERSOLE J S LILLY J H SHAW F R
TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS POULTRY FARM-WASTES TOXICITY INSECTICIDES MASSACHUSETTS FLIES LARVAL-MORTALITY COUMAPHOS-ORAL-DRENCH-POWDER FANNIA-CANICULARIS WHITE-LEGHORN-HENS
JOURNAL OF ECONOMIC ENTOMOLOGY VOL 58 NO 4 AUG 1965 P 709-710 1 TAB 4 REF

100 65 1219 NICHOLS M S
NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROGEN-FIXATION DENIT
RIFICATION WASTES NITROGEN-FIXING-BACTERIA AMMONIA ODOR AQUATIC-PLANTS GROUNDWATER TOXICITY WASTE-TREATME
NT NITROGEN-DEPOSITS MINERALIZATION METHEMOGLOBINEMIA LIVESTOCK-POISONING SILAGE-GAS ODOR-PREVENTION
JOURNAL AMERICAN WATER WORKS ASSOCIATION VOL 57 NO 10 1965 P 1319-1327 25 REF

100 66 0063 ELRICK D E BIGGAR J W WEBBER L R
SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RADIOACTIVE DISPOSAL B
IOLOGICAL SOIL POLLUTANTS ORIGIN BEHAVIOR
JOUR SOIL WATER CONSERVATION VOL 21, P 7-11, 1966

100 66 0290 SCHEFFERLE H E
CORYNEFORM BACTERIA POULTRY DEEP LITTER KEYWORDS CORYNEFORM BACTERIA POULTRY LITTER
JOUR OF APPLIED BACTERIOLOGY V29 N1 PP147-160 1966

100 66 0341 LITTLE F J
AGRICULTURE AND THE PREVENTION OF RIVER-POLLUTION, AS EXPERIENCED IN THE WEST-OF-SCOTLAND KEYWORDS EFFLUE
NTS SILAGE PREVENTION RIVER-POLLUTION WEST-OF-SCOTLAND
JOUR PROC INST SEW PURIF 1966 452-454

100 66 0347 SCHELTINGA H M J
AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDATION-DITCH HOGS
JOUR PROC INST SEW PURIF 1966 585-588

100 66 0422 BHATTACHARYA A N FONTENOT J P
PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEEDS DIETS DIGESTION
METABOLISM PROTEIN ENERGY POULTRY LITTERS
JOUR OF AN SCIENCE VOL 25 1966 PP367-371

100 66 0437 TAIGANIDES E P HAZEN T E
PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL OXYGEN DEMAND ODOR
FARM WASTES
TRANS OF THE AM SOC OF AG ENGINEERS VOL 9 PP374-376 1966

100 66 0473 MACDONALD F W DAVIS H R
BOD OF CAPTIVE WILD ANIMAL WASTES KEYWORDS ZOO TOTAL-SOLID BOD WASTES
WATER AND SEWAGE WORKS, VOL 113, P 64-67 FEB 1966

100 66 0478 IRGENS R L DAY D L
LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE DISPOSAL OXIDATION
LAGOONS LABORATORY STABILIZATION SWINE
JOUR AG ENG RESEARCH VOL 11 NO 1 PP1-10 1966

100 66 0479 CHARLES D R PAYNE C G
THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DIETS PH BLOOD RESPIR
ATION EGGS INFLUENCE ATMOSPHERIC-AMMONIA
BRITISH POULTRY SCIENCE, VOL 7, P 177-198, 1966

100 66 0506 MINER J R LIPPER R I FINA L R FUNK J W
CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE VARIATION
JOUR WATER POLLUTION CONTROL FEDERATION VOL 38 PP 1582-91 1966

100 66 1080 FETH J H
NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUNDWATER PUBLIC-HEA
LTH FIXATION NITROGEN-CYCLE WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION FERTILIZERS PROTEINS ROCKS L
EACHING PRECIPITATION ATMOSPHERE AMMONIA AEROSOLS WATER-QUALITY GEOCHEMISTRY
WATER RESOURCES RESEARCH VOL 2 NO 1 1ST QUARTER 1966 P 41-58 9 TAB 1 FIG 57 REF

100 67 0041 SALTER P J BERRY G WILLIAMS J B
THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYWORDS SOIL MOISTURE
FIELD-CAPACITY WILTING-POINT AVAILABLE-WATER-CAPACITY EFFECTS MANURE
JOURNAL OF SOIL SCIENCE 18 2 1967 318

100 67 0076 STEWART B A VIETS F G JR HUTCHINSON G L KEMPER W D
NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS KEYWORDS NITRATES WATER-POLLUTION-SOURCES L
EACHING WATER-POLLUTANTS FEEDLOTS
ENVIRONMENTAL SCI AND TECH 1 9 SEPT 1967 P 736-739

100 67 0079 TASK GROUP 2610P
SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS NITROGEN-COMPOUNDS
DOMESTIC-WASTES DETERGENTS INDUSTRIAL-WASTES FUELS RUNOFF SOURCES
JOUR AM WATER WORKS ASSOC 59 MARCH 1967 344-366

100 67 0104 MINER J R LIPPER R I ERICKSON L E
MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION STIRRED-TANK-INJECTI
ON-MODEL RAIN FEEDLOT
TRANSACTIONS ASAE 10 4 497-501 1967

100 67 0230 LOEHR R C AGNEW R W
CATTLE-WASTES - POLLUTION AND POTENTIAL TREATMENT KEYWORDS ANAEROBIC-DIGESTION ANAEROBIC-LAGOON EFFLUENT
FEEDLOTS CATTLE-WASTES
JOUR SAN ENGR DIV ASCE 93 SA4 AUGUST 1967 55-72

100 67 0233 LOEHR R C
EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOON-OPERATION LOADING
STABILIZATION EFFLUENT-QUALITY ANAEROBIC-LAGOONS FEEDLOT-WASTES
JOUR WATER POLLUTION CONTROL FEDERATION 39 3 MARCH 1967 384-391

100 67 0302 MINER J R FINA L R PIATT C
SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF KEYWORDS SALMONELLA INFANTIS FEEDLOT RUNOFF
APPLIED MICROBIOLOGY 15 3 627-8 MAY 1967

100 67 0448 PATEL J D
INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM KEYWORDS ODOR ANAEROBIC-DIGESTION METHANE FERTILIZERS PRODU
CTION
POULTRY DIGEST, VOL 26, P 100-101, 1967

100 67 0501 EASTWOOD R E KADA J M SCHOENBURG R B BRYDON H W
INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRADATION AEROBIC-COND
ITIONS INVESTIGATIONS FLY-CONTROL COMPOSTING POULTRY-MANURES
JOUR ECON ENTOMOL 60 1 FEB 1967 88-98

100 67 0713 DALE A C DAY D L
OME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITROGEN PHOSPHORUS PAT
ASSIUM AERATION AEROBIC PORPERTIES DAIRY MANURE
TRANS ASAE VOL 10 NO 4 P546-548 1967

100 67 1218 STEAD F M
FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGEMENT STREAM-COND
ITIONS STANDARDS INDUSTRIAL-WASTES PUBLIC-HEALTH WATER-POLLUTION-SOURCES MUNICIPAL-WASTES WASTE-WATER-DISP
OSAL BENEFITS PATHOGENS PESTICIDE-POLLUTIONS TOTAL-MANAGEMENT AQUATIC-SYSTEM
JOURNAL OF THE AMERICAN WATER WORKS VOL 59 NO 12 DEC 1967 P 1497-1501

100 67 1258 FAIR J F MORRISON S M
RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS WATER-QUALITY AQUATIC-MICROBIO
LOGY PATHOGENIC-BACTERIA WILD-LIFE LIVESTOCK SALMONELLA POTABLE-WATER
WATER RESOURCES RESEARCH VOL 3 NO 3 1967 P 799-803 2 TAB 5 REF

100 68 0011 DENDY M Y REED M J MCCARTNEY M G
THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION,RESEARCH AND INDUS
TRY-ABSTRACT KEYWORDS PHYSICAL-PROPERTIES PERFORMANCE SOURCES PINE-BARK SEARCH POULTRY LITTER
POULTRY SCIENCE 45 1968 1666

100 68 0036 CHALOUPKA G W LLOYD R W GORDY J F GREENE L M
OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S DISEASE-ABSTRACT K
EYWORDS CONDEMNATION DISINFECTION LEUCOSIS IMMUNITY CAUSATIVE AGENT OBSERVATIONS RE-USE BROILER LITTER M
AREK S DISEASE
POULTRY SCIENCE 47 1968 1660

100 68 0044 HOWES J R
THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS FERTILIZER STABILIZ
ATION ABSORBENT-SUBSTRATE INOCULATION NITROGEN DIGESTION POULTRY FECES CAGES
POULTRY SCIENCE 47 1968 1682

100 68 0077 GIBBONS J
FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATION HOUSING-SYSTEMS
FARM-WASTE-DISPOSAL CATTLE
WATER POLL CONTROL 67 6 1968 622-626

100 68 0087 JONES D D JONES B A JR DAY D L
AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRESSION-ANALYSIS AER
OBIC-DIGESTION CATTLE-WASTE
TRANSACTIONS OF THE ASAE 11 1968 757-761

100 68 0090 WITZEL S A WILKE J T SCHMITZ F L
WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS RUNOFF SAMPLER
TRANSACTIONS OF THE ASAE 11 6 883,886 1968

100 68 0106 DAY D L
OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXYGEN ELECTRIC-POWER-
COSTS OXIDATION DITCHES DISPOSAL
INTL JOUR FARM BLDG RES 2 DEC 3 1967 2-7

100 68 0287 THOMPSON P D
METHODS FOR DISPOSAL OF POULTRY MANURE KEYWORDS NEW ZEALAND IRRIGATION DRYING STORAGE
NEW ZEALAND JOUR OF AGRICULTURE V116 N1 PP44-49 JAN 68

100 68 0296 GODIN P BELKO J
A NEW APPROACH TO CAGE WASTE DISPOSAL IN A CANINE LABORATORY KEYWORDS DOG FLUSHING
LABORATORY ANIMAL CARE V18 N3 PP401-04 JUN 68

100 68 0306 ZABLATZKY H R PETERSON S A
ANAEROBIC DIGESTION FAILURES KEYWORDS SLUDGE DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUILD-UP MUNICI
PAL WASTES ANAEROBIC DIGESTION FAILURES
JOUR OF WATER POL CON FED VOL 40 NO4 PP581-585 1968

100 68 0370 ABBOTT J L LINGLE J C
EFFECT OF SOIL TEMPERATURE ON THE AVAILABILITY OF PHOSPHOROUS IN ANIMAL MANURES KEYWORDS NUTRIENTS

100 68 0307 EFFECT SOIL TEMPERATURE PHOSPHORUS MANURES

100 68 0370 SOIL SCIENCE V105 N3 PP145-52 1968

100 68 0337 RILEY C T
A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT ODOR LITTER STORAGE
DRYING REVIEW POULTRY-WASTE-DISPOSAL
WAT POLLUT CONTROL 67 6 1968 627-631

100 68 0381 PONTIN R A BAXTER S H
WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECONDARY-DITCH LAYOUT OP
ERATION WASTES PIG-PRODUCTION
WAT POLL CONTROL 67 6 1968 632

100 68 0442 HAMMOND C W DAY D L HANSEN E L
CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS LIQUID HOG MANURE
AGRICULTURAL ENGINEERING V49 N6 PP340-343 JUNE 1968

100 68 0452 GILLHAM R W WEBBER L R
GROUNDWATER CONTAMINATION KEYWORDS NITROGEN BARNYARD GROUNDWATER CONTAMINATION
WATER AND POLLUTION V106 N5 PP54-57 MAY 1968

100 71 0461 ROSS E MIYAHARA A Y
FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-GAINS FEED-CONVERSI
ON FUMIGATION REUSE BROILER LITTER
POULTRY SCIENCE 50 NO 4 1096-1100 JULY 1971

100 68 0481 BOUWER H
RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE WATER DISPOSAL INFIL
TRATION
JOUR OF SOIL AND WATER CONSERVATION VOL 23 1968 PP164-168

100 68 0500 LOEHR R C
ANAEROBIC LAGOONS CONSIDERATIONS IN DESIGN AND APPLICATION KEYWORDS FARM-LAGOONS ANAEROBIC-DIGESTION DES
IGN SOLIDS APPLICATION
TRANS ASAE VOL 11 1968 P 320-322&330

100 68 0502 GERRY R W
MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN DRY-MATTER CALCIUM
PHOSPHORUS BROILERS
POULTRY SCIENCE 47 1968 339-340

100 68 0730 STEWART B A VIETS F G JR HUTCHINSON G L
AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS COLORADO SPRINKLER
-IRRIGATION CATTLE ALFALFA AMMONIUM
JOUR SOIL WAT CONSERVATION VOL 23 NO 1 P13-15 JAN-FEB 1968

100 68 1121 WALKER K C WADLEIGH C H
WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS SEDIMENT-YIELD
NUTRIENTS EUTROPHICATION INORGANIC-COMPOUNDS NITRATES PHOSPHATES CALCIUM MAGNESIUM FERTILIZERS AGRICULTURA
L-CHEMICALS FISHKILL PESTICIDES ENDRIN IRRIGATION ACID-MINE-WATER
PLANT FOOD REVIEW VOL 14 NO 1 1968 3 P

100 68 1229 LOEHR R C RUF J A
ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUSTRIAL-WASTES LAGO
ONS DAIRY-INDUSTRY ANIMALS BIOCHEMICAL-OXYGEN-DEMAND COLIFORMS EFFICIENCIES SEWAGE-TREATMENT SLUDGE WASTE
-WATER-TREATMENT DAIRY-CATTLE FIELD-STUDY MILKING-PARLOR WASTE-CHARACTERISTICS
JOURNAL OF THE WATER POLLUTION CONTROL FEDERATION VOL 40 NO 1 JANUARY 1968 P 83-94 4 TAB 5 FIG 14 REF

100 69 0030 BHAGAT S K PROCTER D E
TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DIGESTION AEROBIC-TRE
ATMENT COD STORAGE-CAPACITY EFFLUENTS TOTAL-SOLIDS TREATMENT DAIRY LAGOONING
JOUR WATER POLL CONTROL FED 41 5 785-795 MAY 1969

100 69 0035 PRATT G L HARKNESS R E BUTLER R G PARSONS J L BUCHANAN M L
TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TANK EFFLUENTS AERATI
ON SETTLING-TANK SLATTED-FLOOR TURBIDITY TREATMENT BEEF-CATTLE REUSE
TRANSACTIONS OF THE ASAE 12 4 1969 471-473

100 69 0037 LOEHR R C
WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSPHATES EFFLUENTS MIN
IMUM-REMOVAL-EFFICIENCIES CRITERIA TREATMENT-PROCESSES LEGISLATION
AGRICULTURAL ENGINEERING 50 AUG 1969 468-470

100 69 0040 RUSZLER P L CARSON J R
PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY MOISTURE ABSORPTIO
N SIZE PHYSICAL BIOLOGICAL EVALUATION LITTER
POULTRY SCIENCE 47 1969 1712

100 69 0045 WILKINS R J
THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRASSES SHEEP DIGESTIB
ILITY-COEFFICICELLULOSE FORAGE FAECES
JOURNAL OF AGRICULTURAL SCIENCE 73 1 1969 57-64

100 69 0052 GILLHAM R W WEBBER L R
NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-NET NITRATE WATER-TA
BLE GROUNDWATER BARNYARD
JOURNAL WPCF 41 10 OCT 1969 1752-1762

100 69 0057 TAIGANIDES E P WHITE R K
THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AMMONIA HYDROGEN-SULF
IDE TOXICITY MENACE ANIMAL
TRANSACTIONS OF THE ASAE 12 3 1969 359-362

100 69 0058 WITZ R L PRATT G L SELL J L
REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES KEYWORDS RECIRCULATED-WATER STORAGE-TANKS FLUSHING-G
UTTERS CLEANING CAGED-LAYER-HOUSES
TRANS ASAE, 12 6 , P 807-812 NOVEMBER 1969

100 69 0060 ROBBINS J W D KRIZ G J
RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTICIDES WASTE-WATER H
YDROGEOLOGY RELATION GROUNDWATER
TRANSACTIONS OF THE ASAE 12 3 1969 397-403

100 69 0061 WITZEL S A MINSHALL N E NICHOLS M S WILKE J T
SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K SOILS WEIRS SNOW R
UNOFF-SAMPLER WATERSHEDS
TRANS ASAE 12 3 1969 P338-341

100 69 0071 GRUB W ALBIN R C WELLS D M WHEATON R Z
ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECIP BOD NITROGEN PHOS
PHORUS SLOPE SURFACES RATION-COMPOSITION FEEDLOT-LAYOUT ANALYSIS
RANSACTIONS OF THE ASAE 12 1969 490-492 495

100 69 0081 MORRISON J L
DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWORDS ALFALFA GROUNDW
ATER DISTRIBUTION ARSENIC POULTRY-LITTER BROILER-CHICKENS
JOUR AGR FOOD CHEM 17 NOV 1969 1288-1290

100 69 0086 LOWMAN B KNIGHT D W
THE APPARENT-DIGESTIBILITY OF ENERGY AND PROTEIN IN TOPLAN DRIED-POULTRY-MANURE KEYWORDS DIETS VALUE ORG
ANIC-MATTER APPARENT-DIGESTIBILITY DRIED-POULTRY-MANURE
ANIMAL PRODUCTION 11 2 1969 276

100 69 0095 HERMANSON R E HAZEN T E JOHNSON H P
BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES ANAEROBIC-LAGOON REGR
ESSION-ANAL LEAST-SQUARES BOD-REDUCTION MIXED-LIQUOR SWINE-WASTE
TRANSACTIONS OF THE ASAE 12 3 342-348 1969

100 69 0096 MERKEL J A HAZEN T E MINER J R
IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGANIC-ACIDS PH CHROMA
TOGRAPHY ALCOHOLS SULFIDES AMINES CARBONYLS ESTERS MERCAPTANS ABSORPTION IDENTIFICATION CONFINEMENT SWINE
TRANSACTIONS OF THE ASAE 12 3 310-313 315 1969

100 69 0103 HUTCHINSON G L VIETS F G JR
NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE FEEDLOTS KEYWORDS
AMMONIA SURFACE-WATER NITROGEN-ENRIGHMENT VOLATILITY ABSCRPTION FEEDLOTS
SCIENCE 166 OCT 24 1969 514-515

100 69 0105 MINER J R HAZEN T E
AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMATOGRAPHY ISOLATION A
BSORPTION AMMONIA AMINES
TRANSACTIONS OF THE ASAE 12 6 772 1969

100 69 0108 MILLS K C PARKER B F ROSS I J
EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SILAGE GRAIN PASTURE
COMPOSITION EFFECTS FEED STEER EXCRETA
TRANSACTIONS OF THE ASAE 12 1 1969 133

100 69 0259 LOEHR R C
ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIGESTION LAGOONS POPU
LATION-EQUIVALPROBLEM
PROC ASCE JOUR SAN ENGR DIV 95 SAZ 1969 189

100 69 0265 DUFFY M E
PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISEASE PREVENTION
ENVIRONMENT VOL 11 NO 8 1969 PP14-21

100 69 0310 BAMESBERGER W L ADAMS D F
IMPROVEMENT IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION KEYWORDS ODOR COLLEC
TION HYDROGEN SULFIDE CADMIUM-HYDROXIDE-SUSPENSION
ENVIRONMENTAL SCIENCE AND TECHNOLOGY V3 PP258-61 1969

100 69 0316 STOMBAUGH D P TEAGUE H S ROLLER W L
EFFECTS OF ATMOSPHERIC AMMONIA ON THE PIG KEYWORDS EFFECTS ATMOSPHERIC-AMMONIA PIG
JOUR OF ANIMAL SCIENCE V28 PP844-47 1969

100 69 0353 DAY D L JONES D D CONVERSE J C JENSEN A H HANSEN E L
OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT LAGOONS DESIGN-CRITE
RIA PASVEER SLOTTED-FLOOR HOGS SLUDGE AEROBIC-TREATMENT BUILDINGS TREATMENT
ASAE NO 69-924 ALSO AGR ENGR 52 2 , P 71-73, FEB 1971

100 69 0355 SCHELTINGA H M J
FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
WAT POLL CONTROL 68 1969 403-413

100 69 0360 CABES L J JR COLMER A R BARR H T TOWER B A
THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISMS AERATION BACTERI
AL-POPULATION INDOOR POULTRY-LAGOON
POULTRY SCIENCE 48 1 1969 54-63

100 69 0361 HARMON B G JENSEN A H BAKER D H
NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT RATS FEED DIETS EX
CRETA OXIDATION-DITCH RESIDUE
J ANIMAL SCIENCE 29 1 , JULY 1969, P 136

100 69 0363 BURNETT W E
ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROMOTOGRAPHY VOLUME FI
LTERS VOLATILEODOR-TRANSPORT PARTICULATE-MATTER POULTRY-HOUSES
POULTRY SCIENCE 48 1 1969 182-185

100 69 0364 SHANNON D W F BROWN W O
LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPERATURE DRY-MATTER L
OSSES ENERGY NITROGEN POULTRY EXCRETA
POULTRY SCIENCE 48 1969 41-43

100 69 0373 PECK J H ANDERSON J R
ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CALIFORNIA KEYWORDS
BIOCONTROL POULTRY-DROPPINGS CALIFORNIA
JOUR MEDICAL ENTOMOLOGY 6 2 1969 163-167

100 69 0374 PECK J H
ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CALIFORNIA KEYWORDS M
ORTALITY IMMATURE-DIPTERA POULTRY-DROPPINGS
JOUR MEDICAL ENTOMOLOGY 6 2 MAY 31, 1969 168-171

100 69 0375 WEIDNER R B CHRISTIANSON A G WEIBEL S R ROBECK G G
RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIFORMS SAMPLING RURA
L-RUNOFF FACTOR STREAM-POLLUTION
JOUR WATER POLLUTION CONTROL FEDERATION 41 3 MARCH 1969 377-384

100 69 0376 SMYSER C F SNOEYENBOS G H
EVALUATION OF SEVERAL METHODS OF ISOLATING SALMONELLA FROM POULTRY-LITTER AND ANIMAL-FEEDSTUFFS KEYWORDS BY-PRODUCTS EVALUATION SALMONELLA POULTRY-LITTER ANIMAL-FEEDSTUFFS
AVIAN DISEASES 13 1 1969 134-141

100 69 0416 RANKIN J D TAYLOR R J
A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING CATTLE SLURRY TO PASTURE KEYWORDS SOIL-BORNE DISEASES WASTE WATER DISPOSAL STUDY HAZARDS SYSTEM APPLYING CATTLE-SLURRY PASTURE
THE VETERINARY REC VOL 85 NOV 22 1969 PP578-581

100 69 0445 WOOD J M
EFFLUENT DISPOSAL KEYWORDS DAIRY NEW-ZEALAND EFFLUENT
NEW ZEALAND JOUR OF DAIRY TECHNOLOGY V4 N4 PP238-242 DEC 1969

100 69 0508 BURNETT W E
AIR POLLUTION FROM ANIMAL WASTES,DETERMINATION OF MALODORS BY GAS CHROMATOGRAPHIC AND ORGANOLEPTIC TECHNIQUES KEYWORDS ODORS CHEMICALS SULFUR-COMPOUNDS ORGANIC-ACIDS SKATOLE
ENVIRONMENTAL SCIENCE AND TECHNOLOGY VOL 3 P 744-749 1969

100 69 0679 STRATTON F E
NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITROGEN LOSSES ALKALINE WATER IMPOUNDMENTS
JOUR SANITARY ENGR DIV PROC AMER SOC CIVIL ENGR SA2 P223-231 APRIL 1969

100 69 0690 PAULSON G D
AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM THE MATURE CHICKEN KEYWORDS POULTRY SAMPLING SURGICAL-MODIFICATION METABOLISM-CAGE METHOD COLLECTION
POULTRY SCI 48 4 1331-1336 AUG 69

100 69 0693 PLOTKA E D ERB R E
IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE KEYWORDS SHEEP ORGANIC-COMPOUNDS CHROMATOGRAPHY ESTRONE ESTROGEN IDENTIFICATION EXCRETION URINE
JOUR ANIMAL SCI 29 6 934-939 JUN 69

100 69 0707 SELTZER W MOUM S G GOLDHAFT T M
A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS AIR POLLUTION POULTRY PIGS CATTLE BACTERICIDES PARAFORMALDEHYDE METHOGEN ODOR-CONTROL MANURE-ODOR METHOD TREATMENT AMMONIA
POULTRY SCI 48 6 1912-1918 NOV 69

100 69 0714 SHARMA R M PACKER R A
EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS CATTLE HOGS MACCONKEY-BR, OTH TETRATHIONATE SELENITE EVALUATION SALMONELLA FECES
JOUR APPLIED MICROBIOLOGY 18 4 589-595 1969

100 69 0736 KRAFT D J OLECHOWSKI G C BERKOWITZ J FINSTEIN M S
SALMONELLA IN WASTES PRODUCED AT COMMERCIAL POULTRY FARMS KEYWORDS SALMONELLA-ISOLATION POULTRY
APPLIED MICROBIOLOGY 18 5 703-707 NOV 69

100 69 1042 MCMANUS J A ZALFA A A
THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS WATER-POLLUTION-SOURCES ANIMAL-WASTES FERTILIZERS FARM-WASTES WATER-POLLUTION-TREATMENT LEGAL-ASPECTS PAWTUCKET-RHODE-ISLAND
JOURNAL OF THE NEW ENGLAND WATER WORKS ASSOCIATION VOL 83 NO 4 DECEMBER 1969 P 311-321 2 TAB 2 FIG

100 69 1198 BUSCEMI P A
CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS RUNOFF GROUNDWATER SESTON SEDIMENTS ORGANIC-MATTER CURRENTS-WATER WATER-POLLUTION-SOURCES SURFACE-RUNOFF RAINFALL SNOWMELT SURFACE-WATERS STREAMS HYDROGEN-ION-CONCENTRATION IRON MAGNESIUM NITRATES PHOSPHATED ALGEA CETRITUS PULP-WASTES LIVESTOCK IDAHO TREE-BARK CHARCOAL ALGAL-GROWTH STREAM-CONCOURSE PALCUSE-RIVER-IDAHO
OIKOS VOL 20 NO 1 1969 P 119-127 3 TAB 3 FIG 30 REF

100 69 1231 FOEHRENBACH J
POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS EUTROPHICATION BAYS FARM-WASTES POULTRY WATER-POLLUTION-SOURCES WATER-POLLUTION-EFFECTS DISSOLVED-OXYGEN OXYGEN-DEMAND STREAMFLOW SPORT-FISHING COMMERCIAL-FISHING RECREATION ECOLOGY ECONOMICS FISHERIES PESTICIDES WASTE-WATER-DISPOSAL GREAT-SOUTH-BAY-LONG-ISLAND-NY
JOURNAL OF WATER POLLUTION CONTROL FEDERATION VOL 41 NO 8 PART 1 AUG 1969 P 1456-1466 1 TAB 4 FIG 16 REF

100 70 0012 DOBSON R C KUTZ F W
CONTROL OF HOUSE FLIES IN SWINE FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL KEYWORDS LAGOONS COLLECTION-PIT SLOTTED-FLOOR CONTROL HOUSE-FLIES
JOUR OF ECONOMIC ENTOMOLOGY 63 1 171 FEBRUARY 1970

100 70 0013 PECK J H ANDERSON J R
INFLUENCE OF POULTRY-MANURE-REMOVAL SCHEDULES ON VARIOUS DIPTERA LARVAE AND SELECTED ANTHROPOD PREDATORS KEYWORDS SAMPLING CONTROL-OF-FLIES POULTRY-MANURE-REMOVAL PREDATORS
JOUR OF ECONOMIC ENTOMOLOGY 63 1 82-90 FEB 1970

100 70 0014 MORRISON S R MENDEL V E BOND T E
INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GAIN FEED-EFFICIENCY INFLUENCE SPACE CATTLE
TRANSACTIONS OF THE ASAE 13 1 145-147 JAN 1970

100 70 0017 LOVELADY H G STORK E J
AN IMPROVED METHOD FOR PREPARATION OF FECES FOR BOMB CALORIMETRY KEYWORDS LYOPHILIZE DRYING METHOD CALORIMETRY
CLINICAL CHEMISTRY V16 N3 P253-254 1970 U S CLRNGHS P123100066 AD714 846 1969

100 70 0018 HAREIN P K DE LAS CASAS E B S YORK M D
SALMONELLA SPP AND SEROTYPES OF ESCHERICHIA COLI ISOLATED FROM THE LESSER MEALWORM COLLECTED IN POULTRY BROODER HOUSES KEYWORDS CULTURES LITTER PATHOGENS POULTRY
JOUR OF ECONOMIC ENTOMOLOGY 63 1 80-82 FEB 1970

100 70 0019 BURNETT W E DONDERO N C
CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS DEODORANTS ANIMAL -WASTES
TRANSACTIONS OF THE ASAE 13 2 221-224 MARCH 1970

100 70 0020 YORK L R FLEGAL C J ZINDEL H C COLEMAN T H
EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DURING STORAGE KEYW ORDS HAUGH-UNIT COLOR-AND-ODOR-OBSERVATIONS EFFECT DIETS DEHYDRATED-POULTRY-WASTE SHELL-EGGS STORAGE
POULTRY SCIENCE 49 2 590-591 MARCH 1970

100 70 0021 OLSEN R J HENSLER R F ATTOE O J
EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AND ON CERTAIN SOIL T EST VALUES KEYWORDS NITRIFICATION DENITRIFICATION RATES-OF-APPLICATION N-RECOVERY FIELD-MOISTURE-CAPACI TY EFF MANURE-APPLICATION
SOIL SCI SOC OF AMERICA PROCEEDINGS 34 2 222 MARCH 1970

100 70 0023 FINCHER G T STEWART T B DAVIS R
ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS HABITATS HOSTS PIT-TRAPS ANIMAL S ATTRACTION COPROPHAGOUS-BEETLES FECES ANIMALS
THE JOURNAL OF PARASITOLOGY 56 2 378-383 APRIL 1970

100 70 0024 GOYAL S M SINGH I P
PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODENTS CROSS-INFECTIO NS SOURCES SALMONELLAI POULTRY
BRITISH VETERINARY JOURNAL 126 4 180-184 1970

100 70 0025 QUARLES C L GENTRY R F BRESSLER G O
BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYWORDS FERTILITY A IR-SAMPLER LITTER-HOUSES WIRE-FLOOR BACTERIAL-CONTAMINATION EGG-HATCHABILITY
POULTRY SCIENCE 49 1 60-66 1970

100 70 0026 FUNG D Y C KRAFT A A
A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULTURES AND POULTRY P RODUCTS KEYWORDS CONCENTRATIONS STRAINS MOTILITY-FLASK METHOD DETECTION ISOLATION SALMONELLA POULTRY
POULTRY SCIENCE 49 1 46-54 1970

100 70 0027 STEFANOVIC M P BAYLEY H S SLINGER S J
EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID OUTPUT IN THE URIN E KEYWORDS AIR-TEMPERATURE METABOLIC-RESPONSE EFFECT STRESS SWINE VANILMANDELIC-ACID URINE
JOURNAL OF ANIMAL SCIENCE 30 3 378-381 1970

100 70 0028 CALVERT C C MORGAN N O MARTIN R D
HOUSEFLY LARVAE BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS KEYWORDS INSECTS ODOR UTILIZATION BI ODEGRADATION HEN-EXCRETA
POULTRY SCI 49 2 588-590 MAR 70

100 70 0031 STEWART B A
VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT CONDITIONS KEYWORD S WATER POLLUTION NITRATE AMMONIA MOISTURE-CONTENT SOIL PH STOCKING-RATECATTLE-FEEDLOT
ENVIRONMENTAL SCIENCE AND TECHNOLOGY 4 7 579-582 JULY 1970

100 70 0034 AMENTA J S
A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND FECES KEYWORDS CH EMICAL-ANAYSIS PLASMA CHOLESTEROL LABORATORY TESTS FECES
CLINICAL CHEMISTRY 16 4 1970 339-346

100 70 0042 MINSHALL N E WITZEL S A NICHOLS M S
STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PRECIPITATION RUNOFF FR OZEN-GROUND FARM-OPERTIONS
PROC AM SOC CE, JOUR SANITARY ENGR DIV 96 SA2 APR70 513

100 70 0047 PRYOR W J
PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTRIENT-REQUIREMENTS P ERFORMANCE PRINCIPLES PRACTICES BEEF FEEDLOTS
AUSTRALIAN VETERINARY JOURNAL 46 4 APRIL 1970 P173-177

100 70 0048 HEATHCOTE R G
SOIL FERTILITY UNDER CONTINUOUS CULTIVATION IN NORTHERN NIGERIA I THE ROLE OF ORGANIC MANURES KEYWORDS TRACE-ELEMENTS LIMITING-FACTORS CROP-RESPONSE MANURES
EXPERIMENTAL AGRICULTURE, 6 3 P 229-237, 1970

100 70 0049 KOELLIKER J K MINER J R
USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND APPLICATION RATE KEY WORDS COD LAGOONS NITRATES NITROGEN BACTERIA DISPOSAL IRRIGATION SOIL APPLICATION-RATE
TRANS ASAE, 13 4 , P 496-499, JULY-AUG 1970

100 70 0050 LOEHR R C
TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDING-TANKS OXIDATION-DITCHES COMPOSTING NITROGEN PHOSPHORUS DRYING NITRIFICATION DENITRIFICATION
INDUSTRIAL WATER ENGINEERING, 7 11 P 14-18, NOV 1970

100 70 0051 LAW J P JR BERNARD H
IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION LIVESTOCK CHEMICALS AQUATIC-LIFE FISH DISSOLVED-OXYGEN DO FERTILIZERS SALINITY RECREATION
TRANS ASAE, 13 4 P 474-478 JULY-AUG 1970

100 70 0064 ERB R E TILLSON S A HODGEN G D PLOTKA E D
URINARY CREATININE AS AN INDEX COMPOUND FOR ESTIMATING RATE OF STEROIDS IN THE DOMESTIC SOW KEYWORDS SWI NE INDEX-COMPOUND
JOUR ANIMAL SCIENCE 30 1 , P 79-85, JANUARY 1970

100 70 0065 ANON
AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION DISPOSAL CONTAMINA TION MEASURE POTENTIAL LIQUID POULTRY
ENVIRONMENTAL SCIENCE AND TECHNOL. 4 12 ,P 1098-1100, DEC 1970

100 70 0082 CALVERT C C MARTIN R D MORGAN N O
HOUSE FLY PUPAE AS FOOD FOR POULTRY KEYWORDS FEEDS NUTRIENTS MUSCA-DOMESTICA
JOUR ECONOMIC ENTOMOLOGY, VOL 62, P 938-939, 1970 NO 4

100 70 0083 TOWNSHEND A R BLACK S A JANSE J F
BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BEEF-FEEDLOT ONTARIO
JOUR WATER POLLUTION CONTROL FEDERATION 42 2 FEB 1970 195-208

100 70 0084 BELL R G
FATTY ACID CONTENT AS A MEASURE OF THE ODOUR POTENTIAL OF STORED LIQUID POULTRY MANURE KEYWORDS ODOR LEG ISLATION
POULTRY SCIENCE, 49 4 , P 1126-1129, JULY 1970

100 70 0085 ANON
DANGEROUS GASES IN AGRICULTURE KEYWORDS SLURRIES STORAGE GASES
AGRICULTURE, 77 9 ,P 431-432, SEPT 1970

100 70 0089 WHEATLAND A B BORNE B J
TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR DISPOSAL FOAMING O XIDATION-DITCH FLUSHING-GUTTER SLURRIES INCINERATION BOD COD SEA
WAT POLLUT CONTROL, 69 2 , P-195-208, FEB 1970

100 70 0094 BELL R G
THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES KEYWORDS COMPOSTIN G TEMPERATURE DEPTH MICROORGANISMS CANADA AERATION ODOR SALMONELLA INFLUENCE AERATION POULTRY
J AGRIC ENGNG RES 15 1 , 11-16, 1970

100 70 0102 MINER J R BAUMANN E R WILLRICH T L HAZEN T E
POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION INFILTRATION LAGOON S ZONING
JOUR WATER POLLN CONTROL FED 42 3 391 MARCH 1970 PART 1

100 70 0107 BRESSLER G O
DRYING POULTRY MANURE INSIDE THE POULTRY HOUSE KEYWORDS DRYING POULTRY MANURE
AGRIC ENGR V51 N3 P136 MAR 70 CONDENSATION PAPER NA-1-502

100 70 0110 SMYSER C F SNOEYENBOS G H MCKIE B
ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRICHMENT MEDIA INCUBAT ED AT ELEVATED TEMPERATURES KEYWORDS PH INDICATORS PLATING-MEDIUM ISOLATION SALMONELLAE BY-PRODUCTS POU LTRY-LITTER
AVIAN DISEASES 14 2 1970 248-254

100 70 0112 RILEY C T
CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION-EQUIVALENTS SLURRI ES SLUDGE AREATRENDS DISPOSAL
WAT POLL CONTROL, 69 2 , P174-179, FEB 1970

100 70 0228 MINER J R
RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT POLLUTION-ABATEMEN T POLLUTANTS URBAN-FRINGE
AGR ENGR, 51 12 , P 702-703, DEC 1970

100 70 0260 JACKSON S W LANGLOIS B E JOHNSON T H
GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS KEYWORDS WASTE R EUSE URIC ACID GROWTH CONDITIONS
POULTRY SCIENCE VOL 49 NO 6 1970 PP1749-1750

100 70 0270 BELLO T R GORDON V L
RAPID CONCENTRATION OF STRONGYLE EGGS FROM EQUINE FECES FOR IN VITRO STUDIES KEYWORDS SEPARATION-TECHNIQ UES LABORATORY CONCENTRATION
AMER JOUR OF VETERINARY RESEARCH 31 12 P 2285-2288 DEC 1970

100 70 0299 THOMAS R E LAW J P JR HARLIN C C JR
HYDROLOGY OF SPRAY-RUNOFF WASTEWATER TREATMENT KEYWORDS HYDROLOGY WASTE-WATER-TREATMENT SOIL-DISPOSAL-FI ELDS
J IRR AND DRAIN DIV PROCEEDINGS ASCE 96 3 1970 P 289-298

100 70 0340 MCKELL C M BROWN V W ADOLPH R H DUNCAN C
FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE KEYWORDS POULTRY CROP-RESPONSE CALIFORNIA PROTEINS COSTS
J OF RANGE MANAGEMENT, VOL 23, P 336-340, 1970

100 70 0342 SMITH L W GOERING H K GORDON C H
IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION COSTS CELL-WALL OXIDA NTS ALKALIS
JOUR OF ANIMAL SCIENCE, 31 6 P 1205-1209 DEC 1970 16 REF

100 70 0362 RALL G D WOOD A J WESCOTT R B DOMMERT A R
DISTRIBUTION OF BACTERIA IN FECES OF SWINE KEYWORDS MICROORGANISMS PATTERNS SWINE
APPLIED MICROBIOLOGY, 20 5 , P 789-792, NOV 1970

100 70 0365 BAYLEY N D
AGRICULTURE FACES NEW CHALLANGES IN CURRENT ENVIRONMENTAL CRISIS KEYWORDS WATER SALINITY PLANNING FERTIL IZERS SEDIMENTCHALLANGES
WATER AND WASTES ENGR 7 11 , P F-14-F-16, NOVEMBER 1970

100 70 0367 CARLSON K H BAYLEY H S
NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND DIETS CONTAINING GRA DED LEVELS OF SOYBEAN OIL MEAL OR CASEIN KEYWORDS HOGS PROCEDURE NITROGEN AMINO DIET
J NUTRITION V 100 NO 11 1353-1361, 1970

100 70 0368 HERR G H
AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMENT NEIGHBORS RESEAR CH NEEDS
COMPOST SCIENCE, J OF WASTE RECYCLING, 11 5, P 8-11, OCT 1970

100 70 0369 CROSS O E DURAN A
ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUDGE BOD PH LOADING-R
ATES SWINE
TRANS ASAE, 13 3 , P 320-322,325, MAY 1970

100 70 0372 LOEHR R C
DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GROUNDWATER NUTRIENTS
RAINFALL BEEF
JOUR SAN ENGR DIV, PROC-ASCE 96 SA6 DEC 1970 1295-1309

100 70 0413 EL-SABBAN F F BRATZLER J W LONG T A FRIAR D E H GENTRY R F
VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIGESTION DIETS NITROG
EN FARM WASTES VALUE
JOUR OF ANIMAL SCI VOL 31 1970 PP107-111

100 70 0417 HOLT R F TIMMONS D R LATTERELL J J
ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SOIL CROPS THRESHOLD-
LEVEL PHOSPHATES
J AGR FOOD CHEM , VOL 18, NO 5, 1970 P 781-784

100 70 0418 MOORE J D ANTHONY W B
ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES TOXICITY ORGANIC ACI
D SYNTHESIS FEED FERMENTATION
JOUR OF AN SCI VOL 30 1970 P 324

100 70 0420 STEELMAN C D COLMER A R
SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGOONS ORGANIC WASTE P
OLLUTION EFFECTS AQUATIC-INSECTS
ANNALS OF THE ENTOMOLOGICAL SOC OF AM VOL 63 NO 2 1970 397-400

100 70 0421 CHIANG H C
EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNESOTA KEYWORDS SOI
L TREATMENT EFFECTS MANURE-APPLICATIONS MITE-PRECATION CORN-ROOTWORM
JOUR OF ECONOMIC ENTOMOLOGY VOL 63 NO 3 JUNE 1970 PP934-936

100 70 0458 VANDERHOLM D H BEER C E
USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSAL SYSTEM KEYWORDS
RUNOFF BOD COD IRRIGATION STORAGE LAND-REQUIREMENTS RATES NITROGEN SOIL DESIGN OPERATION SYSTEM
TRANS ASAE, 13 5 , P 562-564, SEPT-OCT 1970

100 70 0510 LAAK R
CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FERTILIZERS NUTRIENTS
LAND-NEEDED MANURE DISPOSAL
WATER AND SEWAGE WORKS P-134-138 APRIL 1970

100 70 0570 RODRIGUEZ J G SINGH P TAYLOR B
MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVIPOSITION INSECTICID
ES DIAZINON FLY
JOURNAL OF MEDICAL ENTOMOLOGY VOL7 NO3 1970 P335-341

100 70 0578 MCALLISTER J S V
COLLECTION AND DISPOSAL OF FARM WASTES KEYWORDS N-IRELAND GASES SLURRY DISPOSAL
WATER POLLUTION CONTROL V4 N69 P425-29 1970

100 70 0581 WHITE C
BROILER LITTER ON WELSH COAL TIPS KEYWORDS GRASS
AGRICULTURE GB V77 N2 P49-51 FEB 70

100 70 0585 GRIFFITH C C
BOD POSES PROBLEMS FOR POULTRY GROWERS AND PROCESSORS KEYWORDS BOD PROBLEMS POULTRY GROWERS
WATER AND SEWAGE WORKS V117 N1 PIW 9-14 JAN-FEB 1970 ALSO PROCEEDINGS 1969 PURDUE INDUSTRIAL WASTE CONF

100 70 0678 MOORE J A BROOKER D B
THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT KEYWORDS REUSE ODOR POLLUTION FUTURE MANAGEMENT
AGRICULTURAL ENGINEERING 51 7 414 JULY 70 ABSTR ASAE J-469

100 70 0684 LOEHR R C HART S A
CHANGING PRACTICES IN AGRICULTURE AND THEIR EFFECT ON THE ENVIRONMENT KEYWORDS ODOR POLLUTION
CRITICAL REVIEWS IN ENVIRONMENTAL CONTROL VI NI P69-99 F70

100 70 0685 MUEHLING A J
GASES AND ODORS FROM STORED SWINE WASTES AMMONIA MANURE METHANE CARBON-DIOXIDE HYDROGEN-SULFIDE KEYWORDS
SWINE-CONFINEMENT MANURE-ODORS STORAGE-PITS GASES
JOUR ANIMAL SCI 30 4 526-531 APR 70

100 70 0691 PETERSON R A HELLICKSON M A WAGNER W D LONGHOUSE A D
THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS KEYWORDS POULTRY
-MANURE EFFECT HUMIDITY FLOORING MOISTURE-CONTENT
POULTRY SCI 49 2 439-443 MAR 70

100 70 0723 ANTHONY W B
FEEDING VALUE OF CATTLE MANURE FOR CATTLE KEYWORDS REUSE UTILIZATION
JOUR OF ANIMAL SCI 30 2 274 FEB 70

100 70 0738 KANG S F FAN L T LEE E S ERICKSON L E
MODELING FEEDLOT POLLUTION I ANALOG SIMULATION KEYWORDS RUNOFF MODELING FEEDLOT
TRANSACTIONS ASAE V13 N6 P858-69 NOV-DEC 1970

100 70 1037 WATSON S
NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS NITROGEN WATER-POLLUTIO
N-EFFECTS LAND-MANAGEMENT ENVIRONMENTAL-EFFECTS FERTILIZERS AMMONIA NITRATES UREAS NITROGEN-FIXATION CROP-
RESPONSE NITROGEN-FIXING-VACTERIA NITROGEN-CYCLE LEGUMES GRASSES PROTEINS SOIL-MICROORGANISMS SEWAGE FARM
-WASTES
ADVANCEMENT OF SCIENCE VOL 27 NO 131 SEPT 1970 P 25-37 5 TAB 5 FIG 15 REF

100 70 1040 EL-SHARKAWI F M MOAWAD S K
STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS DAIRY-INDUSTRY O
XIDATION-LAGOONS PILOT-PLANTS ALGAE BIOCHEMICAL-OXYGEN-DEMAND BIOLOGICAL-TREATMENT PHOTOSYNTHESIS STABILI
ZATION WASTE-WATER-TREATMENT FARM-WASTES ALEXANDRIA-EGYPT PANDORINA SOLUBLE-ORGANIC-SOLIDS
JOURNAL OF THE WATER POLLUTION CONTROL FEDERATION VOL 42 NO 1 JAN 1970 P 115-125 5 TAB 4 FIG 17 REF

100 70 1041 NIGHTINGALE H I
STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AGRICULTURAL AREA-FRE
SNO CALIFORNIA KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER CALIFORNIA NITRATES SALINITY WATER-WELLS AQU
IFERS IRRIGATION-WATER FERTILIZERS URBANIZATION STATISTICAL-METHODS SURVEYS CONDUCTIVITY FARM-WASTES REG
RESSION-ANALYSIS FRESNO-CALIF
GROUNDWATER VOL 8 NO 1 JAN-FEB 1970 P 22-28 5 TAB 6 FIG 8 REF

100 70 1051 ANON
POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS WATER-POLLUTION-SOURC
ES BIOCHEMICAL-OXYGEN-DEMAND DISOLVED-OXYGEN HYDROGEN-ION-CONCENTRATION AMMONIA NITRATES PHOSPHATES SOLID
-WASTES ANIMAL-WASTES-WILDLIFE WATER-POLLUTION-CONTROL FOOD-ABUNDANCE CHEMICAL-OXYGEN-DEMAND PATHOGENIC-BA
CTERIA ANIMAL-PARASITES SILTS FECES DRUGS
WATER AND SEWAGE WORKS VOL 117 NO 18 AUGUST 1970 P 291-297 3 TAB 6 FIG 15 REF

100 70 1090 MILLER R W GORDON C H MORGAN N O BOWMAN M C BEROZA M
COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS FEEDS ADDITIVES
CATTLE FARM-WASTES DAIRY-INDUSTRY MORTALITY MILK INSECTICIDES LARVAE COUMAPHOS HOUSE-FLIES MUSCA-DOMESTIC
A-L
JOURNAL OF ECONOMIC ENTOMOLOGY VOL 63 NO 3 JUNE 1970 P 853-855 3 TAB 14 REF

100 70 1111 PEAKALL D B LINCER J L
POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTICIDE-TOXICITY PHY
SICAL-PROPERTIES CHEMICAL-ANALYSIS PERSISTENCE ABSORPTION DDT CHEMICAL-PROPERTIES PLASTICS PAINTS RUBBER
RESINS GAS-CHROMATOGRAPHY SPECTROPHOTOMETRY MALLARD-DUCK POULTRY SONBIRDS WADING-BIRDS MUSSELS HERRINGS
PATH-OF-POLLUTANTS WATER-POLYCHLORINATED-BIPHENYLS CHEMICAL-STRUCTURE
BIOSCIENCE VOL 20 NO 17 SEPT 1 1970 P 958-964 2 TAB 1 FIG 62 REF

100 70 1194 DOWNING A L
REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION ALGAL-CONTROL FIN
ANCING PLANT-GROWTH NITROGEN PHOSPHROUS RESERVOIRS FISHERIES WATER-SUPPLY COSTS WATER-DEMAND ECONOMIC-JUST
IFICATION AQUATIC-WEED-CONTROL RIVERS AGRICULTURE ROOTED-AQUATIC-PLANTS DRAINAGE RUNOFF FERTILIZERS LIVEST
OCK ECONOMICS FISH-KILLS INHIBITORS WATER-POLLUTION-SOURCES HUMAN-DISEASES RESEARCH-POLICY UNITED-KINGDOM
FUTURE-TRENDS CLADOPHORA RESEARCH-STRATEGY THAMES-RIVER-ENGLAND LEE-RI
JOURNAL OF THE SOCIETY FOR WATER TREATMENT AND EXAMINATION PART 3 V 19 1970 P 223-238

100 70 1195 EDWARDS W M HARROLD L L
AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHORUS NITRATES PES
TICICES SOIL-CONSERVATION RUNOFF EROSION PERCOLATION SEDIMENT WASTE LAKE-ERIE BARNYARD SOLIDS LIQUIDS
THE OHIO JOURNAL OF SCIENCE V 70 NO 1 JAN 1970 P 50-56

100 70 1211 CRAINE L B EHLERS M H NELSON D K
ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGINEERING CATTLE EL
ECTRICAL-GROUNDING WATER-CONSUMPTION ELECTRICAL-NETWORKS ELECTRIC-CURRENTS ELECTRICAL-POTENTIAL VOLTAGE
AGRICULTURAL ENGINEERING VOL 51 JULY 1970 P 415-417 1 TAB 2 FIG

100 70 1217 GELDREICH E
APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION BIOINDICATORS WA
TER-QUALITY BACTERIA QUATIC-BACTERIA AQUATIC-MICROBIOLOGY AQUATIC-MICROORGANISMS COLIFORMS SALMONELLA STR
EPTOCOCCUS WATER-POLLUTION WATER-POLLUTION-SOURCES POLLUTANT-IDENTIFICATION PATH-OF-POLLUTANTS ANIMAL-WAST
ES WATER-ZONING SEDIMENT-WATER-INTERFACES DOMESTIC-WASTES LEGAL-ASPECTS SEWAGE-BACTERIA PATHOGENIC-BACTER
IA
JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION VOL 62 NO 2 FEB 1970 P 113-120 53 REF

100 70 1227 MINER J R
AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES WASTE-WATER-TREAT
MENT ODORS CATTLE CROPS BIOLOGICAL-TREATMENT DAIRY-INDUSTRY POULTRY MANURE FEED-LOTS
JOURNAL OF THE WATER POLLUTION CONTROL FEDERATION VOL 42 NO 6 JUNE 1970 P 1171-1179 59 REF

100 70 1230 BOYLE W C
LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PONDS OXIDATION BI
OLOGICAL-TREATMENT SEWAGE-TREATMENT AERATION TEMPERATURE INDUSTRIAL-WASTES NUTRIENTS COLIFORM EFFICIENCY
POULTRY TERTIARY-TREATMENT
JOURNAL OF THE WATER POLLUTION CONTROL FEDERATION VOL 42 NO 6 JUNE 1970 P 910-916 39 REF

100 70 1233 COOKE G W WILLIAMS R J B
LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURCES NITROGEN NITRA
TES AGRICULTURAL-WATERSHEDS PHOSPHORUS LEACHING SOILS DRAINAGE LYSIMETERS FERTILIZERS RAINFALL MODEL-STUDI
ES ANALYTICAL-TECHNIQUES ARABLE-LAND GRASSLANDS CLAYS LIQUID-WASTES LIVESTOCK SOLUBILITY PHOSPHATES SUBSOI
L DOMESTIC-ANIMALS EROSION WIND-EROSION SUSPENDED-LOAD UNITED-KINGDOM PLOWING NITROGEN-LOSSES
JOURNAL OF THE SOCIETY FOR WATER TREATMENT AND EXAMINATION VOL 19 PART 3 1970 P 253-276 7 TAB 34 REF

100 70 1251 ANONYMOUS
AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-POLLUTION-SOURCES
COLORADO CATTLE URINE PATH-OF-POLLUTANTS FARM-WASTES FEEDLOTS
AGRICULTURAL RESEARCH USDA VOL 19 NO 2 AUG 1970 P 8-9

100 68 0043 ROSS E
FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS FUMIGATION BROILER LITTER
POULTRY SCIENCE V47 P1711-1712 1968

100 71 0187 WALKER J P ORR H L POS J
CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS KEYWORDS POULTRY
AERATION ODOR

100 71 0189 ANIMAL WASTE MANAGEMENT, PROCEEDINGS, CORNELL UNIVERSITY

100 71 0187 CONFERENCE OF AGRICULTURAL WASTE MANAGEMENT 1969 P249-253

100 71 0257 WEETH H J HUNTER J E
DRINKING OF SULFATE-WATER BY CATTLE KEYWORDS GROWTH-RATES SODIUM-CHLORIDE TOXICITY CATTLE
JOUR ANIMAL SCIENCE 32 2 , P 277-281, 1971

100 71 0261 GRAMMS L C POLKOWSKI L B WITZEL S A
ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUDGE VOLATILE SOLIDS REDUCTION ANAEROBIC DIGESTION
TRANS OF THE ASAE VOL 14 NO 1 JAN-FEB 1971 PP 7-11,13

100 71 0266 WALKER J P ORR H L POS J
CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS KEYWORDS POULTRY OXIDATION-LAGOONS CONFINEMENT-PENS PERFORMANCE WASTE-DISPOSAL FARM-WASTES WASTE-TREATMENT STORAGE-TANKS SLURRIES AERATION EQUIPMENT NITROGEN ODOR DESIGN-CRITERIA LIQUID-MANURE EGG-PRODUCTION EGG-QUALITY ANTI-FOAMING-AGENT
POULTRY SCIENCE VOL 50 NO 2 MARCH 1971 P 501-505 1 TAB 4 REF

100 71 0273 ELMUND G K MORRISON S M GRANT D W NEVINS M P
ROLE OF EXCRETED CHLORTETRACYCLINE IN MODIFYING THE DECOMPOSITION PROCESS IN FEEDLOT WASTE KEYWORDS BIOD EGRADATION BOD RUMEN-MICROFLORA DIETARY-ANTIBIOTIC
BUL ENVIRONMENTAL CONTAM AND TOXICOLOGY 6 2 P 129-131 1971

100 71 0291 DUNN C MARTIN W J
COMPARISON OF MEDIA FOR ISOLATION OF SALMONELLAE AND SHIGELLAE FROM FECAL SPECIMENS KEYWORDS BACTERIA COMPARISON ISOLATION
APPLIED MICROBIOLOGY V22 N1 PP17-22 JULY 71

100 71 0303 FUJITA T TANAYAMA S SUZUCKI Z
METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL ANALYSIS URINARY M ETABOLITES FATE
JOUR OF BIOCHEMISTRY VOL 69 NO 1 1971 PP63-71

100 71 0304 SHINDALA A SCARBROUGH J H
STATE OF THE ART REVIEW TREATMENT AND DISPOSAL OF SWINE WASTES KEYWORDS CHEMICAL OXYGEN DEMAND ANAEROBI C DIGESTION
WATER AND SEWAGE WORKS VOL 118 NO 2 FEB 1971 PP50-57

100 71 0307 GITAY H POLSON A
ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS-ARMIGERA AND ITS PERISTENCE IN AVIAN FECES KEYWORDS VIRUS CA TTLE-EGRET ISOLATION AVIAN
J OF INVERTEBRATE PATHOLOGY, 17 2 , P 288-290 1971

100 71 0312 ROSENFELD R S HELLMAN L
REDUCTION AND ESTERIFICATION OF CHOLESTEROL AND SITOSTEROL BY HOMOGENATES OF FECES KEYWORDS FEDES
JOUR OF LIPID RESEARCH V12 N2 PP192-97 1971

100 71 0314 BURNETT W E
GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDENTIFICATION CONTROL GASES ODORS POULTRY
POULTRY SCIENCE 50 1 P 61-63 JANUARY 1971

100 71 0318 GILBERTSON C B MCCALLA T M ELLIS J R CROSS O E WOODS W R
RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-CORES NITROGEN RAINF ALL VALUE RUNOFF MOVEMENT FEEDLOTS
JOUR WATER POLL FED 43 3 , P 483-493 MARCH 1971

100 71 0348 ANON
BIOLOGICAL FLY CONTROL IN DEEP PITS KEYWORDS POULTRY BIOLOGICAL FLY PITS
POULTRY DIGEST, P 25, JANUARY 1971

100 71 0441 UTLEY P R BRADLEY N W BOLING J A
METHODS OF SAMPLE PREPARATION FOR CHEMICAL DETERMINATION OF CHROMIC OXIDE IN BOVINE FECES KEYWORDS METH OD SAMPLE-PREPARATION CHROMIC-OXIDE BOVINE
JOUR DAIRY SCIENCE V54 N7 PP1091-1093 JULY 1971

100 71 0443 SLETTEN O SINGER R H
SULFUR BACTERIA IN RED LAGOONS KEYWORDS ODOR SULFUR-BACTERIA LAGOONS
JOUR OF THE WATER POLLUTION CONTROL FED V43 N10 PP2118-2122 OCT 1971

100 71 0444 CLAUDON D G THOMPSON D I CHRISTENSON E H LAWTON G W DICK E C
PROLONGED SALMONELLA CONTAMINATION OF A RECREATIONAL LAKE BY RUNOFF WATERS KEYWORDS SALMONELLA-CONTAMINA TION RUNOFF
APPLIED MICROBIOLOGY V21 N5 PP875-877 MAY 1971

100 71 0447 MINER J R
LIVESTOCK WASTES - ANNUAL LITERATURE REVIEW KEYWORDS LITERATURE LIVESTOCK FARM-WASTES
JOUR OF WATER POLLUTION CONTROL FEDERATION V43 N6 PP991-998 JUNE 1971

100 71 0450 ADRIANO D C PRATT P F BISHOP S E
NITRATE AND SALT IN SOILS AND GROUND-WATERS FROM LAND DISPOSAL OF DAIRY MANURE KEYWORDS NITRATE GROUND-WATERS LAND-DISPOSAL DAIRY
SOIL SCIENCE SOCIETY AMERICA PROCEEDINGS V35 PP759-62 1971

100 71 0451 KAMPELMACHER E H JANSEN L M
REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AEROBIC BACTERIA CHLO RINATION NETHERLANDS SALMONELLA COMPOST HOG OXIDATION
JOUR WATER POLLUTION CONTROL FED V43 N7 PP1541-45 JULY 1971

100 71 0453 FRINK C R
PLANT NUTRIENTS AND WATER QUALITY KEYWORDS NUTRIENTS WATER-QUALITY
AGRICULTURAL SCIENCE REVIEW V9 N2 PP11-25 1971

100 71 0454 ALEXANDER R M
SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION ENVIRONMENTAL CONTROL
AGRICULTURAL SCI REVIEW VOL 9 NO 1 1971 PP9-18

100 71 0460 MCCARTNEY M G
EFFECT OF TYPE OF HOUSING AND LITTER ON PRODUCTION OF BROILERS KEYWORDS EFFECT LITTER BROILERS
POULTRY SCIENCE V50 N4 PP1200-1202 JULY 1971

100 71 0462 PHAR P A BRADLEY N W LITTLE C O BOLING J A CUNDIFF L V
NUTRIENT DIGESTIBILITY USING FECAL COLLECTION APPARATUS AND INDICATOR METHOD FOR STEERS FED AD LIBITUM KEYWORDS DIGESTIBILITY COLLECTION METHOD STEERS
JOUR OF ANIMAL SCIENCE V33 N3 PP695-697 SEPT 1971

100 71 0464 MANES J D SCHNEIDER D L
EXTRACTION OF BILE ACIDS FROM RAT FECES CONTAINING CHOLESTYRAMINE KEYWORDS EXTRACTION
JOUR OF LIPID RESEARCH V12 N3 PP376-377 1971

100 71 0468 ROBERTSON A M GALBRAITH H
EFFECT OF VENTILATION ON THE GAS CONCENTRATION IN A PART- SLATTED PIGGERY KEYWORDS EFFECT GAS CONCENTRATION PIGGERY
FARM BUILDING RESEARCH AND DEVELOPMENT STUDIES MAY 1971 P17

100 71 0472 KINDELL J M
A YEAR IN THE LIFE OF A SLURRY COMPOUND KEYWORDS STORAGE BRITAIN
AGRICULTURE G B V78 N6 P268-69 JUNE 1971

100 71 0476 LOVETT J MESSER J W READ B JR
THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER KEYWORDS FUNGUS PH BACTERIA MOLD POULTRY-LITTER
POULTRY SCIENCE V50 N3 PP746-51 MAY 1971

100 71 0484 VANDONSEL D J GELDREICH E E
RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS SEDIMENT-WATER-INTERFACE SAMPLING MUD-WATER-INTERFACES WATER-QUALITY PATHOGENIC-BACTERIA STREPTOCOCCUS DOMESTIC-WASTES FARM-WASTES E-COLI
WATER RESEARCH VOL 5 NO 11 P1079-87 NOV 1971

100 71 0507 WEBBER L R
ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLLUTANTS
J SOIL AND WATER CONSERVATION 26 2 1971 P 47-50 21 REF

100 71 0509 TAN K H LEONARD R A BERTRAND A R WILKINSON S R
THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT OF POULTRY LITTER
KEYWORDS ORGANIC MATTER INFRARED-ANALYSIS NATURE POULTRY
SOIL SCI SOC AMER PROC, 35 2 P 265-269 MARCH 1971

100 71 0567 CRAGG J CLAYTON Y M
BACTERIAL AND FUNGAL FLORA OF SEAGULL DROPPINGS IN JERSEY KEYWORDS BACTERIAL FLORA SEAGULL
JOUR OF CLINICAL PATHOLOGY V24 N4 P317-19 1971

100 71 0569 GUGGOLZ J SAUNDERS R M KOHLER G O KLOPFENSTEIN T J
ENZYMATIC EVALUATION OF PROCESSES FOR IMPROVING AGRICULTURAL WASTES FOR RUMINANT FEEDS KEYWORDS ENZYMATIC-EVALUATION WASTES FEEDS
JOURNAL OF ANIMAL SCIENCE V33 N1 P167-70 JULY 1971

100 71 0571 HENSLER R F OLSEN R J WITZEL S A ATTOE O J PAULSON W H JOHANNES R F
EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES KEYWORDS EFFECT METHOD MANURE CROP RECOVERY RUNOFF
TRANSACTIONS OF THE ASAE V13 N6 P726-31 NOV-DEC 1970

100 71 0572 MESSER J W LOVETT J MURTHY G K WEHBY A J SCHAEFER M L
AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO ANIMALS MICROBIOLOGICAL AND CHEMICAL PARAMETERS KEYWORDS SALMONELLA ARSENIC ASSESSMENT PROBLEMS FEED POULTRY-LITTER ANIMALS
POULTRY SCIENCE V50 N3 P874-81 MAY 1971

100 71 0573 GILBERTSON C B MCCALLA T M ELLIS J R WOODS W R
METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS RUNOFF CATTLE SETTLING-BASIN LIQUID-STORAGE FEEDLOT METHOD
TRANSACTIONS OF THE ASAE VOL 14 NO 5 SEPT-OCT 71 P899-905

100 71 0574 JONES D D DAY D L GARRIGUS U S
OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS CATTLE OXIDATION-LAGOONS
TRANSACTIONS OF THE ASAE VOL 14 NO 5 SEPT-OCT 71 P825-827

100 71 0576 FRUS J D HAZEN T E MINER J R
CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS HOGS AMMONIA ORGANIC-GASES
TRANSACTIONS OF THE ASAE VOL 14 NO 5 1971 P837-840

100 71 0582 HAZEN T E
CRITERIA NEEDED TO DESIGN ANIMAL QUARTERS FOR COMFORT AND PRODUCTIVITY KEYWORDS AIR-QUALITY CRITERIA DESIGN
JOUR OF ANIMAL SCIENCE V32 N3 P584-89 MAR 1971

100 71 0588 NYE J C DALE A C BLOODGOOD D E
EFFECT OF TEMPERATURE ON AEROBIC DECOMPOSITION OF DAIRY CATTLE MANURE
TRANSACTIONS OF THE ASAE V14 N3 P545-48 MAY-JUNE 1971

100 71 0589 ELLIOTT L F SCHUMAN G E VIETS F G JR
SOIL MICROBIOLOGY AND BIOCHEMISTRY KEYWORDS NITROGEN AMMONIA-VOLATILIZATION FEEDLOTS
SOIL SCIENCE SOCIETY OF AMERICA PROCEEDINGS V35 P752-5 1971

100 71 0674 LUDINGTON D C SOBEL A T GORMEL B
CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS ODORS POULTRY WATER-CONTENT CONTROL
TRANS ASAE VOL 14 NO 4 P771-774,780 1971

100 71 0680 CLAWSON W J
ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE KEYWORDS TRANSPORTATION PROCESSING UTILIZATION DI
SPOSAL COSTS
JOUR OF ANIMAL SCIENCE 32 4 P 816-820 APRIL 1971

100 71 0681 TRAVIS D O POWERS W L MURPHY L S LIPPER R I
EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWORDS POLLUTION SALI
NE-SOILS ALKALI-SOILS WATER-QUALITY IRRIGATION EFFECT PHYSICAL CHEMICAL PORPERTIES
SOIL SCI SOC AMER PROC 35 1 P 122-126 JANUARY 1971

100 71 0682 BELL R G
AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KEYWORDS ODOR FATTY-
ACID BOD AERATION POULTRY PROCESS
POULTRY SCIENCE 50 1 P 155-158 JANUARY 1971

100 71 0683 CONRAD J H MAYROSE V B
ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEMS STORAGE ODOR VENT
ILATION HOUSING DISPOSAL SWINE
JOUR OF ANIMAL SCIENCE 32 4 P 811-815, APRIL 1971

100 71 0695 REECE F N DEATON J W
CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS KEYWORD CONFINEMENT-PENS VENTILA
TION TEMPERATURE COOLING POULTRY
TRANS ASAE VOL 14 NO 6 PP1073-1075 NOV-DEC 1971

100 71 0721 ALVERSON R M
HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOFF NUTRIENTS SPREADE
RS DESIGN
AGRICULTURAL ENGINEERING P20-22 JAN 1971

100 71 0722 ABSHIRE R GUTHRIE R K
THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS AN INDICATOR OF FECA
L POLLUTION OF WATER KEYWORD TEST-PROCEDURES SAMPLING WATER-QUALITY SEWAGE-EFFLUENTS RUNOFF WATER-POLLUT
ION BACTERIA
WATER RESEARCH VOL 5 NO 11 P1089-97 NOV 1971

100 71 0729 BELL R G POS J
DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WASTE-TREATMENT RUNOFF
AIR-POLLUTION DESIGN OPERATION COMPOSTING POULTRY
TRANS ASAE VOL 14 NO 6 P1020-23 NOV-DEC 1971

100 71 0742 FRANTSI C SAVAN M
INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES AND ORGANS OF BROOK
TROUT SALVELINUS FONTINALIS KEYWORD FISH-DISEASES VIRUSES FISH BACTERIA FISH-HATCHERIES FISH-MANAGEMENT
JOUR FISHERIES RESEARCH BOARD OF CANADA VOL 28 NO 7 P1064-65 1971

100 71 0748 HODGSON A S
THE ELIMINATION OF ODOR FROM THE EFFLUENT GASES OF CHICKEN MANURE DRYING PLANT KEYWORD POULTRY-ODOR DEHY
DRATION FEED
JOUR AGR ENG RESEARCH VOL 16 NO 4 PP387-393 DEC 1971

100 71 0751 ANTHONY W B
ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PACKING-HOUSE LITERAT
URE NUTRIENT FEEDS PROTEIN FEEDING WASTELAGE
JOUR OF ANIMAL SCIENCE 32 4 P 799-802 APRIL 1971

100 71 0758 ALBIN R C
HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC SYSTEMS AEROBIC LA
GOONS POLLUTION-ASPECTS LITERATURE FEEDLOT
JOUR OF ANIMAL SCIENCE 32 4 P 803-810 APRIL 1971

100 71 0688 O CALLAGHAN J R DODD V A O DONOGHUE P A J POLLOCK K A
CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL-OXYGEN-DEMAND CHEM
ICAL-OXYGEN-DEMAND HYDROGEN-ION-CONCENTRATION NUTRIENTS PHOSPHORUS POTASSIUM CONFINEMENT-PENS SOLID-WASTES
JOUR AGR ENGR RESEARCH VOL 16 NO 4 P399-419 DEC 1971

100 71 1038 WELLS D M HUDDLESTON E W REKERS R G
CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS FARM-WASTES WATER
-POLLUTION-SOURCES RUNOFF NUTIRENTS SOLUTES NITRATES PHOSPHATES HERBICIDES PESTICIDES PLAYAS OVERLAND-FLO
W
WATER RESOURCES BULLETIN VOL 7 NO 1 FEB 1971 P 124-132 3 TAB

100 71 1039 TAYLOR A W EDWARDS W M SIMPSON E C
NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS NUTRIENTS RUNOFF FORES
TS FARMS OHIO NITROGEN NITRATES PHOSPHATES POTASSIUM DATA-COLLECTIONS WATER-QUALITY PATH-OF-POLLUTANTS E
UTROPHICATION APPALACHIAN-MOUNTAIN-REGION FARM-WASTES STATISTICAL-METHODS FERTILIZERS LEACHING WATER-POL
LUTION-SOURCES
WATER RESOURCES RESEARCH VOL 7 NO 1 FEB 1971 P 81-89 6 TAB 3 FIG

100 71 1047 JONES D D DAY D L GARRIGUS U S
OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OXIDATION-LAGOONS A
EROBIC-BACTERIA COSTS CATTLE WASTE-WATER-TREATMENT BIOCHEMICAL-OXYGEN-DEMAND CHEMICAL-OXYGEN-DEMAND BEEF-C
ATTLE-WASTES
TRANSACTION OF THE ASAE VOL 14 NO 5 SEPT-OCT 1971 P 825-827 2 TAB 6 FIG 1 REF

100 71 1092 MILLER R W PICKENS L G GORDON C H
EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS CATTLE FARM-WASTES LARVA
E MORTALITY ADDITIVES FEEDS POULTRY FLY-CONTROL BACILLUS-THURINGIENSIS-BERLINER MUSCA-DOMESTICA-L BIOTROL-
BT8-183
JOURNAL OF ECONOMIC ENTOMOLOGY VOL 24 NO 4 AUG 1971 P 902-903 2 TAB 11 REF

100 71 1197 TOMLINSON T E
NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERTILIZERS NITRATES PERCOLATION FARM-WASTES DRAINAGE-WATER FEED-LOTS NITROGEN PHOSPHORUS POTASSIUM RIVERS LEACHING SOIL-EROS ION BRITAIN
OUTLOOK ON AGRICULTURE VOL 6 NO 6 1971 P 272-278 8 TAB 2 FIG 19 REF

100 71 1212 STUART D G BISSONNETTE G K GOODRICH T D WALTER W G
EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL INVESTIGATIONS OF MO UNTAIN STREAMS KEYWORDS WATER-QUALITY WATERSHEDS MOUNTAINS BACTERIA WATER-POLLUTION-SOURCES WATERSHED-M ANAGEMENT COLIFORMS ENTERIC-BACTERIA CULTURES SAMPLING NUTRIENTS MONTANA RECREATION ANIMAL-WASTES STREAMS E-COLI LUMBERING CAMPING WATER-SUPPLY WILDLIFE CHEMICAL-ANALYSIS SALMONELLA PATHOGENIC-BACTERIA SHIGELLA F ILTRATION ENTEROBACTER AEROGENES HYALITE-WATERSHED MYSTIC-WATERSHED
APPLIED MICROBIOLOGY VOL 22 NO 6 DEC 1971 P 1048-1054 2 TAB 6 FIG 15 REF

100 71 1213 GASSER W GEHRT K M
A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-BACTERIA COMPUTER -PROGRAMS PROGRAMMING-LANGUAGES POLLUTANT-IDENTIFICATION MICROORGANISMS COMPUTER-MODELS AUTOMATION E-COLI DATA DATA-PROCEDDING PSEUDOMONAS SALMONELLA STREPTOCOCCUS PROTEUS-VULGARIS PSEUDOMONAS-AERUGINOSA AUCALIGE NES-FAECALIS SERRATIA SERRATIA-MARCESENS SALMONELLA-TYPHOSA KLEBSIELLA KLEBSIELLA-PHEUMONIAE STAPHYLOCOCCU S STAPHYLOCOCCUS-AUREUS SARCINA-LUTEA DIPLOCOCCUS-PHEUMON
BIOSCIENCE VOL 21 NO 20 OCTOBER 15 1971 P 1044-1045 3 TAB 7 REF

100 71 1214 GOWAN D
THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION FERTILIZERS FARM-MANAGEMENT LIVESTOCK ECONOMICS COPPER ARSENIC-COMPOUNDS ODOR SEWERS BIOCHEMICAL-OXYGEN-DEMAND SLURRIES CHL ORIDES AMMONIA NITROGEN DAIRY-INDUSTRY UNITED-KINGDOM FARM-INCOME
EFFLUENT AND WATER TREATMENT JOURNAL JUNE 1971 P 303-308 2 TAB 10 REF

100 71 1216 YIH R Y SWITHENBANK C
IDENTIFICATION OF METABOLITES OF N- 1,1-DIMETHYIPROPYNL -3,5-DICHIOROBENZAMINE IN RAT AND COW URINE AND RA T FECES KEYWORDS LABORATORY-TESTS CHEMICAL-ANALYSIS METABOLIC-PATHWAYS
J AGR FOOD CHEM , VOL 19, NO 2 1971, P 320-324 P 320-324 3 TAB 3 FIG 7 REF

100 71 1221 THORPE V A DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL
FLUIDS KEYWORDS FLUIDS BY AERATION & FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY KEYWORDS MERCURY PO LLUTANT-IDENTIFICATION FEEDS FISH CHEMICAL-ANALYSIS ACIDS CHEMICAL-REACTIONS OXIDATION FEEDS MILK-POULTRY REDUCTION-CHEMICAL CALIBRATIONS AERATION BIOLOGICAL-SAMPLES POTASSIUM-PERMANGANATE STANNOUS-CHLORIDE SULFU RIC-ACID REAGENTS BLOOD URINE MEAT EGGS ATOMIC-ABSORPTION-SPECTROPHOTOMETRY PRECISION SAMPLE-PREPARATION C HEMICAL-RECOVERY

100 71 1223 BRUST R A MIYAZAKI S HODGSON G C
EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS KEYWORDS POULTRY BLOOD DURSBAN CHOLIN-ESTERASE WATER-POLLUTION-EFFECTS
JOURNAL OF ECONOMIC ENTOMOLOGY VOL 64 NO 5 1971 P 1179-1183

100 71 1228 LOEHR R C
ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISPOSAL TREATMENT SY STEMS-ANALYSIS RUNOFF POLLUTANT NUTRIENTS AEROBIC-TREATMENT ANAEROBIC-DIGESTION DENTRIFICATION NITRIFICA TION EFFLUENTS LEGAL-ASPECTS WASTE-WATER-TREATMENT WASTE-DISPOSAL OPTIONS LAND-DISPOSAL OXIDATION-DITCH POLLUTIONAL-CHARACTERISTICS-ALTERNATIVES ALTERNATIVES DISPOSAL
JOURNAL WATER POLLUTION CONTROL FEDERATION VOL 43 NO 4 P 668-678 2 TAB 2 FIG 10 REF

100 71 1232 FRITSCHI E W MACDONALD F W
WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREATMENT DESIGN-CRIT ERIA SAMPLING ANALYTICAL-TECHNIQUES EVAPORATION DISINFECTION BIOLOGICAL-OXYGEN-DEMAND URINE COLIFORMS PA THOGENIC-BACTERIA ANIMAL-PARASITES CHLORINATION LOUISIANA TREATMENT-FACILITIES PRIMATES BACTERIOLOGICAL-AN ALYSES FECES
JOURNAL WATER POLLUTION CONTROL FEDERATION VOL 43 NO 5 MAY 1971 P 883-889

100 71 1236 CROSBY III J W JOHNSTONE D L FENTON R L
MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GLACIAL-DRIFT FARM-WASTES CONFINEMENT-PENS COLIFORMS NITRATES NUTRIENTS SOLUTES SOIL-WATER-MOVEMENT GROUNDWATER WASHINGTON W ATER-POLLUTION-SOURCES CHLORIDES SOIL-MOISTURE FEEDLOT-CATTLE OUTWASH-GLACIAL
WATER RESOURCES RESEARCH VOL 7 NO 1 FEB 1971 P 204-208 5 FIG 11 REF

100 72 0746 DUGAN G L GOLUEKE C G OSWALD W J
RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMICAL-OXYGEN-DEMAND CH EMICAL-OXYGEN-DEMAND NUTRIENT RECYCLING POULTRY
JOUR WAT POL CONTROL FED VOL 44 NO 3 P432-440 MARCH 1972

100 72 1097 LORIMOR J C MIELKE L M ELLIOTT L F ELLIS J R
NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS NITRATES CATTLE FEED-LOTS W ATER-POLLUTION IRRIGATION FARM GROUNDWATER WATER-QUALITY AQUIFER SAMPLES NEBRASKA WELLS 3-DAY-PUMPING-ST UDY TRANSMISSIVITY
WATER RESOURCES BULLETIN VOL 8 NO 5 OCT 1972 P 999-1005 3 TAB 4 FIG 6 REF

100 72 1129 GILBERTSON C B NIENABER J A MCCALLA T M ELLIS J R WOODS W R
BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS FEED-LOTS RUNOFF CON TINUOUS-FLOW FARM-WASTES CATTLE WASTE-WATER-TREATMENT SOLIDS-REMOVAL-SYSTEMS BATCH-SYSTEM
TRANSACTIONS OF THE AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS V 15 NO 6 1972 P 1132-1134 6 FIG 8 R EF

100 72 1188 BETHEA R M NARAYAN R S
IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOTS FARM WASTES-GAS ES GAS-CHROMATOGRAPHY SOLUBILITY ALCOHOLS AMINES ALDEHYDES ESTERS CARBONYLS
TRANSACTIONS OF THE ASAE 1972 P 1135-1137 2 TAB 2 FIG 10 REF

100 72 1193 ZALL R R
CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWORDS SEWAGE-EFFLUE NTS WASTE-IDENTIFICATION DAIRY-INDUSTRY CATTLE EFFLUENTS FARM-WASTES BIOCHEMICAL-OXYGEN-DEMAND WATER-POLL UTION-SOURCES NUTRIENTS NITRATES NITRITES
JOURNAL OF MILK FOOD TECHNOLOGY V 35 NO 1 1972 P 53-55 6 TAB 1 FIG 3 REF

100 72 1149 KATZ S E FASSBENDER C A
IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHICKEN MUSCLE LIVER AN D EGGS KEYWORDS ANITBIOTICS-PESTICIDES ANALYTICAL-TECHNIQUES EVALUATION POLLUTANT-IDENTIFICATION MILK P OULTRY ORGANIC-PESTICIDES METHOLOLOGY CENTYRIFUGATION BIOASSAY PESTICIDE-RESIDUES METHODOLOGY FEEDS BIOLOG ICAL-SAMPLES OXYTETRACYCLINE MILK-PRODUCTS TISSUES MUSCLE LIVER EGGS DETECTION-LIMITS BIOACCUMULATION REC OVERY CHLORTETRACYLINE
BULLETIN OF ENVIROMENTAL CONTAMINATION AND TOXICOLOGY VOL 7 NO 4 APRIL 1972 P 229-236 8 TAB 6 REF

100 72 1215 HUNT L M GILBERT B N
AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KEYWORDS DIGESTION T RITIUM AUTOMATION CHEMICAL-ANALYSIS BIOASSAY POLLUTANT-IDENTIFICATION SUSPENSION QUENCHING AQUEOUS-SOLUTI ONS ANIMAL-WASTES SOLVENT-EXTRACTIONS WATER-POLLUTION-SOURCES THIOCARBAMATE-PESTICIDES SHEEP BIOLOGICAL-SA MPLES COMBUSTION FERBAM TISSUE RECOVERY LIQUID-SCINTILLATION SAMPLE-PREPARATION LUNGS PANCREAS BONE HEART BRAIN SPLEEN MUSCLE LIVER KIDNEYS FECES BLOOD
INTERNATIONAL JOURNAL OF APPLIED RADIATION AND ISOTOPES VOL 23 NO 5 MAY 1972 P 246-249 2 TAB 1 FIG 8 R EF

100 72 1222 GEHRT A J
PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICAL-TECHNIQUES PROT EIN CENTRIFUGATION POULTRY NITROGEN-COMPOUNDS ORGANIC-COMPOUNDS CHEMICAL-ANALYSIS METHODOLOGY QUALITY-CON TROL PEPSIN INTERLABORATORY-TESTS COLLABORATIVE-STUDIES BIOLOGICAL-SAMPLES METHOL-VALIDATION DATA-INTERP RETATION
JOURNAL OF THE ASSOCIATION OF OFFICIAL ANALYTICAL CHEMISTS VOL 55 NO 4 1972 P 702-706 1 TAB 4 REF

100 72 1224 EVANS M R OWENS J D
FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER KEYWORDS DRAINAG E-WATER FARM-WASTES ENVIRONMENTAL-EFFECTS SUB-SURFACE-DRAINAGE ENTERIC-BACTERIA SUBSURFACE-WATERS HOGS FLO W-RATES EQUATIONS WATER-POLLUTION-SOURCES PERCOLATION SOIL-WATER-MOVEMENT SEEPAGE POLLUTANT-IDENTIFICATION CIOCHEMICAL-OXYGEN-DEMAND E-COLI FILTRATION MEMBRANES DISCHARGE-WATER WEIR-GAUGES CLAY-LOAM SANDS SURFACE -RUNOFF ENTEROCOCCI BIOCHEMICAL-TESTS FECAL-COLIFORMS
JOURNAL OF GENERAL MICROBIOLOGY VOL 71 NO 3 AUG 1972 P 477-485 4 FIG 8 REF

100 72 1235 MCGHEE T J TORRENS R L SMAUS R J
BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-DEMAND POLLUTANT-IDENTIFICATION CATTLE ORGANIC-METTER CHEMICAL-OXYGEN-DEMAND OXYGEN-DEMAND FEED-LOTS FARM-WASTES CATTLE-FE EDLOT-RUNOFF ULTIMATE-BOD
WATER AND SEWAGE WORKS VOL 119 NO 6 JUNE 1972 P 58-61 1 TAB 7 FIG 20 REF

100 73 1034 HAMILTON H E ROSS I J JACKSON S W
TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTEMS KEYWORDS AUTOC LAVES FARM-WASTES POULTRY LIVESTOCK ANAEROBIC-CONDITIONS FERMENTATION ANALYTICAL-TECHNIQUES DILUTION RUM EN-SAMPLING FERMENTOR-SAMPLING TEST-TUBES PIPETTING-DEVICE INOCULATION MICROBIAL-GROWTH COLONY-COUNTING CHEMICAL-CHANGES
TRANSACTIONS OF ASAE VOL 16 NO 1 1973 P 172-175 9 FIG 4 REF

100 73 1069 BERRYMAN C BATEY T CALDWELL T H BODY D A
MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS SILTS FERTILIZERS POTATOES NITRO GEN PHOSPHORUS POTASSIUM ENGLAND NUTRIENTS DRAINAGE FARM-WASTES WASTE-DISPOSAL SOIL-PROFILES TUBER-BLACKE NING
JOURNAL OF AGRICULTURAL SCIENCE VOL 80 APRIL 1973 P 269-281 12 TAB 1 FIG 17 REF

100 73 1086 LITTLEFIELD L H BLETNER J K GOFF O E
THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF EGG YOLKS KEYWORDS RECYCLING CATTLE FARM-WASTES POULTRY DIETS BLOOD-XANTHOPHYLL-LEVELS YOLK-PIGMENTATIONS BLOOD
POULTRY SCIENCE VOL 52 NO 1 JAN 1973 P 179-181 3 TAB 10 REF

100 73 1087 LUEBS R E DAVIS K R LAAG A E
ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY AREA KEYWORDS DAIRY -INDUSTRY CATTLE NITROGEN AMMONIA AIR-POLLUTION FEED-LOTS WATER-POLLUTION TOXICITY FARM-WASTES SAMPLING T EMPERATURE HUMIDITY WINDS RAINFALL DISTILLABLE-NITROGEN NONDISTILLABLE-NITROGEN ATMOSPHERIC-NH3
JOURNAL OF ENVIRONMENTAL QUALITY VOL 2 NO 1 JAN-MARCH 1973 P 137-141 3 TAB 3 FIG 18 REF

100 73 1088 ROBINSON J J SCOTT D FRASER C
OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION OF URINARY NITROGEN EXCRETED AS UREA IN SHEEP KEYWORDS SHEEP DIETS ENERGY PROTEIN-INTAKE GESTATION URINARY-NITROGEN NITROGE N-RETENTION
THE JOURNAL OF AGRICULTURAL SCIENCE VOL 80 NO 3 JUNE 1973 P 363-368 3 TAB 4 FIG 14 REF

100 73 1128 CULLEY D D JR EPPS E A
USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TREATMENT FARM-LAGO ONS NUTRIENT-REMOVAL FEEDS LIVESTOCK DUCKWEED LEMNACEAE
JOURNAL WATER POLLUTION CONTROL FEDERATION V 45 NO 2 FEB 1973 P 337-347 5 TAB 1 FIG 28 REF

100 73 1155 HECKER J F
THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS NITROGEN SHEEP ENZYMES HYDROL YSIS SOLUBLE-MUCINS TCA-SOLUBLE-MUCIN RUMEN-LIQUOR FAECEL-LIQUOR GASTRO-INTESTINAL-TRACTS FUCOSE RHAMNOSE HEXOSE METHYL-PENTOSE HISTOLOGY
JOURNAL OF AGRICULTURAL SCIENCE V 80 1973 P 63-69 4 TAB 40 REF

100 73 1162 ABBOTT J L TUCKER T C
PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS FERTILITY WASTE-DISPOSAL PHOSP HORUS NITROGEN CALCAREOUS-SOILS COTTON BARLEY ALFALFA ARIZONA CYCLING-NUTRIENTS PLANT-NUTRITION POLLUTIO N-CONTROL
SOIL SCIENCE SOCIETY OF AMERICA PROCEEDINGS V 37 NO 1 JAN FEB 1973 P 60-63 5 TAB 1 FIG 11 REF

100 73 1164 COX N A DAVIS B H WATTS A B COLMER A R
SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWING ORAL INOCULATION KEYWORDS SALMONELLA FARM-WASTES POULTRY BACTERIA DISEASES ANALYSIS TISSUES CONTAMINATION EGGS INOCULAT ION SEFTENBERG THOMPSON TYPHIMURIUM
POULTRY SCIENCE V 52 NO 2 MAR 1973 P 661-666 3 TAB 21 REF

100 73 1165 SHERMAN M HERRICK R B
FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-PYRICYL PHOSPHOROTH IOATE TO LAYING HENS KEYWORDS PESTICIDE-TOXICITY FARM-WASTES POULTRY LARVAE FEEDS ADDITIVES DURSBAN FLY -CONTROL
POULTRY SCIENCE V 52 NO 2 MAR 1973 P 741-747 3 TAB 3 FIG 12 REF

100 73 1184 DUGAN G L YOUNG R H F TAKAMIYA G
ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-TREATMENT AIR-POL
LUTION WATER-POLLUTION GROUNDWATER-POLLUTION WASTE-WATER-TREATMENT BIOCHEMICAL-OXYGEN-DEMAND NITROGEN PO
NDS DRYING INCINERATION RECYCLING HAWAII SUBTROPICAL-ENVIRONMENT LAND-SPREADING COMPOSTING
JOURNAL WATER POLLUTION CONTROL FEDERATION V 45 NO 4 APR 1973 P 742-750 4 TAB 1 FIG 22 REF

100 73 1190 CHICCO C F AMMERMAN C B FEASTER J P DUNAVANT B G
NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEYWORDS CALCUIM PH
OSPHORUS MAGNESUIM SHEEP METABOLISM NUTRITIONAL-INTERRELATIONSHIPS PLASMA FECAL-EXCRETION BASAL-DIET FEM
UR-DEPOSITION
JOURNAL OF ANIMAL SCIENCE V 36 NO 5 MAY 1973 P 986-993 6 TAB 1 FIG 28 REF

100 73 1263 CROSS D L BOLING J A BRADLEY N W
CHROMIC OXIDE AND CRUDE PRUTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRICTION KEYWORDS FAR
M-WASTES PROTEINS CATTLE METABOLISM CHROMIC-OXIDE WATER-RESTRICTION DRY-MATTER-DISPESTIBILITY FECAL-DRY-MA
TTER
JOURNAL OF ANIMAL SCIENCE VOL 36 NO 5 MAY 1973 P 982-985 4 TAB 2 FIG 12 REF

100 70 1237 LIAO P B

POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES

KEYWORDS WATER-POLLUTION-SOURCES FISH-HATCHERIES SALMONIDS
WATER-REQUIREMENTS TEMPERATURE NUTRIENTS ALGAE WEEDS TASTE ODOR PATHOGENIC-BACTERIA ORGANIC-WASTES SOLID-
WASTES CHEMICALS MICHIGAN CALIFORNIA TUBIFICIDS COLORADO WATER-POLLUTION-CONTROL WASHINGTON CHEMICAL-OXYGE
N-DEMAND DISSOLVED-OXYGEN HYDROGEN-ION-CONCENTRATION AMMONIA NITRATES PHOSPHATES SUSPENDED-LOAD DISSOLVED-
SOLIDS EFFLUENTS SETTLEABLE-SOLIDS HATCHERY-EFFLUENTS PARASITES JORDAN-RIVER-MICH SAN-JOAQUIN-RIVER-CA
WATER AND SEWAGE WORKS VOL 117 NO 8 1970 P 291-297 3 TAB 6 FIG 15 REF

200 64 0750 DORNBUSH J N ANDERSEN J R
LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFINEMENT BIOCHEMICAL-
OXYGEN-DEMAND CHEMICAL-OXYGEN-DEMAND AMMONIA NITROGEN SOUTH-DAKOTA LAGOON
PROC 19TH IND WASTE CONF PART 1 PP317-325 1964

200 64 0759 MAYES J L SMITH S M MINER J R
STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICAL-OXYGEN-DEMAND AMM
ONIA NITROGEN FISH CATTLE FEEDLOT RUNOFF
PROC 14TH ANNUAL CONF SANITARY ENGR U KANSAS LAWRENCE 24PP JAN 1964

200 64 1240 CLARK H F KABLER P W
THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-ENGINEERING WATER F
OODS SOILS GASES HYDROGEN CARBON-DIOXIDE FERMENTATION PLANTS CATTLE GRAINS-CROPS BIOCHEMISTRY MICRO-ORGAN
ISMS MILK ACID-BACTERIA CARBOHYDRATES PHYSIOCHEMICAL-PROPERTIES ANIMALS STATISTICAL-METHODS BIRDS HUMAN-
DISEASES SHEEP GEOGRAPHICAL-REGIONS UNITED-STATES INSPECTION SPORES HYDROGEN-SULFIDE E-COLI PHYSIOLOGY BAC
ILLUS-COLI TAXONOMY HEALTH AEROBACTER-AEROGENES FECES GLUCOSE MORPHOLOGY BACTERIUM-COLI BACTER
PROCEEDINGS OF AUDOLFS RESEARCH CONFERENCE PRINCIPLES & APPLICATIONS IN AQUATIC MICROBIOLOGY
JOHN WILEY AND SONS INC RUTGERS UNIV NEW BRUNSWICK N J 1964 P 202-229 2 TAB 1 FIG 52 REF

200 64 1241 GUTIERREZ J DAVIS R E
PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTION METABOLISM AM
INO-ACIDS TRACERS PROTEINS CHROMATOGRAPHY FERMENTATION DIGESTION LIPIDS MANOMETERS STREPTOCOCCUS ALFALFA
RUMEN PHYSIOLOGY CASEIN ISOTRICHS HOLOTRICHS PARAMECIUM ISOTRICHA-PROSTOMA ISOTRICHA-INTESTINALIS DASYTR
ICHA DIPLODINIUM-ECAUDATUM ENTODINIUM-SIMPLEX OPHRYOSCOLEX-CAUDATUS STARCH EPIDINIUM-ECAUDATUM DIPLOCOCCU
S PEPTOSTREPTOCOCCUS
PROCEEDINGS OF RUDOLFS RESEARCH CONFERENCE PRINCIPLES AND APPLICATIONS IN AQUATIC MICROBI
OLOGY JOHN WILEY AND SONS INC RUTGERS UNIV NEW BRUNSWICK N J 1964 P 394-404 1 TAB 2 FIG 17 REF.

200 66 0115 ASAE SPONSOR
MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR STORAGE CATTLE SWINE
POULTRY FEED IRRIGATION FEEDLOT PRODUCTION PROPERTIES STORAGE HEALTH POLLUTION LABOR ENVIRONMENT RUNOFF
EQUIPMENT OXIDATION-DITCH COMPOSTING COPROPHAGY NITROGEN TREATMENT SYSTEMS CONFINMENT MANAGEMENT
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 1-160,1966

200 66 0116 WITZEL S A MCCOY E POLKOWSKI L B ATTOE O J NICHOLS M S
PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWORDS LAGOON-FLORA
AEROBIC AEROBIC PLANT-RESPONSE BOD COD PROPERTIES
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 10-14,1966

200 66 0117 MORRIS G L
DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLANTS WASTE-LOADS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 15-18,1966

200 66 0118 DECKER W M STEELE J H
HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALTH DISEASES PATHOGE
NIC-ORGANISM WATER-POLLUTION SALMONELLOSIS HEALTH VECTOR
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 18-20,1966

200 66 0119 ANDERSON J R
BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES KEYWORDS FILTH-FLIES CONFINEMENT PRODUCTION MODELS
FLIES
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 20-23,1966

200 66 0120 MINER J R FINA L R FUNK J W LIPPER R I LARSON G H
STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFALL COLIFORMS KJELD
AHL-NITROGEN BACTERIA SLUGGING WATER-POLLUTION RUNOFF CATTLE FEEDLOTS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 23-27,1966

200 66 0121 SOBEL A T
PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROPERTIES LIQUID-WAST
E POULTRY CATTLE FREEZING-POINT VS FLOWABILITY PRODUCTION PROPERTIES
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 27-32,1966

200 66 0122 OSTRANDER C E
METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPOSAL CONFINEMENT HAN
DLING PUMPS METHOD
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 32-33,1966

200 66 0123 HART S A MOORE J A HALE W F
PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELECTION-CRITERIA
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 34-38,1966

200 66 0124 MYERS E A
ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DISTRIBUTION FREEZIN
G DISPOSAL PENN-STATE IRRIGATION-HEADS PROBLEM
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 38-41,1966

200 66 0125 MORRISON S R MENDEL V E BOND T E
SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS BEHAVIOR FEED-EFFIC
IENCY GAINS FEEDLOT
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 41-43,1966

200 66 0126 SCHMISSEUR W E BROWN C M JR ALBRIGHT J L DILLON W M DALE A C
MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING KEYWORDS CATTLE CONFINEMENT DISPOSAL BEDDING
LABOR
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 43-45,1966

200 66 0127 DAVIS E H
CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING SHEDS MANAGEMENT
SANITATION HEALTH-AUTHORITIES CLIMATIC-CONDITIONS ALLEYWAYS DISPOSAL
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 45-47,1966

200 66 0128 MOORE J A FAIRBANK W C
MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPMENT SLURRIES COMPOS
TING
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 47-49,1966

200 66 0129 QUISENBERRY J H MALIK D D IBARBIA R
WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CONFINEMENT DIETS LA
YING-BIRDS GENETICS EXCRETION EGGS DISPOSAL
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 49-51,1966

200 66 0130 REED C H
DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES LIQUID-MANURE MANAG
EMENT PLOW DISPOSAL POULTRY
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 52-53,1966

200 66 0131 JONES J H TAYLOR G S
DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOIL-CLOGGING RURAL-AR
EAS CONSTRUCT DISPOSAL
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 53-55,1966

200 66 0132 BERRY E C
REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIODEGRADATION BACTERIA
PHAGE FUNGI CHEMICAL-ENVIRONMENT PHYSICAL-ENVIRONMENT INOCULATION REQUIREMENTS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 56-58,1966

200 66 0133 IRGENS R L DAY D L
AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION PITS OXIDATION OXID
ATION-DITCH TREATMENT SWINE
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 58-60, 1966

200 66 0134 WEBSTER N W CLAYTON J T
OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYWORDS AERATION SED
IMENTATION VOLATILE SOLIDS DISSOLVED OXYGEN BOD CHARACTERISTICS DAIRY
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 61-65, 1966

200 66 0135 BRIDGHAM D O CLAYTON J T
TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TEST RECIRCULATED-WAT
ER EFFLUENTS SEDIMENTATION SLUDGE VOLATILE-SOLIDS LOADING-RATE BACTERIA TRICKLING-FILTERS DAIRY-MANURE
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 66-68,1966

200 66 0136 HOWES J R
ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMPOSTING MICROORGANIS
MS AEROBIC CELLULOSE POULTRY
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 68-69,1966

200 66 0137 WILLRICH T L
PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOON-FEEDING PERFORMA
NCE TREATMENT SWINE
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 70-74,1966

200 66 0138 CURTIS D R
DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMPERATURE KJELDAHL-N
ITROGEN VOLATILE ACIDS OXIDATION-REDUCTION-POTENTIAL DESIGN ANAERCEIC LAGOONS SWINE DISPOSAL
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 75-80,1966

200 66 0139 AGNEW R W LOEHR R C
CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF AEROBIC ANAEROBIC C
HARACTERISTIC DISPOSAL KJELDAHL-NITROGEN LABORATORY-TESTS ALKALINITY CATTLE TREATMENT
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 81-84,1966

200 66 0140 CASSELL E A WARNER A F JACOBS G B
DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUDGE POULTRY CONDIT
IONERS MUNICIPAL WASTES
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 85-91,1966

200 66 0141 CROSS D E
REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING EXPELLED-WATER CAT
HODES MOISTURE-DISTRIBUTION LABORATORY-TESTS REMOVAL POULTRY ELECTRO-OSMOSIS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 91-93,1966

200 66 0142 NURNBERGER F Y MACKSON C J DAVIDSON J A
REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING EXPELLED-WATER JOU
LE-HEATING REMOVAL POULTRY ELECTRO-OSMOSIS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 93-95,1966

200 66 0143 SUBEL A T LUDINGTON D C
DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUELS LABORATORY-TEST
COMBUSTION INCINERATION
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 95-98,1966

200 66 0144 DAVIS R V COOLEY C E HADDER A V
TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POULTRY WATER-QUALITY
RAPPAHANNOCK-RIVER MPN SALMONELLA DETENTION-PONDS TREATMENT DUCK
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 98-105,1966

200 66 0145 FONTENOT J P BHATTACHARYA A N DRAKE C L MCCLURE W H
VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VALUE TDN POULTRY PR
OTEINS LITTER
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 105-108,1966

200 66 0146 ANTHONY W B
UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MANURE STEERS ADG CARC
AS-DATA DIGESTION-COEFFICIENTS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 109-112,1966

200 66 0147 DURHAM R M
COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISHES FEEDS SHEEP SWIN
E LIVESTOCK DIGESTION-COEFFICIENTS COPROPHAGY
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 112-114,1966

200 66 0148 FOERSTER E L SR
ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE ECONOMICS FALLEN-STOC
K COPROPHAGY DISPOSAL NUTRIENTS EQUIPMENT DIGESTION-TANKS PROTEIN
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 114-117,1966

200 66 0149 EBY H J
EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO ACT AS CHEMICAL FILT
ERS KEYWORDS NUTRIENTS LAGOON NUTRIENTS GRASSES FERTILIZER EFFLUENTS EVALUATING FILTERS
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 117-120,1966

200 66 0150 STUBBLEFIELD T M
PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS CATTLE FEEDLOTS REL
OCATION MANURE LEGAL ASPECTS ODOR METROPOLITAN-AREAS PROBLEM ARIZONA
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 120-122,1966

200 66 0151 KESLER R P
ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWORDS SWINE LAGOONS D
ISPOSAL NUTRIENTS COST LIQUID-WASTE FERTILIZER STORAGE-CAPACITY
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 122-125,1966

200 66 0152 MORRIS W H M
ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTRIENTS IRRIGATION OX
IDATION-PITCH ANAEROBIC AEROBIC TREATMENT LOSSES STORAGE MODEL DISPOSAL
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 126-131,1966

200 66 0153 JORDAN H C
POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANALYSIS ECONOMICS PO
ULTRY-MANURE
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 132-133,1966

200 66 0154 ALLRED E R
FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMILY-FARM EQUIPMENT
TRENDS EUROPE
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 133-136,1966

200 66 0155 TIETJEN C
PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-WASTES FECES SWINE N
ITROGEN FERTILIZER CATTLE URINE DISPOSAL GERMANY PLANT
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 136-140,1966

200 66 0156 SCHELTINGA H M J
BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALANCE OXIDATION-DITCH
HOLLAND TREATMENT
PROC NAT SYMP ANIMAL WASTE MGMT, ASAE SP-0366, 140-143,1966

200 66 0438 THOMAS R E SCHWARTZ W A BENDIXEN T W
SOIL CHEMICAL CHANGES AND INFILTRATION RATE REDUCTION UNDER SEWAGE SPREADING KEYWORDS LYSIMETERS WASTE W
ATER TREATMENT
SOIL SCI SOC OF AM PROC VOL 30 PP641-646 1966

200 66 0587 CARLSON D A GUMERMAN R C
HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATION SOIL-BACTERIA ODO
R SOIL-TYPES SULFER-BACTERIA PSEUDOMONAS ELUTION-WATER
PROC 21ST PURDUE INDUSTRIAL WASTE CONF EXT SERIES 121 1966 P172-191

200 66 1112 MINER J R BERNARD L R FINA L R LARSON G H LIPPER R I
CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNOFF CATTLE FARM-WA
STES RAINFALL-INTENSITY CHEMICAL-PROPERTIES BACTERIA NITROGEN COLIFORM STREPTOCOCCUS LABORATORY-TESTS DA
TA-COLLECTION ANALYSIS
PROCEEDINGS INDUSTRIAL WASTE CONFERENCE 21ST MAY 3-5 1966 P 834-347 9 TAB 9 FIG 10 REF

200 67 0734 LIPPER R I MINER J R LARSON G H
CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION WATER-POLLUTION CATTLE KANSAS COLIFORMS IMPOUNDING
OKLAHOMA CATTLE FEEDERS SEMINAR STILLWATER FEB 2-3 1967 P 1-9

200 67 1243 LOEHR R C
THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES WATER-POLLUTION-SOURCES CATTLE FISHKILL WASTE-DISPOSAL KANSAS RUNOFF NITROGEN-DRAINAGE DISEASES WATER-POLLUTION-EFFECTS ANIMAL-PRODUCTION-TRENDS ANIMAL-CONFINEMENT-TRENDS ORGANIC-POLLUTION INORGANIC-POLLUTION
PROCEEDINGS OF THE THIRD ANNUAL AMERICAN WATER RESOURCES CONFERENCE 1967 P 314-324 2 TAB 2 FIG 28 REF

200 68 0434 OWENS T R GRIFFIN W L
ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS CONFINEMENT-PENS RUNOFF ECONOMICS RAINFALLCONTROL

200 68 0694 PROCTOR D E
2ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT LUBBOCK TEX 1968 PAPER NO 12 62 P THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLUTION KEYWORDS FARM-WASTES RUNOFF CONFINEMENT-PENS AEROBIC LAGOON DAIRY MANAGEMENT
EIGHTH TEX IND WATER AND WASTEWATER CONF LUBBOCK TEX JUNE 6-7 1968

200 68 0724 WEBBER L R LANE T H NODWELL J H
GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFINEMENT-PENS PHOSPHORUS POTASSIUM NITROGEN CROPS APPLICATION-RATES LANDFILLS ANAEROBIC-DIGESTION DRYING WASTE-STORAGE REQUIREMENTS DISPOSAL
PROC 8TH IND WATER WASTEWATER CONF LUBBOCK TEX P20-34 JUN 6-7 1968

200 68 0725 ANTHONY W B
POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAGE GAINS CONFINEMENT-PENS RECYCLE CONTROL MANURE
PROC 8TH IND WATER WASTEWATER CONF LUBBOCK TEX P59 JUNE 1968

200 68 0726 OWENS T R GRIFFIN W L
ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES CATTLE FEED-LOTS ECONOMICS RUNOFF RAINFALL
PROCEEDINGS EIGHTH INDUSTRIAL WATER AND WASTEWATER CONFERENCE LUBBOCK TEXAS JUNE 6-7 1968 P 82-106 10 TAB

200 68 0760 MAHONEY G W A OMTVEDT I T STEPHENS D F TURMAN E J EDWARDS R
HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENTILATION COOLING TEMPERATURE ENVIRONMENTAL-CONTROL SLOTTED-FLOOR EFFECTS
ASAE SOUTHWEST REGION MEETING BATON ROUGE LA LSU P1-14 APRIL 1968

200 68 1186 LOEHR R C
TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS RUNOFF MANAGEMENT FARM-MANAGEMENT AEROBIC-TREATMENT WATER-POLLUTION WATER-POLLUTION-CONTROL WATER-POLLUTION-TREATMENT SOLID-WASTES LEGAL-ASPECTS RUNOFF-FORECASTING CATTLE HOGS POULTRY FARM-WASTES MANURE AGRICULTURAL-RUNOFF ANAEROBIC-LAGOONS
PROCEEDINGS OF THE 23RD INDUSTRIAL WASTE CONFERENCE MAY 7 8 AND 9 1968 PART ONE PURDUE UNIVERSITY LAFAYETTE INDIANA P 507-519 5 TAB 2 FIG 21 REF

200 68 1187 PROCTOR D E
THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGEMENT DAIRY-INDUSTRY ALGAE CATTLE SLURRIES SPRAYING ACTIVATED-SLUDGE MANURE ANAEROBIC-LAGOON AERATED-LAGOON
PROCEEDINGS OF THE 23RD INDUSTRIAL WASTE CONFERENCE MAY 7 8 AND 9 1968 PART ONE PURDUE UNIVERSITY LAFAYETTE INDIANA P 554-566 8 FIG

200 68 1242 KRONE R B
THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGENIC-BACTERIA VIRUSES GROUNDWATER-MOVEMENT MUNICIPAL-WASTES IRRIGATION-WATER ARTIFICIAL-RECHARGE FILTRATION SORPTION INFILTRATION PERCOLATION SOIL-DISPOSAL-FIELDS SOIL-CONTAMINATION SOIL-PHYSICAL-PROPERTIES MUNICIPAL-WASTE-RECHARGE
SYMPOSIUM ON MUNCIPAL SEWAGE EFFLUENT FOR IRRIGATION LOUISIANA POLYTECHNICAL INSTITUTE RUSTON LA JULY 30 1968 P 75-104 2 FIG 55 REF

200 68 1244 DUNLOP S G
SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER RECLAIMED-WATER MUNICIPAL-WASTES PATHOGENIC-BACTERIA VIRUSES PARASITISM WASTE-TREATMENT ENVIROMENTAL-SANITATION WASTE-WATER-IRRIGATION
SYMPOSIUM MUNCIPAL SEWAGE EFFLUENT FOR IRRIGATION LOUISIANA POLYTECHNICAL INSTITUTE RUSTON LA JULY 30 1968 P 107-121 1 TAB 62 REF

200 69 0055 TAIGANIDES E P
MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEMENT GENERATION PROCESSING UTILIZATION COMPOSTING GAS BOD ANAEROBIC AEROBIC DEHYDRATION DISPOSAL
PROC 24TH INDUSTRIAL WASTE CONF, PURDUE UNIV P 542-549 1969

200 69 0056 ANTONIE R L WELCH F M
PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS EQUIPMENT AEROBIC-CONDITIONS AERATION BIODEGRADATION COD BIOMASS LOADING RATE TREATMENT DAIRY
PROC 24TH INDUSTRIAL WASTE CONF, PURDUE UNIV, P 115-126,1969

200 69 0074 JONES D D CONVERSE J C DAY D L
AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH TOTAL-SOLIDS BOD DO ODOR GASES DIGESTION SWINE
PROC CIGR, P 204-211, 1969

200 69 0078 JONES D D DAY D L CONVERSE J C
OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS KEYWORDS DO EQUIPMENT OXIDATION-DITCH ALPHA-FACTOR ODOR MASS-TRANSFER THEORETICAL-ANALYSIS CONFINEMENT
PROC 24TH INDUSTRIAL WASTE CONF, PURDUE UNIV, P 542-549,1969

.60 69 0157 LOEHR R C EDITOR
ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION HOGS CAT
TLE FERTILIZER ODORS ECONOMICS LEGAL-ASPECTS LEGISLATION COSTS FEEDLOTS AERATION SOILS AEROBIC-CONDITIONS
ANAEROBIC-CONDITIONS
ANIMAL WASTE MANAGEMENT, PROCEEDINGS CORNELL UNIVERSITY CONFERENCE ON AGRICULTURAL WASTE MANAGEMENT JAN 13
-15 1969 414 P

200 69 0158 WEINBERGER L W
REFLECTIONS ON POLLUTION CONTROL KEYWORDS WATER-QUALITY COST-BENEFIT-RATIO ENVIRONMENT NATIONAL-POLICY M
ISCONCEPTION
ANIMAL WASTE MANAGEMENT 1969 1-3 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0159 KING D R
ENVIRONMENTAL POLLUTION--NOW AND IN THE YEARS AHEAD KEYWORDS LEGAL-ASPECTS DESIGN-STANDARDS WASTE-DISPOS
AL
ANIMAL WASTE MANAGEMENT 1969 4-8 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0160 BERNARD H
EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES KEYWORDS LEGAL-AS
PECTS BOD COD STANDARDS MUNINCIPAL-WASTES FWPCA DISPOSAL-REQUIREMENTS
ANIMAL WASTE MANAGEMENT 1969 9-16 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0161 LOEHR R C
THE CHALLENGE OF ANIMAL WASTE MANAGEMENT KEYWORDS ODORS WASTE-TREATMENT WASTE-MANAGEMENT ENVIRONMENTAL-
QUALITY
ANIMAL WASTE MANAGEMENT 1969 17-22 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0162 JONES P H
THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KEYWORDS BOD BIOLOGI
CAL-TREATMENT OXYGEN WATER-POLLUTION NITROGEN ODORS CARBON AERATION CUTLOCK TREATMENT
ANIMAL WASTE MANAGEMENT 1969 23-36 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0163 VICKERS A F GENETELLI E J
DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION KEYWORDS POULTRY A
EROBIC-TREATMENT BOD DO ODOR LOADING-PARAMETER DESIGN SLURRIES
ANIMAL WASTE MANAGEMENT 1969 37-49 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0164 SCHMID L A LIPPER R I
SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION BOD COD METHANE ODOR
FEED-RATION SWINE CHARACTERIZATION
ANIMAL WASTE MANAGEMENT 1969 50-57 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0165 WELLS D M ALBIN R C GRUB W WHEATON R Z
AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT TEMPERATURE NITROGE
N PHOSPHORUS COMPOSTING-PROCESS AEROBIC-STABILIZATION CATTLE
ANIMAL WASTE MANAGEMENT 1969 58-62 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0166 KOLEGA J J NELSON G L GRAVES Q B
ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATIONS OXYGEN DO MODEL S
TUDIES ROTOR-AERATION OXYGENATION OXIDATION-DITCH
ANIMAL WASTE MANAGEMENT 1969 63-75 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0167 BLOODGOOD D E ROBSON C M
AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADING-RATES KJELDAHL-NI
TROGEN STORAGE DAIRY
ANIMAL WASTE MANAGEMENT 1969 76-80 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0168 CLAYTON J T FENG T H
AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LONG RANGE SOLUTION K
EYWORDS BOD EFFLUENTS AEROBIC-TREATMENT ANAEROBIC-DIGESTION NITRATES PH SEDIMENTATION-TANKS VOLATILE-SOL
IDS
ANIMAL WASTE MANAGEMENT 1969 81-87 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0169 SMITH L W GOERING H K GORDON C H
INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE ORCHARD GRASS ALFA
LFA NAOH SODIUM-PEROXIDE FERMENTATION TREATMENTS
ANIMAL WASTE MANAGEMENT 1969 88-97 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0170 LONG T A BRATZLER J W FREAR D E.H
THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORDS FEEDS NITROGEN R
ATIONS FEEDLOT-PERFORMANCE DIGESTION-COEFFICIENT CARCASS-CHARACTERISTICS POULTRY-WASTE
ANIMAL WASTE MANAGEMENT 1969 98-104 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0171 ANTHONY W B
CATTLE MANURE- REUSE THROUGH WASTELAGE FEEDING KEYWORDS FEEDS PERFORMANCES WASTELAGE YEAST-FERMENTATION
CATTLE
ANIMAL WASTE MANAGEMENT 1969 105-113 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0172 REED C H
SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD KEYWORDS SLURRIE
S DISPOSAL UTILIZATION POULTRY EQUIPMENT METHOD
ANIMAL WASTE MANAGEMENT 1969 114-119 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0173 MILLER B F LINDSAY W L PARSO A A
USE OF POULTRY MANURE FOR CORRECTION OF ZN AND FE DEFICIENCIES IN PLANTS KEYWORDS FERTILIZERS CORN MICRO
NUTRIENT-DEFICIENCY POULTRY
ANIMAL WASTE MANAGEMENT 1969 120-123 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0174 WEBBER L R LANE T H
THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRATES NITROGEN-POLLUT
ION CROP-UTILIZATION POLLUTION-CONTROL PROBLEM DISPOSAL
ANIMAL WASTE MANAGEMENT 1969 124-130 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0175 TOWNSHEND A K REICHERT K A NODWELL J H
STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVINCE OF ONTARIO KEY WORDS LAGOONS POPULATION-EQUIVALENT CONFINEMENT-HOUSING CONCENTRATIONS LAND-DISPOSAL OXIDATION-DITCH POL LUTION-POTENTIAL CONTROL
ANIMAL WASTE MANAGEMENT 1969 131-149 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0176 DALE A C OGILVIE J R CHANG A C DOUGLAS M P
DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OXIDATION-REDUCTION-P OTENTIAL ODOR DISPOSAL LAGOONS IRRIGATION SPRINKLER-IRRIGATION
CORNELL UNIV CONF ON AGR WASTE MGMT ANIMAL WASTE MANAGEMENT 1969 150-159

200 69 0177 JONES D D DAY D L CONVERSE J C
FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGEN-DEMAND BOD COD TO TAL-SOLIDS OXIDATION-DITCHES CONFINEMENT SWINE
ANIMAL WASTE MANAGEMENT 1969 160-171 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0178 MOORE J A LARSON R E ALLRED E R
STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMATE KEYWORDS BOD CO D AIR-TEMPERATURE ROTORS SLATTED-FLOOR OXIDATION-DITCH BEEF COLD-CLIMATE
ANIMAL WASTE MANAGEMENT 1969 172-177 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0179 EDWARDS J B ROBINSON J B
CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO NITROGEN KEYWORDS NITRIFICATION DENITRIFICATION REDOX-POTENTIAL ROTORS OXIDATION-DITCH POULTRY
ANIMAL WASTE MANAGEMENT 1969 178-184 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0180 FOREE G R O DELL R A
FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLING TANK, LAGOON SYST EM KEYWORDS HOGS DO BOD COD PH EFFICIENCIES TOTAL,VOLATILE &FIXED SOLIDSDISPOSAL OXIDATION-DITCH
ANIMAL WASTE MANAGEMENT 1969 185-192 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0181 RADEMACHER J M RESNIK A V
FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION GROUNDWATER WATER-QU ALITY-ACT RESEARCH REGULATION FEEDLOT
ANIMAL WASTE MANAGEMENT 1969 193-202 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0182 NORTON T E HANSEN R W
CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTENSITY BOD RUNOFF SUR FACE-STORAGE FEEDLOT
ANIMAL WASTE MANAGEMENT 1969 203-216 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0183 GRUB W ALBIN R C WELLS O M WHEATON R Z
THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE FEEDLOTS KEYWORD S BOD NITROGEN PHOSPHORUS RUNOFF RATION FEEDLOT-LAYOUT EFFECT DESIGN MANAGEMENT CONTROL
ANIMAL WASTE MANAGEMENT 1969 217-224 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0184 LOEHR R C
TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDITIONS BOD COD AMMONI A NITRATES NITRITES RAINFALL DIGESTION AEROBIC-STABILIZATION INTERMITTENT-LOADING POLISHING-UNIT TREATMEN T BEEF
ANIMAL WASTE MANAGEMENT 1969 225-241 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0185 OSTRANDER C E
WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORTALITY DISPOSAL MAN AGEMENT
ANIMAL WASTE MANAGEMENT 1969 242-244 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0186 LASALLE R M JR LAUNDER M
MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT COSTS DEHYDRATION A NHYDROUS-AMMONIA
ANIMAL WASTE MANAGEMENT 1969 245-248 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0187 WALKER J P POS J
CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS KEYWORDS ANAEROBI C AEROBIC BOD MORTALITY FEED-CONVERSION AERATOR POPULATION-EQUIVALENT LAYER OXIDATION-DITCHES STORAGE
ANIMAL WASTE MANAGEMENT 1969 249 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0188 MEEK A M MERRILL W G PIERCE R A
PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS DAIRY-CATTLE STORA GE ODOR SLATTED-FLOORS POISONOUS-GASES AGITATION FREE-STALL-HOUSING PROBLEMS PRACTICES
ANIMAL WASTE MANAGEMENT 1969 254-259 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0189 SOBEL A T
MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPOR-DILUTION RANKING THRESHOLD-ODOR-NUMBER ODOR-INTENSITY-INDEX PANEL MEASUREMENT
ANIMAL WASTE MANAGEMENT 1969 260-270 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0190 BURNETT W E DONDERO N C
MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AND ODOR GENERATION KEYWORDS ODOR-PANEL AEROBIC-BACTERIA ANAEROBIC-BACTERIA AMMONIA HYDROGEN-SULFIDE SULFUR-BACTERIA URIC-ACI D OLFACTORY-THRESHOLD-TEST ODOR-INTENSITY-INDEX THRESHOLD-ODOR-NUMBERS
ANIMAL WASTE MANAGEMENT 1969 271-291 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0191 GUMERMAN R C CARLSON P A
CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-MOISTURE SOIL-FILTE R DETENTION-TIME REMOVAL-MECHANISM REACTION-TEMPERATURE REMOVAL
ANIMAL WASTE MANAGEMENT 1969 292-302 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0192 EBY H J WILLSON G B
POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTERS CLOGGING POULTR Y DUST ODOR REMOVAL
ANIMAL WASTE MANAGEMENT 1969 303-309 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0193 WARD J C JEX E M
CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL DISSOLVED-SOLIDS FO
AMING COLLOIDAL-PROPERTIES COAGULATION ACTIVATION-ENERGY VOLATILE-SOLIDS CHARACTERISTICS CATTLE
ANIMAL WASTE MANAGEMENT 1969 310-326 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0194 TAIGANIDES E P WHITE R K
TYPICAL VARIATIONS ENCOUNTERED IN THE MEASUREMENT OF OXYGEN DEMAND OF ANIMAL WASTES KEYWORDS BOD OXYGEN-
DEMAND WARBURG MEASUREMENT
ANIMAL WASTE MANAGEMENT 1969 327-335 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0195 MORRISON S M GRANT D W NEVINS M P ELMUND G K
ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE KEYWORDS CATTLE BIODEG
RADATION ASSAY RESIDUES CHLORDETRACYCLINE
ANIMAL WASTE MANAGEMENT 1969 336-339 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0196 EL-SABBAN F F LONG T A GENTRY R F FREAR D E H
THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARBOHYDRATES INSULATIO
N VENTILATION MINERALOGY MOISTURE NUTRITIVE-VALUE CORRELATION-ANALYSIS LITTER
ANIMAL WASTE MANAGEMENT 1969 340-346 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0197 SOBEL A T
REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VOLUME HUMIDITY REMO
VAL
ANIMAL WASTE MANAGEMENT 1969 347-362 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0198 BINIEK J P
LIVESTOCK PRODUCTION VS ENVIRONMENTAL QUALITY - AN IMPASSE KEYWORDS ECONOMIC-EFFICIENCY ODORS QUALITY-S
TANDARDS
ANIMAL WASTE MANAGEMENT 1969 363-368 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0199 OKEY R W RICKLES R N TAYLOR R B
RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORDS CATTLE EFFLUENT
BOD COD ODOR AERATION NITROGEN COST-ANALYSIS ULTIMATE-DISPOSAL CLARIFIER TECHNIQUES
ANIMAL WASTE MANAGEMENT 1969 369-387 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0200 LINTON R E
THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POTASH LAND-USE LAND-D
ISPOSAL COSTS POULTRY
ANIMAL WASTE MANAGEMENT 1969 388-392 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0201 MCEACHRON L W ZWERMAN P J KEARL C D MUSGRAVE R B
ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS FERTILIZERS ROTATION
S SOIL-TYPES LAND-DISPOSAL CONTINUOUS-CORN ECONOMIC DAIRY
ANIMAL WASTE MANAGEMENT 1969 393-400 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0202 CASLER G L
ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COSTS ODOR VALUE FERTIL
IZER LABOR LIQUID-MANURE DAIRY
ANIMAL WASTE MANAGEMENT 1969 401-406 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0203 ALLEE D J CLAVEL P
WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICATION REGULATORY-MEC
HANISMS POULTRY PROBLEM
ANIMAL WASTE MANAGEMENT 1969 407-414 CORNELL UNIV CONF ON AGR WASTE MGMT

200 69 0423 FWPCA
2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-DATA NITRATE BOD RU
NOFF LEGISLATION WATER-QUALITY DISPOSAL STORAGE POLLUTANT-IDENTIFICATION FERTILIZERS NUTRIENTS SEDIMENT GR
ANTS PLANNING MANAGEMENT
USDI FWPCA, MISSOURI BASIN REGION , KANSAS CITY MISSOURI 256 P

200 69 0424 RESNIK A V RADEMACHER J M
ANIMAL WASTE RUNOFF-A MAJOR WATER QUALITY CHALLENGE KEYWORDS RUNOFF BOD POLLUTANT-IDENTIFICATION EUTROPH
ICATION
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI FWPCA , PAPER 1

200 69 0425 DAGUE R R
ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF MANAGEMENT IOWA RE
TENTION PROBLEM
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 2 14 P

200 69 0426 GRAY M W
REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUALITY RECREATION LEGA
L-ASPECTS FEEDLOT MANAGEMENT
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 3 38 P

200 69 0427 SMITH G E
MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NUTRIENT CATTLE FERTI
LIZER COSTS MANAGEMENT DISPOSAL
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 4 8 P

200 69 0428 LIPPER R I
DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-RUNOFF BOD NUTRIENTS
POLLUTANTS DESIGN MANAGEMENT
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA PAPER 6 9 P

200 69 0429 SMITH G E
CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROGEN METHEMOGLOBIN LE
ACHING FERTILIZERS
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA,PAPER 7 16 P

200 69 0430 NORTON T E HANSEN R W
CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQUID-WASTE PROCEDURE
EQUIPMENT FEEDLOT HYDROLOGY
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 8 26 P

200 69 0431 ROBOHN W F
MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION POLLUTION-ABATEMENT LAGOONS LEGAL-ASPECTS SUGAR-BEETS IRRIGATION SALTS FERTILIZERS PROCESSINGPROBLEMS
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 9 16 P

200 69 0432 JENSEN E T
AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LIVESTOCK GRANTS FWPCA RESEARCH SOURCE
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 10 11 P

200 69 0433 SMITH T R
EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOFF PESTICIDES ALGAE NITROGEN EFFECT
2 ND COMPENDIUM OF ANIMAL WASTE MGMT, USDI-FWPCA, PAPER 11 11 P

200 69 0482 WITZEL S A MINSHALL N E MCCOY E OLSEN R J CRABTREE K T
THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUTRIENTS NITRATES NITRITES POTASSIUM PHOSPHORUS WELLS SUPPLEMENTAL-IRRIGATION FERTILIZERS FISHKILL EUTROPHICATION ALGAL-GROWTH DEOXYGENATION EFFECTS POLLUTION
ASAE ANNUAL MEETING PAPER NO 69-428 PURDUE U 24P 1969

200 69 0516 UNIV OF WISC EXT SER
PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-WASTES CATTLE HOGS POULTRY ENVIRONMENT SOCIAL-ASPECTS AIR-POLLUTION WATER-POLLUTION SOIL-CONTAMINATION
UNIV EXTENSION THE UNIVERSITY OF WISCONSIN NOV 6-7 1969 129 P

200 69 0517 BLACK R J KEHR W O
QUANTITIES AND CHARACTERISTICS OF FARM ANIMAL-WASTES KEYWORDS WATER-POLLUTION POPULATION QUANTITES CHARACTERISTICS
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF NOV 6-7 1969 17-21 UNIV OF WISCONSIN EXTENSION

200 69 0518 MCCOY E
HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEALTH-PROBLEMS
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISCONSIN EXTENSION P 22-24 NOV 6-7 1969

200 69 0519 EVANS O
AESTHETICS AND ODORS KEYWORDS HYDROGEN-SULFIDE ANAEBOBIC-CONDITIONS ODOR-THRESHOLD AESTHETICS
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISCONSIN EXTENSION P 25-26 NOV 6-7 1969

200 69 0520 ERDMANN A A
DEAD-ANIMALS AND HOW THEY CONTRIBUTE TO POLLUTION OF THE ENVIRONMENT KEYWORDS DEAD-ANIMAL-DISPOSAL RENDERING-PLANTS POLLUTION
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISCONSIN EXTENSION P 27-29 NOV 6-7 1969

200 69 0521 SCHRAUFNAGEL F H
WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FLOW LAND-DISPOSAL ROBLEMS
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISCONSIN EXTENSION P 30-32 NOV 6-7 1969

200 69 0522 BRAY R W
FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE HOGS ODOR
PROC FARM ANIMAL WASTE AND BY PROD MGMT CONF, UNIV OF WISC EXTENSION P 33-35 NOV 6-7 1969

200 69 0523 BEATTY M T KERRIGAN J E PORTER W K
WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN WISCONSIN KEYWORDS SPATIAL-DISTRIBUTION GEOLOGY SOILS POPULATION WATER-QUALITY WISCONSIN
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 26-57 NOV 6-7 1969

200 69 0524 BERGE O I BRUNS E G BREVIK T J BROOKS L A
CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST INVESTMENT STORAGE-TANKS DAIRY MANURE-DISPOSAL
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 58-69-NOV 6-7 1969

200 69 0525 BARTH C
ENGINEERING-RESEARCH ON FARM-ANIMAL-MANURE KEYWORDS ODORS BIOLOGICAL-TREATMENT WASTE-MANAGEMENT RESEARCH
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 70-79 NOV 6-7 1969

200 69 0526 DUMELLE J D
NATION-WIDE RESEARCH ON ANIMAL-WASTE-DISPOSAL KEYWORDS GRANTS ALGAE FWPCA NUTRIENTS RESEARCH
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 80-81 NOV 6-7 1969

200 69 0527 KERRIGAN J E
WATER-RESOURCES-CENTER RESEARCH ON ANIMAL-WASTES AND WATER-QUALITY KEYWORDS EUTROPHICATION WISCONSIN RESEARCH
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 82-85 NOV 6-7 1969

200 69 0528 SKINNER J
THERES HOPE AHEAD KEYWORDS ODOR LAND-USE GOALS POPULATION
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 86-90 NOV 6-7 1969

200 69 0529 YANGGEN D A
INTRODUCTION TO FEDERAL STATE AND LOCAL ACTION-PROGRAMS TO SOLVE ANIMAL-WASTE-DISPOSAL PROBLEMS KEYWORDS GOVT-PROGRAMPROGRAMS PROBLEMS
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 91 NOV 6-7 1969

200 69 0530 HALL F E
THE ROLE OF THE FEDERAL WATER-POLLUTION CONTROL ADMINISTRATION IN FARM-ANIMAL-WASTE AND THE BY-PRODUCT MANAGEMENT KEYWORDS FWPCA WATER-QUALITY-STANDARDS MANAGEMENT
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 92-95 NOV 6-7 1969

200 69 0531 DENSMORE J
TECHNICAL-ASSISTANCE AVAILABLE FROM THE SOIL-CONSERVATION SERVICE KEYWORDS SCS SURFACE-RUNOFF
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 96-97 NOV 6-7 1969

200 69 0532 HUOVER K H
COST-SHARING UNDER THE AGRICULTURAL-CONSERVATION-PROGRAM KEYWORDS POLLUTION-ABATEMENT WISCONSIN
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 98-100 NOV 6-7 1969

200 69 0533 FRANGOS T G
THE REGULATORY ROLE OF THE DEPARTMENT OF NATURAL-RESOURCES KEYWORDS LEGISLATION POLLUTION-ABATEMENT WISC
ONSIN REGULATORY
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 101-104 NOV 6-7 1969

200 69 0534 TUSS J
COLUMBIA-COUNTY PROGRAM KEYWORDS POLLUTION-ABATEMENT ODOR ZONING NITRATES PROGRAM
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 105-107 NOV 6-7 1969

200 69 0535 JOHNSON J
WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POLLUTION EDUCATION
PROBLEMS
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 108-110 NOV 6-7 1969

200 69 0536 VANDEBERG G
ROLE OF UNIVERSITY-EXTENSION KEYWORDS ENVIRONMENT EDUCATION UNIVERSITIES WATER-POLLUTION ROLE
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 111-113 NOV 6-7 1969

200 69 0537 VILSTRUP R H
WHERE DO WE GO FROM HERE KEYWORDS ENVIRONMENT TECHNOLOGY EDUCATION
PROC FARM ANIMAL WASTE AND BY-PROD MGMT CONF, UNIV OF WISC EXTENSION P 114-115 NOV 6-4 1969

200 69 0539 US DEPT INT FWPCA
PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE KEYWORDS CATTLE WATER-POLLUTION FEEDLOT-POLLUTION-CONT
ROL ANIMAL-PRODUCTION FEEDLOT-REGULATION
MISSOURI BASIN REGION FWPCA USDI FEBRUARY 1969 40 P

200 69 0540 CLAYTON W
INDUSTRY AND THE ENVIRONMENT-FEEDLOT WASTE MANAGEMENT KEYWORDS REGULATION CATTLE ECOSYSTEMS POLLUTION-AB
ATEMENT MANAGEMENT
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL,P5-7, FEB 69

200 69 0541 JESSEE R S
FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR CATTLE POLLUTION
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P7-8, FEB69

200 69 0542 RADEMACHER J M
ANIMAL WASTE POLLUTION-OVERVIEW OF THE PROBLEM KEYWORDS RUNOFF GROUNDWATER FISH-KILL WELLS OVERVIEW
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P7-9, FE B 69

200 69 0543 JOSEPH C B
INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMICS GROUNDWATER RUNO
FF CONTROL
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P9-10, FEB 69

200 69 0544 BADALICH J P
HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MINNESOTA PERMITS IN
VENTORY
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P11-12, FEB 69

200 69 0545 ROZICH F J
HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION COLORADO WATER-QUALIT
Y-ACT INVENTORY
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P12-14, FEB 69

200 69 0546 MAYES J L
THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WATER-QUALITY-CONTROL
ODOR PERMITS KANSAS CONTROL PROGRAM
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL , P15-17, FEB 69

200 69 0547 O BRIEN T FILIPI T A
CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WASTE-TREATMENT WASTE-
STORAGE CONTROL FEEDLOT RUNOFF
PROC ANIMAL WASTE MGMT CONF,FED WAT POLL CONTROL,P18-19, FEB 69

200 69 0548 EVANS C E
RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOTS IN NORTHEASTERN C
OLORADO AND EASTERN NEBRASKA KEYWORDS NITRATES BOD ODOR RUNOFF AMMONIA RESEARCH MANAGEMENT FEEDLOTS
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P20-22, FEB 69

200 69 0549 MINER J R
THE UNIVERSITIES ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS RUNOFF CATTLE RESEARCH-AND-DEVELOPMENT CON
TROL
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P23-24, FEB 69

200 69 0550 TURNBULL R
HOW TO GAIN PUBLIC SUPPORT KEYWORDS RUNOFF POLLUTION-ABATEMENT CATTLE
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P24-25, FEB 69

200 69 0551 BADALICH J P
MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULATION ADMINISTRATIVE
-AGENCIES FEEDLOT CONTROL PROGRAM
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P25-26, FEB 69

200 69 0552 BARKER B
STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DAKOTA KEYWORDS REG
ULATION LEGISLATION ADMINISTRATIVE-AGENCIES CATTLE CONTROL PROGRAM SOUTH DAKOTA
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P26, FEB 69

200 69 0553 WILLEMS D
STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS REDULATIONS POLLUT
ION-ABATEMENT MONTANA S PROGRAM CONTROL FEEDLOTS
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P27, FEB 69

200 69 0554 CROCKETT B
MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRATIVE-AGENCIES CATT
LE MISSOURI MANAGEMENT
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P27, FEB 69

200 69 0555 GRAY M W
STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS REGULATION LEGISL
ATION CATTLE KANSAS CONTROL PROGRAM
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P28, FEB 69

200 69 0556 FILIPI T A
STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF ADMINISTRATIVE-AGENC
IES CATTLE CONTROL PROGRAM
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL P29, FEB 69

200 69 0557 PETERSON N L
STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS REGULATIONS ADMINIS
TRATIVE-AGENCIES RUNOFF CATTLE NORTH-DAKOTA S PROGRAM CONTROL
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P30, FEB 69

200 69 0558 ROZICH F J
COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM KEY
WORDS REGULATIONS LEGISLATION CATTLE ADMINISTRATIVE-AGENCIES COLORADO S CONTROL PROGRAM
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P30-31 FEB 69

200 69 0559 SCHLIEKELMAN R J
FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES CATTLE FEEDLOT CO
NTROL IOWA
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P31-32, FEB 69

200 69 0560 RESNIK A V
ANIMAL WASTE MANAGEMENT-QUESTIONS AND ANSWERS KEYWORDS RUNOFF CONFINEMENT-PENS REGULATION MANAGEMENT
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P33-34, FEB 69

200 69 0561 PETERSON N L
INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUNOFF CATTLE CONFINE
MENT-PENS INVENTORY PROBLEM FEEDLOT
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P34-35 FEB 69

200 69 0562 MCNABB C G
ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFINEMENT PENS PROBLEM
POLLUTION
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P35-36 FEB 69

200 69 0563 MATTHEW F L
A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION KEYWORDS CATTLE RUNOFF REGULATION LEGI
SLATION PROCEDURE
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P37-38, FEB 69

200 69 0564 SCHMID L A
RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL KEYWORDS BYPRODUCTS POLLUTION-ABATEMENT RESEARCH CATTLE
CONTROL
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P38-39, FEB 69

200 69 0565 BERNARD H
RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT KEYWORDS WASTE-TREATMENT CATTLE ADMINISTRATIVE
-AGENCIES RESEARCH MANAGEMENT
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P40, FEB 69

200 69 0566 BODENHAMER S H
DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM KEYWORDS REGULATIONS LEGISLATION POLLUTION-ABATEMEN
T MANAGEMENT PROGRAM
PROC ANIMAL WASTE MGMT CONF, FED WAT POLL CONTROL, P40,FEB 69

200 69 0676 MCCALLA T M VIETS F G JR
CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS KEYWORDS RUNOFF GROUNDWATER MICROBI
AL BEEF FEEDLOTS
PROCEEDINGS POLLUTION RESEARCH SYMPOSIUM MAY 23 1971 24PP

200 69 0696 ROBBINS J W D KRIZ G J HOWELLS D H
QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGOONS NITRATES PHOSPH
ORUS COLIFORMS BIOCHEMICAL-OXYGEN-DEMAND CHEMICAL-OXYGEN-DEMAND TOXICITY ANTIBIOTICS SWINE
ASAE WINTER MEETING PAPER NO 63-706 CHICAGO 42P DEC 1969

200 69 0706 MOORE J A BATES D W
HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS KEYWORDS STORAGE-TA
NKS DISPOSAL LABOR TREATMENT-FACILITIES SLURRIES STRUCTURAL-DESIGN HANDLING STORAGE TREATMENT DAIRY BEEF
CONFINED
ASAE WINTER MEETING PAPER NO 69-935 9P CHICAGO DEC 1969

200 69 0708 ROBBINS J W D KRIZ G J HOWELLS D H
TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PROCEDURES RUNOFF WAT
ER-QUALITY RUNOFF TOXICITY STABILIZATION CORRELATION-ANALYSIS SWINE
ASAE WINTER MEETING PAPER NO 69-928 27P CHICAGO DEC 1969

200 69 0756 JEDELE D G DAY D L
SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FACILITIES SPECIFICATI
ONS MANAGEMENT
ASAE WINTER MEETING PAPER NO 69-934 4P CHICAGO DEC 1969

200 69 1102 BOPANDIKAR M V
MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY OXIDATION-LAGOONS BACTERIA EFFICIENCIES LAGOONS MICROORGANISMS ORGANIC-LOADING PATHOGENIC-BACTERIA PONDS VIRUSES BACTERIAL-REMOVAL VIRAL-REMOVAL
ADVANCES IN WATER POLLUTION RESEARCH PROCEEDINGS FOURTH INTERNATIONAL CONFERENCE ON WATER POLLUTION RESEARCH CZECHOSLOVAKIA APRIL 21-25 1969 7 P 32 REF

200 69 1116 MOORE J A
MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADING CATTLE HOGS SHEEP FARM-WASTES WATER-POLLUTION-SOURCES WATER-QUALITY WASTE-DISPOSAL MINNESOTA NITROGEN PHOSPHORUS POTASSIUM AEROBIC-TREATMENT WATER-POLLUTION-CONTROL
WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL WRSC BULLETIN 13 WATER RESOURCES RESEARCH CENTER UNIVERSITY OF MINNESOTA MINNEAPOLIS JUNE 1969 P 29-34 2 TAB

200 69 1117 ANON
WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNUAL MEETING OF MINNESOTA CHAPTER SOIL CONSERVATION SOCIETY OF AMERICA KEYWORDS WATER-POLLUTION-SOURCES WATER-POLLUTION-EFFECTS EUTROPHICATION NUTRIENTS ALGAE FISH-POPULATION WATER-POLLUTION-CONTROL FARM-WASTES MUNICIPAL-WASTES SEPTIC-TANKS RECREATION-WASTES WATER-QUALITY
WRSC BULLETIN 13 MINNESOTA WATER RESOURCES RESEARCH CENTER MINNEAPOLIS JUNE 1969 79 P

200 69 1167 TAIGANIDES E P
AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURAL-WASTES SUBSIDY CHEMICALS CONFINEMENT-PENS MUNICIPAL-WASTES MANAGEMENT URBAN-RURAL-INTERFACE
FRONTIERS IN CONSERVATION PROCEEDINGS 24TH ANNUAL MEETING SOIL CONSERVATION SOCIETY OF AMERICA COLORADO STATE UNIVERSITY FORT COLLINS AUG 10-13 1969 P 90-92 2 FIG

200 69 1185 BINIEK J P
ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBICIDES WATER-POLLUTION-CONTROL FARM-WASTES WASTE-DISPOSAL LIVESTOCK FEED-LOTS RUNOFF WASTE-TREATMENT PERCOLATION MANAGEMENT
FRONTIERS IN CONSERVATION PROCEEDINGS 24TH ANNUAL MEETING SOIL CONSERVATION SOCIETY OF AMERICA COLORADO STATE UNIVERSITY FORT COLLINS AUG 10 13 1969 P 102-106 1 TAB 10 REF

200 70 0054 DORNBUSH J N
POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS RUNOFF POLLUTANTS POPULATION-EQUIVALENTS FEEDLOTS LOCATING CATTLE SOUTH DAKOTA
PROC SOUTH DAKOTA AGR AND WAT QUALITY P 37-46, 1970

200 70 0114 BACHE D H
SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS COSTS STORAGE-CAPACITY ODOR OXIDATION LEGISLATION SLATTED-FLOORS LAND-DISPOSAL
AMERICAN PORK CONFERENCE, PAPER, DES MOINES IA MARCH 3 1970

200 70 0214 SWADER F N
RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS NUTRIENTS N P K RUNOFF EFFLUENT PRECIPITATION FEEDLOTS WATER-POLLUTION
PROCEEDINGS, CORNELL UNIV CONF ON AG WASTE MGMT 1970 27OP

200 70 0215 STECKEL J E
MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-FURROW-COVER APPLICATION-RATES NUTRIENTS POULTRY
REL OF AG TO SOIL & WATER POLLUTION 1970 P30 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0216 MIELKE L N ELLIS J R SWANSON N P LORIMOR J C MCCALLA T M
GROUNDWATER QUALITY AND FLUCTUATIONS IN A SHALLOW UNCONFINED AQUIFER UNDER A LEVEL FEEDLOT KEYWORDS NITRATE DISCHARGE GROUNDWATER FEEDLOT
REL OF AG TO SOIL & WATER POLLUTION 1970 P31-40 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0217 HILEMAN L H
POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKANSAS KEYWORDS WATER-POLLUTION SOIL-TESTS NUTRIENTS SALTS IONS NITRATES POULTRY-LITTER ARKANSAS
REL OF AG TO SOIL & WATER POLLUTION 1970 41-47 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0218 DAY D L
REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DITCHES KEYWORDS LAGOON BOD ROTORS DENITRIFICATION OXIDATION-DITCH COAGULATION
REL OF AG TO SOIL & WATER POLLUTION 1970 77-84 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0219 OKEY R W RICKLES R N
THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORDS CATTLE BIOLOGICAL-TREATMENT BOD PHOSPHORUS CAPITAL-COSTS INSTALLATION-COSTS INCINERATION DESIGN DISPOSAL
REL OF AG TO SOIL & WATER POLLUTION 1970 85-97 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0220 MCKENNA M F CLARK J H
THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEEDER-HOG ENTERPRISES KEYWORDS STORAGE-CAPACITY FERTILIZERS STORAGE-TANKS VALUE ECONOMICS HANDLING SPREADING HOG
REL OF AG TO SOIL & WATER POLLUTION 1970 98-110 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0221 OVERMAN A R HORTENSTINE C C WING J M
LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATER-POLLUTION SPRINKLER-IRRIGATION DISPOSAL DAIRY
REL OF AG TO SOIL & WATER POLLUTION 1970 123-126 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0222 FRINK C R
THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION CORN NITRATE UREA NITROGEN DAIRY
REL OF AG TO SOIL & WATER POLLUTION 1970 127-133 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0223 MATHERS A C STEWART B A
NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATTLE FEEDLOT-WASTES TO SOIL KEYWORDS NITRIFICATION NITRATE AMMONIA CARBON-DIOXIDE INCUBATION FEEDLOT SOIL
REL OF AG TO SOIL & WATER POLLUTION 1970 207-214 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0224 SWANSON N P MIELKE L N LORIMOR J C
HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEBRASKA KEYWORDS RUN OFF EVAPORATION INFILTRATION EROSION MANURE-PACK FEEDLOTS NEBRASKA
REL OF AG TO SOIL & WATER POLLUTION 1970 226-232 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0225 WALKER W R
LEGAL-RESTRAINTS ON AGRICULTURAL-POLLUTION KEYWORDS ODORS WATER-POLLUTION PESTICIDES LEGISLATION COMMON-LAW
REL OF AG TO SOIL & WATER POLLUTION 1970 233-241 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0226 SCHULTZ D A
A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFACE-WATER POLLUTION KEYWORDS N P K WATER-QUALITY NUTRIENTS FERTILIZER NUTRIENT-LOSSES METHOD POLLUTION
REL OF AG TO SOIL & WATER POLLUTION 1970 251-262 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0227 ZWERMAN P J DRIELSMA A B JONES G D KLAUSNER S D ELLIS D
RATES OF WATER-INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY-MANURE KEYWORDS ROTATIONS FERTILIZER INTENSITY INFILTRATION DAIRY
REL OF AG TO SOIL & WATER POLLUTION 1970 263-270 CORNELL UNIV CONF ON AGR WASTE MGMT

200 70 0232 WELLS D M GRUB W ALBIN R C MEENAGHAN G F COLEMAN E A
CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORDS RUNOFF IRRIGATION CONTROL POLLUTION FEEDLOTS
PRESENTED 5TH INTERNATIONAL WATER POLLUTION CONF JULY-AUG 70 PERGAMON PRESS LTD SPR 71

200 70 0234 NEWCASTLE UPON TYNE
FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT TREATMENT DISEASE HEALTH OXIDATION-DITCH FLUSHING-GUTTER NUISANCE BIOLOGICAL-TREATMENT BUILDINGS POPULATION-EQUIVALENTS LAGOONS AERATION TOXICITY
PROC OF SYMP, THE INST OF WAT POLLUT CONTR UNIV NEWCASTLE UPON TYNE 1970, 148 PAGES

200 70 0235 JONES K B C RILEY C T
ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK PLANNING ORIGINS NATURE
PROC OF SYMP FARM WASTES,UNIV NEWCASTLE PAPER 1,P 7-14 1970

200 70 0236 GOWAN D
ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK RIVER-AUTHORITIES INTENSIVE-FARMNATURE
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 2, P15-18 1970

200 70 0237 BERRYMAN C
THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL FERTILITY KEYWORDS DISPOSAL SLURRIES COMPOSITION FERTILITY IRRIGATION ANAEROBIC NUTRIENTS PROBLEM DISPOSAL SOIL
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 3, P 19-23 1970

200 70 0238 VENN J A J
THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIES TOXICITY HEALTH GASES PROBLEM
PROC SYMP FARM WASTES UNIV NEWCASTLE, PAPER 4, P 24-29 1970

200 70 0239 BARTROP T H C
FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATION DISEASE BACTERIA HEALTH NUISANCE PROBLEMS
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 5, P 33-37 1970

200 70 0240 FISH H
WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS LEGAL ASPECTS BOD UK LAW RUNOFF QUALITY SOURCES RIPARIAN-WATER POLLUTION DISPOSAL
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 6, P 38-43 1970

200 70 0241 SIMPSON J R HIBBERD R L
SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAPITAL-COST UK BOD POPULATION-EQUIVALENTS SEWAGE LOADING-RATES MOGDEN-FORMULA
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 7, P 44-51 1970

200 70 0242 BARRETT F
MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERSE-OSMOSIS AERATION TREATMENT EQUIPMENT STERILIZATION ADSORPTION CHLORINATION RECIRCULATED WATER DISPOSAL
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 8, P 57-65 1970

200 70 0243 RILEY C T
MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLUDGE CHEMICAL PROPERTIES LAND-USE POULTRY PROBLEMS
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 9, P 66-72 1970

200 70 0244 POINTER C G
MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS DESIGN FARROWING CLEANING
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 10 P 73-80 1970

200 70 0245 COOPER M M
MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT-PENS UK PROBLEM CATTLE
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 11 P 81-83 1970

200 70 0246 WELLER J B
BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STORAGE UK SLATTED-FLOORS LIVESTOCK DESIGN
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 12, P 84-93 1970

200 70 0247 GLERUM J C DE JONG A P S POELMA H R
BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERIA COSTS HOUSING DESIGN
PROC SYMP FARM WASTES, UNIV NEWCASTLE, PAPER 13 P 94-100

200 70 0248 SMITH R J HAZEN T E MINER J R
PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH FLUSHING-GUTTER SLUR
RIES RECIRCULATED-WATER DESIGN ANAEROBIC-CONDITIONS
PROC SYMP FARM WASTES UNIV NEWCASTLE PAPER 14 P 101-105 1970

200 70 0249 QUICK A J
LAND DISPOSAL AND STORAGE OF FARM WASTES 1 PLANNING AND CHOICE OF SYSTEM KEYWORDS EFFECTS MANAGEMENT CO
MPARISON DISPOSAL STORAGE
PROC SYMP FARM WASTES UNIV NEWCASTLE PAPER 15 P 110-115 1970

200 70 0250 PAYNE J I
LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPMENT SLURRIES COSTS
IRRIGATION DISPOSAL STORAGE HANDLING DISTRIBUTION
PROC SYMP FARM WASTES UNIV NEWCASTLE PAPER 16 P 116-121 1970

200 70 0251 ROBINSON K BAXTER S H SAXON J R
AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXIDATION-DITCH SWINE E
QUIPMENT TREATMENT
PROC SYMP FARM WASTES UNIV NEWCASTLE PAPER 17 P 122-131 1970

200 70 0252 BAINES S
ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METHANE MIXING BOD PH D
IGESTION ANAEROBIC TREATMENT
PROC SYMP FARM WASTES UNIV NEWCASTLE PAPER 18 P 132-137 1970 UNIV OF WISCONSIN EXTENSION

200 70 0253 SCHELTINGA H M J POELMA H R
TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES OXIDATION-PITCH PAS
VEER-DITCH AEROBIC-TREATMENT BOD COSTS TREATMENT
PROC SYMP FARM WASTES UNIV NEWCASTLE PAPER 19 P 138-148

200 70 0320 N J TASK FORCE
AGRICULTURAL-WASTES IN AN URBAN-ENVIRONMENT KEYWORDS ODOR LEGISLATION FUNDING RESEARCH-NEEDS PUBLIC-RELA
TIONS
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 256 P NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0321 RETRUM R
WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAGE LAGOONS AERATION
COSTS DISPOSAL POULTRY
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 64-75 NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0322 BRADY N C
FUNDING FOR AGRICULTURAL-WASTE RESEARCH KEYWORDS GRANTS USDA RESEARCH-FUNDS ENVIRONMENT RESEARCH
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 89-98 NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0323 HERR G H
AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-CONTENT RESEARCH
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 109-117 NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0324 LOEHR R C
DISPOSAL OF SOLID AGRICULTURAL-WASTES - CONCEPTS AND PRINCIPLES KEYWORDS RESEARCH-NEEDS REFEEDING LAND-D
ISPOSAL DISPOSAL
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 126-134 NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0325 REED C H
RECYCLING AND UTILIZATION OF BIODEGRADABLE-WASTES IN THE SOIL KEYWORDS BIOLOGICAL-SYSTEMS NITROGEN-CYCLE
RECYCLING
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 135-139 NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0326 LUKE G W
AGRICULTURAL-WASTE RESEARCH-NEEDS KEYWORDS ENVIRONMENT ODOR WASTE-HANDLING SURVEYS RESEARCH-NEEDS
PROC AG WASTE IN AN URBAN ENVIRON SEPT 1970 140-141 NEW JERSEY ANIMAL WASTE TASK FORCE

200 70 0498 WITHEROW J L SCALF M R
WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIENT KANSAS SPRINKLER
-IRRIGATION CONTROL FEEDLOTS
ASAE TEX SECTION 6TH ANNUAL MEETING 9P SEPT 1970

200 70 0670 LOEHR R C
ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CONFINEMENT-PENS FARM
-MANAGEMENT OXIDATION-PONDS AEROBIC-BACTERIA ANAEROBIC SOIL-DISPOSAL-FIELDS WASTEWATER-TREATMENT RUNOFF FE
RTILIZER NITRATES POULTRY SWINE CATTLE ODORS INCINERATION DRYING PHOSPHOROUS DISPOSAL
PROC OF THE 9TH ANNUAL ENVIRONMENTAL & WATER RESOURCES ENGINEERING CONF, VANDERBILT UNIV SCHOOL OF EN
G TECH RPT 22 JUNE 4 1970 P 185-198

200 70 0687 NILES C F GORDON H P
OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFFLUENTS ACTIVATED-SL
UDGE BIOCHEMICAL-OXYGEN-DEMAND LABOR PRE-TREATMENT MANAGEMENT INDIANA ANAEROBIC HOG
PROC 25TH IND WASTE CONF, ENG EXT SER NO 137 PURDUE U PART 2PP612-616 MAY 1970

200 70 0698 SCALF M R DUFFER W R KREIS R D
CHARACTERISTICS AND EFFECTS OF CATTLE FEEDLOT RUNOFF KEYWO RD FISHKILL DISSOLVED-OXYGEN DIVERSION-STRUCT
URES SEDIMENTATION BIOCHEMICAL-OXYGEN-DEMAND ALGAE CONFINEMENT-PENS IMPOUNDMENTS ALGAL-BLOOMS CHARACTERIS
TICS EFFECTS RUNOFF
PROC 25TH IND WASTE CONF PART 2 P855-864 MAY 1970

200 70 0715 YOUNG R J
OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORCED-DRYING OXIDATIO
N-PONDS ODOR RUNOFF POULTRY ECONOMICS INVESTMENT PROBLEMS DISPOSAL
PROC POULTRY WASTE MGMT SEM U GEORGIA ATHENS P1-5 JUNE 1970

200 70 0716 CALVERT C C MORGAN N D MARTIN R D EBY H J
BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVAE PROTEIN BIODEGRAD
ATION FERTILIZER
PROC POULTRY WASTE MGMT SEM U GEORGIA ATHENS P6-12 JUNE 1970

200 70 0717 KEIM J K
PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT KEYWORDS BOD SEWER MUNICIPAL-WASTES POULTRY MANAGEMENT
PROC POULTRY WASTE MGMT SEM U GEORGIA ATHENS P13-15 JUN 1970

200 70 0718 HAMM C
WATER UTILIZATION IN PROCESSING PLANTS KEYWORDS BOD POULTRY BACTERIA INDUSTRIAL-WASTES
PROC POULTRY WASTE MGMT SEM U GEORGIA ATHENS P16-22 JUN 1970

200 70 0719 WILLIAMS D J
FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE PASTURE POULTRY CATTLE FERTILIZER FEEDING
PROC POULTRY WASTE MGMT SEM U GEORGIA ATHENS P23 JUNE 1970

200 70 0720 WILLIAMS D J WILKINSON S R JACKSON W A DAWSON R N
PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-DISPOSAL POULTRY LITTER FESCUE NITROGEN PHOSPHORUS POTASSIUM CALCIUM MAGNESIUM FERTILITY NITRATE-POISONING GRASS-TETANY
PROCEEDINGS POULTRY WASTE MANAGEMENT SEMINAR UNIVERSITY OF GEORGIA ATHENS JUNE 23 1970 P 24-29 6 REF

200 70 0727 SHEFFIELD C W KALEEL R T
EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DENITRIFICATION EUTROPHICATION RUNOFF NUTRIENTS BOTTOM-SEDIMENTS DRAINAGE-WATER NITRATES WATER-MANAGEMENT PEAT PHOSPHATES DIKES CANALS NITRIFICATION EFFECTS
PROC 25TH IND WASTE CONF PART 2 P904-913 MAY 1970

200 70 0728 SMART P MCKINNEY R E
ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-TREATMENT AERATION CONFINEMENT-PENS ACTIVATED-SLUDGE BIOCHEMICAL-OXYGEN-DEMAND ROTORS ODOR ANAEROBIC-CONDITIONS CONCRETE-SLATS ODORLESS PORK
PROC 25TH IND WASTE CONF, ENG EXT SER NO 137 PURDUE U PART 2PP757-760 MAY 1970

200 70 0737 KOELLIKER J K MINER J R
REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICATION KEYWORD LIQUID-WASTES ANAEROBIC-CONDITIONS IRRIGATION AEROBIC-CONDITIONS OXIDATION-REDUCTION-POTENTIAL SWINE LAGOON DENITRIFICATION
PROC 25TH IND WASTE CONF, ENG EXT SER NO 137 PURDUE U PART 1PP472-480 MAY 1970

200 70 0747 DAGUE R R
ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITERIA RUNOFF WASTEWATER-DISPOSAL WASTEWATER-TREATMENT PHYSICAL-PROPERTIES CHEMICAL-PROPERTIES BIOLOGICAL-PROPERTIES CONTROL-SYSTEMS ECONOMIC-FEASIBILTY BY-PRODUCTS ALTERNATIVES MANAGEMENT
PROC 25TH IND WASTE CONF PART 1 P258-265 PURDUE U MAY 1970

200 70 0755 SHEFFIELD C W BEVILLE B
FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL SUBSURFACE-DRAINS SPRINKLER-IRRIGATION AEROBIC-TREATMENT ANAEROBIC-DIGESTION DAIRY-INDUSTRY BIOCHEMICAL-OXYGEN-DEMAND TURBIDITY RETENTION FLORICA
PROC 25TH IND WASTE CONF PART 2 P914-918 MAY 1970

200 70 1050 BERRY P S
THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANITATION REMEDIES LEGISLATION POLLUTION-ABATEMENT NATURAL-RESOURCES RESOURCE-ALLOCATION ENVIRONMNETAL-EFFECTS CONSERVATION WATER-POLLUTION WATER-POLLUTION-CONTROL AIR-POLLUTION FEDERAL-GOVERNMENT STATE-GOVERNMENTS ADMINISTRATIVE-AGENCIES GOVERNMENT-FINANCE INDUSTRIES FOREST-MANAGEMENT OIL-INDUSTRY LIVESTOCK MINING LUMBERING LAND TAXES DECISION-MAKING LEGAL-ASPECTS NATIONAL-ENVIRONMENTAL
TRANSCRIPTS OF THE SPEECHES NATIONAL CONFERENCE ON ENVIRONMENTAL LAW NOVEMBER 1970 P 183-207

200 70 1053 MIDDAUGH P R
BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORDS WATER-POLLUTION-SOURCES FARM-WASTES BACTERIA-E-COLI COLIFORMS PATHOGENIS-BACTERIA SEWAGE-BACTERIA E-COLI ENTERIC-BACTERIA STREPTOCOCCUS-BOVIS STREPTOCOCCUS-FAECALIS POLLUTANT-IDENTIFICATION
COMPLETION REPORT OWRR PROJECT A-019-S OAK1 APRIL 1970 14 P

200 70 1113 LOEHR R C SCHULTE D D
AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WASTES PILOT-PLANTS CHLORINATION PHOSPHATES MIXING COALGULATION FLOCCULATION DISSOLVED-OXYGEN BIOCHEMICAL-OXYGEN-DEMAND AEROBIC-CONDITIONS ANEROBIC-CONDITIONS ANEROBIC-CONDITIONS COST-ANALYSIS DESIGN-CRITERIA MATHEMATICAL-MODELS WASTE-WATER-TREATMENT AERATED-LAGOONS DUCK-WASTES
2ND INTERNATIONAL SYMPOSIUM FOR WASTE TREATMENT LAGOONS KANSAS CITY MISSOURI JUNE 23-25 1970 P 249-258 2 TAB 7 FIG 11 REF

200 70 1114 HART S A
ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LAGOONS ORGANIC-LOADING INFILTRATION EVAPORATION PERCOLATION AERATION OXYGENATION ODORS SPRINKLER-IRRIGATION AEROBIC-CONDITIONS ANAEROBIC-CONDITIONS BIOCHEMICAL-OXYGEN-DEMAND WASTE-WATER-TREATMENT AERATED-LAGOONS
2ND INTERNATIONAL SYMPOSIUM FOR WASTE TREATMENT LAGOONS KANSAS CITY MISSOURI JUNE 23-25 1970 P 320-324 1 TAB 19 REF

200 70 1115 LOEHR R C
CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WASTE-TREATMENT NITRIFICATION DENTRIFICATION CONFINEMENT-PENS FARM-LAGOONS ORGANIC-WASTES WATER-TREATMENT BIODEGRADATION AERATION AEROBIC-TREATMENT NITROGEN-REMOVAL
PROCEEDINGS 12TH SANITARY ENGINEERING CONFERENCE OF NITRATE AND WATER SUPPLY SOURCE AND CONTROL UNIVERSITY OF ILLINOIS URBANA FEB 11-12 1970 P 177-189 1 TAB 4 FIG 22 REF

200 70 1118 LAW JR J P WITHEROW J L
WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY WATER-POLLUTION-SOURCES WATER-POLLUTION-CONTROL ARID-LANDS IRRIGATION AGRICULTURE EVAPORATION SALINITY FARM-WASTES SURFACE-WATERS GROUNDWATER PLANNING IRRIGATION-EFFECTS WASTES NUTRIENTS
FEDERAL WATER QUALITY ADMINISTRATION WATER POLLUTION CONTROL RESEARCH SERIES 13030 DYY 6 69 OCT 1970 105 P

200 70 1159 MUEHLING A J
METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LAGOONS IRRIGATION SOLID-FLOORS-WITH-BEDDING SLOTTED-FLOORS
REPORTS OF THE TWELFTH ANNUAL SWINE DAY SPECIAL REPORT 316 OREGON STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION CORVALLIS DEC 1970 P 10-13

200 70 1175 BRINCK C W
ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL WASTE-TREATMENT WA
TER-POLLUTION-CONTROL CATTLE MONTANA
MONTANA AGRICULTURE FOCUS ON IMPROVING THE ENVIRONMENT COLLEGE OF GREAT FALLS DEC 3 4 1970 P 41-43

200 71 0274 GRATTO C
WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING COSTS INDUCEMENTS
PESTICIDES
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 1-6

200 71 0275 CLUSEN MRS D
THE CITIZENS-VIEW OF POLLUTION KEYWORDS ENVIRONMENT
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 7-13

200 71 0276 DOUGLAS P
THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOGICAL-CONCENTRATION
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 15-22

200 71 0277 STANEK G
THE FARMERS CONCERN KEYWORDS PESTICIDES WATER-POLLUTION PANIC-POWER MIS-USE RESISTANCE
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 23-29

200 71 0278 TAEUBER C
POPULATION GROWTH-RATE SHOULDNT GET ALL THE BLAME KEYWORDS FERTILITY CITIES RESOURCES
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 31-39

200 71 0279 SMITH G E
POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS KEYWORDS NITRATE EUTROPHICATION TOXICITY WATER-
SUPPLIES FERTILIZERS
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 40-48

200 71 0280 UPHOLT W M
PESTICIDES KEYWORDS DDT HAZARDS BENEFICIAL-USE HEALTH PESTICIDES
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 40-48

200 71 0281 TAIGANIDES E P
LIVESTOCK-WASTE KEYWORDS COPROLOGY BYPRODUCTS PRODUCTION
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 57

200 71 0282 GRANT K E
SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHEDS VALUE BENEFITS
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 67-76

200 71 0283 TIMMONS J F
ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS BENEFITS CONTROL
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 77-85

200 71 0284 COCHRAN D M
CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONSERVANCY-DISTRICTS I
OWA LEGISLATION
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 87-93

200 71 0285 HAEFELE E T
POLLUTION-CONTROL DECISIONS - WHO SHOULD MAKE THEM KEYWORDS INDIVIDUAL-RIGHTS LEGISLATION CONTROL
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 85-99

200 71 0286 SHAEFFER J R
AGRICULTURAL-BENEFITS FROM URBAN POLLUTION-CONTROL KEYWORDS SEWAGE-TREATMENT TREATMENT-CELLS MICHIGAN PU
MPING CONTROL
33RD ANNUAL, NATIONAL FARM INSTITUTE FEB 1971 DES MOINES 101-107

200 71 0440 LEVI D R
LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUISANCE-LAW ACTUAL-DA
MAGES PUNITIVE-DAMAGES LAWSUITS WATER-POLLUTION ZONING LICENSING PORK-PRODUCTION
AM PORK CONGRESS MARCH 3,1971 DES MOINES IA 103-111

200 71 0483 MINER J R
HOW CAN PORK-PRODUCERS COMPLY WITH ENVIRONMENTAL QUALITY-STANDARDS KEYWORDS WATER-QUALITY ODOR POLLUTION
-CONTROL STANDARDS
AM PORK CONGRESS MARCH 3,1971 DES MOINES IA 98-102

200 71 0583 ELLIOT L F MCCALLA T M
AIR POLLUTION FROM AGRICULTURE KEYWORDS DUST ALLERGENS ODORS PESTICIDES SMOKE
PROC EXPLORING NEBRASKA S POLLUTION PROBLEMS SYMPOSIUM ARTICLE NO 31275 APRIL 22 1971

200 71 0586 VEIRS C E
CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT KEYWORDS LIVESTOCK-WASTES WATER-POLLUTION-SOURCES
RUNOFF FEEDLOTS MANAGEMENT
PROC TECH AND MGMT OF THE ENVIRONMENT SEMINAR, CORVALLIS, OREGON JULY 1971 P65-76

200 71 0593 HANSEN E H
ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISLATION MANAGEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P1-205

200 71 0594 CAMPBELL J P
IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULATIONS FERTILIZER EP
A CONTROL
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P7-9

200 71 0595 DOMINICK D D
ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION EPA MANAGEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P11-14

200 71 0596 CATH W S
SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA USDA LAWS
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P17-18

200 71 0597 SCHWIESOW W F
STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOFF ODOR STATUTES LAW
S PERMITS FEEDLOTS FEDERAL-WATER-QUALITY-ACT REGULATIONS DESIGN MANAGEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P19-25

200 71 0598 CONRAD R D
MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATION PERMITS CIVIL-L
AW INSPECTION FEEDLOTS EFFLUENT-STANDARDS CONTROL
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P28-32

200 71 0599 DENNISTOUN R M
THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REGULATION STATUTES PE
RMITS LAWS LIVESTOCK FEEDLOT USDA PERMIT-APPLICATIONS MINNESOTA PROBLEMS
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P33-35

200 71 0600 GOWDY B R
STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES LAWS LIVESTOCK FEED
-YARD-ACT OKLAHOMA PERMITS MANAGEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P37-39

200 71 0601 HEATH M S
PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULATION STATUTES LAWS
NORTH CAROLINA CONTROL
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P41-43

200 71 0602 LAWSON L G
STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS RUNOFF LAWS FEEDLOT VIRGINIA MANAGEMEN
T
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P45-47

200 71 0603 BERNARD H DENIT J D ANDERSON D
EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATMENT CONFINEMENT-PENS
AERATOR DIGESTION-TANKS SOIL-DISPOSAL-FIELDS ZERO-DISCHARGE BIO-FILTER MANAGEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P69-83

200 71 0604 DALE A C
STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTRY RUNOFF ENVIRONMEN
TAL-SANITATION FERTILIZATION ODORS FIELD-SPREADING TREATMENT MANAGEMENT RESEARCH
PROC NAT SYM ANI WASTE MANAGEMENT SEPT 71 WARRENTON VIR P85-95

200 71 0605 VIETS F G
CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-PROPERTIES LAND-SPR
EADING ZONING CATTLE
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P97-105

200 71 0606 LOEHR R C
POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY MANAGEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P107-110

200 71 0607 MUEHLING A J
SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEMENT-PENS SWINE MANA
GEMENT
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P111-119

200 71 0608 YECK R G SCHLEUSENER P E
RECYCLING OF ANIMAL WASTES KEYWORDS REUSE FERTILIZATION NUTRITION PHOSPHORUS NITROGEN
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P121-127

200 71 0609 TAYLOR J C
REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION LEGAL-ASPECTS REFE
EDING POULTRY-LITTER INTER-AGENCY-COOPERATION LIVESTOCK
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P129-131

200 71 0610 SCHWENGEL F
WATER POLLUTION AND THE FARMER KEYWORDS RUNOFF COSTS PESTICIDES GOVERNMENT-FINANCE CONGRESS
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P133-135

200 71 0611 BYERLY T C
U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPP
ORTS WATER-RESOURCES-DEVELOPMENT SCS ASSISTANCE PROGRAMS
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P139-141

200 71 0612 SWACKHAMER G L
PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS CREDI
T LOANS FINANCING ECONOMIC-FEASIBILITY FARM-CREDIT-SYSTEM ASSISTANCE DISPOSAL SYSTEMS
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P143-145

200 71 0613 MACKENTHUN K M
TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINISTRATIVE-AGENCIES GOV
ERNMENT-SUPPORTS EPA WATER-RESOURCES-DEVELOPMENT ASSISTANCE CONTROL
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P147-149

200 71 0614 ARMSTRONG A E
SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO SMALL FIRMS IN SOL
VING PROBLEMS RELATIVE TO ANIMAL WASTE DISPOSAL KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPORTS SMA
LL-BUSINESS-ADMINISTRATION PROGRAMS ASSISTANCE DISPOSAL
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P151-152

200 71 0615 YATES J C
FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORDS ADMINISTRATIVE-A
GENCIES GOVERNMENT-SUPPORTS COMMUNITY DITCHES SCS ASCS ASSISTANCE SYSTEMS
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P153-155

200 71 0616 LAST D G
THE LAKE MENDOTA WATERSHED PROJECT KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPORTS ASCS SCS REAP
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P163-167

200 71 0617 WESLEY R L
THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRATIVE-AGENCIES LAGOON
S RE-USE CO-OPEXTENSION-SERVICE VIRGINIA
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P169-171

200 71 0618 MCMUNN E W
COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION KEYWORDS COMMUNICATION TECHNOLOGY POLITICAL-ASPECTS EDUCAT
ION KNOWLEDGE
ANIMAL WASTE MGMT PROC NAT SYM ANIMAL WASTE MGMT WARRENTON VIR SEPT 71 P173-175

200 71 0619 ANON
REPORTS AND RECOMMENDATIONS OF WORKING GROUPS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPORTS ECONO
MIC-FEASIBILITY EXTENSION-SERVICE EPA
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P179-185

200 71 0620 ANON
RECOMMENDATIONS OF NATIONAL MILK PRODUCERS FEDERATION KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPOR
TS REAP USDA
PROC NAT SYM ANI WASTE MGMT SEPT 71 WARRENTON VIR P187-188

200 71 0640 PRATT G L JOHNSON D W BUCHANAN M L
HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARATION SETTLING BASINS
RUNOFF HANDLING LIVESTOCK
NORTH DAK UNIV REPORTS ON ENVIR QUAL VOL4 NO28 P22-24 MAR-APR 71

200 71 0641 BROMEL M C
BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERIOLOGICAL-ANALYSIS N
ORTH-DAKOTA SALMONELLA CLOSTRIDIUM SHIGELLA FISHKILL OXYGEN-DEMAND
NORTH DAKOTA UNIV REPORTS ON ENVIR QUAL VOL4 NO28 P60-61 MARCH-APRIL 1971

200 71 0642 SWADER F N LOEHR R C LAWRENCE J E LUDINGTON D C SPLITTS TOSSER D F
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-QUALITY PESTICIDES
SURFACE-RUNOFF EUTROPHICATION WASTE-TREATMENT LIQUID-WASTE LAND-SPREADING
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 1-172

200 71 0643 PEDERSON R W
AGRICULTURE S RESPONSIBILITIES IN A CLEAN ENVIRONMENT KEYWORDS POLLUTION-ABATEMENT ECOSYSTEMS
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MGMT P 1-5

200 71 0644 DENIT J D
ENVIRONMENTAL QUALITY AND PRODUCTIVITY KEYWORDS WATER-QUALITY WATER-POLLUTION
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 6 - 11

200 71 0645 PIMENTEL D
PESTICIDES AND PEST CONTROL IN THE FUTURE KEYWORDS PEST-CONTROL AGRICULTURAL-CHEMICALS ECOSYSTEMS CONTR
OL
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 12 - 14

200 71 0646 OGLESBY R T
FARM LAND RUNOFF KEYWORDS NITROGEN-COMPOUNDS PHOSPHORUS- COMPOUNDS SOIL-EROSION RUNOFF
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 15 - 19

200 71 0647 DOWNING D L
ENVIRONMENTAL PROBLEMS IN THE FOOD PROCESSING INDUSTRY KEYWORDS LIQUID-WASTES INDUSTRIAL-WASTES WATER-PO
LLUTION PROBLEMS
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 20 - 24

200 71 0648 LATHWELL D J REID W S BOULDIN D R
FERTILIZER PRACTICES WHICH MINIMIZE NUTRIENT LOSS KEYWORDS FERTILIZER-REQUIREMENTS CROP-RESPONSE FERTILI
ZATION
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 25 - 35

200 71 0649 KLAUSNER S D ZWERMAN P J SCOTT T W
LAND DISPOSAL OF MANURE IN RELATION TO WATER QUALITY KEYWORDS FERTILIZATION SURFACE-RUNOFF EUTROPHICATIO
N DISPOSAL
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 36 - 46

200 71 0650 PENDLETON R F DEWEY J E
GUIDELINES FOR MINIMIZING PESTICIDE POLLUTION KEYWORDS PESTICIDE-DRIFT WATER-QUALITY PHYTOTOXICITY
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 47 - 51

200 71 0651 OSTRANDER C E
ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMENT HANDLING UNITED
KINGDOM
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 52 - 53

200 71 0652 LOEHR R C
LIQUID WASTE TREATMENT I FUNDAMENTALS KEYWORDS AEROBIC-TR EATMENT ANAEROBIC-BIODEGRADATION TREATMENT
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 54 - 62

200 71 0653 LOEHR R C
LIQUID WASTE TREATMENT II OXIDATION PONDS AND AERATED LAGOONS KEYWORDS AEROBIC-TREATMENT DISSOLVED-OXYGE
N TREATMENT OXIDATION-PONDS LAGOONS
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 63 - 71

200 71 0654 LOEHR R C
LIQUID WASTE TREATMENT III THE OXIDATION DITCH KEYWORDS AEROBIC-TREATMENT DISSOLVED-OXYGEN TREATMENT
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 72 - 78

200 71 0655 LAWRENCE A W
ANAEROBIC BIOLOGICAL WASTE TREATMENT SYSTEMS KEYWORDS METHANE-BACTERIA FARM-LAGOONS ANAEROBIC TREATMENT
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 79 - 92

200 71 0656 LAWRENCE A W
CHLORINATION OF WASTEWATER EFFLUENTS KEYWORDS DISINFECTION WATER-TREATMENT PUBLIC-HEALTH TERTIARY-TREATM
ENT CHLORINATION
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 93 - 101

200 71 0657 LUDINGTON D C
SOLIDS DESTRUCTION OR SEVERE TREATMENT KEYWORDS INCINERATION SOLID-WASTES CHEMICAL-DEGRADATION
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 102 - 106

200 71 0658 SOBEL A T
MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION REMOVAL
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 107 - 114

200 71 0659 TUTH S J GOLD B
COMPOSTING KEYWORDS ARTIFICIAL-USE HUMUS AEROBIC-CONDITIONS COMPOSTING
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 115 - 120

200 71 0660 HEALD W R LOEHR R C
UTILIZATION OF AGRICULTURAL WASTES KEYWORDS WASTE-BYPRODUCTS ARTIFICAL-USE WASTE-DISPOSAL FERTILIZATION
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 121 - 129

200 71 0661 LUDINGTON D C
ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SOIL-INJECTION SOIL-F
ILTRATION ODORS CONTROL
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 130 - 136

200 71 0662 GUEST R W
WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATMENT CONVENTIONAL-HA
NDLING HANDLING ALTERNATIVES
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 137 - 141

200 71 0663 YOUNG R J
INTEGRATION OF COMPONENTS INTO A SYSTEM KEYWORDS WATER-QUALITY-ACT FERTILIZERS DISPOSAL-METHODS FEDERAL-
REGULATIONS SYSTEM
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 142 - 149

200 71 0664 CROWLEY J W
ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS REGULATIONS WASTE-DIS
POSAL CATTLE HEALTH SAFETY LEGAL ASPECTS PUBLIC-HEALTH-AGENCY
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 150-156

200 71 0665 EVERINGHAM R
WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-TANK ODORS LIQUID W
ASTES MANAGEMENT DAIRY
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 157 - 160

200 71 0666 JOHANSON K J
PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS SETTLING-BASINS DISP
OSAL DISINFECTION RUN-OFF TREATMENT
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 161 - 166

200 71 0667 RUSSELL P
FOOD PROCESSING WASTEWATER TREATMENT KEYWORDS ANAEROBIC-LAGOON ACTIVATED-SLUDGE IRRIGATION CHEMICAL-DEGR
ADATION TREATMENT
AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS 1971 CORNELL UNIV CONF ON AGR WASTE
MANAGEMENT P 167 - 172

200 71 0669 DAY D L BRYANT M P JENSEN A H MELSTED S W
ANIMAL AND HUMAN METABOLIC WASTES KEYWORDS BOD PE METABOLIC-WASTES
PROCEEDINGS FIRST ALLERTON CONF SPEC PUBL NO 21 COLLEGE OF AGRICULTURE UNIV OF ILLINOIS P23-25 APRIL 1
971

200 71 0703 SWANSON N P GILBERTSON C B
FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAMPLING FEEDLOTS RUNO
FF SETTLING-BASIN WEIRS FLOWMETERS MANAGEMENT PROBLEM
ASAE ANNUAL MEETING PAPER NO 71-522 WASH ST U 6P JUNE 1971

200 71 0705 PAINE M D WITZ J A BUTCHBAKER A F MCCROSKEY J E BACON C M
A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATICAL-MODELS CATTLE M
ODEL-STUDIES ENERGY-TRANSFER METABOLISM NUTRITION SIMULATION-ANALYSIS BEEF
PROC ASAE OKLA SECTION FALL MEETING 21P 1971

200 71 0709 WITHEROW J L SCALF M R
BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION REGULATIONS CONTROL
RAINFALL FEEDLOT MANAGEMENT PROGRAM
EPA WATER QUAL OFF KERR WAT RES CENTER ADA OKLA 10P 1971

200 71 0733 BUTCHBAKER A F GARTON J E MAHONEY G W A PAINE M D WETMORE A
ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES CONFINEMENT-PENS DI
SPOSAL FARM-LAGOONS WASTE-DISPOSAL COST-COMPARISONS WASTE-STORAGE DESIGN-CRITERIA ALTERNATIVES MANAGEMENT
ASAE SW REG MEETING PAPER NO SWR71-403 SEQUOYAH ST PARK OKLA 20 P 1971

200 71 0740 HULTGREN J P HAZEN T E
PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BEHAVIOR DESIGN-CRITE
RIA TRAINING ENVIRONMENTAL-EFFECTS LIGHT-INTENSITY TEMPERATURE ODOR
ASAE MID-CENT MEETING PAPER NO MC71-101 ST JOSEPH 15P 1971

200 71 0762 YECK R G
LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RUNOFF CATTLE SWINE P
OULTRY AERATION HYDRAULIC-STRUCTURES AEROBIC-LAGOON ANAEROBIC-TREATMENT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P1-360 1971 ASAE PUBLICATION PROC-271

200 71 0763 BAYLEY NED D
ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUTRIENTS PATHOGENS
WASTE-DISPOSAL ECONOMICS
LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT PROCEEDINGS INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTES
OHIO STATE UNIVERSITY APRIL 19-22 1971 P 6-7

200 71 0764 KOTTMAN R M GEYER R E
FUTURE PROSPECTS FOR ANIMAL AGRICULTURE KEYWORDS ECONOMICS INCOME FARM-WASTES NUTRIENT-REQUIREMENTS
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P9-18 1971 ASAE PUBLICATION PROC-271

200 71 0765 CATH W S
ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION FED
ERAL-GOVERNMENTS STATE-GOVERNMENTS LOCAL-GOVERNMENTS PROBLEMS MANAGEMENT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P21-22 1971

200 71 0766 STEWART R E
RESPONSIBILITIES OF A PROFESSIONAL SOCIETY TOWARD URGENT SOCIAL PROBLEMS KEYWORDS TECHNOLOGY ENGINEERING
AIR-POLLUTIONPROBLEMS
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P23-24 1971 ASAE PUBLICATION PROC-271

200 71 0767 CURRY N H
PUTTING IT ALL TOGETHER KEYWORDS FEDERAL-GOVERNMENTS STATE-GOVERNMENTS BUDGETING DESIGN ENGINEERING
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P25-26 1971 ASAE PUBLICATION PROC-271

200 71 0768 SCHOLZ H G
SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEYWORDS ANAEROBIC-DI
GESTION SWINE DEHYDRATION DRYING LIQUID-WASTES POULTRY SYSTEMS
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P27-29 1971 ASAE PUBLICATION PROC-271

200 71 0769 NORDSTEDT R A BARRE H J TAIGANIDES E P
A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MODELS MATHEMATICAL-MO
DEL WASTE-STORAGE WASTE-DISPOSAL OPTIMIZATION NUTRIENTS STORAGE DISPOSAL
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P30-33 1971 ASAE PUBLICATION PROC-271

200 71 0770 FOGG C E
LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER RUNOFF BOD IRRIGAT
ION-SYSTEMS MANAGEMENT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P34-35 1971 ASAE PUBLICATION PROC-271

200 71 0771 VELEBIL M
TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA KEYWORDS CATTLE LITTER FAR
M-WASTES HANDLING CZECHOSLOVAKIA
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P36-38 1971 ASAE PUBLICATION PROC-271

200 71 0772 TURNBULL J E HORE F R FELDMAN M
A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD CLIMATE KEYWORDS
CONFINEMENT-PENS ODOR CATTLE LIQUID-WASTE AIR-POLLUTION SYSTEM COLD-CLIMATE
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P39-43 1971 ASAE PUBLICATION PROC-271

200 71 0773 MADDEN J M DORNBUSH J N
MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED-LOTS RUNOFF BOD CO
D CATTLE MEASUREMENT RUNOFF
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P44-47 1971 ASAE PUBLICATION PROC-271

200 71 0774 EDWARDS W M CHICHESTER F W HARROLD L L
MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-IRRIGATION CHEMICAL-
ANALYSIS BOD NITROGEN PHOSPHORUS WATER-QUALITY MANAGEMENT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P48-50 1971 ASAE PUBLICATION PROC-271

200 71 0775 SWANSON N P MIELKE L N LORIMOR J C MCCALLA T M ELLIS J R
TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY, DURATION, AND RECU
RRANCE KEYWORDS RUNOFF FUNGI COLIFORM CROP NITROGEN PHOSPHORUS TRANSPORT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P51-55 1971 ASAE PUBLICATION PROC-271

200 71 0776 GILBERTSON C B MCCALLA T M ELLIS J R WOODS W R
CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDLOTS KEYWORDS COD
BOD NITROGEN FEED-LOTS CATTLE CHARACTERISTICS
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P56-59 1971 ASAE PUBLICATION PROC-271

200 71 0777 MORRISON S R LOFGREEN G P BOND T E
FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAPORATION SPRINKLER-I
RRIGATION FEEDLOT MANAGEMENT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P60-61 1971 ASAE PUBLICATION PROC-271

200 71 0778 MANGES H L SCHMID L A MURPHY L S
LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATION COD NITROGEN PHOS
PHORUS DISPOSAL FEEDLOT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P62-65 1971 ASAE PUBLICATION PROC-271

200 71 0779 BUTCHBAKER A F GARTON J E MAHONEY G W A PAINE M D
EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TREATMENT WASTE-DISP
OSAL CATTLE FEEDLOT CONFINEMENT-PENS RUNOFF PACIFIC-NORTHWEST MIDWEST SOUTHERN-HIGH-PLAINS SOUTHWEST COMP
UTER-PROGRAM LIQUID-FLUSH-SYSTEM-SLOTTED-FLOOR
LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT PROCEEDINGS INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTES
OHIO STATE UNIVERSITY APRIL 19-22 1971 P 66-69 2 TAB 6 FIG 6 REF

200 71 0780 HEGG R O LARSON R E
THE WASTE PATTERN OF BEEF CATTLE ON SLATTED FLOORS KEYWORDS FEED-LOTS CONFINEMENT-PENS OXIDATION-LAGOON
AERATION
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P70-72 1971 ASAE PUBLICATION PROC-271

200 71 0781 SCHULTE D D LOEHR R C
ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERATED-LAGOON WATER-CO
NSUMPTION ANALYSIS TREATMENT
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P73-76 1971 ASAE PUBLICATION PROC-271

200 71 0782 NORDSTEDT R A BALDWIN L B HORTENSTINE C C
MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGATION LAGOON CATTLE B
OD GROUNDWATERAEROBIC-LAGOON NITROGEN DAIRY
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P77-80 1971 ASAE PUBLICATION PROC-271

200 71 0783 BRESSLER G O BERGMAN E L
SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRYING POULTRY ORGANIC
BACTERIA AIR-POLLUTION WATER-POLLUTION ANAEROBIC-CONDITION PROBLEM DEHYDRATION
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P81-84 1971 ASAE PUBLICATION PROC-271

200 71 0784 TURNER D O PROCTOR D E
A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINEMENT-PENS ROTATION
NITROGEN DISPOSAL
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P85-88 1971 ASAE PUBLICATION PROC-271

200 71 0785 CARLSON L G
A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHATES PROTEINS BOD COD
NITROGEN POTASSIUM MICROORGANISMS RECYCLE
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P89-91 1971 ASAE PUBLICATION PROC-271

200 71 0786 JONES K B C
THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCIETY KEYWORDS POUL
TRY CATTLE SOLID-WASTES BOD PHOSPHATES NITROGEN CONFINEMENT-PENS
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P92-94 1971 ASAE PUBLICATION PROC-271

200 71 0787 TAIGANIDES E P STROSHINE R L
IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOIL OXYGEN DEMAND COD
BOD ODOR
PROC INTER SYM LIVESTOCK WASTES OHIO STATE UNIV P95-98 1971 ASAE PUBLICATION PROC-271

200 71 0788 WILLRICH T L MINER J R
LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-ASPECTS SWINE CATTLE
POULTRY WATER-POLLUTION LAW-SUITS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P99-101 1971 ASAE PUBLICATION PROC-271

200 71 0789 JOHNSON J B CONNOR L J
ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS KEYWORDS FEED-LO
T RUNOFF CATTLE LEGAL-ASPECT POLLUTION-CONTROL GOVERNMENTS STANDARDS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P102-104 1971 ASAE PUBLICATION PROC-271

200 71 0790 HARTUNG L D HAMMOND E G MINER J R
IDENTIFICATION OF CARBONYL COMPOUNDS IN A SWINE-BUILDING ATMOSPHERE KEYWORDS ODOR ORGANIC-COMPOUNDS AIR-
POLLUTION SWINE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P105-106 1971 ASAE PUBLICATION PROC-271

200 71 0791 NORDSTEDT R A TAIGANIDES E P
METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS CHEMICAL TREATMENT A
IR-POLLUTION MODEL-STUDIES ODOR-NUISANCE CONTROL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P107-109 1971 ASAE PUBLICATION PROC-271

200 71 0792 WHITE R K TAIGANIDES E P COLE G D
CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOGRAPHY ANALYTICAL-TE
CHNIQUE ODOR HYDROGEN-ION-CONCENTRATION AMINO AERATION SULFUR HYDROCARBON DAIRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P110-113 1971 ASAE PUBLICATION PROC-271

200 71 0793 WILLSON G B
CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AMMONIA CONTROL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P114-116 1971 ASAE PUBLICATION PROC-271

200 71 0794 HASHIMOTO A G LUDINGTON D C
AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN MICROFLORA AMMONIA POULTR
Y ACIDITY SLURRIES
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P117-121 1971

200 71 0795 BROMEL M LEE Y N BALDWIN B
ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAGOON KEYWORDS FAR
M-WASTES PATHOGEN ANTIBIOTIC LIQUID-WASTE SALMONELLA MICROORGANISMS CATTLE E-COLI PUBLIC-HEALTH-HAZARD R-
FACTORS LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT
PROCEEDINGS INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTES OHIO STATE UNIVERSITY APRIL 19-22 1971 P 122-1
25 6 TAB 2 FIG 11 REF

200 71 0796 MIDDAUGH P R KOUPAL L R PIERCE R L TIEDE J E ZERFAS J W
DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE OF ENTERIC BACTERIA
KEYWORDS RUNOFF COLIFORM MICROORGANISMS STREPTOCOCCUS NITROGEN CATTLE SHEEP GOATS LAGOON
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P126-128 1971 ASAE PUBLICATION PROC-271

200 71 0797 HAMILTON H E ROSS I J BEGIN J J JACKSON S W
GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICROORGANISMS MICROBIAL
CATTLE GROWTH-RATE HYDROGEN-ION-CONCENTRATION POULTRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P129-131 1971 ASAE PUBLICATION PROC-271

200 71 0798 MCCALLA T M ELLIOTT L F
THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS KEYWORDS PATHOGENI
C-BACTERIA CROPS ODORS NITROGEN MANAGEMENT FEEDLOTS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P132-134 1971 ASAE PUBLICATION PROC-271

200 71 0799 SEWELL J I
AGITATION IN LIQUID MANURE TANKS KEYWORDS LIQUID-WASTES PUMPS SLURRIES MODEL-STUDIES
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P135-137 1971 ASAE PUBLICATION PROC-271

200 71 0800 GRIMM K LANGENEGGER G
MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE KEYWORDS LIQUID-WASTES PUMP-T
ESTING MANURE-CONSISTANCY MANURE-PUMP METHOD
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P138-141 1971 ASAE PUBLICATION PROC-271

200 71 0801 STALEY L M BULLEY N R WINOT T A
PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES KEYWORDS CATTLE IRR
IGATION BOD ACIDITY POTASSIUM SODIUM-CHLORIDE AMMONIUM CHARACTERISTICS SLURRIES
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P142-145 1971 ASAE PUBLICATION PROC-271

200 71 0802 TAIGANIDES E P WHITE R K
AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT PRODUCTION UNIT KE
YWORDS ODORS OXIDATION-TREATMENT DUST AEROBIC-DIGESTER WASTE-SLUDGE BOD HANDLING RECYCLING
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P146-148 1971 ASAE PUBLICATION PROC-271

200 71 0803 SMITH R J HAZEN T E MINER J R
MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATED WASTE WATER KEYW
ORDS CONFINEMENT-PENS COD SETTLING-BASIN SLUDGE HYDRAULIC-TRANSPORTATION MANAGEMENT SWINE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P149-153 1971 ASAE PUBLICATION PROC-271

200 71 0804 JONES E E WILLSON G B SCHWIESOW W F
IMPROVING WATER UTILIZATION EFFICIENCY IN AUTOMATIC HYDRAULIC WASTE REMOVAL KEYWORDS SWINE VELOCITY SEDI
MENT-TRANSPORTEFFICIENCY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P154-158 1971 ASAE PUBLICATION PROC-271

200 71 0805 GALLER W S DAVEY C B
HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTING CARBON NITROGEN G
REENHOUSES GRAINS CATION-EXCHANGE POULTRY SAWDUST
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P159-162 1971 ASAE PUBLICATION PROC-271

200 71 0806 WILLSON G B
COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS COMPOSTING DAIRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P163-165 1971 ASAE PUBLICATION PROC-271

200 71 0807 ROBBINS J W D KRIZ G J HOWELLS D H
QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIFORM BOD COD TOTAL-O
RGANIC-CARBON QUALITY PRODUCTION
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P166-169 1971 ASAE PUBLICATION PROC-271

200 71 0808 MINER J R WOOTEN J W DODD J D
WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OXIDATION-LAGOON NITR
OGEN PHOSPHORUS COD HYACINTHS TREAT
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P170-173 1971 ASAE PUBLICATION PROC-271

200 71 0809 ELMUND G K MORRISON S M GRANT D W
ENZYME FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOTMANURE KEYWORDS BOD AMINO-ACID MICROBIAL-DEG
RADATION ENZYME DECOMPOSITION
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P174-175 1971 ASAE PUBLICATION PROC-271

200 71 0810 TAIGANIDES E P WHITE R K STROSHINE R L
WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD WASTE-TREATMENT SOI
L-OXYGEN-DEMAND
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P176-179 1971 ASAE PUBLICATION PROC-271

200 71 0811 ARIAIL J D HUMENIK F J KRIZ G J
BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBIOTICS SEWAGE LAGOON
SWINE BOD ANALYSIS ADDITIVES
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P180-182 1971 ASAE PUBLICATION PROC-271

200 71 0812 MEYER R C HINDS F C ISAACSON H R HINESLY T D
PORCINE ENTEROVIRUS SURVIVAL AND ANAEROBIC SLUDGE DIGESTION KEYWORDS VIRUSES SWINE SLUDGE-DIGESTION ENTE
RVIRUS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P183-184 1971 ASAE PUBLICATION PROC-271

200 71 0813 THYGESON J R GROSSMANN E D MACARTHUR J
THROUGH-CIRCULATION DRYING OF MANURE IN SUPERHEATED STEAM KEYWORDS MOISTURE-CONTENT ODOR DRYING
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P185-189 1971 ASAE PUBLICATION PROC-271

200 71 0814 WHITE R K TAIGANIDES E P
PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS POULTRY SWINE ODOR
THERMAL-CAPACITY CATTLE PYROLYSIS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P190-191 1971 ASAE PUBLICATION PROC-271

200 71 0815 SURBROOK T C SHEPPARD C C BOYD J S ZINDEL H C FLEGAL C J
DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P192-194 1971 ASAE PUBLICATION PROC-271

200 71 0816 MORRIS W H M
ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS FERTILIZERS NUTRIEN TS ECONOMIC-FEASIBILITY CONFINEMENT
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P195-196 1971 ASAE PUBLICATION PROC-271

200 71 0817 JORDAN H C
MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALUE BY-PRODUCTS COMPO STING
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P197-198 1971 ASAE PUBLICATION PROC-271

200 71 0818 OKEY R W BALAKRISHNAN S
THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TREATMENT NITRIPICATIO T DENITRIFICATION PHOSPHORUS SWINE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P199-203 1971 ASAE PUBLICATION PROC-271

200 71 0819 BADGER D D CROSS G R
ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING OPERATIONS KEYWORD S CONFINEMENT-PENS COSTS REGULATION FARM LAGOONS CATTLE HOGS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P204-207 1971 ASAE PUBLICATION PROC-271

200 71 0820 LEE H Y OWENS T R
COSTS OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FEEDING OPERATIONS FO R THE SOUTHERNHIGH PLAINS KEYWORDS AGRICULTURAL-RUNOFF CONFINEMENT-PENS COSTS CONTROL CATTLE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P207-208 1971 ASAE PUBLICATION PROC-271

200 71 0821 LOEHR R C ANDERSON D F ANTHONISEN A C
AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE AERATION AEROBIC -LAGOONS POULTRY BIOCHEMICAL-OXYGEN-DEMAND WASTE-STORAGE
LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT PROCEEDINGS INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTES OHIO STATE UNIVERSITY APRIL 19-22 1971 P 209-212 3 TAB 5 FIG 5 REF

200 71 0822 WINDT T A BULLEY N R STALEY L M
DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE BRITISH COLUMBIA SW INE FARM KEYWORDS AERATION HOGS WASTE-STORAGE BOD OXIDATION-LAGOONS DESIGN INSTALLATION OXIDATION-DITCH
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P213-216 1971 ASAE PUBLICATION PROC-271

200 71 0823 LARSON R E MOORE J A
BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW KEYWORDS AERATION CATTLE BOD WASTE-STORAGE OXIDA TION-DITCH
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P217-219 1971 ASAE PUBLICATION PROC-271

200 71 0824 POS J BELL R G ROBINSON J B
AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFICATION DENITRIFICATI ON AERATION TREATMENT LIQUID SOLID POULTRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P220-224 1971 ASAE PUBLICATION PROC-271

200 71 0825 ROBINSON K SAXON J R BAXTER S H
MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE KEYWORDS OXYGEN-DEMAND SALMONELLA STREPTOCOCC US PATHOGENIC-BACTERIA SWINE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P225-228 1971 ASAE PUBLICATION PROC-271

200 71 0826 MATHERS A C STEWART B A
CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE KEYWORDS GRAIN-SOR GHUM CROP-RESPONSE SOIL-TESTS LEACHING NITRATES IRRIGATION FEEDLOTS CATTLEANALYSIS DISPOSAL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P229-234 1971 ASAE PUBLICATION PROC-271

200 71 0827 ERICKSON A E TIEDJE J M ELLIS B G HANSEN C M
A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM LIQUID FEEDLOT WAST E KEYWORDS NITRIFICATION DENITRIFICATION NUTRIENT-REMOVAL FEEDLOTS HOGSSYSTEM LIQUID
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P232-234 1971 ASAE PUBLICATION PROC-271

200 71 0828 REDDELL D L JOHNSON W H LYERLY P J HOBGOOD P
DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-PRODUCTION CROP-RESP ONSE TRENCHES DISPOSAL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P235-238 1971 ASAE PUBLICATION PROC-271

200 71 0829 MCCASKEY T A ROLLINS G H LITTLE J A
WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY WASTE KEYWORDS WA STE-WATER WATER-QUALITY CATTLE ODOR BOD AGRICULTURAL-RUNOFF DISPOSAL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P239-242 1971 ASAE PUBLICATION PROC-271

200 71 0830 ADRIANO D C PRATT P F BISHOP S E
FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS NITRATES LEACHING AMMONIA SALTS DENITRIFICATION CHLORIDES CATTLE DISPOSAL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P243-246 1971 ASAE PUBLICATION PROC-271

200 71 0831 HILEMAN L H
EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYWORDS POULTRY FERTI LIZATION CROP-RESPONSE SALINITY EFFECT PROPERTIES
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P247-248 1971 ASAE PUBLICATION PROC-271

200 71 0832 CONCANNON T J GENETELLI E J
GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SALINITY FERTILIZATIO N SAMPLING BIOINDICATORS GROUNDWATER
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P249-253 1971 ASAE PUBLICATION PROC-271

200 71 0833 HENSLER R F ERHARDT W H WALSH L M
EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CROP-RESPONSE NUTRIENT S CATTLE EFFECT SYSTEMS CYCLING
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P254-257 1971 ASAE PUBLICATION PROC-271

200 71 0834 BARTLETT H D MARRIOTT L F
SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORAGE ANALYSIS CATTLE DISPOSAL LIQUID
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P258-260 1971 ASAE PUBLICATION PROC-271

200 71 0835 STEWART T A MCILWAIN R
AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILATIVE-CAPACITY POULTR
Y WASTE-STORAGE STORAGE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P261-262 1971 ASAE PUBLICATION PROC-271

200 71 0836 DIESCH S L POMEROY B S ALLRED E R
SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENIC-BACTERIA AERATION
CATTLE AEROBIC-CONDITIONS WASTE-STORAGE OXIDATION-DITCH DETECTION LEPTOSPIRES
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P263-266 1971 ASAE PUBLICATION PROC-271

200 71 0837 CONVERSE J C DAY D L PFEFFER J T JONES B A
AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS KEYWORD BIODEGRADAT
ION HYDROGEN-SULFIDE ORGANIC-ACIDS OXIDATION-REDUCTION-POTENTIALS CONTROL ODORS LIQUID SWINE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P267-271 1971 ASAE PUBLICATION PROC-271

200 71 0838 CHANG A C DALE A C BELL J M
NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WASTES KEYWORD NITR
IFICATION NITROGEN-CYCLE DIGESTION DENITRIFICATION DAIRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P272-274 1971 ASAE PUBLICATION PROC-271

200 71 0839 TEN HAVE P
AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE KEYWORD DENITRIFICATION ACTIVATED-SLUDGE COSTS SLURRY AEROBI
C
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P275-278 1971 ASAE PUBLICATION PROC-271

200 71 0840 BARTH C L POLKOWSKI L B
LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FARM-LAGOONS SLURRY
AERATION STROAGE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P279-282 1971 ASAE PUBLICATION PROC-271

200 71 0841 OGILVIE J R DALE A C
SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRIGATION WASTE-STORAG
E CHEMICAL-OXYGEN-DEMAND AERATION DAIRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P283-285 1971 ASAE PUBLICATION PROC-271

200 71 0842 WESLEY R L HALE E B PORTER H C
THE USE OF OXIDATION PONDS FOR POULTRY PROCESSING WASTE DISPOSAL KEYWORD INDUSTRIAL-WASTES ODOR POULTRY
DISPOSAL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P286-287 1971 ASAE PUBLICATION PROC-271

200 71 0843 HILL D T SMITH R E
ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS KEYWORD ACTIVATED-SLUDGE ANAEROBIC-DIGESTION L
AG-TIME BIOCHEMICAL-OXYGEN-DEMAND TIME-CONSTANT
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P288-290 1971 ASAE PUBLICATION PROC-271

200 71 0844 TAYLOR J C
REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORD ADMINISTRATIVE AGENCIES LEGISLATION
REGULATORY RECYCLED
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P291-292 1971 ASAE PUBLICATION PROC-271

200 71 0845 ANTHONY W B
CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS NEMATODES FEEDLOTS WA
STELAGE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P293-296 1971 ASAE PUBLICATION PROC-271

200 71 0846 BULL L S REID J T
NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POULTRY ANIMAL-PATHOL
OGY COLIFORMS NUTRIENT-REQUIREMENTS COSTS AIR-DRIED-CHICKEN-MANURE-ADM
LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT PROCEEDINGS INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTES
OHIO STATE UNIVERSITY APRIL 19-22 1971 P 297-300 7 TAB 14 REF

200 71 0847 FONTENOT J P WEBB K E HARMON B W TUCKER R E MOORE W E
STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINANTS KEYWORD RECYC
LING CATTLE NUTRITIONAL-REQUIREMENTS ANIMAL-PATHOLOGY VALUE BROILER-LITTER
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P301-304 1971 ASAE PUBLICATION PROC-271

200 71 0848 FLEGAL C J ZINDEL H C
DEHYDRATED POULTRY WASTE DPW AS A FEEDSTUFF IN POULTRY RATIONS KEYWORD RECYCLING NUTRITIONAL-REQUIREME
NTS DEHYDRATED-POULTRY-WASTE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P305-307 ASAE PUBLICATION PROC-271

200 71 0849 BUCHOLTZ H F HENDERSON H E THOMAS J W ZINDEL H C
DRIED ANIMAL WASTE AS A PROTEIN SUPPLEMENT FOR RUMINANTS KEYWORD RECYCLING POULTRY NUTRITIONAL-REQUIREME
NTS PROTEIN-SUPPLEMENT
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P308-310 1971 ASAE PUBLICATION PROC-271

200 71 0850 HODGETTS B
THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYCLING COSTS DRYING
RESPONSE IRRIGATION DAIRY
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P311-313 1971 ASAE PUBLICATION PROC-271

200 71 0851 SMITH L W GOERING H K GORDON C H
NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS FARM-WASTES RECY
CLING DRYING CATTLE SHEEP NUTRIENT-REQUIREMENTS CHEMICAL-DEGRADATION LIGNINS CELLULOSE WOOD-WASTES
LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT PROCEEDINGS INTERNATIONAL SYMPOSIUM ON LIVESTOCK WASTES
OHIO STATE UNIVERSITY APRIL 19-22 1971 P 314-318 8 TAB 5 REF

200 71 0852 CALVERT C C MORGAN N O EBY H J
BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES THEIR NUTRITIONAL VALUE TO THE GROWING CHICK KEYWORD RECYC
LING INSECTS LARVAE DRYING NUTRIENT-REQUIREMENTS
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P319-320 1971 ASAE PUBLICATION PROC-271

200 71 0853 WILKINSON S R STUEDEMANN J A WILLIAMS D J JONES J B DAWSON R N
RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE OF BEEF COW HEALTH P
ROBLEMS KEYWORD FERTILIZERS CROP-RESPONSE NUTRIENT-REQUIREMENTS RECYCLING BROILER LITTER FESCUE-PASTURE
S DISPOSAL HEALTH
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P321-324 1971 ASAE PUBLICATION PROC-271

200 71 0854 GOODRICH P R MONKE E J
MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMOVAL SPRINKLER-IRRIG
ATION LEACHING CLAY-LOAM PHOSPHORUS-RADIOISOTOPES MOVEMENT
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P325-328 1971 ASAE PUBLICATION PROC-271

200 71 0855 KOELLIKER J K MINER J R BEER C E HAZEN T E
TREATMENT OF LIVESTOCK-LAGOON EFFLUENT BY SOIL FILTRATION KEYWORD ANAEROBIC-LAGOON-EFFLUENT TREATMENT S
OIL-FILTRATION
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P329-333 1971 ASAE PUBLICATION PROC-271

200 71 0856 OVERMAN A R HORTENSTINE C C WING J M
GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTILIZERS SLURRY NUTRIE
NT-REMOVAL LEACHING CROP RESPONSE
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P334-337 1971 ASAE PUBLICATION PROC-271

200 71 0857 LARSEN V AXLEY J H
NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTER AMMONIA LEACHING
SEWAGE-DISPOSAL NUTRIENT REMOVAL
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P338-340 1971 ASAE PUBLICATION PROC-271

200 71 0858 GRAVES R E CLAYTON J T LIGHT R G
RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANURE KEYWORD SLURRY
SCREENS AERATION RECYCLING COLIFORMS TRANSPORT
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P341-344 1971 ASAE PUBLICATION PROC-271

200 71 0859 CLERUM J C KLOMP G POELMA H R
THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY KEYWORD SIEVE-ANALYSIS SEDIMENTATION DEWATERING
SEPERATION PIG
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P345-347 1971 ASAE PUBLICATION PROC-271

200 71 0860 ROSS I J BEGIN J J MIDDEN T M
DEWATERING POULTRY MANURE BY CENTRIFUGATION KEYWORD CENTRIFUGATION DEWATERING POULTRY MANURE WASHING
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P348-350 1971 ASAE PUBLICATION PROC-271

200 71 0861 HOLMES L W DAY D L PFEFFER J T
CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYCLING CENTRIFUGATION
HOGS NUTRIENTS CHEMICAL ANALYSIS PROTEINS AERATION OXIDATION-DITCH
PROC INTER SYM LIVESTOCK WASTES, OHIO STATE U P351-354 1971 ASAE PUBLICATION PROC-271

200 71 1033 FARRELL J B
NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FARM-ANIMALS UREA A
CTIVATED-CARBON CHLORINATION DENITRIFICATION INDUSTRIAL-WASTES WASTE-TREATMENT AIR-POLLUTION NITRIC-ACID
PROCEEDINGS OF SYMPOSIUM ON NITROGEN IN SOIL AND WATER HESPELER ONTARIO CANADA MARCH 30-31 1971 14 P
3 TAB 2 FIG 13 REF

200 71 1094 BORDEAUX JR A F
AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SURFACE-WATERS TECH
NOLOGY FERTILIZERS CONSERVATION INSECTICIDES FARM-WASTES NITRATES FARM-PRICES COSTS WASTE-DISPOSAL WATER
-TREATMENT DDT REGULATION KENTUCKY AGRICULTURE
PRESENTED AT THE COLLEGE OF AGRICULTURE ANNUAL CONFERENCE UNIVERSITY OF KENTUCKY LEXINGTON JAN 5-7 1971
P 1-7 6 REF

200 71 1095 DOROUGH H W
BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS AGRICULTURE KENTUCKY RUNOFF
FARM-WASTES SURFACE-WATERS INSECTICIDES TOXICITY SOILS DAIRY-INDUSTRY EROSION FERTILIZERS LIVESTOCK AIR
-POLLUTION WATER-POLLUTION SOIL-CONTAMINATION SEDIMENTATION TOBACCO-INDUSTRY ENVIRONMENTAL-QUALITY
PRESENTED AT THE COLLEGE OF AGRICULTURE ANNUAL CONFERENCE UNIVERSITY OF KENTUCKY LEXINGTON JAN 5-7 1971
P 8-13

200 71 1096 BARFIELD B J HAMILTON H E ROSS I J
ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLOGY WASTE-DISPOSAL
LAGOONS KENTUCKY INSECTICIDES ODOR LIVESTOCK OXIDATION-LAGOONS FARM-WASTES AIR-POLLUTION WATER-POLLUTION
SOIL-CONTAMINATION COMPOSTING MICROBIAL-DISPOSAL
PRESENTED AT THE COLLEGE OF AGRICULTURE ANNUAL CONFERENCE UNIVERSITY OF KENTUCKY LEXINGTON JAN 5-7 1971
P 8-13

200 71 1099 HOTTLE G A
SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POLLUTION-CONTROL WA
STES PATHOGENIC-BACTERIA CONFERENCES PUBLIC-HEALTH RIVERS SEWAGE BIOCHEMICAL-OXYGEN-DEMAND SOLID-WASTES AM
MONIA NITROGEN-COMPOUNDS NITRATES PHOSPHATES SLUDGE-TREATMENT DISSOLVED-OXYGEN BACTERIA FUNGI PROTOZOA FER
MENTATION BACTERIOPHAGE NUTRIENTS FILTERS-EQUIPMENT OXIDATION LAKES WISCONSIN ANAEROBIC-DIGESTION ALGAE EU
TROPHICATION BIODEGRADATION PLASTICS PHOSPHORUS-COMPOUNDS
LIVERPOOL JULY 13-15 1971 12 P 11 REF

200 71 1234 TOETZ D W
SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS OXIDATION-LAGOONS WATER-P
OLLUTION-EFFECTS FARM-WASTES OKLAHOMA CYANOPHYTA CHLORELLA IONS PHYTOPLANKTON NITRATES NITROGEN-FIXATION A
LGAE CONDUCTIVITY CHLOROPHYLL PIGMENTS DISPERSION RUNOFF FEEDLOTS LEMNA
PROCEEDINGS OKLAHOMA ACADEMY OF SCIENCE VOL 51 1971 P 30-35 2 TAB 4 FIG 11 REF

200 71 1252 DAWES J H LARSON T E HARMESON R H
NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS NITROGEN-COMPOUND
S ILLINOIS HYDROLOGIC-CYCLE FERTILIZERS INDUSTRIAL-WASTES DECOMPOSING-ORGANIC-MATTER ORGANIC-WASTES DOMEST
IC-WASTES LIVESTOCK PRECIPITATION-ATMOSPHERIC WATER-QUALITY CHEMICAL-ANALYSIS SOILS SOIL-WATER SEEPAGE SOR
PTION CROPS NITRATES
FRONTIERS IN CONSERVATION PROCEEDINGS 24TH ANNUAL MEETING SOIL CONSERVATION SOCIETY OF AMERICA COLORADO
STATE UNIVERSITY FORT COLLINS AUG 10 13 1969 P 94-102 6 TAB 8 FIG 6 REF

200 72 1010 GILBERTSON C B ET AL
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES MANAGEMENT AIR-PO
LLUTION WATER-POLLUTION SOIL-CONTAMINATION WASTE-TREATMENT WASTE-STORAGE WASTE-DISPOSAL RUNOFF FEED-LOTS
NEBRASKA
NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 133 P 2 TAB 98 REF

200 72 1011 YECK R G
NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER RECYCLING LIVESTOCK AIR-POLLUTION WATER-POLLUTION SOIL-CONTAMINATION RUNOFF WASTE-DISPOSAL WASTE-TREATMENT ODOR NEBRASKA LIVESTOCK-WASTE-MANAGEMENT-RESEARCH
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 5-10

200 72 1012 KLEIS R W
REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK FARM-WASTES MANAGEMENT AIR-POLLUTION WATER-POLLUTION WASTE-TREATMENT WASTE-STORAGE WASTE-DISPOSAL RECYCLING NITROGEN NUTRIENTS CONFINEMENT-PENS SOIL US-DEPARTMENT-OF-AGRICULTURE ENVIRONMENTAL-PROTECTION-AGENCY
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 11-15 1 TAB

200 72 1013 ELLIOTT L F
POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOIL-CONTAMINATION FARM-WASTES FEEDLOTS ODOR SURFACE-WATERS GROUNDWATER LIVESTOCK SPECTROSCOPY CHROMATOGRAPHY NITRATES OXIDATION SOIL-PROFILES NEBRASKA KANSAS
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 23-28 28 REF

200 72 1014 WITTMUSS H
APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT FARM-WASTES LIVESTOCK FEED-LOTS RUNOFF IRRIGATION NITRATES NEBRASKA KANSAS NORTH-DAKOTA MOUNDING
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 31-35

200 72 1015 NIENABER J A
DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE RUNOFF DRAINAGE FLUMES TERRACING NEBRASKA RUNOFF-CONTROL-SYSTEM DEBRIS-BASIN HOLDING-POND DISPOSAL-AREA
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 39-45 18 REF

200 72 1016 ELLIS J R
CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF THERMAL-PROPERTIES NUTRIENTS NITRATES PHOSPHORUS AMMONIA PATHOGENIC-BACTERIA WATER-POLLUTION PHYSICAL-PROPERTIES CHEMICAL-PROPERTIES BIOLOGICAL-PROPERTIES ANIMAL-PARASITES AMINO-ACIDS WASTE-DISPOSAL POLLUTION-POTENTIAL WASTE-MANAGEMENT
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 49-53 29 REF

200 72 1017 FARLIN S
WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT NUTRITION NEBRASKA MISSOURI IOWA MINNESOTA GAINS ANIMAL-PERFORMANCE MOUNDING COLD WARM-SLOT-HOUSING
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 57-59 5 REF

200 72 1018 OLSON E A
EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS NEBRASKA ECONOMICS OXIDATION-LAGOONS HOGS WASTE-DISPOSAL VENTILATION FARM-WASTES ODOR FEED-LOTS CATTLE HOGS INLETS-WATERWAYS NEBRASKA-LIVESTOCK-FEEDERS-ASSOCIATION DEPARTMENT-OF-ENVIRONMENTAL-CONTROL VOLUNTARY-WASTE-CONTROL REGULATORY-WASTE-CONTROL REGULATORY-WASTE-CONTROL AMERICAN-SOIL-CONSERVATION-SOCIETY
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 63-66

200 72 1019 KREJCI W
PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS FEED-LOTS FARM-WASTES RUNOFF ODOR CATTLE HOGS LAGOONS SURFACE-WATERS NEBRASKA AIR-POLLUTION LEGAL-ASPECTS AGRICULTURAL-RESEARCH-SERVICE DEPARTMENT-OF-ENVIRONMENTAL-CONTROL
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REPORT NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 69-71

200 72 1020 MCCALLA T M SCHUMAN G E
POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOIL-CONTAMINATION FEED-LOTS ODOR RUNOFF WASTE-STORAGE WASTE-TREATMENT WASTE-DISPOSAL LIVESTOCK FARM-WASTES NITRATES GROUNDWATER ABANDONED-FEEDLOT-RECLAMATION
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION NOV 29-30 1972 P 75-79

200 72 1021 CROSS O E
APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS WASTE-DISPOSAL RECYCLING WATER-POLLUTION APPLICATION-METHODS IRRIGATION SOIL-MANAGEMENT PHYSICAL-PROPERTIES CHEMICAL-PROPERTIES RUNOFF GROUNDWATER EFFLUENTS NITRATES CENTRIFUGATION CONDUCTIVITY PHYTOTOXICITY CATTLE HENS TURKEYS MICRONUTRIENTS
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 83-89 14 REF

200 72 1022 SWANSON N P
RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEYWORDS FEED-LOT WASTE-DISPOSAL NEBRASKA FARM-WASTES POLLUTANTS CATTLE GRAVITY IRRIGATION RUNOFF EFFLUENTS INFILTRATION ENVIRONMENTAL-PROTECTION-AGENCY UNIVERSITY-OF-NEBRASKA-FIELD-LABORATORY SOIL-CONSERVATION-SERVICE BUFFER-STRIPS FIELD-DISPOSAL MEAT-ANIMAL-RESEARCH-CENTER
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 93-97 4 REF

200 72 1023 GILBERTSON C B
CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES CHEMICAL-PROPERTIES FEED-LOTS COLIFORMS PATHOGENIC-BACTERIA LAGOONS MANAGEMENT WASTE-DISPOSAL DEGRADATION RUNOFF CATTLE CATONIC-NUTRIENTS MOUNDING MICROBIAL-PROPERTIES
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCOLN NOV 29-30 1972 P 101-103 29 REF

200 72 1024 BOND T E
WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASKA RECYCLING POLLUTANTS ODOR WASTE-DISPOSAL CONFINEMENT-PENS FEED-LOTS NUTRIENTS OXIDATION WASTE-TREATMENT TRANSPORTATION HOUSED-CONFINEMENT MEAT-ANIMAL-RESEARCH-CENTER
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUCIN EDUCATION LINCOLN NOV 29-30 1972 P 107-110 1 TAB

200 72 1025 SPLINTER W E
OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL RECYCLING CONFINEMEN
T-PENS AQUATIC-ANIMALS HOGS CATTLE FILTERS NEBRASKA PAUNCH-MANURE HORSES
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCO
LN NOV 29-30 1972 P 113-114

200 72 1026 KINNEY JR T B
REGIONAL ADMINISTRATORS SUMMARY KEYWORDS FARM-WASTES RESEARCH
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCO
LN NOV 29-30 1972 P 117-119

200 72 1027 TEETER H M
REGIONAL ADMINISTRATORS SUMMARY KEYWORDS PROGRAM-PLANNING-REVIEW
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCO
LN NOV 29-30 1972 P 121-124

200 72 1028 GREGORY KEITH E
AREA DIRECTORS SUMMARY KEYWORDS FARM-WASTES MANAGEMENT FEED-LOTS US-MEAT-ANIMAL-RESEARCH-CENTER AGRICULT
URAL-RESEARCH-SERVICE
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCO
LN NOV 29-30 1972 P 125-126

200 72 1029 OTTOSON HOWARD W
CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WASTE-DISPOSAL ODOR
FEED-LOTS CONFINEMENT-PENS NEBRASKA AGRICULTURAL-RESEARCH-SERVICE ENVIRONMENTAL-PROTECTION-AGENCY LAND-AP
PLICATION
PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW NEBRASKA CENTER FOR CONTINUING EDUCATION LINCO
LN NOV 29-30 1972 P 127-129

200 72 1030 JONES R W SLONEKER J H INGLETT G E
RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-LOTS WASTE-DISPOSA
L AMINO-ACIDS PROTEINS FILTRATION CENTRIFUGATION ILLINOIS FRACTIONATING
PROCEEDINGS 18TH ANNUAL INSTITUTE OF ENVIRONMENTAL SCIENCES P 267-269 3 TAB 17 REF

200 72 1054 MCGHEE T TORRENS R L
APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS BIOLOGICAL-TREATMENT FARM-WASTES
FEED-LOTS CATTLE WASTE-WATER-TREATMENT BIOCHEMICAL-OXYGEN-DEMAND AGRICULTURAL-RUNOFF CHEMICAL-OXYGEN-DEMA
ND SEWAGE-TREATMENT AEROBIC-TREATMENT
PAPER PRESENTED AT THE 16TH ANNUAL GREAT PLAINS WASTE WATER DESIGN CONFERENCE OMAHA NEBRASKA MARCH 28 1972
18 P 5 TAB 4 FIG 13 REF

200 72 1089 DAY D L HARMON B G
A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS RECYCLING FEEDS SWINE FARM-WAST
ES AEROBIC-CONDITIONS WATER NUTRIENTS OXIDATION-LAGOONS PROTEINS ODOR-CONTROL RATS WASTE-MANAGEMENT
PAPER NO 72-954 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS DEC 11-15
1972 10 P 7 TAB 5 FIG 21 REF

200 72 1108 SEWELL J I ALPHIN J M
EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS WATER-QUALITY FEEDLOTS LAGGO
NS TENNESSEE FARM-WASTES ON-SITE-INVESTIGATIONS WATER-POLLUTION-SOURCES LAND-USE NITRATES PHOSPHATES DISS
OLVED-OXYGEN COLIFORMS BACTERIA
PAPER PRESENTED AT SOUTHEAST REGION MEETING OF THE AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS AND SOUTHERN
SECTION SOIL CONSERVATION SOCIETY OF AMERICA RICHMOND VIRGINIA FEB 14 1972 8 P 3 TAB 7 REF

200 72 1152 MAHONEY G W A BUTCHBAKER A F FRYREAR J I
PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FALL WINTER PERIOD K
EYWORDS CATTLE WINDBREAKS OXIDATION-LAGOONS WASTE-WATER-TREATMENT FARM-WASTES PRODUCTIVITY FEEDS CROWDIN
G SLOTTED-FLOORS WEIGHT-GAIN
PAPER NO 72-426 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 65TH ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE
27-30 1972 18 P 1 TAB 5 FIG 6 REF

200 73 1062 FERRELL C L GARRETT W N
CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CALCIUM NUTRIENT-REQ
UIREMENTS WASTE-DISPOSAL CALIFORNIA RATION DIGESTION-STALLS FORCED-AIR-OVENS DIGESTIBILITY
PROCEEDINGS WESTERN SECTION AMERICAN SOCIETY OF ANIMAL SCIENCE VOL 24 1973 P 415-419 5 TAB 5 REF

200 73 1082 PARKER H W ALBUS JR C J SMITH G L
COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS CATTLE FEEDLOTS W
ASTE-DISPOSAL RECYCLING ELECTRICITY FARM-WASTES GASES FUELS FERTILIZERS BY-PRODUCTS SODIUM-CHLORIDE PYROLY
SIS MUNICIPAL-WASTES RETORT CHAR POLLUTION-ABATEMENT
PAPER 43 B-RV AMERICAN INSTITUTE OF CHEMICAL ENGINEERS 74TH NATIONAL MEETING NEW ORLEANS MARCH 12 197
3 4 TAB 5 FIG 17 REF

200 73 1083 MASSIE JR J R PARKER H W
CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPOSAL RECYCLING SOL
ID-WASTES OXIDATION TEMPERATURE ENERGY BY-PRODUCTS ECONOMICS TEXAS AIR-POLLUTION WATER-POLLUTION DRYING
PYROLYSIS CONTINUOUS-REFUSE-RETORT MUNICIPAL-REFUSE AGRICULTURAL-CROP-WASTES CHAR-PRODUCT FUEL
PAPER NO 43A AMERICAN INSTITUTE OF CHEMICAL ENGINEERS 74TH NATIONAL MEETING NEW ORLEANS MARCH 12-15
1973 31 P 12 FIG 3 REF

200 73 1093 SMITH L W CALVERT C C MENEAR J R
DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS FARM-WASTES ARSENIC SHEEP NIT
ROGEN FEEDS GROWTH NUTRITION CHEMICAL-PROPERTIES RECYCLING POULTRY-MANURE-SUPPLEMENTED-DIETS FEED-ADDITIV
ES DIGESTIBILITY SOYBEAN-OIL-MEAL
PROCEEDINGS 1973 MARYLAND NUTRITION CONFERENCE FOR FEED MANUFACTURERS THE UNIVERSITY OF MARYLAND THE M
ARYLAND FEED INDUSTRY INCORPORATED AND THE AMERICAN FEED MANUFACTURERS ASSOCIATION MARCH 15-16 1973 P 3

200 73 1189 MILLER A L
A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS FERTILIZERS CATTLE
NITROGEN PHOSPHORUS SILAGE MISSOURI MONTANA
MONTANA AGRICULTURE FOCUS ON IMPROVING THE ENVIRONMENT COLLEGE OF GREAT FALLS DEC 3 4 1970 P 44-46

300 1077 STEWART B A MATHERS A C
SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES KEYWORDS FEED-LO
TS FARM-WASTES WATER-POLLUTION SOIL-CONTAMINATION CATTLE NITRATES POLLUTANTS SOIL-PROFILES WASTE-DISPOSAL
WATER SALT LEACHING SOIL-CONDITIONS CROPLANDS
CONTRIBUTION FROM SOIL AND WATER CONSERVATION RESEARCH DIVISION AGRICULTURAL RESEARCH SERVICE US DEPA
RTMENT OF AGRICULTURE IN COOPERATION WITH THE TEXAS AGRICULTURAL

300 1105 ANON
RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-CONTROL WASTE-DIS
POSAL DOMESTIC-ANIMALS LEGISLATION FEEDS WATER-POLLUTION-SOURCES WATER-POLICY ADMINISTRATIVE-AGENCIES REGU
LATION PROGRAMS STANDARDS STREAMS RIVERS POLLUTION-ABATEMENT ADMINISTRATION CATTLE POULTRY WATER-FOWL ANI
MALS LEGAL-ASPECTS WASTE-DISPOSAL FARM-WASTES
NEBRASKA WATER POLLUTION CONTROL COUNCIL LINCOLN 2 P

300 26 1204 ANONYMOUS
OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS OHIO MUNCIPAL-W
ASTES GARBAGE-DUMPS POLLUTION-ABATEMENT WATER-POLLUTION WASTE-DISPOSAL LEGAL-ASPECTS JUDICIAL DECI-SIONS
STREAMS HOGS RIPARIAN-WATER RIPARIAN-LAND RIPARIAN-RIGHT FARMS FARM-WASTES
153 NE 341 345 OHIO CT APP 1926

300 30 1205 ANONYMOUS
SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS TENNESSEE WATER-POLLU
TION STREAMS REASONABLE-USE CATTLE DOMESTIC-WATER RIPARIAN-RIGHTS WATER-QUALITY SPRING-WATERS SPRINGS LEGA
L-ASPECTS JUDICIAL-DECISIONS WATER-POLLUTION-SOURCES REMEDIES RELATIVE-RIGHTS
12 TENNESSEE APP 496-500 1930

300 46 1207 ANONYMOUS
FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES WATER-POLLUTION
COLD-SPRINGS FARM-WASTES IMPAIRED-WATER-QUALITY PUBLIC-HEALTH SEEPAGE DAMAGES LEGAL ASPECTS DAMAGES-LEGA
L-ASPECTS
197 SW 2D 735-738 ARK 1946

300 46 1208 ANONYMOUS
GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-POLLUTION PRESCRIPT
IVE-RIGHTS SEWAGE-SLUDGE SEWAGE-EFFLUENTS LIVESTOCK-WASTES DISPOSAL FARM-WASTES DECOMPOSING-ORGANIC-MATTE
R RIPARIAN-WATER DAIRY-INDUSTRY DISTRIBUTION-SYSTEMS NUISANCE-WATER-LAW LEGAL-ASPECTS JUDICIAL-DECISIONS P
OULTRY
303 KENTUCKY 207 197 SW 2D 258-261 1946

300 49 1210 HABEEB W R
MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS DAMAGES WATER-POLL
UTION REASONABLE-USE VALUE MARKET-VALUE DEPRECIATION ECONOMIC-RENT WATER-UTILIZATION ODOR TREES CROPS REC
REATION BOATING SWIMMING FISH LIVESTOCK
49 ALR 2D 253-314

300 53 1206 ANONYMOUS
POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS WATER-POLLUTION-SOURCES POLLUTION-ABATEM
ENT PUBLIC-HEALTH WASTES INDUSTRIAL-WASTES WATER-QUALITY CHEMCONTROL SEWAGE ORGANIC-WASTES LEGISLATION JU
DICIAL-DECISION WATER-SUPPLY HOGS WATER-QUALITY-CONTROL DYE-STUFFS SLAUGHTER-HOUSES
DELAWARE CODE ANNOTATED TITLE 16 SECTIONS 1301-1302 1953

300 62 0754 ANON
NOTES ON WATER POLLUTION WASTE WATERS FROM FARMS KEYWORDS FARM-WASTES IRRIGATION BOD NITROGEN WASTE-DIS
POSAL
DEPT OF SCIENTIFIC AND INDUSTRIAL RESEARCH JUNE 1972 4 P

300 64 1110 VEATCH J O HUMPHRYS C R
LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES ODOR TOXICITY WA
TER-POLLUTION-EFFECTS WATER-QUALITY CATTLE DEFINITIONS WATER-BLOOM TOXIC-ALGAE RECREATIONAL-USE
BULLETIN FROM MICHIGAN AGRICULTURAL COLLEGE EXPERIMENT STATION EAST LANSING 1964 P 241 1 FIG

300 65 0053 ANON
FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCRAPERS SPREADERS HA
NDLING
MECHANIZATION LEAFLET 8 MINISTRY OF AGR, FISHERIES AND FOOD DEC 1965

300 65 0739 CHRISTY M BROWN J R MURPHY L S
NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
SCI AND TECH GUIDE, U MISSOURI EXT COLUMBIA P9808-09 MAR 65

300 65 0757 IRGENS R L DAY D L
AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA NITRATE PHOSPHATE OD
OR TREATMENT SWINE
ILLINOIS RESEARCH U ILL AGR EXP STA FALL 1965 P14-15

300 67 0701 GRAY M W
WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHKILL STREPTOCOCCUS C
ATTLE LAGOON IRRIGATION
ENVIR HEALTH SERVICES KAN ST DEPT HEALTH 14P MAR 67

300 67 0710 BLACK S A
FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONOMICS FEEDLOT DISPO
SAL
THE ONTARIO WAT RESOURCES COMMISSION PUB NO 28 36P DEC 1967

300 67 0711 ENGBERG R A
THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOLATING-WATER PUMPING
CATTLE NITRATE
NEBRASKA WATER SURVEY PAPER 21 LINCOLN 17P OCT 1967

300 67 1249 ANONYMOUS
AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS WATER-POLLUTION-
CONTROL WATER-POLLUTION STATE-GOVERNMENTS STATE-JURISDICTION ADMINISTRATION REGULATION ADMINISTRATIVE-AGE
NCIES LEGAL-ASPECTS PERMITS STANDARDS WATER-POLLUTION-SOURCES TREATMENT-FACILITIES PUBLIC-HEALTH CATTLE SH
EEP FARM-WASTES FARMS
REGULATIONS NO 28-18-1 THRU 28-18-4 KANSAS DEPARTMENT OF HEALTH ENVIROMENTAL HEALTH SERVICES TOPEKA KAN
SAS MAY 1967 4 P

300 67 1250 STEWART B A VIETS JR F G HUTCHINSON G L KEMPER W D CLARK F E
DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MIDDLE SOUTH PLATTE V
ALLEY OF COLORADO KEYWORDS NITRATES AMMONIA WATER-POLLUTION-SOURCES CORES FIELDS PLANTS ALFALFA CEREAL
-CROPS IRRIGATED-LAND COLORADO GROUNDWATER PERCOLATION NATIVE-GRASSES FEEDLOTS CORRALS SOUTH-PLATTE-VALL
EY-COLO NITRATES COLORADO
U S DEPARTMENT OF AGRICULTURE AGRICULTURAL RESEARCH SERVICE DEC 1967 206 P 25 TAB 31 FIG 13 REF

300 67 1253 MCKINNEY R E BELLA R
WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATMENT AEROBIC-TREAT
MENT HOGS FARM-LAGOONS SETTLING-BASINS SOIL-DISPOSAL-FIELDS SEWAGE-TREATMENT DISPOSAL ENVIRONMENTAL-ENGIN
EERING SLUDGE-DISPOSAL WASTE-STORAGE HOG-FARM-WASTES
KANSAS WATER RESOURCES RESEARCH INSTITUTE PROJECT COMPLETION REPORT CONTRIBUTION NO 24 KANSAS UN
IVERSITY LAWRENCE 1968 88 P 12 TAB 21 FIG 13 REF

300 68 0256 ABBOTT J L
USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENEFICIAL-USE
BULLETIN A-55, AGR EXPT STAT AND COOPERT EXT SERV, UNIV ARIZ

300 68 0352 SCHWIESOW W F BRODIE H L EBY H J
DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SEPTIC-TANKS SOIL-DI
SPOSAL FLUSHING-GUTTERS DISPOSAL SWINE STREAM-POLLUTION
UNIV OF MARYLAND WATER RESOURCES RESEARCH CENTER COMPLETION REPORT 11PP 1970 OWRR PROJ A-004-MD 1

300 68 0702 ANON
BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS STREPTOCOCCUS LAKE
RECREATION TEXAS
U S DEPT INT FWPCA KERR WAT RESEARCH CENTER ADA OKLA 37P 68

300 68 0741 ANON
RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACILITIES AND GUIDELINE
S FOR CONSTRUCTION OF SEALED EVAPORATION AND RETENTION PONDS KEYWORDS COLORADO CONFINEMENT-PENS FEEDLOTS
FARM-WASTES COLORADO DEPT OF HEALTH, WATER POLLUTION CONTROL COMM DENVER RULES GUIDELINES EVAPORATION
APRIL 10 1968 11 P 3 FIG

300 68 0749 DAY D L CONVERSE J C JONES D D
ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PENS AMMONIA FOAMING
ROTOR-AERATION SWINE
ILL RESEARCH, U ILL AGR EXP STA S68 P16-17 1968

300 68 1043 WADLEIGH C H
WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS WATER-POLLUTION-SOURCES WATER-POLLUTION-EFFECTS
AGRICULTURE FORESTRY AGRICULTURAL-CHEMICALS FERTILIZERS PESTICIDES FARM-WASTES FARM-MANAGEMENT ORGANIC-WA
STES INDUSTRIAL-WASTES FOREST-MANAGEMENT SEDIMENT-LOAD MICROORGANISMS FARM-AND-FORESTRY-WASTES
DEPT OF AGRICULTURE MISC PUBLICATION NO 1065 MARCH 1968 112 P 4 TAB 1 FIG 139 REF

300 68 1122 WITZEL S MCCOY E ATTOE O J POLKOWSKI L B CRABTREE K T
NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTILIZERS ESSENTIAL-N
UTRIENTS NITRIFICATION CROPS TOXICITY SOIL-POROSITY IRRIGATION GROUNDWATER RUNOFF FROZEN-GROUND SOIL-EROS
ION WATER-POLLUTION DENTRIFICATION PHOSPHORUS-COMPOUNDS ALGAE AQUATIC-PLANTS NITROGEN-CYCLE FARM-WASTE G
ROUND-WATER NITRATES EUTROPHICATION WATER-POLLUTION-SOURCES AGRICULTURAL-WATERSHEDS
TECHNICAL COMPLETION REPORT WATER RESOURCES CENTER UNIVERSITY OF WISCONSIN MADISON DEC 1968 65 P 15 TAB 12
FIG 27 27 REF

300 68 1123 PRATT G L
A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER KEYWORDS WATER-RE
USE STOCK-WATER DOMESTIC-ANIMALS FARM-WASTES POTABLE-WATER SOLID-WASTES URINE WATER-POLLUTION AERATION AER
OBIC-TREATMENT COAGULATION FILTERING-SYSTEMS FILTRATION FLOCCULATION OXIDATION WASTE-STORAGES WASTE-WATER-
TREATMENT WATER-PURIFICATION WATER-TREATMENT BIOLOGICAL-TREATMENT
RESEARCH PROJECT TECHNICAL COMPLETION REPORT TO OFFICE OF WATER RESOURCES RESEARCH WASHINGTON D C DEC 19
68 24 P 11 TAB 2 REF

300 68 1202 ANONYMOUS
OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICIDE POLLUTING POND.
OF ADJACENT LANDOWNER KEYWORDS ALABAMA WATER-POLLUTION INSECTICIDES RAINFALL CATTLE PONDS STREAMS FEDE
RAL-GOVERNMENT ADMINISTRATIVE-AGENCIES RAIN LEGAL-ASPECTS JUDICIAL-DECISIONS WATER-POLLUTION-EFFECTS WAT
ER-POLLUTION-SOURCES POLLUTANTS WATER-WELLS DAMAGES REMEDIES REGULATION
294 F SUPPLEMENT 400-405 S D ALA 1968

300 68 1209 ANONYMOUS
ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILITY FOR CATTLE WASTE
RUNOFF KEYWORDS CATTLE WASTE-WATER-POLLUTION DAMAGES KANSAS WATER-POLLUTION-SOURCES FARM-WASTES POLLUTI
ON-ABATEMENT SURFACE-RUNOFF WATER-POLLUTION-EFFECTS WATER-POLLUTION-CONTROL REMEDIES LEGAL-ASPECTS JUDICIA
L-DECISIONS LIVESTOCK STOCK-WATER WATER-SUPPLY WATER-WELLS
436 P2D 816-828 KAN 1968

300 69 0001 MUEHLING A J
SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBIC-TREATMENT ANAER
OBIC ODOR OXIDATION-DITCH SPACE-REQUIREMENTS LEGAL-IMPLICATIONS SWINE HOUSING MANAGEMENT
DEPT OF AG ENGR COLLEGE OF AG UNIV OF ILLINOIS AUGUST 1969 91 P 232 REF

300 69 0002 MUEHLING A J
SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPTH SLUDGE MANAGEMENT
INLETS OUTLETS LOADING-RATES SOLIDS TEMPERATURE SWINE MANAGEMENT LAGOONS
COOP EXT SERVICE, UNIV OF ILL AUG 1969 AENG-877

300 69 0003 MUEHLING A J
CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEASON MANAGEMENT PERF
ORMANCE CONFINEMENT SWINE HOUSING REQUIREMENTS
COOP EXT SERVICE, UNIV OF ILL AUGUST 1969 AENG-874

300 69 0004 MUEHLING A J
CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-CONCRETE WOOD METAL
DIMENSIONS SPACING FAILURE DURABILITY CORROSION CONFINEMENT SWINE HOUSING
COOP EXT SERVICE, UNIV OF ILL AUG 1969 AENG-875

300 69 0005 MUEHLING A J
SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMICAL&BIOLOGICAL-PROPE
RTIES ANTIBIOTICS NITROGEN POTASH BOD COD NUTRIENTS FERTILIZER-VALUE SWINE MANAGEMENT-PROPERTIES
COOP EXT SERVICE UNIV OF ILL AUG 1969 AENG-876

300 69 0006 MUEHLING A J
SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DESIGN COSTS ROTOR VO
LUME STORAGE OXYGEN BOD EFFLUENT RATE-OF-FLOW FOAMING SLUDGE ODORS SWINE MANAGEMENT-OXIDATION-DITCH
COOP EXT SERVICE, UNIV OF ILL AUG 1969 AENG-878

300 69 0007 MUEHLING A J
SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBON-DIOXIDE AMMONIA H
YDROGEN-SULFIDE METHANE LETHAL-SITUATIONS STORAGE-PIT SWINE MANAGEMENT
COOP EXT SERVICE, UNIV OF ILL AUG 1969 AENG-879

300 69 0062 DAGUE R R KLINE K J
MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF STORAGE BOD COD NU
TRIENTS MANAGEMENT CATTLE
ISU WAT RESOU RES INST REPT 69-4 USDC CLEARINGHOUSE PB190830JUNE 30 1969 195 P

300 69 0093 DAGUE R R PAULSON W L KLINE K J
HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM FLOW RECURRENCE-
INTERVAL POPULATION-EQUIVALENT FEEDLOT-RUNOFF HYDROLOGIC CONTROL
UNIVERSITY OF IOWA DEPARTMENT OF CIVIL ENGINEERING IOWA CITY REPORT NO 69-2 1969 37 P

300 69 0300 ANON
WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWORD ODOR FEEDLOTS AI
R-POLLUTION AMMONIA SPRINKLER-IRRIGATION LAGOON MICROBIAL BACTERIA RUNOFF MANAGEMENT BEEF
RESEARCH COMMITTEE GREAT PLAINS AGR COUNCIL 11 P JULY 1969

300 69 0317 SULLIVAN R J
AIR POLLUTION ASPECTS OF ODOROUS COMPOUNDS KEYWORDS AIR ODOROUS
US DEPT COMMERCE NATL TECH INFO SERVICE PB 188 089 SEPT 69 245 P

300 69 0467 FOSNAUGH J STEPHENS E R
IDENTIFICATION OF FEEDLOT ODORS KEYWORDS AMINES IDENTIFICATION ODORS
STATEWIDE AIR POLLUTION RESEARCH CENTER PP1-24 APRIL 1969

300 69 0631 SOBEL A T LUDINGTON D C HASHIMOTO A G BURNETT W E DONDERO N C GORMEL
B
ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS THEY RELATE TO AIR PO
LLUTION KEYWORDS ODOR AMMONIA HYDROGEN-SULFIDE GAS-CHROMATOGRAPHY PARTICULATE POULTRY MANAGEMENT SYSTEM
S
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 1969 P1-106

300 69 0632 BURNETT W E
QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATOGRAPHY ORGANIC-COMP
OUNDS AMMONIA HYDROGEN SULFIDE NITROGEN ORGANOLEPTIC-TECHNIQUES DETERMINATION ODOR CHICKEN
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P2-17

300 69 0633 SOBEL A T BURNETT W E
THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE DILUTION AMMONIA M
OISTURECONTENT OLFACTORY-THRESHOLD-TEST DETERMINATION ODOR CHICKEN
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P18-39

300 69 0634 BURNETT W E
ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS CARBON-DIOXIDE HYD
ROGEN-SULFIDE HUMIDITY TEMPERATURE CHEMICAL-DETECTION SULFUR-DIOXIDE ANALYSIS POULTRY
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P40-46

300 69 0635 LUDINGTON D C SOBEL A T HASHIMOTO A G
GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHANE AMMONIA CARBON
DIOXIDE CHICKEN
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P47-64

300 69 0636 BURNETT W E
PARTICULATE MATTER KEYWORDS CIRCULATION GAS-CHROMATOGRAPHYFILTER-PADS POULTRY-DUST ODOR-PANEL PARTICULA
TE
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P65-70

300 69 0637 BURNETT W E DONDERO N C
SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC- COMPOUNDS AMMONIA HYDROGEN-SULFIDE SOIL-COLUMN
S ODORS
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P71-86

300 69 0638 BURNETT W E GORMEL B
ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-DIOXIDE CHLORINE O
DOR CONTROLS TREATMENT
AIR POL FINAL REPORT NEW YORK ST DEPT HEALTH APR 69 P87-97

300 69 0735 BUTLER R G
SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-BASIN CONFINEMENT-P
ENS HYDROGEN-ION-CONCENTRATION BIOCHEMICAL-OXYGEN-DEMAND SULFATE METHANE TREATMENTS
RES PROJ TECH COMP REPORT N DAK ST U AGREE NO 14-01-0001-1402 FARGO P1-35 DEC 1969

300 69 1044 OLSEN R J
EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL
NITROGEN KEYWORDS NITRIFICATION SOIL-NITROGEN PUBLIC-HEALTH SOIL-LEACHING GROUNDWATER SOIL-PROFILES WA
TER-TABLE SURFACE-RUNOFF FARM-WASTES AEROBIC-CONDITIONS INCUBATION LAKE-EUTROPHICATION SOIL-PHOSPHORUS AL
FALFA-BROMEGRASS SPRING-THAWS FERTILIZER-NITROGEN
WATER RESOURCES CENTER REPORT OWRR B-004-WIS UNIVERSITY OF WISCONSIN 1969 79 P 6 TAB 5 FIG 49 REF

300 69 1060 ANON
FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA WATER-POLLUTION-SOURCES WATER-POLLUTION-CONTROLWAS
TE-DISPOSAL WATER-QUALITY WATER-QUALITY-CONTROL WASTES INDUSTRIAL-WASTES REFUSE SEWAGE-DISPOSAL STREAMS
RIVERS PUBLIC-HEALTH ADMINISTRATIVE-AGENCIES SEWAGE-EFFLUENTS GASOLINE OIL-WASTES FARM-WASTES CATTLE SHEEP
HOGS
NORTH DAKOTA CENTURY CODE ANNOTATED SECTIONS 61-01-12 THRU 61-01-14 AS AMENDED SUPP 1969

300 69 1061 ANON
RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES LIVESTOCK CONFINEME NT-PENS WATER-POLLUTION-SOURCES CATTLE TREATMENT-FACILITIES WATER-POLLUTION WASTE-DISPOSAL WASTE-WATER-TRE ATMENT WATER-POLLUTION-CONTROL REGULATION PERMITS STATE-GOVERNMENTS ADMINISTRATIVE-AGENCIES LEGISLATION LE GAL-ASPECTS POULTRY ORGANIC-WASTES ADOPTION-OF-PRACTICES WASTE-WATER-DISPOSAL
IOWA WATER POLLUTION CONTROL COMMISSION DES MOINES 1969 3 P

300 69 1103 ANON
ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURCES ADMINISTRATIVE -AGENCIES POLLUTION-ABATEMENT WATERCOURSES-LEGAL SURFACE-WATERS GROUND-WATER WATER-SUPPLY WATER-REUSE WAT ER-SOURCES INDUSTRIAL-WASTES FARM-WASTES SEWAGE WASTE-DISPOSAL WASTE-TREATMENT WATER-USERS WATER-QUALITY S TANDARDS WILDLIFE-CONSERVATION OIL-INDUSTRY SALINE-WATER-INTRUSION TOXINS SEDIMENTS ON-SITE-INVESTIGATIONS HYDROLOGIC-CYCLE
OKLAHOMA LAW REVIEW VOL 22 NO 3 1969 P 317-345 180 REF

300 69 1124 OLSEN R J
EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANSFORMATION OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NITROGEN PUBLIC-HEALTH SOIL-LEACHING GROUNDWATER SOIL-PROFILES WAT ER-TABLE SURFACE-RUNOFF FARM-WASTES AEROBIC-CONDITIONS INCUBATION LAKE-EUTROPHICATION SOIL-PHOSPHORUS ALFA LFA-BROMEGRASS SPRING-THAWS FERTILIZER-NITROGEN
REPORT 1969 WATER RESOURCES CENTER UNIVERSITY OF WISCONSIN MADISON 79 P

300 69 1125 ALLRED E R
ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-WASTES ORGANIC-WAS TES MINNESOTA BIOCHEMICAL-OXYGEN-DEMAND FARMS POLLUTANTS WATER-POLLUTION-SOURCES EUTROPHICATION LIVESTOCK-WASTE-DISPOSAL BROILER-FARMS LIVESTOCK-WASTES-COMPARISON FEEDLOTS MANURE-PRODUCTION FOOD-PRODUCTION-WASTES PROJECTED-LIVESTOCK-FARMS WASTES-MANAGEMENT
WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL WRSC BULLETIN 13 WATER RESOURCES RESEARCH CENT ER UNIVERSITY OF MINNESOTA MINNEAPOLIS JUNE 1969 P 22-28 3 TAB 2 FIG

300 69 1180 WELLS D M COLEMAN E A GRUB W ALBIN R C MEENAGHAN G F
CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUNOFF PRECIPITATIO N WATER-POLLUTION IRRIGATION PERCOLATION WASTE-STORAGE PONDS MANAGEMENT BIOCHEMICAL-OXYGEN-DEMAND NITROG EN AEROBIC-TREATMENT ANAEROBIC-DIGESTION FIELD-CROPS GERMINATION TEXAS CATTLE FLUSHING
CATTLE FEEDLOT POLLUTION STUDY INTERIM REPORT NO 1 TO TEXAS WATER QUALITY BOARD WRC69-7 TEXAS TECH UNIVERS ITY WATER RESOURCES CENTER AUSTIN NOV 1969 34 P 11 TAB 6 FIG

300 69 1203 ANONYMOUS
FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA WATER-POLLUTION-SOURCES WATER-POLLUTION-CONTROL W ASTE-DISPOSAL WATER-QUALITY WATER-QUALITY-CONTROL WASTES INDUSTRIAL-WASTES REFUSE SEWAGE-EFFLUENTS GASOLIN E OIL-WASTES FARM-WASTES CATTLE SHEEP HOGS SEWAGE-DISPOSAL STREAMS RIVERS PUBLIC-HEALTH-ADMINISTRATIVE-A GENCIES
NORTH DAKOTA CENTURY CODE ANNOTATED SECTIONS 61-01-12 THRU 61-01-14 AS AMENDED SUPPLEMENT 1969

300 70 0008 JONES D D DAY D L DALE A C
AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION-DITCH IRRIGATION TREATMENT
UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION BULLETIN 737

300 70 0009 DAY D L JONES D D CONVERSE J C
LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION-DITCH LOADING-RA TES MANAGEMENT
AGRICULTURAL ENGINEERING DEPARTMENT REPORT JULY 1970 UNIVERSITY OF ILLINOIS 97 P

300 70 0010 GILBERTSON C B MCCALLA T M ELLIS J R CROSS O E WOODS W R
THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WASTES AND NITRATE-MOVE MENT ON UNPAVED-BEEF-FEEDLOTS KEYWORDS RAINFALL-RUNOFF CHEMICAL-ANALYSIS EFFECT CHARACTERISTICS SOLID-WAS TES NITRATE-MOVEMENT
PUB SB508 NEBR AG EXP STATION JUNE 1970 23 P

300 70 0073 LEVI D R HOLSTEIN J C
STOCKMEN S LIABILITY UNDER THE MISSOURI NUISANCE LAW KEYWORDS ODOR NOISE LAWSUITS DAMAGES MISSOURI
UNIV OF MISSOURI GUIDE 851 FILE AG ECON 3 3 70 7M

300 70 0204 SHEPPARD C C ED
POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CORN NUTRIENTS POUL TRY PROBLEMS
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 55PAGES MICHIGAN STATE UNIVERSITY

300 70 0205 ZINDEL H C FLEGAL C J
INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DISEASE
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP4-7 MICHIGAN STATE UNIVERSITY

300 70 0206 DAVIDSON J A MACKSON C J
POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION AGITATION COMPRESSE D-AIR POULTRY HANDLING
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP8-9 MICHIGAN STATE UNIVERSITY

300 70 0207 ROBERTSON L S WOLFORD J
THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMICAL-PROPERTIES SOIL -TESTS PH MICHIGAN EFFECT CHICKEN
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP10-15 MICHIGAN STATE UNIVERSITY

300 70 0208 SURBROOK T C BOYD J S ZINDEL H C
DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY COSTS DRYER-OPERATION
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP16-20 MICHIGAN STATE UNIVERSITY

300 70 0209 FLEGAL C J ZINDEL H C
THE UTILIZATION OF POULTRY-WASTE AS A FEEDSTUFF FOR GROWING CHICKS KEYWORDS DEHYDRATION DIETS FEED-EFFIC IENCY DPW POULTRY-WASTE
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP21-28 MICHIGAN STATE UNIVERSITY

300 70 0210 FLEGAL C J ZINDEL H C
THE RESULT OF FEEDING DRIED-POULTRY-WASTE TO LAYING HENS ON EGG-PRODUCTION AND FEED-CONVERSION KEYWORDS DI ETS FAT POULTRY EGG-PRODUCTION FEED-CONVERSION
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP29-30 MICHIGAN STATE UNIVERSITY

300 70 0211 FLEGAL C J ZINDEL H C
THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE ON PRODUCTION, FEED-EFFICIENCY, BODY-WEIGHT, EGG-WEIGHT, SH
ELL-THICKNESS,AND HAUGH-SCORE KEYWORDS EFFECT DEHYDRATED-POULTRY-WASTE PRODUCTION BODY-WEIGH
T
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP31-33 MICHIGAN STATE UNIVERSITY

300 70 0212 FLEGAL C J GOAN H C ZINDEL H C
THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE TO LAYING-HENS ON THE TASTE OF THE RESULTING EGGS TASTE-TE
ST EFFECT DEHYDRATED-POULTRY-WASTE TASTE
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP34-38 MICHIGAN STATE UNIVERSITY

300 70 0213 THOMAS J W
ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-METABOLISM DRY-MATT
ER PROTEIN DIGESTIBILITY POULTRY SHEEP
RESEARCH REPORT 117 FARM SCIENCE MSU-AES JULY 1970 PP42-44

300 70 0383 LEVI D R
PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION MISSOURI POLLUTION-
LAW PORK
UNIV MISSOURI COLUMBIA, AG ECON PAPER 1970-6

300 70 0384 ANON
THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-POLLUTION ECONOMIC
S FARM-WASTES WATER-POLLUTION-CONTROL WATER-USES POLLUTANT-IDENTIFICATION WATER-MEASUREMENT BIOCHEMICAL-OX
YGEN-DEMAND SHEEP CATTLE RUNOFF HOGS DISTRIBUTION GEOGRAPHICAL-REGIONS POLLUTION-POTENTIAL FEEDLOTS SWINE
POULTRY DAIRY-CATTLE CONSUMPTION
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION MARCH 1970 10 TAB 18 FIG 3 REF

300 70 0385 ANON
AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYWORDS DOMESTIC-AN
IMALS AIR-POLLUTION-EFFECTS TOXICITY POLLUTANT-IDENTIFICATION AIR-POLLUTION ATMOSPHERE SMOKE POLLUTANTS P
HYSIOLOGICAL-ECOLOGY LEGISLATION FARM-WASTES LABORATORY-STUDIES INHALATION INGESTION VETERINARY-DIAGONOSIS
ESTHETIC-EFFECTS AUTOMOBILE-EXHAUSTS
AGRICULTURE HANDBOOK NO 380 US DEPARTMENT OF AGRICULTURE AGRICULTURE RESEARCH SERVICE AUGUST 1970 109 P
666 REF

300 70 0414 VIETS F G
THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDWATERS ODORS AMMONIA
DUST NITRATES AIR-POLLUTION PHOSPHOROUS MICROBIAL CATTLE
MONT STATE U SYM AGR RELATED POLL P11-16 FEB 1970

300 70 0455 SPAHR S L
ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RESEARCH-NEEDS CURREN
T-TECHNOLOGY DISPOSAL PROBLEM
ILLINOIS RESEARCH 12 4 , P 4-5, FALL 1970

300 70 0475 BRAIDS O C SOBHAN-ARDAKANI M MOLINA J A E
LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATION CORN REED-CANAR
Y-GRASS SORGHUM N P K NITRATES SLUDGE
ILLINOIS RESEARCH V12 N3 PP6-7 SUMMER 1970

300 70 0487 ST AMANT P P BECK L A
NITRATE-REMOVAL FROM AGRICULTURAL WASTEWATER KEYWORDS ALGAE CALIFORNIA DENITRIFICATION ALGAE-STRIPPING ME
THANOL
WAT QUAL MGT PROBLEMS IN ARID REGIONS OCT 1970 1 USDI FWQA 13030 DYY JUNE 1969

300 70 0488 DIETRICH G N FREEMAN L R
THE EFFECTS OF SALINITY-STANDARDS ON IRRIGATED-AGRICULTURE IN THE COLORADO-RIVER-BASIN KEYWORDS DESALINA
TION FLOW-AUGMENTATION CONSUMPTIVE-USE EFFECTS IRRIGATED-AGRICULTURE
WAT QUAL MGT PROBLEMS IN ARID REGIONS OCT 1970 9-15 USDI FWQA 13030 DYY JUNE 1969

300 70 0489 DEA S J
WATER-QUALITY REQUIREMENTS AND RE-USE OF WASTEWATER EFFLUENTS KEYWORDS NUTRIENT-REMOVAL WASTEWATER-TREAT
MENT FILTERS RE-USE
WAT QUAL MGT PROBLEMS IN ARID REGIONS OCT 1970 37-44 USDI FWQA 13030 DYY JUNE 1969.

300 70 0490 EVANS N A
SALINITY-CONTROL IN RETURN-FLOW FROM IRRIGATED AREAS A DEMONSTRATION-PROJECT KEYWORDS SALT-BALANCE CANAL
-SEEPAGE CONTROL IRRIGATED
WAT QUAL MGT PROBLEMS IN ARID REGIONS OCT 1970 45-55 USDI FWQA 13030 DYY JUNE 1969

300 70 0491 BAIN R C JR MARLAR J T
WATER-QUALITY CONTROL PROBLEMS IN INLAND-SINKS KEYWORDS SALINITY EUTROPHICATION PYRAMID-LAKE-NEV SALTON-
SEA-CAL CONTROL-PROBLEMS
WAT QUAL MGT PROBLEMS IN ARID REGIONS,USDI OCT 1970 57-77

300 70 0492 CYWIN A REY G DEA S J BERNARD H
DISTILLATION OF WASTEWATERS A WATER-RESOURCE FOR ARID-REGIONS KEYWORDS EFFLUENT-REUSE DEMINERALIZATION
DILUTION DISTILLATION ARID-REGIONS
WAT QUAL MGT PROBLEMS IN ARID REGIONS,USDI OCT 1970 85-94

300 70 0592 FRINK C R
PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALTH NUTRIENTS FERTILI
ZERS NITROGEN PHOSPHORUS EUTROPHICATION DISPOSAL
CONNECTICUT AGR EXP STA CIRCULAR 237 MAY1970 P2-10

300 70 0668 DUGAN G L GOLUEKE C G OSWALD W J RIXFORD C E
PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTE KEYWORDS ALGAE RECLAMATION
UNIV OF CALIF SANITARY ENGR RES LABORATORY SERL RPT 70-1 165 PP MAY 1970

300 70 0743 ERICKSON D B PHAR P A
GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRRIGATION FEED RUNOFF
KANSAS COST GUIDELINES
NUMBER C-418 COOP EXT SERVICE KANSAS ST U 30P APRIL 1970 30 P

300 70 1000 MUEHLING A J
EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL HOGS FEED-LOTS BUILDING-DESIGN SLOTTED-FLOORS FARROWING-HOUSE CONSTRUCTION-METHODS NURSURY-BUILDING FINISHING-BUILDING SOW-CONFINEMENT HOG-PRODUCTION-SYSTEMS
REPORTS OF THE TWELFTH ANNUAL SWINE DAY DEC 1970 P 17-23 8 FIG

300 70 1036 HINES N W
AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTION PESTICIDES FERTILIZERS CHEMICALS FARM-WASTES NITROGEN-COMPOUNDS PHOSPHORUS-COMPOUNDS WATER-POLLUTION-SOURCES WATER-POLLUTION-EFFECTS IRRIGATION-PRACTICES LEACHING CONFINEMENT-PENS DOMESTIC-WASTES SOIL-DISPOSAL-FIELDS WASTE-DISPOSAL EUTROPHICATION WASTE-ASSIMILATIVE-CAPACITY SALINITY SALINE-SOILS SALT-TOLERANCE SEDIMENTATION SEDIMENT-CONTROL SOIL-CONSERVATION
CORNELL LAW REVIEW VOL 55 1970 P 740-760 111 REF

300 70 1059 MURPHY L S GOSCH J W
NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION IRRIGATION NITROGEN FARM-WASTES FERTILIZERS AMMONIUM-COMPOUNDS WATER-POLLUTION-SOURCES NITRATE-MOVEMENT FEEDLOTS
PROJECT COMPLETION REPORT OWRR PROJECT A-016-KAN MARCH 1970 56 P 13 TAB 19 FIG 38 REF

300 70 1084 APPELL J R WENDER I MILLER R D
CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATER GAS STEAM SULFUR ORGANIC-MATTER PROCESSING FURNACE FUELS URBAN-REFUSE CELLULOSIC-WASTES CARBON-MONOXIDE
TECHNICAL PROGRESS REPORT-25 BUREAU OF MINES SOLID WASTE PROGRAM U S DEPARTMENT OF INTERIOR MAY 1970 5 P 3 TAB

300 70 1101 DAVIS E GLOYNA E
BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACTERIA OXIDATION-LAGOONS PATHOGENIC-BACTERIA AUTOGOMISTIC-EFFECTS AXEMIC-CULTURES DIEOFF-RATES AFTERGROWTH BLUE-GREEN-ALGAE FIELD-STUDIES GREEN-ALGAE LABORATORY-STUDIES
FWPCA GRANT 18050 DOL TECHNICAL REPORT EHE-70-06 CRWR-55 MARCH 1970 132 P 144 TAB 9 FIG 60 REF

300 70 1104 WERNER J A
FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY PATHOGENIC-BACTERIA PSEUDOMONAS FISH OYSTERS CRABS CLOSTRIDIUM SALMONELLA SHIGELLA E-COLI BIOINDICATORS BULLHEADS WHITE-PERCH MYCOBACTERIUM AEROMONAS STAPHYLOCOCCUS PASTEURELLA LEPTOSPIRA
1970 7 P 40 REF

300 70 1192 SHAFFER R E BADGER D D
IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS WATER-POLLUTION-CONTROL POLLUTION-ABATEMENT WATER-MANAGEMENT-APPLIED WATER-QUALITY-ACT ENVIRONMENTAL-EFFECTS LAGOONS WATER-POLLUTION-EFFECTS WASTE-DISPOSAL COST-SHARING LEGAL-ASPECTS SOCIAL-ASPECTS FERTILIZERS BENEFITS ARID-LANDS DRY-SEASONS WASTE-DILUTIONS STABILIZATION DISSOLVED-SOLIDS OKLAHOMA TEXAS RETURN-MONETARY PROFIT WATER-UTILIZATION PRODUCTIVITY STREAMS LEGISLATION CATTLE WATER-TREATMENT WASTE-TREATMENT
OKLAHOMA CURRENT FARM ECONOMICS V 43 NO 1 MARCH 1970 P 3-11 3 TAB 19 REF

300 70 1201 ANONYMOUS
OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION WATER-POLLUTION-CONTROL SURFACE-DRAINAGE SURFACE-WATERS SURFACE-RUNOFF WATER-POLLUTION-SOURCES LIVESTOCK POLLUTANTS WATER-QUALITY-CONTROL DOMESTIC-ANIMALS AGRICULTURE LEGAL-ASPECTS LEGISLATION
OKLAHOMA STATUTES ANNOTATED TITLE 2 SECTIONS 9-208 9-210 SUPPLEMENT 1970

300 70 1247 ANONYMOUS
DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTION-ABATEMENT WATER-POLLUTION UNLIMATE-DISPOSAL REGULATION ADMINISTRATIVE-AGENCIES LIQUID-WASTES ORGANIC-WASTES SOLID-WASTES POLLUTANTS WASTE-WATER-DISPOSAL LEGISLATION LEGAL-ASPECTS FARM-WASTES CONFINEMENT-PENS HOGS CATTLE CANNERIES INDUSTRIAL-PLANTS FOODS POULTRY LIVESTOCK
OREGON ADMINISTRATIVE RULES COMPILATION CHAPTER 340 SECTIONS 43-005 THRU 43-025 1970

300 70 1248 PITTMAN D HARRIS P
LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS TEXAS WATER-QUALITY LIVESTOCK FARM-WASTES WASTE-TREATMENT POULTRY WASTES SOLID-WASTES CATTLE HOGS SHEEP WASTE-DISPOSAL FARM-MANAGEMENT
TEXAS WATER QUALITY BOARD AUSTIN TEXAS 1970 30 P 5 TAB 10 REF

300 71 0099 BROWN R L
REMOVAL OF NITRATE BY AN ALGAL SYSTEM KEYWORDS REMOVAL NITRATE ALGAL-SYSTEM
AGRICULTURAL WASTEWATER STUDIES REPORT NO 13030 ELY 132PP APRIL 1971

300 71 0671 SOBEL A T
REMOVAL OF WATER FROM ANIMAL MANURES, PART II EFFECTS OF VELOCITY ON AIR DRYING KEYWORDS POULTRY ODOR WASTE-STORAGE EFFECTS AIR-DRYING
EFFECASTE MGMT ASSOC ODOR CONTROL SEPT 71 CORNELL UNIV P1-10FINAL RPT ARS-USDA COOP AGMT 12-14-100-9767 42 AWM 71-04

300 71 0269 MILLER W D
INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS KEYWORDS RUNOFF NITROGEN WELLS AMMONIUM SODIUM POTASSIUM CALCIUM CHLORIDE INFILTRATION-RATES GROUNDWATER
EPA WAT QUAL OFF PROJECT 16060EGS JAN 1971

300 71 0301 SWEETEN J M
STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDERAL-GOVERNMENT STATE-GOVERNMENT FEEDLOT CONTROL LEGAL-ASPECTS
EPA DIV OF TECH OPER OPEN-FILE REP T001 0 543 1 1971

300 71 0319 DALE A C
FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISPOSAL NITROGEN COMPOSTING OX-DITCH KEYWORDS DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISPOSAL COMPOSTING
FARM WASTE DISPOSAL SYSTEMS COOP EXT SER PURDUE AE80 FEB 71 10 P

300 71 0412 MCCLURG C A BERGMAN E L BRESSLER G O
THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP RESPONSE SOIL ANALYSIS LAB TESTS

300 1 0412 POULTRY

300 71 0412 PENN STATE UNIV PROG REPORT 312 APRIL 1971

300 71 0457 WOODING N H
DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRINKLER-IRRIGATION SO
LID-WASTES EFFLUENTS TREATMENT-FACILITIES LAGCONS PERMITS PENNSYLVANIA LEGISLATION SEPTIC-TANKS LIQUID-WAS
TES DISPOSAL
EXT SER SPEC CIR 154 PENN ST U UNIV PARK 12P

300 71 0466 WATER POLLUTION CONTROL RESEARCH SERIES REPORT JAN 1971 P 55 11 TAB 26 FIG 6 REF
MILLER WILLIAM D INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS K
EYWORDS NITRATES RUNOFF INFILTRATION GROUNDWATER SOIL DRAINAGE-SYSTEM CHEMICAL-ANALYSIS IONIZATION CATTLE
WATER-ANALYSIS FEEDLOT-RUNOFF TEXAS-HIGH-PLAINS RATE-OF-CONCENTRATION
FEEDPEN-RUNOFF-SLOPE CATTLE-LOAD

300 71 0477 MILLER B F
BIOLOGICAL CONVERSION OF ANIMAL WASTES TO NUTRIENTS KEYWORDS POULTRY FLY-PUPAE NUTRIENTS
TERMINATION REPORT 69PP MAY 1971

300 71 0486 MINER J R ED
FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DITCHES ANAEROBIC-TREA
TMENT AEROBIC BOD COD LITERATURE RUNOFF DIGESTION BACTERIA PROPERTIES MANAGEMENT
NORTH CENTRAL REGIONAL PUBLICATION 206, IOWA STATE UNIV SPECIAL REPORT 67, 44PP, MAY 1971

300 71 0511 USDA-ARS AN SCI DIV
ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW KEYWORDS LITERAT
URE-REVIEW DIETS HAZARDS HORMONES ANTIBIOTICS DISEASE BACTERIA RESIDUESREUSE PROBLEMS FEED-ADDITIVES
USDA-ARS 44-224 FEBRUARY 1971 56 PAGES 184 REF

300 71 0512 CALVERT C C
FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS NITROFURANS FECAL-RESI
DUES ADDITIVES-POULTRY
USDA-ARS 44-224 FEBRUARY 1971 P-14-19 ANIMAL-WASTE REUSE NUTRITIVE VALUE AND POTENT
IAL

300 71 0513 FROBISH L T
FECAL-RESIDUES FROM FEED ADDITIVES--SWINE KEYWORDS HAZARDS GROWTH-RATES DIETHYISTILBESTROL FECAL-RESIDUE
S ADDITIVES-SWINE
USDA-ARS 44-224 FEBRUARY 1971 P19-27 ANIMAL-WASTE REUSE NUTRITIVE VALUE AND POTENT
IAL

300 71 0514 DINIUS D A
FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE KEYWORDS DECOMPOSITION DISEASE EXCRETION-DATA
FECAL-RESIDUES ANITIBIOTICS-BEEF
USDA-ARS 44-224 FEBRUARY 1971 P 27-32 ANIMAL-WASTE REUSE NUTRITIVE VALUE AND POTENT
IAL

300 71 0515 MILLER R W
FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON FLY-CONTROL REGISTR
ATION FECAL-RESIDUES LARVICIDES POULTRY CATTLE
USDA-ARS 44-224 FEBRUARY 1971 P 33-41 ANIMAL-WASTE REUSE NUTRITIVE VALUE AND POTENT
IAL

300 71 0538 WELLS D M ALBIN R C GRUB W COLEMAN E A MEENAGHAN G F
CHARACTERISTICS OF WASTES FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORD RUNOFF QUALITY-CONTROL ANALYSIS CATT
LE-CONFINEMENT-PENS CHARACTERISTICS
ENVIRONMENTAL PROTECTION AGENCY PROJECT 13040DEM 87P JAN 71

300 71 0584 SCHWIESOW WILLIAM F
STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 KEYWORDS LEGISLAT
ION STATUTES FARM-WASTES CATTLE LAWS CONFINEMENT-PENS FEEDLOTS STATES-OF-UNITED-STATES PENALTY
UNITED STATES DEPARTMENT OF AGRICULTURE - APRICULTURE RESEARCH SERVICE - AGRICULTURAL ENGINEERING RESEARCH
DIVISION ARS 42 - 189 APRIL 1971 8 P 1 TAB

300 71 0590 GEORGE R M PETERSON M R MCNABB C G ROBBINS J W D GARNER G B
THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT KEYWORDS LAGOONS DESIGN IRRIGATION MISSOURI MANAGEMENT
UNIV OF MISSOURI EXTENSION MP232 71 1M 65PP 1971

300 71 0591 CYWIN A WARD D
AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN KEYWORDS RUNOFF PESTICIDES EUTROPHICATION FERTILIZERS HE
RBICIDES
AGR POL GREAT LAKES BASIN EPA WAT QUAL OFF REPORT 13020 JUL 71 P1-178

300 71 0621 SHEPPARD C C
POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED-EFFICIENCY POULTR
Y RESEARCH
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P1-64

300 71 0622 ZINDEL H C
EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYWORDS NUTRIENTS ANT
IBIOTICS DIET MICHIGAN CHICKEN-MANURE REUSE
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P2-3

300 71 0623 ZINDEL H C FLEGAL C J
ECONOMICS OF DRIED POULTRY WASTE DPW AS A FEED INGREDIENT OR A FERTILIZER KEYWORDS DRYING ODOR RECYCLI
NG ECONOMICS POULTRY
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P4-7

300 71 0624 THOMAS J W ZINDEL H C
FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITROGEN PROTEIN POUL
TRY-WASTE
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P8-11

300 71 0625 SHEPPARD C C FLEGAL C J DORN D A DALE J L
THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE KEYWORDS FECES ANAL
YSIS DRYING-TEMPERATURE PROTEIN POULTRY-WASTE
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P12-16

300 71 0626 ESMAY M L SHEPPARD C C
DRYING OF POULTRY MANURE IN A CAGE-LAYER HOUSE KEYWORDS ODOR ENVIRONMENT AIR-VENTILATION AIR-CONTAMINATI
ON POULTRY
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P17-27

300 71 0627 BUCHOLTZ H F HENDERSON H E FLEGAL C J ZINDEL H C
DRIED POULTRY WASTE AS A PROTEIN SOURCE FOR FEEDLOT CATTLE KEYWORDS FEED-EFFECIENCY RECYCLING POULTRY-W
ASTE CATTLE
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P28-31

300 71 0628 POLIN D VARGHESE S NEFF M GOMEZ M FLEGAL C J ZINDEL
H C
THE METABOLIZEABLE ENERGY VALUE OF DRIED POULTRY WASTE KEYWORDS NUTRIENT DEHYDRATION DIET POULTRY
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P32-44

300 71 0629 FLEGAL C J DORN D A
THE EFFECTS OF CONTINUALLY RECYCLING DEHYDRATED POULTRY WASTES DPW ON THE PERFORMANCE OF SCWL LAYING HEN
S-A PRELIMINARY REPORT KEYWORDS NUTRIENT DEHYDRATED-FECES EFFECTS POULTRY
POULTRY POL RESEARCH REP 152 FARM SCI MICH ST UNIV NOV 71 P45-48

300 71 0630 BENNE E J
A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWORDS PROTEIN DEHYDR
ATION CALCIUM PHOSPHORUS MOISTURE-CONTENT POULTRY
POULTRY POL RESEARCH REP 152 FARM SCIENCE MICH ST UNIV NOV 71 P49-63

300 71 0639 BEER C E KOELLIKER J K
USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDWATER SYSTEMS KEYWO
RDS IRRIGATION DENITRIFICATION TREATMENT-DISPOSAL APPLICATION-RATE WASTE-WATER-TREATMENT CHEMICAL-OXYGEN-
DEMAND NITRATES AMMONIA SOIL-FILTRATION LAGOON GROUNDWATER-SYSTEMS
COMP REPORT IA STATE WATER RESOURCES RESEARCH INSTITUTE, OFFICE WAT RESOURCE RESEARCH AGRMT NO 14-31-001-3
215 ISWRRI-41 IOWA STATE UNIV AMES P1-32

300 71 0672 DAY D L
MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METHANE HYDROGEN-SULFID
E MEASUREMENT CHROMATOGRAPHY
AGR WASTE MGMT ASSOC ODOR CONTROL SEPT 71 CORNELL UNIV P1-6 FINAL RPT ARS-USDA COOP AGMT 12-14-100-9767 42
AWM 71-04

300 71 0673 SOBEL A T
OLFACTORY MEASUREMENT OF ANIMAL MANURE ODORS KEYWORDS DRYING POULTRY AIR-DRYING-MANURE MEASUREMENT ODOR
S
AGR WASTE MGMT ASSOC ODOR CONTROL SEPT 71 CORNELL UNIV 21PP FINAL RPT ARS-USDA COOP AGMT 12-14-100-9767 42
AWM 71-04

300 71 0674 LUDINGTON D C SOBEL A T GORMEL B
CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS DRYING POULTRY AIR-DRYING-MANURE CONTROL MANAGEMENT
AGR WASTE MGMT ASSOC ODOR CONTROL SEPT 71 CORNELL UNIV P1-15FINAL RPT ARS-USDA COOP AGMT 12-14-100-9767 42
AWM 71-04

300 71 0675 GORMEL B SOBEL A T LUDINGTON D C
UNDER CAGE DRYING OF POULTRY MANURE KEYWORDS ODOR AIR-DRYING-MANURE CAGE
AGR WASTE MGMT ASSOC ODOR CONTROL SEPT 71 CORNELL UNIV P1-15FINAL RPT ARS-USDA COOP AGMT 12-14-100-9767 42
AWM 71-04

300 71 0677 ANON
THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES BIOCHEMICAL-OXY
GEN-DEMAND FEEDLOTS WASTE-TREATMENT ECONOMIC RUNOFF AEROBIC-TREATMENT SHEEP SWINE POULTRY
THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY FINAL REPORT MIDWEST RESEARCH INSTITU
TE KANSAS CITY MISSOURI NOV 1971 P 1-224

300 71 0689 OLSON E A
WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MANAGEMENT FEEDLOTS
BULL OF WASTE MGMT FOR FEEDLOTS EC71-795 U NEBRASKA EXT P3-14 1971

300 71 0692 PFOST H B
EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS MICROFLORA AMMONIA S
WINE FEED EFFECT
KANSAS STATE UNIV MANHATTAN P1-9 1971

300 71 0697 ROBBINS J W D HOWELS D H KRIZ G J
ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOONS WASTE-DISPOSAL SA
MPLING ANALYSIS DISPOSAL RUNOFF
ENVIRONMENTAL PROTECTION AGENCY GRANT 13020DGX 114P AUG 1971

300 71 0700 HANSEN R W
LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF ODOR LAGOON SETTLIN
G-BASIN NITROGEN PHOSPHORUS POTASSIUM COLORADO ANAEROBIC-LAGOON DISPOSAL CONTROL
BULL 480A COOP EXTENSION SERVICE COLORADO STATE U 13P OCT 71

300 71 0704 MATSON W E
PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENCIES COSTS LEGAL-ASP
ECTS ODORS SYSTEMS
COOP EXT SER OREGON ST U CORVALLIS CIRCULAR 763 15P 1971

300 71 0732 CLAYTON J T
CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUSTRY AEROBIC-TREATMEN
T SOIL-TREATMENT SOLID-WASTES EFFLUENTS TERTIARY-TREATMENT TRICKLING-FILTERS ENTERIC-BACTERIA FLOW-CHARACT
ERISTICS NITROGEN SYSTEMS
WATER RESOURCES RESEARCH CENTER U MASS AMHERST COMP REP FY72-7 1971 11 P

300 71 0744 CROSS B S RENEKER R W
ANIMAL SLAUGHTERING AND PROCESSING KEYWORDS REGULATIONS BY-PRODUCTS SOLID-WASTES INDUSTRIAL-WASTES WASTE WATER
NAT IND POL CONTROL COUNCIL SUB-COUNCIL REPORT FEB 71 14P

300 71 0745 CROSS B S HAMILTON W A
ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING ANIMAL-PROCESSING-WASTES
NAT IND POL CONTROL COUNCIL STAFF REP FEB 71 15P

300 71 0752 VALLICOTT D R
ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES KEYWORD DESIGN-CRITERIA CONSTRUCTION-COSTS COST-SHARING STANDARDS RUNOFF GOVERNMENT-SUPPORT
USDA SOIL CONS SERVICE LINCOLN NEB 2P 1971

300 71 1008 ANON
ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL RUNOFF WATER-POLLUTION SOIL-CONTAMINATION FARM-WASTES CATTLE ODOR GROUNDWATER TERRACES SEDIMENTATION IRRIGATION WATER-TABLE NITRATES NEBRASKA
COOPERATIVE EFFORT OF NORTHERN PLAINS BRANCH SOIL AND WATER CONSERVATION RESEARCH DIVISION ARS USDA AND THE DEPTS OF AGRONOMY AND AGRICULTURAL ENGINEERING NEBRASKA AGRICULTURAL EXPERIMENT STATION LINCOLN 4 P 2

300 71 1035 ALDRICH S R USCHWALD W R FEHRENBACHER J B
IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS AGRICULTURE ENVIRONMENT FARM-WASTES CROP-PRODUCTION FARM-MANAGEMENT CROP-PRODUCTION-TECHNOLOGY ENVIRONMENTAL-QUALITY
ENVIRONMENTAL GEOLOGY NOTES ILLINOIS STATE GEOLOGICAL SURVEY NO 46 MAY 1971 P 7-24 6 TAB 8 FIG

300 71 1055 ANON
ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USERS PLANNING PROJECTS LEGAL-ASPECTS BOTTOM-SEDIMENTS GEOCHEMISTRY HYDROLOGY CONIFEROUS-FORESTS RIVERS LAKES BIOCHEMICAL-OXYGEN-DEMAND DISSOLVED-OXYGEN MANAGEMENT LIVESTOCK-WASTES WATER-QUALITY EDUCATION EUTROPHICATION PHOSPHATES WATER-POLLUTION-CONTROL CHLORINATEE-HYDROCARBON-PESTICIDES MODEL-STUDIES TUBIFICIDS PHYSICOCHEMICAL-PROPERTIES GASES POLITICAL-ASPECTS ATTITUDES ENVIRONM
ANNUAL REPORT NO 7 MAINE UNIVERSITY WATER RESOURCES CENTER 1971 18 P

300 71 1056 HARL N E BALDWIN R A HUBLY D W
AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWORDS PERMIT-SYSTEM ECONOMIC-EFFICIENCY WATER-QUALITY WATER-RESOURCE-INVESTMENT IOWA MODEL-STUDIES COST-ANALYSIS WATER-ALLOCATION-POLICY COMPETING-USES LEGAL-ASPECTS LINEAR-PROGRAMMING COST-ALLOCATION EVALUATION
COMPLETION REPORT ISWRRI-43 IOWA WATER RESOURCES RESEARCH INSTITUTE AMES NOV 1971 261 P 27 TAB 7 FIG 122 REF

300 71 1057 CROSS F B CAVIN L M
EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASIN KEYWORDS FISHKILL WATER-POLLUTION-EFFECTS SAMPLING HABITATS FEEDLOT-POLLUTION UPPER-NEOSHO-RIVER-BASIN NOCOMIS-ASPER NOTROPIS-RUBELLUS NOTURUS-NOCTURNUS NOTORUS-PLACIDUS NOTROPIS-LUTRENSIS NOTROPIS-CAMURUS
COMPLETION REPORT OWRR A-026-KAN1 1971 50 P 7 TAB 6 FIG 16 REF

300 71 1058 JOHNSON J D STRAUB C P
DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWATER FLOW IN OVERFERTILIZATION OF SURFACE WATERS KEYWORDS MATHEMATICAL-MODELS WATERSHEDS-BASINS NUTRIENTS NITROGEN PHOSPHORUS STREAMFLOW SEWAGE-TREATMENT EFFLUENTS ANNUAL-WASTES FERTILIZERS PRECIPITATION-ATMOSPHERIC SOILS WATER-POLLUTION-SOURCES MODEL-STUDIES MINNESOTA SNOWMELT TREATMENT-FACILITIES NITROGEN-FIXATION DENITRIFICATION
WRRC BULLETIN 35 OWRR PROJECT B-012-MINN1 MINNESOTA WATER RESOURCES RESEARCH CENTER MINNEAPOLIS JUNE 1971 176 P 65 TAB 58 FIG 78 REF

300 71 1081 APPELL H R FU Y C FRIEDMAN S YAVORSKY P M WENDER I
CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTURAL-WASTES WOOD LIGNINS WATER TEMPERATURE CATALYSTS SOLVENTS CONVERSION OIL SOLID-WASTES LOW-SULFUR-OIL URBAN-REFUSE CARBON-MONOXIDE LIQUID-FUELS WASTE-PRODUCTS CONTINUOUS-REACTOR SUCROSE
BUREAU OF MINES REPORT OF INVESTIGATION 1971 RI 7560 DEPARTMENT OF INTERIOR 1971 20 P 10 TAB 3 FIG

300 71 1098 ANON
BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH POULTRY MINK SWINE RUMINANTS FEEDS WATER-POLLUTION-CONTROL SEWAGE-TREATMENT ANIMAL-HUSBANDRY FISH-PROTEIN
CENTER PUBLICATION NO 71-3 COASTAL PLAINS CENTER FOR MARINE DEVELOPMENT SERVICES WILMINGTION NORTH CAROLINA AUG 1971 113 P

300 71 1100 DEGOEIJ J J M
DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRON-ACTIVATION-ANALYSIS CHEMICAL-ANALYSIS INDUSTRIAL-WASTES POLLUTANT-IDENTIFICATION WATER-POLLUTION-SOURCES HEAVY-METALS SEPARATION-TECHNIQUES IRRADIATION SEDIMENTS CATTLE BIRDS FOODS PLANTS MARINE FISH TOXICITY MILK WATER-ANALYSIS MARINE-ANIMALS SALMON HERRINGS COMMERCIAL-FISH AUTOMATION BIOLOGICAL-SAMPLES METHYL-MERCURY PHINE-RIVER SEALS-ANIMALS
REPORT NO IRI-133-71-17 1971 21 P 1 TAB 12 FIG 10 REF

300 71 1106 ANON

MANAGING OUR ENVIRONMENT

KEYWORDS
MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CONTROL SEDIMENTS FARM-WASTES NUTRIENTS PHOSPHORUS ALGAE NITRATES WATER-REUSE SALINITY PESTICIDES LIVESTOCK WASTE-DISPOSAL OXIDATION-LAGOONS DEHYDRATION RUNOFF RADIOACTIVITY FALLOUT BIOCONTROL INSECT-CONTROL IRRIGATION PREDATION PARASITISM INSECT-RESISTANCE INSECT-ATTRACTANTS PRECIPITATION-ATMOSPHERIC GENETICS EROSION-CONTROL AIR-POLLUTION TREES
AGRICULTURE INFORMATION BULLETIN NO 351 DEPARTMENT OF AGRICULTURE WASHINGTON D C APRIL 1971 48 P

300 71 1107 ANON
WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-CHEMICALS CHEMICAL-WASTES FARM-WASTES LIVESTOCK WATER-POLLUTION-SOURCES MISSOURI KANSAS RUNOFF FERTILIZERS PESTICIDES WASTE-DISPOSAL NITRATES LEACHING SALTS ASSOCIATED-COSTS EUTROPHICATION LEGAL-ASPECTS SOCIAL-ASPECTS NUTRIENTS BODIES-OF-WATER LEGISLATION FEDERAL-GOVERNMENT AGRICULTURAL-RUNOFF
HEARINGS BEFORE THE COMMITTEE ON PUBLIC WORKS SUBCOMMITTEE ON AIR AND WATER POLLUTION 92ND CONGRESS 1ST SESSION APRIL 2 1971 P 2515-3188 208 TAB 64 FIG 420 REF

300 71 1119 TSAO G T
TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PRODUCTION KEYWORDS O
XYGEN ABSORPTION FOAMING AERATION CYTOLOGICAL-STUDIES FARM-WASTES WASTE-WATER-TREATMENT BIOLOGICAL-TREATME
NT WALDORF-AERATOR CELL-GROWTH WHEY
COMPLETION REPORT ISWRRI-33 IOWA STATE WATER RESOURCES RESEARCH INSTITUTE AMES APRIL 1971 34 P 27 FIG
12 REF

300 71 1126 BEYERS R J BRISBIN I L COLEMAN D C GENTRY J B GIBBONS J W
SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMENT CYCLING-NUTRIEN
TS RADIOACTIVITY-EFFECTS WATER-POLLUTION-EFFECTS ECOSYSTEMS THERMAL-POLLUTION RADIOECOLOGY SOUTHEAST-US MI
CROORGANISMS BASS ECOLOGY SNAKES POULTRY AQUATIC-LIFE RODENTS AQUATIC-HABITATS AQUATIC-PLANTS AMPHIBIANS T
URTLES PATH-OF-POLLUTANTS RESERVOIRS STREAMS SOIL-WATER-PLANT-RELATIONSHIPS ABSORPTION
AUG 1971 420 P

300 71 1238 NGODDY P O HARPER J P COLLINS R K WELLS G D HEIDAR F A
CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSPORT ULTIMATE-DISP
OSAL AEROBIC-LAGOON-TREATMENT RECYCLED-WASHWATER DIMENSIONAL-ANALYSIS LIVESTOCK-WASTE PHYSICAL-TREATMENT
BIOLOGICAL-TREATMENT RECYCLE LIVESTOCK-WASTE
PROJECT NO 13040 DKP AGRICULTURAL POLLUTION CONTROL LABORATORY MICHIGAN STATE UNIVERSITY EAST LANS
ING MICHIGAN JUNE 1971 110 P

300 71 1245 DUFFER W R KREIS R D HARLIN C C JR
EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL AMMONIA DISSOLVED
-OXYGEN RUNOFF ORGANIC-WASTES NUTRIENTS PHYTOPLANKTON MACROBENTHOS LIGHT-PENETRATION BEEF-CATTLE FEEDLOTS
ZOOPLANKTON SOLIDS-CONCENTRATION EFFECTS IMPOUNDMENTS
ROBERT S KERR WATER RESEARCH CENTER ADA OKLAHOMA 53 P 7 TAB 13 FIG 9 REF

300 71 1246 ANONYMOUS
FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLUTANTS NON-STRUCT
URAL-ALTERNATIVES PATH-OF-POLLUTANTS WATER-LAW LEGISLATION REGULATION FARM-WASTES LAVESTOCK MANAGEMENT F
INANCING MISSOURI-RIVER RIVER-BASINS TECHNICAL-ASSISTANCE
MISSOURI RIVER BASIN ANIMAL WASTE MANAGEMENT PILOT STEERING TASK GROUP KANSAS CITY MO JUNE 1971 45 P 2 FIG

300 71 1257 BUTCHBAKER A F GARTON J E MAHONEY G W A PAINE M D
EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS BEEF-WASTE WASTE-HANDLING-ALTE
RNATIVES WASTE-TREATMENT-ALTERNATIVES ULTIMATE-DISPOSAL WASTE-HANDLING-COSTS FEEDLOT-DESIGN POLLUTION-CONT
ROL BEEF-WASTE-MANAGEMENT
WATER POLLUTION CONTROL RESEARCH SERIES GRANT NO 13040 FXG OKLAHOMA AGRICULTURAL EXPERIMENT STATION OKLAH
OMA STATE UNIVERSITY STILLWATER OKLAHOMA NOV 1971 322 P

300 71 1261 DIETRICH R A
INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOMIES OF SIZE KEYWOR
DS FEED-LOTS CATTLE ECONOMICS SIZE REGIONAL-PRODUCTION-CHARACTERISTICS TRANSPORTATION-RATES LEAST-COST-SH
IPMENT-ROUTES FEED-GRAINS
PROJECT NO HM-2489 IN COOPERATION WITH THE US DEPT OF AGRICULTURE TEXAS AGRICULTURAL EXPERIMENT STAT
ION SEPT 1971 55 P 39 TAB 8 FIG

300 72 1003 ANON
CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WATER-POLLUTION FA
RM-WASTES LAGOONS RUNOFF WASTE-DISPOSAL PACIFIC-NORTHWEST-US WASTE-MANAGEMENT SITE-SELECTION MANURE-MOUND
S
U S ENVIRONMENTAL PROTECTION AGENCY REGION X SEATTLE WASHINGTON APRIL 1972 63 P 6 TAB 35 FIG 8 REF

300 72 1052 HUTCHINSON R E HOFFMAN R A JEFFREY R F
EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS WATER-POLLUTION-SO
URCES GROUNDWATER FARM-WASTES NITROGEN MAINE ON-SITE-INVESTIGATIONS ANALYTICAL-TECHNIQUES POULTRY PATH-O
F-POLLUTANTS SOIL-PROPERTIES RATES-OF-APPLICATION INFILTRATION-RATES DATA-COLLECTIONS POULTRY-MANURE
PROJECT COMPLETION REPORT OWRR A-020-ME1 MAINE WATER RESOURCES RESEARCH CENTER ORONO SEPT 1972 38 P
21 TAB 8 FIG

300 72 1070 EBY H J SINGH V P
PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOSAL LAGOONS KEYWORD
S RECYCLING NUTRIENTS WASTE-WATER LAGOONS ALGAE BACTERIA SEWAGE OXIDATION CLIMATIC-ZONES PROTEINS FARM-W
ASTES INDIA WASTE-DISPOSAL-LAGOONS SEASONAL-GROWTH
PRODUCTION RESEARCH REPORT NO 142 AGRICULTURAL RESEARCH SERVICE US DEPT OF AGRICULTURE APRIL 1972 8 P
2 TAB 2 FIG

300 72 1085 KREIS R D SCALF M R MCNABB J
CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS CATTLE CONFINEMENT-PENS RAINFALL
-RUNOFF-RELATIONSHIPS POLLUTANTS FARM-WASTES NUTRIENTS BIO-CHEMICAL-OXYGEN-DEMAND CHEMICAL-OXYGEN DEMAND
COLIFORMS STREPTOCOCCUS FEEDLOT MANURE-WASTES WASTES-CHARACTERISTICS SOLIDS TOTAL-ORGANIS-CARBON
ENVIRONMENTAL PROTECTION AGENCY REPORT NUMBER EPA-R2-72-061 SEPT 1972 43 P 10 TAB 2 FIG 26 REF

300 72 1146 ANON
FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS KEYWORDS FARM-WASTES SHEEP FEED-LOTS PROTEINS DIGESTIBILIT
Y
AGRICULTURE AT OSU OKLAHOMA STATE UNIVERSITY STILLWATER OKLAHOMA SUMMER 1972 1 P

300 72 1157 CANADA ANIMAL WASTE MANAGEMENT GUIDE COMMITTEE
CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN MANAGEMENT POLLUTI
ON MANURE-UTILIZATION NITROGEN FARM-LAGOONS AERATED-LAGOONS AEROBIC-TREATMENT ANAEROBIC-DIGESTION WASTE-T
REATMENT WASTE-STORAGE WASTE-DISPOSAL DEHYDRATION INCINERATION ZONING REGULATIONS LEGAL-ASPECTS EQUIPMENT
FERTILIZERS CANADA COMPOSTING CANADIAN-LEGISLATION DEAD-BIRD-DISPOSAL
CANADA 1972 57 P 9 TAB 4 FIG

300 72 1170 BRODIE H L
POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS GROUNDWATER-POLLUTION FARM
-WASTES HOGS PERCOLATION FLOOD-IRRIGATION WASTE-DISPOSAL NITROGEN CHEMICAL-OXYGEN-DEMAND PHOSPHATES CHLO
RIDES SULFATES MARYLAND
TECHNICAL REPORT NO 13 UNIVERSITY OF MARYLAND WATER RESOURCES RESEARCH CENTER AGRICULTURAL ENGINEE
RING DEPARTMENT COLLEGE PARK JULY 1970-JUNE 1972 25 P 6 TAB 1 FIG 21 REF

300 72 1182 ZINDEL H C CHANG T S CARTER G R
BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS FARM-WASTES DEHYDRATION P
OULTRY BACTERIA CHEMICAL-ANALYSIS RECYCLING INCUBATION MICHIGAN
JOURNAL ARTICLE NO 5928 MICHIGAN AGRICULTURAL EXPERIMENT STATION
MICHIGAN STATE UNIVERSITY EAST LANSING 1972 4 P 2 REF

300 72 1260 LIN S
NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZERS PESTICIDES ER
OSION SEDIMENT FARM-WASTES NITROGEN PHOSPHORUS RUNOFF WASTE-TREATMENT WASTE-DISPOSAL ILLINOIS DDT SOIL-CO
NSERVATION-METHODS
ILLINOIS STATE WATER SURVEY DEPARTMENT OF REGISTRATION AND EDUCATION URBANA ILLINOIS 1972 36 P 20 TAB 4 F
IG 84 REF

300 72 1264 SWEETEN J M
PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC-BACTERIA MOISTU
RE-CONTENTS TEMPERATURE WASTE-TREATMENT POULTRY LAGOONS WASTE-DISPOSAL ODOR-CONTROL ODOR-MEASUREMENTS OD
OR-INTENSITY ODOR-QUALITY
TEXAS AGRICULTURAL EXTENSION SERVICE TEXAS A M UNIVERSITY DEC 1 1972 8 P 4 REF

300 73 1009 WHITE R K
STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES FEED-LOTS RUNOFF
BIOCHEMICAL-OXYGEN-DEMAND NITROGEN WATER-QUALITY CLIMATES RAINFALL WASTE-DISPOSAL IRRIGATION OHIO
PROJECT COMPLETION REPORT NO 393X UNITED STATES DEPT OF INTERIOR DEC 1972 33 P 5 TAB 14 FIG 5 REF

400 64 0335 CULPIN C
EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRINKLER-IRRIGATION MI
XING EQUIPMENT DISPOSAL
CHEMISTRY & INDUSTRY FEB 29, 1964 350-353 3 REF

400 64 0358 WHEATLAND A B BORNE B J
TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER ENGLAND IRRIGATION
TREATMENT
CHEMISTRY & INDUSTRY FEB 29, 1964 357-362

400 64 0379 WILEY J S
A REPORT ON THREE MANURE-COMPOSTING PLANTS KEYWORDS ODOR AEROBIC-DECOMPOSITION AMMONIA SOIL-CONDITIONER
COMPOST SCIENCE 5 SUMMER 1964 15-16

400 65 0332 ANON
HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOLUME PUMPS TANK-SPRE
ADERS
HOARD S DAIRYMAN 109 NOV 25, 1965 1254-1255 1280-1281

400 65 0356 REED C H
FURROW MANURE-DISPOSAL KEYWORDS POULTRY APPLICATION-RATES PLOW-FURROW-COVER DISPOSAL
POULTRY DIGEST 24 1965 278

400 65 0439 SCHEFFERLE H E
THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC MATTER NITROGEN B
ACTERIA POULTRY-LITTER
JOUR OF APPLIED BACTERIOLOGY VOL 28 NO 3 PP412-420 1965

400 65 0485 BRADLEY M RUSSELL W
POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-OF-GAIN POULTRY-LI
TTER CATTLE-FEED
FEEDSTUFFS, VOL 37, NO 8, P 59-60, 1965

400 65 1127 SMITH G E
WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISSOURI WATER-SUPPL
Y WATER-WELLS WATER-POLLUTION-SOURCES
HOARDS DAIRYMAN V 110 NO 18 SEPT 25 1965 P 1048-1049 3 FIG

400 65 1141 GRUNDMAN J E
NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MISSOURI WATER-POLL
UTION-SOURCES NITRATE-CYANOSIS
MISSOURI RURALIST FEB 27 1965 P 24-25

400 65 1142 LEBEDA D L DAY D L
WASTE CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS KEYWORDS VENTILATION SWINE-WASTE TOLERANCE-LE
VELS GAS-CONCENTRATIONS THRESHOLD-LEVELS
REPRINTED FROM ILLINOIS RESERCH FALL 1965

400 66 0088 RILEY C T
POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZERS HANDLING POULTRY
DISPOSAL
AGRICULTURE 73 1966 110-112

400 66 0354 GIBSON E A
SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS SALMONELLOSIS CATT
LE
AGRICULTURE 73 1966 213-216

400 66 0380 EBY H J
TWO BILLION TONS OF - WHAT KEYWORDS ORGANIC-WASTES VOLUME ORGANIC-MATTER GRASS-BELTS POLLUTION-CONTROL
COMPOST SCIENCE 7 AUTUMN 1966 7-10

400 67 0336 GIBSON E A
DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND DISPOSAL
AGRICULTURE 74 1967 183-188

400 67 0359 LINN A
WHIPPING THE MANURE PROBLEM KEYWORDS OXIDATION-DITCH ODOR AEROBIC-BACTERIA ROTOR PROBLEM
FARM QUARTERLY WINTER 1966-67 56-59 115-116

400 67 1226 TAYLOR A W
PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SEWAGE-EFFLUENTS EU
TROPHICATION IRRIGATION MANURE FEED-LOTS
JOURNAL OF SOIL AND WATER CONSERVATION NOV DEC 1967 P 228-231 4 TAB 26 REF

400 68 0015 ANON
CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION KEYWORDS LAGOON POND FURROW-IRRIGATION PUMP CATTLE
SOIL CONSERVATION 34 4 NOV 1968 84-86

400 68 0032 BULLARD W E JR
NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGANIC-WASTES DILUTION WASTE-WATER-DISPOSAL BACTERIA ORGANIC-MATTER FILTERS
SOIL CONSERVATION 34 4 NOV 1968 75-77

400 68 0033 UNDERWOOD C
IRRIGATING WITH ANIMAL WASTE KEYWORDS SPRINKLER-IRRIGATION SEWAGE-DISPOSAL EFFLUENT HOGS BASIN
SOIL CONSERVATION 34 4 NOV 1968 81-82

400 68 0038 SMITH G R ABBOTT F D
PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNOFF SOIL SCS SOLID-WASTE
SOIL CONSERVATION 37 4 NOV 1968 78-79

400 68 0101 VAN DAM J PERRY C A
MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PROCESSING-PLANT PACKAGING BULK MANAGEMENT-COSTS
CALIFORNIA AGRICULTURE 22 12 DEC 1968 12-13 COMPOST SCIENCE V9 N2 PP26-27 SUMMER 1968

400 68 0229 WILLIAMS H R
THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTION WATER-SHED-PROTECTION SCS MANAGEMENT
WATER & SEWAGE WORKS 115 OCT 1968 463-464

400 68 0449 RILEY C T
WASTES FROM THE POULTRY INDUSTRY KEYWORDS ENGLAND POULTRY
AGRICULTURE V75 N8 PP374-76 AUG 1968

400 69 0016 ANON
FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SOIL-CONTAMINATION NITRATES AQUIFERS DENITRIFICATION WATER-TABLE PERCOLATION FEEDLOTS
AGRICULTURAL RESEARCH 18 6 DEC 1969 14-15

400 69 0039 WILMORE R
LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRINKLER-IRRIGATION LABOR DISPOSAL
FARM JOURNAL 93 8 AUG 1969 26C-26D

400 69 0419 MILLER B F SHAW J H
DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM WASTES MUSCA DOMESTICA POULTRY
POULTRY SCI VOL 48 NO 5 1969 PP1844-1855

400 69 1045 CAMPBELL F R WEBBER L R
AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NUTRIENTS WATER-POLLUTION-SOURCES AGRICULTURE NITROGEN PHOSPHORUS FERTILIZERS RUNOFF FARM-WASTES PRODUCTIVITY AQUATIC-PLANTS CANAL-LAKE-ONTARIO
JOURNAL OF SOIL AND WATER CONSERVATION VOL 24 NO 4 AUG 1969 P 139-141 2 TAB 2 FIG 9 REF

400 69 1225 WADLEIGH C H BRITT C S
CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEVELOPMENT WATER-POLLUTION EUTROPHICATION GOVERNMENT-SUPPORTS SOIL-CONSERVATION INDUSTRIAL-WASTES MUNICIPAL-WASTES FERTILIZERS PESTICIDES SOIL-EROSION ANIMAL-WASTES ECONOMICS NITROGEN WATER-CONSERVATION SOIL-RUNOFF LIVESTOCK
JOURNAL OF SOIL AND WATER CONSERVATION VOL 24 NO 4 OCTOBER 1969 P 172-175 4 REF

400 70 0022 GILLILAND J
SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY-AERATION SYSTEM LAGOONS
POULTRY DIGEST 29 341 330-331 JULY 1970

400 70 0029 FAIRBAIRN C B
DRIED POULTRY MANURE AS CATTLE FEED KEYWORDS DRYING NUTRITIONAL-VALUE POULTRY-MANURE CATTLE-FEED
POULTRY DIGEST 29 341 331 JULY 1970

400 70 0046 JONES K B C
FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BUILDING-CODES NOISE NUISANCES DISPOSAL
GREAT BRITAIN MINISTRY OF AGRICULTURE 77 4 165 APRIL 1970

400 70 0068 HANNAH H W
POSSIBLE DEFENSES AGAINST NUISANCE COMPLAINTS KEYWORDS LEGAL-ASPECTS POULTRY NUISANCE
POULTRY DIGEST, P 601, DECEMBER 1970

400 70 0069 ANON
CONNECTICUT REQUIREMENTS FOR LIQUID MANURE DISPOSAL KEYWORDS REGULATIONS POLLUTANTS CONNECTICUT DISPOSAL
POULTRY DIGEST, P 583, DECEMBER 1970

400 70 0070 MARTIN W P
SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS FERTILIZERS MANURE-VALUE DISPOSAL
JOUR SOIL AND WATER CONSERVATION 25 MARCH 1970 43-45

400 70 0091 LUDINGTON D C SOBEL A T
MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGRAPHY ORANIC-ACIDS MOISTURE ODORS
POULTRY DIGEST SEPT 1970 P445-446

400 70 0092 ANON
SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTLE POPULATION-EQUIVA
LENTS TERRACESRESEARCH
SOUTH DAKOTA FARM & HOME RESEARCH 21 2 P22-27 SPRING 1970

400 70 0097 PARSONS R A PRICE F FAIRBANK W C
POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FLUSHING-GUTTER MICRO
ORGANISMS ODORPOULTRY LAGOON-DESIGN
POULTRY DIGEST, 29 344 , P485-488, OCT 1970

400 70 0109 CHARLES O W
SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS SALT RATION POULT
RY
POULTRY DIGEST SEPT 1970 431

400 70 0111 HERR G H
UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS LAGOONS DISPOSAL A
ERATION AEROBIC DRYING STIRRING LIQUID-WASTES ODOR-PROBLEMS
POULTRY DIGEST, 29 344 P476-479, OCT 1970

400 70 0113 RIDLEN S F JOHNSON H S
LOCATING A POULTRY ENTERPRISE KEYWORDS NEIGHBORS EGGS
POULTRY DIGEST, 29 344 , P495-496, OCT 1970

400 70 0268 ANON
MANURE STACKING KEYWORDS WASTE DUMPS WASTE DISPOSAL UITIMATE DISPOSAL WASTE STORAGE FACILITIES FARM WAST
ES STACKING
HOARD S DAIRYMAN VOL 115 OCT 1970 PP1028,1067

400 70 0308 HARTMAN R C
DEEP PIT SLAT-FLOOR BREEDING HOUSE KEYWORDS POULTRY FARM-WASTES SLOTTED-FLOOR VENTILATION
POULTRY DIGEST DEC 1970 P 580-583

400 70 0351 FAULKNER G
DAIRY-SET-UP FOR 200 COWS KEYWORDS LAGOON COSTS FREE-STALL-HOUSING EVAPORATIVE-LAGOON
POWER FARMING JANUARY 1970 38-39

400 70 0357 ADDISON J N
FROM THE ALS MECHANICAL-CLEANING OF COWSHEDS KEYWORDS DAIRY-CATTLE AGE COSTS SPECIFICATIONS SURVEY
AGRICULTURE 77 11 NOV 1970 534-536

400 70 0415 ANDERSON E D
TURNING WASTES INTO PROFITS KEYWORDS WASTE TREATMENT POULTRY DRYING ODOR CONTROL WASTE STORAGE
FARM QUARTERLY VOL 25 NO 6 NOV-DEC 1970 PP48-49,85

400 70 0577 SOBEL A T
BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
COMPOST SCIENCE VOL 11 NO3 1970 P28-29

400 70 0579 RUSSELL J
OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION KEYWORDS HOGS SMART-PORK-FARM OXI
DATION-DITCHES ODORS HANDLING
FARM JOURNAL 94 8 H-10 AUG 70

400 70 1132 GERSTNER J
THE GREAT MANURE DILEMMA KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT RECYCLING FARM-WASTES LIVESTOCK
THE FURROW SEPT OCT 1970 P 1-2

400 70 1133 ANON
POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING FARM-WASTES LEGAL-ASPECTS LI
VESTOCK
THE FURROW SEPT OCT 1970 P 4

400 70 1176 FRINK C R
ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES NUTRIENTS SEWAGE-T
REATMENT FERTILIZERS FARM-PRACTICES
COMPOST SCIENCE NOV DEC 1970 P 14-15 7 REF

400 71 0262 BERGE O I
WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE DISPOSAL CATTLE WASTE STORAGE WASTE UTILIZATION ODOR
HANDLING
HOARD S DAIRYMAN VOL 116 MARCH 25 1971 PP353,383

400 71 0264 BATES D W
HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE DISPOSAL WASTE DUMPS FARM-WASTES CATTLE HA
NDLING-METHODS SLURRY
HOARD S DAIRYMAN VOL 116 MARCH 10 1971 PP273

400 71 0267 BERGE O I
WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST FACTORS CAPITAL INV
ESTMENTS MANAGEMENT
HOARD S DAIRYMAN VOL 116 APRIL 10 1971 PP420

400 71 0293 SMITH W M
SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH KEYWORDS EGGS EFF
ECTS POULTRY FARM-WASTES DDT PHOSPHORUS PROTEINS CONFINEMENT-PENS OYSTERS CALCIUM FEEDS AMINO-ACIDS WHEAT
SODIUM EGG-SHELLS EGG-QUALITY EGG-PRODUCTION ALBUMEN CHICKEN-HOUSING COW-MANURE
POULTRY DIGEST MARCH 1971 P 136-137

400 71 0294 ANON
MANURE MITES IN INTEGRATED FLY CONTROL KEYWORDS POULTRY CALIFORNIA FLY-CONTROL
POULTRY DIGEST P68 FEB 71

400 71 0295 ANON
OXIDATION DITCH IN CAGE LAYER HOUSE KEYWORDS POULTRY BOD N-IRELAND ODOR OXIDATION-DITCH
POULTRY DIGEST P337 JULY 71

400 71 0297 HARTMAN R C
BROODER-GROW CAGES OVER DEEP PIT KEYWORDS POULTRY FARM-WASTES VENTILATION PIT STORAGE
POULTRY DIGEST APRIL 71 P 165-168

400 71 0298 OLSON E A
MANAGING SWINE WASTES TO PREVENT POLLUTION KEYWORDS FARM-WASTES HOGS WASTE-WATER-DISPOSAL WASTE-MANAGEME
NT MANAGING
NEBRASKA FARMER APRIL 1971 P 18 20 22

400 71 0305 LAURA R D IDNANI M A
RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS NITRIFICATION MIC
ROBIAL DECOMPOSITION ANAEROBIC FERMENTATION EFFECT
CURRENT SCI VOL 40 NO 7 1971 PP158

400 71 0309 WILLSON G B
CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POULTRY ODORS
POULTRY DIGEST PP332-34 JULY 71

400 71 0311 BRESSLER G O
WHY STIRRING MANURE REDUCES ODORS KEYWORDS AEROBIC ANAEROBIC STORAGE ODORS HANDLING
POULTRY DIGEST P60 FEB 71

400 71 0313 ANON
TYPES OF MANURE DRYERS KEYWORDS DEHYDRATION EQUIPMENT
POULTRY DIGEST PP338-40 JULY 71

400 71 0315 HARTMAN R C
IF COW MANURE BREAKS DOWN DDT KEYWORDS COW DDT
POULTRY DIGEST P109 MAR 71

400 71 0327 ZINDEL H C
RECYCLED POULTRY NUTRIENTS KEYWORDS FARM WASTES POULTRY WASTE DISPOSAL DRIED POULTRY WASTE DIETS WASTE T
REATMENT RECYCLED
POULTRY DIGEST VOL 30 351 MAY 1971 PP231-233

400 71 0329 HARROLD T
DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HATCHERY
POULTRY DIGEST VOL 30 351 MAY 1971 PP250-251

400 71 0339 JOHNSON C
FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHING-GUTTER COLLECTIO
N DISPOSAL
HOG FARM MANAGEMENT 8 1 , P 23-25&28, JAN 1971

400 71 0349 ANON
MAXI-MIXING FOR MANURE DISPOSAL KEYWORDS POULTRY COMPOSTING MIXING DISPOSAL
POULTRY DIGEST, P 12, JANUARY 1971

400 71 0350 ADOLPH R H
SCHEDULE MANURE REMOVAL TO AVOID FLY BREEDING KEYWORDS CALIFORNIA POULTRY ODORS FLY
POULTRY DIGEST, P 29, JANUARY 1971

400 71 0435 VIETS F G JR
THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION KEYWORDS WASTE DISPOSAL AIR POLLUTION WASTE DUMPS WASTE
DISPOSAL PROBLEM
AG SCI REVIEW VOL 9 NO 1 1ST QUAR 1971 PP1-8

400 71 0446 CHUMNEY R D
BASIC POINTS TO CONSIDER IN MANURE DISPOSAL PROBLEM KEYWORDS DISPOSAL
POULTRY DIGEST PP608 DEC 1970

400 71 0456 SKINNER J L
TRY TO KEEP ODORS UNDER CONTROL KEYWORDS ODORS CONTROL
POULTRY DIGEST P16 MARCH 71

400 71 0463 ANON
CHEMICAL COMPOSITION OF POULTRY MANURE KEYWORDS CHEMICAL POULTRY CHARACTERISTICS
POULTRY DIGEST PP439-441 SEPT 1971

400 71 0465 CALVERT C C
FEED ADDITIVE RESIDUES IN POULTRY MANURE KEYWORDS ADDITIVE-RESIDUES POULTRY
POULTRY DIGEST PP396-398 AUG 1971

400 71 0504 ANON
COST OF DEHYDRATING POULTRY MANURE KEYWORDS SHELF-LIFE FERTILIZERS EQUIPMENT COST DEHYDRATING-POULTRY
POULTRY DIGEST , P 143, MARCH 1971

400 71 0505 FEREBEE D C
CONFINEMENT-REARING OF TURKEYS KEYWORDS VENTILATION MANAGEMENT PSYCHROMETRICS CONTROLS TURKEYS
POULTRY DIGEST P 110-112 MARCH 1971

400 71 0568 FAIRBANK W C BRAMHALL E L
DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DISPOSAL DISPOSAL REN
DERING
POULTY DIGEST VOL 30 NO 358 DEC 1971 PP600-601

400 71 0575 OSTRANDER C E
POULTRY WASTE HANDLING SYSTEMS KEYWORDS POULTRY HANDLING-SYSTEMS
POULTRY DIGEST P529-32 NOV 1971

400 71 0686 NATZ C
NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF KEYWORDS CATTLE WASTE-TREATMENT SUSPENDED-SOLIDS FARM-WASTES FEEDSTUFF
FEEDSTUFFS VOL 43 NO 28 JULY 10 1971

400 71 0731 TURNER D O
DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPOSING
CROPS AND SOILS FEBRUARY 1971 P 10-11

400 71 0753 VAN DAM J PERRY C A
MANURE CAN BE PROCESSED AND SOLD AT A PROFIT KEYWORD FEEDLOT CATTLE MARKET-VALUE WASTE-DISPOSAL REUSE
THE PRACTICING NUTRITIONIST VOL 3 NO 4 P40,42 1971

400 71 1131 ANON
FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE CONFINEMENT-PENS ANIMAL-DENSITY OPEN-LOT OPEN-SHED COLD-BARN WARM-BARN
FEEDLOT MANAGEMENT JAN 1971 P 34-37 8 FIG

400 71 1134 ANON
FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PROTEINS FEED-LOTS TEXAS FEEDS
BEEF JULY 1971 P 12

400 71 1135 ANON
ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS FEED LOTS RUNOFF FARM WASTES WATER POLLUTION CONTROL NEBRASKA
BEEF JULY 1971 P 15

400 71 1136 ANON
FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WASTES OXIDATION PROTEINS IOWA OXIDATION-LAGOONS WASTE-WATER-TREATMENT LIVESTOCK
BEEF JULY 1971 P 16-17

400 71 1137 RICHTER J
REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEEDLOTS KEYWORDS FEED-LOTS WASTE-DISPOSAL FARM-WASTES LEGAL-ASPECTS WATER-POLLUTION-CONTROL REGISTRATION
BEEF JULY 1971 P 20

400 71 1139 ANON
HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WEATHER EFFECTS WINTER PRODUCTIVITY SHELTER
FEEDLOT MANAGEMENT V 13 NO 2 FEB 1971 P 38-39

400 71 1143 ANON
A LOVELY NEW SCENT FOR MANURE KEYWORDS AIR-POLLUTION SAGEBRUSH FARM-WASTES ODOR WATER-POLLUTION-CONTROL
CALF NEWS V 9 NO 10 OCT 1971 P 4

400 71 1144 JEDELE D G
CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION PERFORMANCE FEED-LOTS FARM-WASTES ILLINOIS CONFINEMENT-PENS
FEEDLOT MANAGEMENT V 13 NO 1 JAN 1971 P 21-23 50

400 71 1172 ANON
OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE AEROBIC-BACTERIA PROTEINS WASTE-TREATMENT RECYCLING IOWA USDA FOOD-AND-DRUG-ADMINISTRATION
BEEF V 8 NO 2 OCT 1971 P 24

400 71 1174 ANON
LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-LOTS FERTILIZERS IRRIGATION-SYSTEMS SETTLING-BASINS LAGOONS WASTE-TREATMENT WASTE-DISPOSAL WATER-POLLUTION-CONTROL NEBRASKA
FEEDLOT MANAGEMENT V 13 NO 6 JUNE 1971 P 56-57

400 71 1196 REIMAN R
CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-ABATEMENT AGRICULTURAL-RUNOFF RETURN-FLOW WASTE-DISPOSAL CATTLE PERMITS DISCHARGE-WATER ANIMAL-WASTES-WILDLIFE FEEDLOTS TEXAS NEW-MEXICO OKLAHOMA IRRIGATION-WATER POLLUTANTS SURFACE-WATERS WATER-POLLUTION-CONTROL SEDIMENT-DISCHARGE EROSION SALINITY FERTILIZERS PESTICIDES WATER-QUALITY-CONTROL TAXES
THE CATTLEMAN V 58 NO 2 JULY 1971 P 43 58

400 72 1032 ANON
NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES PERCOLATION SOIL-ANALYSIS NEBRASKA
CALF NEWS VOL 10 NO 7 JULY 1972 P 38-39 8 FIG

400 72 1130 ANON
THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT POULTRY FEEDS
AGRICULTURAL ENGINEERING V 53 NO 6 JUNE 1972 P 16-17 2 FIG

400 72 1138 MANTHEY E W
HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS FEED-LOTS WASTE-DISPOSAL FARM-WASTES CALIFORNIA CONFINEMENT-PENS CATTLE COW-TOILET
FEEDLOT MANGEMENT V 14 NO 2 FEB 1972 P 10-16 60 7 FIG

400 72 1166 ANDERSON E D
HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE CYCLING-NUTRIENTS FERTILIZERS GROUNDWATER-POLLUTION LEGAL-ASPECTS NITRATES PRODUCTIVITY POTASSIUM PHOSPHORUS REGULATION TOXICITY
THE FARM QUARTERLY V 27 NO 5 FALL 1972 P 44-45 2 TAB

400 72 1171 ANON
MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES INSULATION FARM-WASTES RECYCLING WASTE-DISPOSAL WASTE-TREATMENT OHIO PYROLYSIS BUILDING-MATERIALS
CALF NEWS V 10 NO 8 AUGUST 1972 P 4

400 72 1173 ANON
NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN PHOSPHORUS POTA
SSIUM ASH CATTLE FARM-WASTES AIR-POLLUTION WASTE-TREATMENT OKLAHOMA
CALF NEWS V 10 NO 7 JULY 1972 P 22

400 72 1179 ANON
THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETTLING-BASINS LAGO
ONS IRRIGATION NUTRIENTS RUNOFF DIVERSION-STRUCTURES TERRACES-AGRICULTURAL MISSOURI INSTALLATION-COSTS O
PERATING-COSTS CATTLE
BEEF V 8 NO 8 APR 1972 P 6-7 4 TAB

400 73 1007 ANON
FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOMICS CATTLE FEEDLOT
S WASTE-DISPOSAL FERTILIZER TEXAS IRRIGATION RETENTION-PONDS PLAYA-LAKES
BEEF VOL 9 NO 7 MARCH 1973 P 43 66 1 FIG

400 73 1063 GARMAN W H
AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES SOILS EUTROPHIC
ATION LIVESTOCK AGRICULTURE FARM-WASTES FARM-ANIMALS FERTILIZERS FEED-LOTS ALGAE PLANKTON NUTRIENTS CARBO
N-DIOXIDE WELLS LAKES BALANCE-OF-NATURE
CROPS & SOILS VOL 25 NO 9 AUG-SEPT 1973 P 14-19

400 73 1068 ZUROWSKI T
NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-LOTS NUTRIE
NTS FEEDS ECONOMICS BACTERIA REFEEDING COWMEL FARM-ECOLOGY-COMPANY FOOD-AND-DRUG-ADMINISTRATION COWDOMIN
IUM
FEEDLOT MANAGEMENT VOL 15 NO 8 AUG 1973 P 26 1 FIG

400 73 1073 BIELBY D H MILLER M H WEBBER L R
NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYSIMETERS CORN SLUR
RIES WASTE-DISPOSAL GROUNDWATER SOILS POULTRY IRRIGATION DENITRIFICATION ONTARIO PERCOLATES GUELPH-SANDY-L
OAM
JOURNAL OF SOIL AND WATER CONSERVATION VOL 28 NO 3 MAY-JUNE 1973 P 124-126 4 TAB 3 REF

400 73 1140 ANON
ANOTHER POSSIBLE PROCESS FOR MANURE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT FERTILIZERS AMMONIA
CALF NEWS V 11 NO 1 JAN 1973 P 38

400 73 1145 ANON
FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT CALIFORNIA FEED
S
CALF NEWS V 11 NO 1 JAN 1973 P 28-29 52

400 73 1158 SWANSON N
DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WASTE-DISPOSAL WATER-
POLLUTION-CONTROL IRRIGATION-SYSTEMS FLOOD-PROTECTION DIKES SUMPS BASINS NEBRASKA CATTLE SOIL-CONSERVATIO
N-SERVICE RURAL-ENVIRONMENTAL-ASSISTANCE-PROGRAM
REPRINTED FROM NEBRASKA FARMER FEB 3 1973 P 13-15 1 FIG

400 73 1168 ELAM M L
CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING EFFLUENT NITRATES
SALTS LEAKAGE PUMP RECYCLING DAIRY-INDUSTRY CALIFORNIA WASTE-WATER-IRRIGATION FERTILIZERS FARM-WASTES
HOARDS DAIRYMAN V 118 NO 5 MAR 10 1973 P 311 362 3 FIG

400 73 1178 CONVERSE J C
ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CONFINEMENT-PENS W
ASTE-STORAGE OXIDATION-LAGOONS GASES TOXICITY VOLATILITY AERATION VENTILATION ANAEROBIC-BACTERIA
HOARDS DAIRYMAN V 118 NO 13 JULY 10 1973 P 819

400 73 1181 MEADE T L
SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND CONTROLLED-ENVIRONME
NT TOXIC-WASTES DENITRIFICATION-COLUMN
THE AMERICAN FISH FARMER V 4 NO 5 APR 1973 P 9-10 3 FIG

400 73 1183 ANON
CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS CATTLE EFFLUENT
WASTE-DISPOSAL IRRIGATION-SYSTEM FERTILIZERS ALFALFA ARIZONA
CALF NEWS V 11 NO 3 MAR 1973 P 52-53 68-69

400 73 1191 MANTHEY E W
MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS RELOCATION FARM-WASTES FEED-LOTS A
RIZONA CATTLE RETENTION-POND FLY-PARASITES BIOLOGICAL-FLY-CONTROL PRECONDITIONING FEEDING-OUT-AND-FINISH
ING
FEEDLOT MANAGEMENT V 13 NO 8 AUG 1971 P 34-44

300 68 1259 HART S A TURNER M E
WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATION PONDS DESIGN-CR
ITERIA ANAEROBIC-DIGESTION SLUDGE DISPOSAL ODORS MOSQUITOES INSECT-CONTROL SUBSURFACE-WATERS INFILTRATIO
N BIOCHEMICAL-OXYGEN-DEMAND AGRICULTURAL-WASTES MANURE-STABILIZATION-POND LIVESTOCK-MANURE-CHARACTERISTI
CS POND-LOADING-RATES POND-APPEARANCE-AND-LOCATION SLUDGE-DIGESTION SLUDGE-DISPOSAL
ADVANCES IN WATER QUALITY IMPROVEMENT UNIVERSITY OF TEXAS PRESS AUSTIN TEXAS 1968 P 457-463 2 TAB 6 REF

300 70 0386 WADLEIGH C H BRITT C S
INTRODUCTION ISSUES IN FOOD-PRODUCTION AND CLEAN WATER KEYWORDS ENVIRONMENT FEEDLOTS WASTE-PRODUCTION F
ERTILIZER
AG PRAC AND WAT QUAL ISU PRESS 1970 XIX-XXVII

300 70 0387 JOHNSON H P MOLDENHAUER W C
POLLUTION BY SEDIMENT SOURCES AND THE DETACHMENT AND TRANSPORT-PROCESSES KEYWORDS SEDIMENT-TRANSPORT SO
IL-EROSION
AG PRAC AND WAT QUAL ISU PRESS 1970 3-20

300 70 0388 HOLT R F DOWDY R H TIMMONS D R
CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORGANIC-MATTER SEDIME
NT
AG PRAC AND WAT QUAL ISU PRESS 1970 21-34

500 70 0389 AMEMIYA M
LAND AND WATER-MANAGEMENT FOR MINIMIZING SEDIMENT KEYWORDS SOIL-EROSION SEDIMENT-YIELD EROSION-CONTROL
AG PRAC AND WAT QUAL ISU 1970 35-45

500 70 0390 VERDUIN J
SIGNIFICANCE OF PHOSPHORUS IN WATER-SUPPLIES KEYWORDS NUTRIENTS FERTILIZER DETERGENTS SEWAGE PHOSPHORUS
AG PRAC AND WAT QUAL ISU PRESS 1970 63-71

500 70 0391 BLACK C A
BEHAVIOR OF SOIL AND FERTILIZER-PHOSPHORUS IN RELATION TO WATER-POLLUTION KEYWORDS PHOSPHATES GROUNDWATE
R
AG PRAC AND WAT QUAL ISU PRESS 1970 72-93

500 70 0392 GOLDBERG M C
SOURCES-OF-NITROGEN IN WATER-SUPPLIES KEYWORDS NITRATES GROUNDWATER SURFACE-WATER INFILTRATION NITRITES
AG PRAC AND WAT QUAL ISU PRESS 1970 94-124

500 70 0393 STEVENSON F J WAGNER G H
CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING MICROORGANISMS CHE
MISTRY SOILS
AG PRAC AND WAT QUAL ISU PRESS 1970 125-141

500 70 0394 MARTIN W P FENSTER W E HANSON L D
FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION SOILS NITRATES MAN
AGEMENT
AG PRAC AND WAT QUAL ISU PRESS 1970 142-158

500 70 0395 DAHM P A
CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL TOXAPHENE PARATHIO
N CHEMISTRY INSECTICIDES
AG PRAC AND WAT QUAL ISU PRESS 1970 167-182

500 70 0396 NICHOLSON H P
THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATIONS WATER-POLLUTION R
UNOFF PESTICIDE
AG PRAC AND WAT QUAL ISU PRESS 1970 183-193

500 70 0397 TIMMONS F L FRANK P A DEMINT R J
HERBICIDE RESIDUES IN AGRICULTURAL WATER FROM CONTROL OF AQUATIC AND BANK WEEDS KEYWORDS 2-4-D AQUATIC-W
EEDS RESIDUES CONTROL
AG PRAC AND WAT QUAL ISU PRESS 1970 194-208

500 70 0398 PETERS D C
PESTICIDES AND PEST-MANAGEMENT FOR MAXIMUM-PRODUCTION AND MINIMUM POLLUTION KEYWORDS PEST-CONTROL APPLIE
D-CONTROLS PESTICIDES PEST-MANAGEMENT
AG PRAC AND WAT QUAL ISU PRESS 1970 209-223

500 70 0399 MINER J R WILLRICH T L
LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLUTANTS RUNOFF BOD CO
D LAGOON-EFFLUENT LAGOONS FEEDLOTS
AGRICULTURAL PRACTICES AND WATER QUALITY, ISU PRESS,1970 231-240

500 70 0400 MCCALLA T M FREDERICK L R PALMER G L
MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTILIZER COMPOSITION MI
CROORGANISMS DECOMPOSITION SOILS
AGRICULTURAL PRACTICES AND WATER QUALITY, 1970 ISU PRESS 241-255

500 70 0401 MCKINNEY R E
MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL MICROORGANISMS OXIDA
TION-DITCH ANAEROBIC-LAGOONS LAGOONS AERATION DESIGN-CRITERIA DECOMPOSITION
AGRICULTURAL PRACTICES AND WATER QUALITY, 1970 ISU PRESS 256-264

500 70 0402 DIESCH S L
DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATER-TRANSFER BACTERIA
VIRUS FUNGI DISEASE
AGRICULTURAL PRACTICES AND WATER QUALITY, 1970 ISU PRESS 265-285

500 70 0403 MOORE J A
ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UTILIZATION DISPOSAL
LAGOONS MANAGEMENT
AGRICULTURAL PRACTICES AND WATER QUALITY, 1970 ISU PRESS 286-297

500 70 0404 LEGRAND H E
MOVEMENT OF AGRICULTURAL-POLLUTANTS WITH GROUNDWATER KEYWORDS WATER-POLLUTION ZONE-OF-SATURATION WATER-TA
BLE STANDARDS MOVEMENT
AG PRAC AND WAT QUAL ISU PRESS 1970 303-313

500 70 0405 ARMSTRONG D E ROHLICH G A
EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRATE RUNOFF GROUNDWAT
ER EFFECTS EUTROPHICATION
AG PRAC AND WAT QUAL ISU PRESS 1970 314-330

500 70 0406 CAMPBELL R S WHITLEY J R
EFFECTS OF AGRICULTURAL-POLLUTANTS ON RECREATIONAL-USES OF SURFACE-WATERS KEYWORDS RECREATION FISH PEST
ICIDES EFFECTS
AG PRAC AND WAT QUAL ISU PRESS 1970 331-343

500 70 0407 BAUMANN E R KELMAN S
EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEYWORDS TERTIARY-TRE
ATMENT BOD NITROGEN PHOSPHORUS ALGAE CHLOROPHYLL EFFECTS RUNOFF
AG PRAC AND WAT QUAL ISU PRESS 1970 344-362

500 70 0408 HINES N W
LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES NUISANCE PUBLIC-AGEN
CIES LEGAL
AG PRAC AND WAT QUAL ISU PRESS 1970 365-376

500 70 0409 TIMMONS J F
ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES MEASUREMENT ECONOMIC
AG PRAC AND WAT QUAL ISU PRESS 1970 377-389

500 70 0410 RADEMACHER J M
ALLIANCE FOR ACTION KEYWORDS WATER-POLLUTION FEEDLOTS REGISTRATION INVENTORY WASTE-MANAGEMENT
AG PRAC AND WAT QUAL ISU PRESS 1970 390-396

500 70 0411 BERNARD H
ACCOMPLISHMENTS AND GOALS KEYWORDS WATER-POLLUTION WATER-QUALITY FWPCA STANDARDS ENVIRONMENT
AG PRAC AND WAT QUAL ISU PRESS 1970 397-407

500 71 1072 PETERSON J R MCCALLA T M SMITH G E
HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIGATION NITRATES SOIL-PROFILES LAGOONS PATHOGENIC-BACTERIA FERTILIZERS WATER-POLLUTION SOIL-CONTAMINATION ODOR LEACHING CHEMICAL-PROPERTIES PHYSICAL-PROPERTIES MICROBIAL-COMPOSITION CROPS TOXICITY HUMAN-WASTES PLANT-YIELDS DIGESTED-SLUDGE
FERTILIZER TECHNOLOGY & USE 2ND EDITION SOIL SCIENCE SOCIETY OF AMERICA 1971 P 557-596 27 TAB 8 FIG 42 REF

500 71 1254 ANONYMOUS
ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOSYNTHETIC-BACTERIA SULFUR-BACTERIA NITROGEN-FIXING-BACTERIA SOIL-MICROORGANISMS CLOSTRIDIUM ENTERIC-BACTERIA BIOASSAY ANIMAL-WASTES POULTRY RUMINANTS SEDIMENTS FOODS SOILS ENUMRATION ENRICHMENT CELLULOLYTIC-BACTERIA LIPOLYTIC-BACTERIA BACTERIODACEAE BIOLOGICAL-SAMPLES BACTERIODES-FRAGILIS SPHAEROPHORUS FUSIFORMIS ZYMOMONAS-ANAEROBIA FUSOBACTERIA SPIROCHAETES MICROAEROPHILIC-VIBRIO ANAEROBES CULTURE-MEDIA
ACADEMIC PRESS INC NEW YORK NEW YORK 1971 257 P

500 71 1255 JENSEN R MACKEY D R
DISEASES OF FEEDLOT CATTLE KEYWORDS ANIMAL-DISEASES CATTLE FEED-LOTS FARM-WASTES WATER-POLLUTION-SOURCES
LEA AND FEBIGER PHILADELPHIA PA 1971 377 P

600 68 0471 MOORE J A HART S A
ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION KEYWORDS SUBLIMATION FREEZING WINTER DRYING POULTRY
PACIFIC COAST REGION ASAE PAPER NO PC 68-121

600 69 1005 CRAWFORD R E
FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES LIVESTOCK HYDROLOGY PRECIPITATION WASTE-TREATMENT WASTE-STORAGE WASTE-DISPOSAL WASTE-MANAGEMENT-FACILITIES
CONTINUING EDUCATION SEMINAR TOPEKA KANSAS JANUARY 23 1969 HUTCHINSON KANSAS JANUARY 28 1969 14 P 9 TAB

600 69 1006 STEWART R E BAILEY JR E M
HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMIDITY HYPOTHALMUS CRANIOTOMY CANNULAE RESPIRATION-RATE THERMAL-ENVIRONMENT HYPOTHALMIC-HEATING RECTAL-TEMPERATURE HYPOTHALMIC-TEMPERATURE
PAPER NO 72-511 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 20 P 2 TAB 10 FIG 9 REF

600 69 1160 WARD J C JEX E M NORTON T E
CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISSOLVED-SOLIDS BIOCHEMICAL-OXYGEN-DEMAND ONSAGER-EQUATION CATTLE CONDUCTIVITY VOLATILE-SOLIDS VANT-HOFF-ARRHENUIS-RELATIONSHIP PH
4 P 1 TAB

600 69 1239 WILLARDSON L S MEEK B D GRASS L E DICKEY G L BAILEY J W
DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRATES PERMEABILITY SUMPS IRRIGATION ELECTRICAL-CONDUCTANCE LEACHING PERCOLATION GROUNDWATER DENITRIFICATION SAN-JOAQUIN-VALLEY PANOCHE-SILTY-CLAY
PAPER NO 69-734 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1969 WINTER MEETING CHICAGO ILLINOIS DEC 9-12 1969 8 P 2 TAB 2 FIG

600 70 0080 KUMAR M BARTLETT H D MOHSENIN N N
FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEAR-DIAGRAMS NEWTONIAN-FLUIDS TEMPERATURE MOISTURE-CONTENT VISCOMETERS SHEAR-STRENGTH PROPERTIES SLURRIES
ASAE PAPER NO 70-911, 28 PAGES, 26 REF

600 70 0098 MOORE J A LARSON R E HEGG R O ALLRED E R
BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE ROTORS FOAMING NITROGEN BEEF OXIDATION-DITCH
PAPER NO 70-418 ASAE JULY 1970

600 70 0254 GRUB W MARTIN J D KEETON L L
AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROBIC-DIGESTION BIOLOGICAL-TREATMENTSTABILIZATION BEEF
ASAE PAPER NO 70-909 6 PAGES

600 70 0255 KEETON L L GRUB W WELLS D M MEENAGHAN G F ALBIN R C
EFFECTS OF MANURE-DEPTHS ON RUNOFF FROM SOUTHWESTERN CATTLE-FEEDLOTS KEYWORDS RAINFALL-INTENSITY RAINFALL-RUNOFF EFFECTS SOUTHWESTERN
PAPER NO 70-910 1970 ASAE WINTER MTG 7 P

600 70 0258 MEENAGHAN G F WELLS D M ALBIN R C GRUB W
GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOSTING C N ALKALINITY BEEF BOD BEEF
ASAE PAPER NO 70-907, 15 PAGES

600 70 0469 BARTH C
WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES QUALITY OLFACTORY-MECHANISM
ASAE 70-416 22 PAGES, 65 REF

600 71 0100 CROSS O E MAZURAK A P CHESNIN L
ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT KEYWORDS LAND-APPLICATION RUNOFF PERCOLATION
ASAE PAPER NO 71-906 23PP CHICAGO DEC 1971

600 71 0271 GOERING E LIPPER R I MANGES H L
GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS KEYWORDS DISPOSAL CROP-RESPONSE GROWTH-CHAMBERS RATES TREATMENTS
ASAE PAPER NO MC-71-104 17 PAGES

600 71 0272 PERSON H L MINER J R
A DOSING-SIPHON FOR DISCHARGING CLEANING-WATER INTO FLUSHING-GUTTERS KEYWORDS DESIGN DATA EQUIPMENT TEST -PROCEDURES FLUSHING-GUTTERS
ASAE PAPER MC-71-105 22 PAGES

600 71 0288 ALLEN J B MC WHORTER J C
FIELD CROP IRRIGATION WITH OXIDATION POND EFFLUENT KEYWORDS MISSISSIPPI IRRIGATION OXIDATION-POND
PAPER 71-246 AMER SOC AGRIC ENGRS 26 P

600 71 0493 ROBBINS J W D KRIZ G J HOWELLS D H
NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUNOFF BOD TOC DISPOSA L NITROGEN
ASAE PAPER NO MC-71-102 20 PAGES

600 71 0494 IFEADT C N DESHAZER J A
A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN SWINE CONFINEMENT HOUSING KEYWORDS MODEL-STUDIES ODORS VENTILATION AMMONIA EFFECTS VENTILATION-SYSTEMS SWINE
AM SOC OF AG ENGR PAPER NO MC-71-103 9 PAGES

600 71 0495 LIPPER R I MANGES H L GOERING E
CONTAMINATION OF SURFACE WATERS FROM PLOWED-IN FEEDLOT MANURE KEYWORDS FARM-WASTES DISPOSAL FEEDLOT-MANU RE
AM SOC OF AG ENGR PAPER NO MC-71-803 4 PAGES

600 71 0496 KOELLIKER J K MINER J R
DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION MASS-TRANSFER NITR OGEN BALANCE DESORPTION LAGOONS
AM SOC OF AG ENGR PAPER NO MC-71-804 21 PAGES

600 71 0497 MAYES H F
DEHYDRATION OF ANIMAL WASTES KEYWORDS FARM-WASTES DEHYDRATION FERTILIZERS
AM SOC OF AG ENGR PAPER NO MC-71-805 15 PAGES

600 72 1001 MULKEY L A SMITH R E
INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATMENT ODOR TRICKLIN G-FILTERS FLOW-RATES BIOCHEMICAL-OXYGEN-DEMAND FARM-WASTES HOGS FEEDLOTS INCLINED-PLANE CONTACT-TIME ORGA NIC-REMOVAL PSYCHODA-FLY-LARVAE DESIGN-EQUATIONS
PAPER NO 72-952 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS DEC 11-15 1972 16 P 2 TAB 1 FIG 14 REF

600 72 1002 BARTH C L
USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULATION CLEAN-AIR-AC T FARM-WASTES LIVESTOCK MEASUREMENT QUALITY FEED-LOTS INTENSITY PRIMARY-ODOR-LIST SYRINGE-DILUTION-PROCE DURE OSOMETER
PAPER NO 72-441 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 3 TAB 19 REF

600 72 1004 BARTH C L HILL D T POLKOWSKI L B
CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS ODOR CHEMICAL-PROPERTIES PHYSICA L-PROPERTIES AIR-POLLUTION DAIRY-INDUSTRY FARM-WASTES CATTLE WASTE-STORAGE AMMONIA HYDROGEN-SULFIDE ODOR -INTENSITY-INDEX LIQUIFIED-WASTE-MANAGEMENT ODORANTS VOLATILE-ORGANIC-ACID ACETIC-ACID PH
PAPER NO 72-950 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS DEC 11-15 1972 17 P 2 TAB 9 FIG 24 REF

600 72 1031 PRICE D R SOBEL A T DAVIS H R
ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FARM-WASTES PHYSICAL -PROPERTIES MOISTURE FERTILIZERS WASTE-DISPOSAL NEW-YORK IN-HOUSE-DRYING HIGH-RISE-POULTRY-HOUSE CIRCULAT ION-FANS EXHAUST-FANS DRYING-COSTS
PAPER NO 72-806 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS DEC 11-15 1972 12 P 3 TAB 9 FIG

600 72 1071 PERSON H L MINER J R HAZEN T E MANN A R
A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS HOGS WASTE-TREATMENT FARM-WASTES FEED-LOTS IOWA AERATED-LAGOONS OXIDATION-LAGOONS EFFLUENT NUTRIENTS BACTERIA FUNGI SLIME ODO R PUMPING MAINTENANCE WATER-QUALITY WASTE-TRANSPORT WASTE-MANAGEMENT-SYSTEMS ROTATION-BIOLOGICAL-CONTACTO R FLUSHING-GUTTER HYDRAULIC-CLEANING
PAPER NO 72-439 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 30 P 2 TAB 8 FIG 6 REF

600 72 1074 MORRISON S R GIVENS R L LOFGREEN G P
SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-CONDITIONING TEMP ERATURE PERFORMANCE CALIFORNIA HEAT-STRESS RESPIRATORY-RATE
PAPER NO 72-423 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 12 P 5 TAB 1 FIG

600 72 1076 PAYNE F A ROSS I J HAMILTON H E FOX J D
HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTRY WASTE-TREATMENT RECYCLING TEMPERATURE PRESSURE MOISTURE-CONTENT EXTRUSION THERMAL-DESTRUCTION URIC-ACID CHEMICAL-CHANGES PHYSICAL-CHANGES STERILIZATION FLASH-VOLITALIZATION MICROBIAL-ORGANISMS
PAPER NO 72-450 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 22 P 1 TAB 6 FIG 17 REF

600 72 1148 DAVIS S FAIRBANK W WEISHEIT H
DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES INFILTRATION-RATES FARM-LAGOONS SEWAGE-PONDS SEALING CATTLE DAIRY-INDUSTRY
PAPER NO 72-222 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 10 P 2 TAB 1 FIG 10 REF

600 72 1149 SEWELL J I
MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOFF GROUNDWATER SLU RRIES IRRIGATION-SYSTEMS CATTLE FARM-WASTES WASTE-DISPOSAL MANAGEMENT FEED-LOTS
PAPER NO 72-443 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 13 P 7 FIG 5 REF

600 72 1150 BATES D W
OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STALL-BARN SOLID-ALL EYS SLATTED-ALLEYS LIQUID-MANURE-SYSTEMS STACKING-SYSTEM LIQUID-STORAGE-SYSTEM BEDDING FREE-STALL-BARN
PAPER NO 72-413 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 3 P

600 72 1151 NABBEN K
IMPROVED BEEF CONFINEMENT FACILITIES THROUGH PIT VENTILATION AND TEMPERED AIR INTAKES KEYWORDS VENTILAT ION VIRUS-PNEUMONIA-IN-BEEF-CATTLE-FOGGING VELOMETER-TEST
PAPER NO 72-449 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 7 P

600 72 1153 PAINE M D WITZ J A BUTCHBAKER A F BACON C M MCCROSKEY J E
MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS FEED-LOTS MATHEMATICAL-MODELS ENE RGY SYSTEMS-ANALYSIS FARM-WASTES CATTLE ANIMAL-METABOLISM BIOENERGETICS
PAPER NO 72-510 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 25 P 2 TAB 8 FIG 26 REF

600 72 1154 PONTIF J NIPPER W A LOYACANO A F BRAUD J
WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES LOUISIANA WINDBREA KS CLIMATES CATTLE FEED-LOTS SHELTERS FANS
PAPER NO 72-425 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 23 P 7 TAB 6 FIG 6 REF

600 72 1156 CRAMER C O CONVERSE J C HSU T S
SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS SEEPAGE FARM-WASTES CAT TLE SOLID-WASTES ORGANIC-MATTER NUTRIENTS NITROGEN COD BOD PHYSICAL-PROPERTIES CHEMICAL-PROPERTIES VOLATIL ITY DEGRADATION-DECOMPOSTITION DAIRY WASTE-DISPOSAL WASTE-STORAGE WISCONSIN MANURE-STACKING BEDDING STEAM-DISTILLATION-METHOD
PAPER NO 72-442 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 MEETING 1972 23 P 8 TAB 11 FIG 15 REF

600 72 1163 AL ZAKRI A S FREY A L
ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN IOWA SEWAGE-SLU DGE-TREATMENT FREEZE-THAW-TESTS EXTRACTION ESCHERICHIA-COLI RECYCLING WASTE-TREATMENT BACILLUS-MEGATERIU M BIURET-REACTION
PAPER NO 72-581 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS DEC 11-15 1972 18 P 3 TAB 19 REF

600 72 1169 REDDELL D L LYERLY P J HEFNER J J
CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS CULTIVATION CROP-YIELD NITRATES FORAGE SALINITY FARM-WASTES CATTLE WASTE-DISPOSAL TEXAS GROUND-WATER IRRIGATION AQUIFER FE RTILIZERS MOISTURE-CONTENT NUTRIENTS
PAPER NO 72 960 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS 1972 14 P 7 TAB 2 FIG 9 REF

600 72 1177 MANGES H L MURPHY L S GOERING E H
DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTLE FEED-LOTS RUNOF F RATES-OF-APPLICATION IRRIGATION CORN-FIELD SOIL-PROPERTIES NITROGEN PHOSPHORUS POTASSIUM SODIUM SALINI TY GREENSBERG-SILITY-CLAY-LOAM PLANT-POPULATION FORAGE-YIELDS
PAPER NO 72-961 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1972 WINTER MEETING CHICAGO ILLINOIS DEC 11-15 1972 12 P 1 TAB 5 FIG 6 REF

600 72 1262 BUTCHBAKER A F MAHONEY G W A GARTON J E
CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS WASTE-DISPOSAL CA TTLE TEMPERATURE BEEF-HOUSING-SYSTEM ANAEROBIC-LAGOONS MOISTURE-DEFICIT AERATED-LAGOONS MANAGEMENT SITE-SELECTION
PAPER NO 72-410 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 65TH ANNUAL MEETING HOT SPRINGS ARKANSAS JUNE 27-30 1972 35 P 1 TAB 10 FIG 28 REF

600 73 1065 BOORAM C V HAZEN T E FREDERICK L R
EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS HOGS CATTLE IOWA FARM-WASTES CON FINEMENT-PENS LAGOONS ANAEROBIC-CONDITIONS EFFLUENTS NUTRIENTS ELECTRICAL-CONDUCTANCE SALTS WASTE-DISPOSA L IRRIGATION TOXICITY WATER-POLLUTION CORN-FIELD SOIL-CONTAMINATION WASTE-QUALITY CLARION-WEBSTER-SOIL TI LE-DRAINED-GRASS-PLOTS PLANT-TISSUES
PAPER NO 73-239 AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS 1973 ANNUAL MEETING UNIVERSITY OF KENTUCKY LEX INGTON JUNE 17-20 1973 19 P 17 TAB 1 FIG 16 REF

600 73 1075 FRECKS G A GILBERTSON C B
THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES KENTUCK Y FEEDS DIGESTION VOLATILITY SHRINKAGE POROSITY CHEMICAL-PROPERTIES PHYSICAL-PROPERTIES VOLUMETRIC-ANALY SIS SIEVE-ANALYSIS DENSITY WASTE-TREATMENT WASTE-STORAGE SOLIDS MOISTURE-CONTENT CHEMICAL-OXYGEN-DEMAND E NGINEERING RATION DRYING-RATES
PAPER NO 73-442 AMERICAN SOCIETY OF APRICULTURAL ENGINEERS 66TH ANNUAL MEETING UNIVERSITY OF KENTUCKY LEX INGTON JUNE 17-20 1973 24 P 6 TAB 6 FIG 20 REF

600 73 1147 SWEETEN J M ALLEN W S REDDELL D L
SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPOSAL GROUNDWATER POLLUTANTS AQUIFERS WASTE-WATER-TREATMENT FERTILIZERS FEED-LOTS CATTLE FARM-WASTES
CATTLE FEDDERS INFORMATION PUBLICATION NO L 1094 TEXAS A M UNIVERSITY COLLEGE STATION TEXAS 197 3 4 P

700 68 0330 BELLA R A
CONFINED SWINE MANURE DISPOSAL KEYWORDS OXIDATION-DITCH ROTOR-DESIGN OXYGEN-TRANSFER SWINE DISPOSAL
MS THESIS DEPT CIVIL ENGR KANSAS UNIV 157P 1968

700 69 0712 JEX E M
CATTLE FEEDLOT WASTE CHARACTERISTICS KEYWORDS FEEDLOTS BOD HYDROGEN-ION-CONCENTRATION REDOX-POTENTIAL C HARACTERISTICS
MS THESIS COLORADO STATE UNIV FORT COLLINS 70P JAN 69

700 69 1067 NORDSTEDT R
ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR WASTE-DISPOSAL WAST
E-STORAGE AIR-POLLUTION LIVESTOCK FEED-LOTS FERTILIZERS NUTRIENTS NITRATES EFFLUENT DIFFUSION SCHEDULING-M
ODEL
PH D DISSERTATION DEPARTMENT OF AGRICULTURAL ENGINEERING OHIO STATE UNIVERSITY 1969 101 P 25 TAB 17 FIG
23 REF

700 70 0231 ARIAIL J D
THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WASTES KEYWORDS BOD
LAGOON ZINC COPPER CHLOROTETRACYCLINE FECAL STREPTOCOCCUS COD VS ADDITIVES SWINE
MS THESIS DEPT BIOLOGICAL AND AGRIC ENGR NORTH CAROLINA STATE UNIV 72P 1970

700 70 1046 HUDSON B L
AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNICIPAL SEWER TAXATIO
N KEYWORDS WASTE-WATER-POLLUTION ECONOMICS WASTE-WATER-TREATMENT POULTRY WATER-POLLUTION-SOURCES BIOCHE
MICAL-OXYGEN-DEMAND INDUSTRIES DELAWARE SEWAGE-DISTRICTS TAXES SEWAGE-ASSESSMENTS
M S THESIS OWRR B-003-DEL3 DEPARTMENT OF AGRICULTURAL AND FOOD ECONOMICS DELAWARE UNIVERSITY JUNE 1970 9
2 P 4 TAB 28 FIG 40 REF

700 70 1066 ROBBINS J
WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGRAPHS HOGS NORTH-C
AROLINA NUTRIENTS LAGOONS SOILS RUNOFF INFLUENT VACTERIA SURFACE-WATERS WATER-POLLUTION DRAINAGE STREAMS
FARM-WASTES HYDROLOGIC-SYSTEMS SAMPLING BIOCHEMICAL-OXYGEN-DEMAND NITROGEN PHOSPHATES BIODEGRADATION ORGAN
IC-CARBON SWINE
PH D THESIS DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING NORTH CAROLINA STATE UNIVERSITY 19
70 440 P 48 TAB 51 FIG 57 REF

700 70 1109 SCARBOROUGH J H
AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS ANAEROBIC-DIGESTION
SLURRIES CONFINEMENT-PENS FARM-MANAGEMENT WASTE-TREATMENT SAMPLING BIOCHEMICAL-OXYGEN-DEMAND CHEMICAL-OXY
GEN-DEMAND PHOSPHATE HYDROGEN-ION-CONCENTRATION ALKALINITY NITROGEN SEDIMENTATION WATER-POLLUTION-SOURCES
ODOR OXIDATION-LAGOONS WASTE-WATER-TREATMENT
M S THESIS DEPARTMENT OF CIVIL ENGINEERING MISSISSIPPI STATE UNIVERSITY STATE COLLEGE AUG 1970 92 P 8 TAB
24 FIG 44 REF

700 70 1256 GOODRICH P
MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINATION SATURATED-SOI
LS ISOTHERMS DENITRIFICATION WASTE-WATER-POLLUTION ELECTROMAGNETIC WAVES INSTRUMENTATION EFFLUENTS RADIOA
CTIVE-TRACER SOLUTIONS SCINTILLATOR AUTOMATIC-DATA-COLLECTION SANDY-LOAM-LAND-DISPOSAL INFLUENT MOVEMEN
T SOILS
PH D THESIS DEPARTMENT OF AGRICULTURAL ENGINEERING PURDUE UNIVERSITY 1970 135 P 3 TAB 57 FIG 49 R
EF

700 71 1120 BILGIN A
SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STREAMS KEYWORDS NEW
-JERSEY WATER-POLLUTION-SOURCES POLLUTANTS PHOSPHATES NITRATES SURFACE-RUNOFF LEACHING SEWAGE-DISPOSAL CH
EMICAL-WASTE DOMESTIC-WASTES FARM-WASTES INDUSTRIAL-WASTES FERTILIZERS NITROGEN-CYCLE NUTRIENTS NITRIFICA
TION DECOMPOSING-ORGANIC-MATERIAL EUTROPHICATION BALANCE-OF-NATURE BIOCHEMICAL-OXYGEN-DEMAND MIDDLESEX-COU
NTY-NJ SOMERSET-COUNTY
M S THESIS DEPARTMENT OF SOILS AND CROPS RUTGERS UNIVERSITY GRADUATE SCHOOL NEW BRUNSWICK NEW JERSEY MARCH
1971 113 P 1 TAB 29 FIG 60 REF

700 72 1048 KOELIKER J K
SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONCENTRATION KEYWORD
S ANAEROBIC-CONDITIONS IRRIGATION CHEMICAL-OXYGEN-DEMAND DENITRIFICATION NITROGEN APPLICATION-RATES PHOS
PHORUS LAGOONS FARM-WASTES WASTEWATER-TREATMENT WASTE-REUSE SPRINKLER-IRRIGATION SOILS HOGS WASTEWATER-D
ISPOSAL SANDS CLAYS SWINE-WASTES
PH D THESIS OWRR A-021-IA6 DEPARTMENT OF AGRICULTURAL ENGINEERING IOWA STATE UNIVERSITY 1972 203 P 6
6 TAB 11 FIG 60 FIG

700 72 1049 JACOBS J J
ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTURAL RUNOFF KEYWOR
DS ECONOMICS WATER-QUALITY-CONTROL POLLUTANTS AGRICULTURAL-RUNOFF SEDIMENTS PHOSPHORUS IOWA WATER-MANAGE
MENT-APPLIED WATER-POLLUTION-SOURCES COST-ANALYSIS CULTIVATION NISHNABOTNA-RIVER-BASIN MINIMUM-TILLAGE
PH D THESIS OWRR B-015-IA2 IOWA STATE UNIVERSITY 1972 208 P 58 TAB 5 FIG 129 REF

SECTION IV

AUTHOR INDEX

AUTHOR INDEX

ABBOTT F D 400 68 0038
ABBOTT J L 100 68 0370
100 73 1162
300 68 0256
ABSHIRE R 100 71 0722
ADAMS D F 100 69 0310
ADAMS J L 100 65 0066
ADDISON J N 400 70 0357
ADOLPH R H 100 70 0340
400 71 0350
ADRIANO D C 100 71 0450
200 71 0830
AGNEW R W 100 67 0230
200 66 0139
AL ZAKRI A S 600 72 1163
ALBIN R C 100 69 0071
100 71 0758
200 69 0165
200 69 0183
200 70 0232
300 69 1180
300 71 0538
600 70 0255
600 70 0258
ALBRIGHT J L 200 66 0126
ALBUS JR C J 200 73 1082
ALDRICH S R 300 71 1035
ALEXANDER R M 100 71 0454
ALLEE D J 200 69 0203
ALLEN J B 600 71 0288
ALLEN W S 600 73 1147
ALLRED E R 200 66 0154
200 69 0178
200 71 0836
300 69 1125
600 70 0098
ALPHIN J M 200 72 1108
ALVERSON R M 100 71 0721
AL-TIMIMI A A 100 65 0066
AMEMIYA M 500 70 0389
AMENTA J S 100 70 0034
AMMERMAN C B 100 73 1190
ANDERSEN J R 200 64 0750
ANDERSON D 200 71 0603
ANDERSON D F 200 71 0821
ANDERSON E D 400 70 0415
400 72 1166
ANDERSON J R 100 69 0373
100 70 0013
200 66 0119
ANON 100 70 0065
100 70 0085
100 70 1051
100 71 0348
200 69 1117
200 71 0619
200 71 0620
300 1105
300 62 0754
300 65 0053
300 68 0702
300 68 0741
300 69 0300
300 69 1060
300 69 1061
300 69 1103
300 70 0384
300 70 0385
300 71 0677
300 71 1008
300 71 1055
300 71 1098
300 71 1106
300 71 1107
300 72 1003
300 72 1146
400 65 0332
400 68 0015
400 69 0016
400 70 0069
400 70 0092
400 70 0268
400 70 1133
400 71 0294
400 71 0295
400 71 0313
400 71 0349
400 71 0463
400 71 0504
400 71 1131
400 71 1134
400 71 1135
400 71 1136
400 71 1139
400 71 1143
400 71 1172
400 71 1174
400 72 1032
400 72 1130
400 72 1171

ANON 400 72 1173
400 72 1179
400 73 1007
400 73 1140
400 73 1145
400 73 1183
ANONYMOUS 100 70 1251
300 26 1204
300 30 1205
300 46 1207
300 46 1208
300 53 1206
300 67 1249
300 68 1202
300 68 1209
300 69 1203
300 70 1201
300 70 1247
300 71 1246
500 71 1254
ANTHONISEN A C 200 71 0821
ANTHONY W B 100 70 0418
100 70 0723
100 71 0751
200 66 0146
200 68 0725
200 69 0171
200 71 0845
ANTONIE R L 200 69 0056
APPELL H R 300 71 1081
APPELL J R 300 70 1084
ARIAIL J D 200 71 0811
700 70 0231
ARMSTRONG A E 200 71 0614
ARMSTRONG D E 500 70 0405
ASAE SPONSOR 200 66 0115
ATOMIC-ABSORPTION-SP 100 71 1221
ATTOE O J 100 70 0021
100 71 0571
200 66 0116
300 68 1122
AXLEY J H 200 71 0857
BACHE D H 200 70 0114
BACON C M 200 71 0705
600 72 1153
BADALICH J P 200 69 0544
200 69 0551
BADGER D D 200 71 0819
300 70 1192
BAILEY J W 600 69 1239
BAILEY JR E M 600 69 1006
BAIN R C JR 300 70 0491
BAINES S 200 70 0252
BAKER D H 100 69 0361
BALAKRISHNAN S 200 71 0818
BALDWIN B 200 71 0795
BALDWIN L B 200 71 0782
BALDWIN R A 300 71 1056
BAMESBERGER W L 100 69 0310
BARFIELD B J 200 71 1096
BARKER B 200 69 0552
BARR H T 100 69 0360
BARRE H J 200 71 0769
BARRETT F 200 70 0242
BARTH C 200 69 0525
600 70 0469
BARTH C L 200 71 0840
600 72 1002
600 72 1004
BARTLETT H D 200 71 0834
600 70 0080
BARTROP T H C 200 70 0239
BATES O W 200 69 0706
400 71 0264
600 72 1150
BATEY T 100 73 1069
BAUMANN E R 100 64 0474
100 70 0102
500 70 0407
BAXTER S H 100 68 0381
200 70 0251
200 71 0825
BAYLEY H S 100 70 0027
100 70 0367
BAYLEY N D 100 70 0365
BAYLEY NED D 200 71 0763
BEATTY M T 200 69 0523
BECK L A 300 70 0487
BEER C E 100 70 0458
200 71 0855
300 71 0639
BEGIN J J 200 71 0797
200 71 0860
BELKO J 100 68 0296
BELL J M 200 71 0838
BELL R G 100 70 0084
100 70 0094
100 71 0682
100 71 0729
200 71 0824

BELLA R 300 67 1253
BELLA R A 700 68 0330
BELLO T R 100 70 0270
BENDIXEN T W 200 66 0438
BENNE E J 300 71 0630
BERGE O I 200 69 0524
400 71 0262
400 71 0267
BERGMAN E L 200 71 0783
300 71 0412
BERKOWITZ J 100 65 0736
BERNARD H 100 70 0051
200 69 0160
200 69 0565
200 71 0603
300 70 0492
500 70 0411
BERNARD L R 200 66 1112
BEROZA M 100 70 1090
BERRY E C 200 66 0132
BERRY G 100 67 0041
BERRY P S 200 70 1050
BERRYMAN C 100 73 1069
200 70 0237
BERTRAND A R 100 71 0509
BETHEA R M 100 72 1188
BEVILLE B 200 70 0755
BEYERS R J 300 71 1126
BHAGAT S K 100 69 0030
BHATTACHARYA A N 100 65 1079
100 66 0422
200 66 0145
BIELBY D H 400 73 1073
BIGGAR J W 100 66 0063
BILGIN A 700 71 1120
BINIEK J P 200 69 0198
200 69 1185
BISHOP S E 100 71 0450
200 71 0830
BISSONNETTE G K 100 71 1212
BLACK C A 500 70 0391
BLACK R J 200 69 0517
BLACK S A 100 70 0083
300 67 0710
BLACKMAN W C 100 65 0378
BLETNER J K 100 73 1086
BLOODGOOD D E 100 71 0588
200 69 0167
BODENHAMER S H 200 69 0566
BODY D A 100 73 1069
BOLING J A 100 71 0441
100 71 0462
100 73 1263
BOND T E 100 70 0014
200 66 0125
200 71 0777
200 72 1024
BOURAM C V 600 73 1065
BOPANDIKAR M V 200 69 1102
BORDEAUX JR A F 200 71 1094
BORDNER R H 100 62 0382
BORNE B J 100 70 0089
400 64 0358
BOULDIN D R 200 71 0648
BOUWER H 100 68 0481
BOWMAN M C 100 70 1090
BOYD J S 200 71 0815
300 70 0208
BOYLE W C 100 70 1230
BRADLEY M 400 65 0485
BRADLEY N W 100 71 0441
100 71 0462
100 73 1263
BRADY N C 200 70 0322
BRAIDS O C 300 70 0475
BRAMHALL E L 400 71 0568
BRATZLER J W 100 70 0413
200 69 0170
BRAUD J 600 72 1154
BRAY R W 200 69 0522
BRESSLER G O 100 70 0025
100 70 0107
200 71 0783
300 71 0412
400 71 0311
BREVIK T J 200 69 0524
BRIDGHAM D O 200 66 0135
BRINCK C W 200 70 1175
BRISBIN I L 300 71 1126
BRITT C S 400 69 1225
500 70 0386
BRODIE H L 300 68 0352
300 72 1170
BROMEL M 200 71 0795
BROMEL M C 200 71 0641
BROOKER D B 100 70 0678
BROOKS L A 200 69 0524
BROWN C M JR 200 66 0126
BROWN J R 300 65 0739
BROWN R L 300 71 0099

AUTHOR INDEX

BROWN V W 100 70 0340
BROWN W O 100 69 0364
BRUNS E G 200 69 0524
BRUST R A 100 71 1223
BRYANT M P 200 71 0669
BRYDON H W 100 67 0501
BUCHANAN M L 100 69 0035
200 71 0640
BUCHOLTZ H F 200 71 0849
300 71 0627
BUILT UP POULTRY LIT 100 65 0699
BULL L S 200 71 0846
BULLARD W E JR 400 68 0032
BULLEY N R 200 71 0801
200 71 0822
BUNTING A H 100 65 0377
BURNETT W E 100 69 0363
100 69 0508
100 70 0019
100 71 0314
200 69 0190
300 69 0631
300 69 0632
300 69 0633
300 69 0634
300 69 0636
300 69 0637
300 69 0638
BUSCEMI P A 100 69 1198
BUTCHBAKER A F 200 71 0705
200 71 0733
200 71 0779
200 72 1152
300 71 1257
600 72 1153
600 72 1262
BUTLER R G 100 69 0035
300 69 0735
BYERLY T C 200 71 0611
CABES L J JR 100 69 0360
CALDWELL T H 100 73 1069
CALVERT C C 100 70 0028
100 70 0082
200 70 0716
200 71 0852
200 73 1093
300 71 0512
400 71 0465
CAMPBELL F R 400 69 1045
CAMPBELL J P 200 71 0594
CAMPBELL R S 500 70 0406
CANADA ANIMAL WASTE 300 72 1157
CARLSON D A 200 66 0587
CARLSON K H 100 70 0367
CARLSON L G 200 71 0785
CARLSON P A 200 69 0191
CARSON J R 100 69 0040
CARTER G R 300 72 1182
CASLER G L 200 69 0202
CASSELL E A 200 66 0140
CATH W S 200 71 0596
200 71 0765
CAVIN L M 300 71 1057
CHALOUPKA G W 100 68 0036
CHANG A C 200 69 0176
200 71 0838
CHANG T S 300 72 1182
CHARLES D R 100 66 0479
CHARLES O W 400 70 0109
CHESNIN L 600 71 0100
CHIANG H C 100 70 0421
CHICCO C F 100 73 1190
CHICHESTER F W 200 71 0774
CHRISTENSON E H 100 71 0444
CHRISTIANSON A G 100 69 0375
CHRISTY M 300 65 0739
CHUMNEY R D 400 71 0446
CLARK C E 100 65 0075
CLARK F E 300 67 1250
CLARK H F 100 62 0382
200 64 1240
CLARK J H 200 70 0220
CLAUDON D G 100 71 0444
CLAVEL P 200 69 0203
CLAWSON W J 100 71 0680
CLAYTON J T 200 66 0134
200 66 0135
200 69 0168
200 71 0858
300 71 0732
CLAYTON W 200 69 0540
CLAYTON Y M 100 71 0567
CLUSEN MRS D 200 71 0275
COCHRAN D M 200 71 0284
COLE G D 200 71 0792
COLEMAN D C 300 71 1126
COLEMAN E A 200 70 0232
300 69 1180
300 71 0538
COLEMAN T H 100 70 0020
COLLINS R K 300 71 1238
COLMER A R 100 69 0360
100 70 0420
100 73 1164
CONCANNON T J 200 71 0832
CONNOR J K 100 64 0072
CONNOR L J 200 71 0789
CONRAD J H 100 71 0683
CONRAD R D 200 71 0598
CONVERSE J C 100 69 0353
200 69 0074
200 69 0078
200 69 0177
200 71 0837
300 68 0749
300 70 0009
400 73 1178
600 72 1156
COOKE G W 100 70 1233
COOLEY C E 200 66 0144
COOPER M M 200 70 0245
COX N A 100 73 1164
CRABTREE K T 200 69 0482
300 68 1122
CRAGG J 100 71 0567
CRAINE L B 100 70 1211
CRAMER C O 600 72 1156
CRAWFORD R E 600 69 1005
CROCKETT B 200 69 0554
CROSBY III J W 100 71 1236
CROSS B S 300 71 0744
300 71 0745
CROSS D L 100 73 1263
CROSS F B 300 71 1057
CROSS G R 200 71 0819
CROSS O E 100 70 0369
100 71 0318
200 66 0141
200 72 1021
300 70 0010
600 71 0100
CROWLEY J W 200 71 0664
CULLEY D D JR 100 73 1128
CULPIN C 400 64 0335
CUNDIFF L V 100 71 0462
CURRY N H 200 71 0767
CURTIS D R 200 66 0138
CYWIN A 300 70 0492
300 71 0591
DAGUE R R 200 69 0425
200 70 0747
300 69 0062
300 69 0093
DAHM P A 500 70 0395
DALE A C 100 67 0713
100 71 0588
200 66 0126
200 69 0176
200 71 0604
200 71 0838
200 71 0841
300 70 0008
300 71 0319
DALE J L 300 71 0625
DAVEY C B 200 71 0805
DAVIDSON J A 200 66 0142
300 70 0206
DAVIS B H 100 73 1164
DAVIS E 300 70 1101
DAVIS E H 200 66 0127
DAVIS H R 100 66 0473
600 72 1031
DAVIS K R 100 73 1087
DAVIS R 100 70 0023
DAVIS R E 200 64 1241
DAVIS R V 200 66 0144
DAVIS S 600 72 1148
DAWES J H 200 71 1252
DAWSON R N 200 70 0720
200 71 0853
DAY D L 100 66 0478
100 67 0713
100 68 0087
100 68 0106
100 68 0442
100 69 0353
100 71 0574
100 71 1047
200 66 0133
200 69 0074
200 69 0078
200 69 0177
200 69 0756
200 70 0218
200 71 0669
200 71 0837
200 71 0861
200 72 1089
300 65 0757
300 68 0749
DAY D L 300 70 0008
300 70 0009
300 71 0672
400 65 1142
DE JONG A P S 200 70 0247
DE LAS CASAS E B S 100 70 0018
DEA S J 300 70 0489
300 70 0492
DEATON J W 100 71 0695
DECKER W M 200 66 0118
DEGOEIJ J J M 300 71 1100
DEMINT R J 500 70 0397
DENDY M Y 100 68 0011
DENIT J D 200 71 0603
200 71 0644
DENNISTOUN R M 200 71 0599
DENSMORE J 200 69 0531
DESHAZER J A 600 71 0494
DEWEY J E 200 71 0650
DICK E C 100 71 0444
DICKEY G L 600 69 1239
DIESCH S L 200 71 0836
500 70 0402
DIETRICH G N 300 70 0488
DIETRICH R A 300 71 1261
DILLON W M 200 66 0126
DINIUS D A 300 71 0514
DOBSON R C 100 70 0012
DODD J D 200 71 0808
DODD V A 100 71 0688
DOMINICK D D 200 71 0595
DOMMERT A R 100 70 0362
DONDERO N C 100 70 0019
200 69 0190
300 69 0631
300 69 0637
DORN D A 300 71 0625
300 71 0629
DORNBUSH J N 200 64 0750
200 70 0054
200 71 0773
DOROUGH H W 200 71 1095
DOUGLAS M P 200 69 0176
DOUGLAS P 200 71 0276
DOWDY R H 500 70 0388
DOWNING A L 100 70 1194
DOWNING D L 200 71 0647
DRAKE C L 200 66 0145
DRIELSMA A B 200 70 0227
DRUMMOND R O 100 63 1064
DUFFER W R 200 70 0698
300 71 1245
DUFFY M E 100 69 0265
DUGAN G L 100 72 0746
100 73 1184
300 70 0668
DUMELLE J O 200 69 0526
DUNAVANT B G 100 73 1190
DUNCAN C 100 70 0340
DUNLOP S G 200 68 1244
DUNN C 100 71 0291
DURAN A 100 70 0369
DURHAM R M 200 66 0147
DYER I A 100 55 0328
EASTWOOD R E 100 67 0501
EBY H J 100 62 0499
200 66 0149
200 69 0192
200 70 0716
200 71 0852
300 68 0352
300 72 1070
400 66 0380
EDWARDS J B 200 69 0179
EDWARDS R 200 68 0760
EDWARDS W M 100 70 1195
100 71 1039
200 71 0774
EHLERS M H 100 70 1211
ELAM M L 400 73 1168
ELLIOT L F 200 71 0583
ELLIOTT L F 100 71 0589
100 72 1097
200 71 0798
200 72 1013
ELLIS B G 200 71 0827
ELLIS D 200 70 0227
ELLIS J R 100 71 0318
100 71 0573
100 72 1097
100 72 1129
200 70 0216
200 71 0775
200 71 0776
200 72 1016
300 70 0010
ELMUND G K 100 71 0273
200 69 0195
200 71 0809
ELRICK D E 100 66 0063

AUTHOR INDEX

EL-SABBAN F F 100 70 0413
200 69 0196
EL-SHARKAWI F M 100 70 1040
ENGBERG R A 300 67 0711
EPPS E A 100 73 1128
ERB R E 100 69 0693
100 70 0064
ERDMANN A A 200 69 0520
ERHARDT W H 200 71 0833
ERICKSON A E 200 71 0827
ERICKSON D B 300 70 0743
ERICKSON L E 100 67 0104
100 70 0738
ESMAY M L 300 71 0626
EVANS C E 200 69 0548
EVANS D 200 69 0519
EVANS M R 100 72 1224
EVANS N A 300 70 0490
EVERINGHAM R 200 71 0665
EVERSOLE J S 100 65 1091
FAIR J F 100 67 1258
FAIRBAIRN C B 400 70 0029
FAIRBANK W 600 72 1148
FAIRBANK W C 200 66 0128
400 70 0097
400 71 0568
FAN L T 100 70 0738
FARLIN S 200 72 1017
FARRELL J B 200 71 1033
FASSBENDER C A 100 72 1199
FAULKNER G 400 70 0351
FEASTER J P 100 73 1190
FEHRENBACHER J B 300 71 1035
FELDMAN M 200 71 0772
FENG T H 200 69 0168
FENSTER W E 500 70 0394
FENTON R L 100 71 1236
FEREBEE D C 400 71 0505
FERRELL C L 200 73 1062
FETH J H 100 66 1080
FILIPI T A 200 69 0547
200 69 0556
FINA L R 100 66 0506
100 67 0302
200 66 0120
200 66 1112
FINCHER G T 100 70 0023
FINSTEIN M S 100 69 0736
FISH H 200 70 0240
FLEGAL C J 100 70 0020
200 71 0815
200 71 0848
300 70 0205
300 70 0209
300 70 0210
300 70 0211
300 70 0212
300 71 0623
300 71 0625
300 71 0627
300 71 0628
300 71 0629
FLETCHER D W 100 55 0328
FOEHRENBACH J 100 69 1231
FOERSTER E L SR 200 66 0148
FOGG C E 200 71 0770
FOLTZ V D 100 64 0345
FONTENOT J P 100 65 1079
100 66 0422
200 66 0145
200 71 0847
FOREE G R 200 69 0180
FORSYTH R J 100 65 0344
FOSNAUGH J 300 69 0467
FOX J D 600 72 1076
FRANGOS T G 200 69 0533
FRANK P A 500 70 0397
FRANTSI C 100 71 0742
FRASER C 100 73 1088
FREAR D E H 200 69 0170
200 69 0196
FRECKS G A 600 73 1075
FREDERICK L R 500 70 0400
600 73 1065
FREEMAN L R 300 70 0488
FREY A L 600 72 1163
FRIAR D E H 100 70 0413
FRIEDMAN S 300 71 1081
FRINK C R 100 71 0453
200 70 0222
300 70 0592
400 70 1176
FRITSCHI E W 100 71 1232
FROBISH L T 300 71 0513
FROST D V 100 60 1078
FRUS J D 100 71 0576
FRYREAR J I 200 72 1152
FU Y C 300 71 1081
FUJITA T 100 71 0303
FUNG D Y C 100 70 0026
FUNK J W 100 66 0506
200 66 0120
FWPCA 200 69 0423
GALBRAITH H 100 71 0468
GALLER W S 200 71 0805
GARMAN W H 400 73 1063
GARNER G B 300 71 0590
GARRETT W N 200 73 1062
GARRIGUS U S 100 71 0574
100 71 1047
GARTON J E 200 71 0733
200 71 0779
300 71 1257
600 72 1262
GASSER W 100 71 1213
GATES C D 100 63 0289
GEHRT A J 100 72 1222
GEHRT K M 100 71 1213
GELDREICH E 100 70 1217
GELDREICH E E 100 62 0382
100 71 0484
GENETELLI E J 200 69 0163
200 71 0832
GENTRY J B 300 71 1126
GENTRY R F 100 70 0025
100 70 0413
200 69 0196
GEORGE R M 300 71 0590
GERRY R W 100 68 0502
GERSTNER J 400 70 1132
GEYER R E 200 71 0764
GIBBONS J 100 68 0077
GIBBONS J W 300 71 1126
GIBSON E A 400 66 0354
400 67 0336
GILBERT B N 100 72 1215
GILBERTSON C B 100 71 0318
100 71 0573
100 72 1129
200 71 0703
200 71 0776
200 72 1023
300 70 0010
600 73 1075
GILBERTSON C B ET AL 200 72 1010
GILLHAM R W 100 68 0452
100 69 0052
GILLILAND J 400 70 0022
GITAY H 100 71 0307
GIVENS R L 600 72 1074
GLERUM J C 200 70 0247
200 71 0859
GLOYNA E 300 70 1101
GOAN H C 300 70 0212
GODIN P 100 68 0296
GOERING E 600 71 0271
600 71 0495
GOERING E H 600 72 1177
GOERING H K 100 70 0342
200 69 0169
200 71 0851
GOFF D E 100 73 1086
GOLD B 200 71 0659
GOLDBERG M C 500 70 0392
GOLDHAFT T M 100 69 0707
GOLUEKE C G 100 72 0746
300 70 0668
GOMEZ M 300 71 0628
GOODRICH P 700 70 1256
GOODRICH P R 200 71 0854
GOODRICH T D 100 71 1212
GORDON C H 100 70 0342
100 70 1090
100 71 1092
200 69 0169
200 71 0851
GORDON H P 200 70 0687
GORDON V L 100 70 0270
GORDY J F 100 68 0036
GORMEL B 100 71 0674
300 69 0631
300 69 0638
300 71 0674
300 71 0675
GOSCH J W 300 70 1059
GOULDEN C E 100 64 1200
GOWAN D 100 71 1214
200 70 0236
GOWDY B R 200 71 0600
GOYAL S M 100 70 0024
GRAMMS L C 100 71 0261
GRANT D W 100 71 0273
200 69 0195
200 71 0809
GRANT K E 200 71 0282
GRASS L E 600 69 1239
GRATTO C 200 71 0274
GRAVES Q B 200 69 0166
GRAVES R E 200 71 0858
GRAY M W 200 69 0426
GRAY M W 200 69 0555
300 67 0701
GREENE L M 100 68 0036
GREGORY KEITH E 200 72 1028
GRIFFIN W L 200 68 0434
200 68 0726
GRIFFITH C C 100 70 0585
GRIMM K 200 71 0800
GROSSMANN E D 200 71 0813
GRUB W 100 63 0436
100 69 0071
200 69 0165
200 69 0183
200 70 0232
300 69 1180
300 71 0538
600 70 0254
600 70 0255
600 70 0258
GRUNDMAN J E 400 65 1141
GUEST R W 200 71 0662
GUGGOLZ J 100 71 0569
GUMERMAN R C 200 66 0587
200 69 0191
GUTHRIE R K 100 71 0722
GUTIERREZ J 200 64 1241
HABEEB W R 300 49 1210
HADDER A V 200 66 0144
HAEFELE E T 200 71 0285
HALE E B 200 71 0842
HALE W F 200 66 0123
HALL F E 200 69 0530
HALVORSON H O 100 65 0263
HAMILTON H E 100 73 1034
200 71 0797
200 71 1096
600 72 1076
HAMILTON W A 300 71 0745
HAMM D 200 70 0718
HAMMOND C W 100 68 0442
HAMMOND E G 200 71 0790
HANNAH H W 400 70 0068
HANSEN C M 100 58 0580
200 71 0827
HANSEN E H 200 71 0593
HANSEN E L 100 68 0442
100 69 0353
HANSEN R W 200 69 0182
200 69 0430
300 71 0700
HANSON L D 500 70 0394
HAREIN P K 100 70 0018
HARKNESS R E 100 69 0035
HARL N E 300 71 1056
HARLIN C C JR 100 70 0299
300 71 1245
HARMESON R H 200 71 1252
HARMON B G 100 69 0361
200 72 1089
HARMON B W 200 71 0847
HARPER J P 300 71 1238
HARRIS P 300 70 1248
HARROLD L L 100 70 1195
200 71 0774
HARROLD T 400 71 0329
HART S A 100 60 0059
100 63 0338
100 64 0371
100 65 0346
100 70 0684
200 66 0123
200 70 1114
500 68 1259
600 68 0471
HARTMAN R C 400 70 0308
400 71 0297
400 71 0315
HARTUNG L D 200 71 0790
HASHIMOTO A G 200 71 0794
300 69 0631
300 69 0635
HAZEN T E 100 64 0474
100 66 0437
100 69 0095
100 69 0096
100 69 0105
100 70 0102
100 71 0576
100 71 0582
200 70 0248
200 71 0740
200 71 0803
200 71 0855
600 72 1071
600 73 1065
HEALD W R 200 71 0660
HEATH M S 200 71 0601
HEATHCOTE R G 100 70 0048
HECKER J F 100 73 1155
HEFNER J J 600 72 1169

AUTHOR INDEX

HEGG R O 200 71 0780
600 70 0098
HEIDAR F A 300 71 1238
HELLICKSON M A 100 70 0691
HELLMAN L 100 71 0312
HENDERSON H E 200 71 0849
300 71 0627
HENDERSON J M 100 62 0292
HENSLER R F 100 70 0021
100 71 0571
200 71 0833
HERMANSON R E 100 69 0095
HERR G H 100 70 0368
200 70 0323
400 70 0111
HERRICK R B 100 73 1165
HIBBERD R L 200 70 0241
HIBBS C M 100 64 0345
HICKEY J L S 100 62 0480
HILEMAN L H 200 70 0217
200 71 0831
HILL D T 200 71 0843
600 72 1004
HINDS F C 200 71 0812
HINES N W 300 70 1036
500 70 0408
HINESLY T D 200 71 0812
HOBGOOD P 200 71 0828
HODGEN G D 100 70 0064
HODGETTS B 200 71 0850
HODGSON A S 100 71 0748
HODGSON G C 100 71 1223
HOFFMAN R A 300 72 1052
HOLMES L W 200 71 0861
HOLSTEIN J C 300 70 0073
HOLT R F 100 70 0417
500 70 0388
HOOVER K H 200 69 0532
HORE F R 200 71 0772
HORTENSTINE C C 200 70 0221
200 71 0782
200 71 0856
HOTTLE G A 200 71 1099
HOWELLS D H 200 69 0696
200 69 0708
200 71 0807
600 71 0493
HOWELS D H 300 71 0697
HOWES J R 100 63 0436
100 68 0044
200 66 0136
HSU T S 600 72 1156
HUBLY D W 300 71 1056
HUDDLESTON E W 100 71 1038
HUDSON B L 700 70 1046
HUFF C B 100 62 0382
HULTGREN J P 200 71 0740
HUMENIK F J 200 71 0811
HUMPHRYS C R 300 64 1110
HUNGATE R E 100 55 0328
HUNT L M 100 72 1215
HUNTER J E 100 71 0257
HUTCHINSON G L 100 67 0076
100 68 0730
100 69 0103
300 67 1250
HUTCHINSON R E 300 72 1052
IBARBIA R 200 66 0129
IDNANI M A 400 71 0305
IFEADT C N 600 71 0494
INGLETT G E 200 72 1030
IRGENS R L 100 65 0263
100 66 0478
200 66 0133
300 65 0757
ISAACSON H R 200 71 0812
JACKSON S W 100 70 0260
100 73 1034
200 71 0797
JACKSON W A 200 70 0720
JACOBS G B 200 66 0140
JACOBS J J 700 72 1049
JANSE J F 100 70 0083
JANSEN L M 100 71 0451
JAWORSKI N A 100 62 0480
JEDELE D G 100 59 0459
200 69 0756
400 71 1144
JEFFREY E A 100 65 0378
JEFFREY R F 300 72 1052
JENSEN A H 100 69 0353
100 69 0361
200 71 0669
JENSEN E T 200 69 0432
JENSEN R 500 71 1255
JESSEE R S 200 69 0541
JEX E M 200 69 0193
600 69 1160
700 69 0712
JOHANNES R F 100 71 0571
JOHANSON K J 200 71 0666
JOHNSON C 400 71 0339
JOHNSON C A 100 65 0331
100 65 0366
JOHNSON D W 200 71 0640
JOHNSON H P 100 64 0474
100 69 0095
500 70 0387
JOHNSON H S 400 70 0113
JOHNSON J 200 69 0535
JOHNSON J B 200 71 0789
JOHNSON J D 300 71 1058
JOHNSON T H 100 70 0260
JOHNSON W H 200 71 0828
JOHNSTONE D L 100 71 1236
JONES B A 200 71 0837
JONES B A JR 100 68 0087
JONES D D 100 68 0087
100 69 0353
100 71 0574
100 71 1047
200 69 0074
200 69 0078
200 69 0177
300 68 0749
300 70 0008
300 70 0009
JONES E E 200 71 0804
JONES G D 200 70 0227
JONES J B 200 71 0853
JONES J H 200 66 0131
JONES K B C 200 70 0235
200 71 0786
400 70 0046
JONES P H 200 69 0162
JONES R W 200 72 1030
JORDAN H C 200 66 0153
200 71 0817
JOSEPH C B 200 69 0543
KABLER P W 100 62 0382
200 64 1240
KADA J M 100 67 0501
KALEEL R T 200 70 0727
KAMPELMACHER E H 100 71 0451
KANG S F 100 70 0738
KATZ S E 100 72 1199
KEARL C D 200 69 0201
KEETON L L 600 70 0254
600 70 0255
KEHR W Q 200 69 0517
KEIM J K 200 70 0717
KELMAN S 500 70 0407
KEMPER W D 100 67 0076
300 67 1250
KERRIGAN J E 200 69 0523
200 69 0527
KESLER R P 200 66 0151
KINDELL J M 100 71 0472
KING D R 200 69 0159
KINNEY JR T B 200 72 1026
KLAUSNER S D 200 70 0227
200 71 0649
KLEIS R W 200 72 1012
KLINE K J 300 69 0062
300 69 0093
KLOMP G 200 71 0859
KLOPFENSTEIN T J 100 71 0569
KNIGHT D W 100 69 0086
KOELIKER J K 700 72 1048
KOELLIKER J K 100 70 0049
200 70 0737
200 71 0855
300 71 0639
600 71 0496
KOHLER G U 100 71 0569
KOLEGA J J 200 69 0166
KOON J 100 63 0436
KOTTMAN R M 200 71 0764
KOUPAL L R 200 71 0796
KRAFT A A 100 70 0026
KRAFT D J 100 69 0736
KREIS R D 200 70 0698
300 71 1245
300 72 1085
KREJCI W 200 72 1019
KRIZ G J 100 69 0060
200 69 0696
200 69 0708
200 71 0807
200 71 0811
300 71 0697
600 71 0493
KRONE R B 200 68 1242
KUMAR M 600 70 0080
KUTZ F W 100 70 0012
LAAG A E 100 73 1087
LAAK R 100 70 0510
LANE T H 200 68 0724
200 69 0174
LANGENEGGER G 200 71 0800
LANGLOIS B E 100 70 0260
LARSEN V 200 71 0857
LARSON G H 200 66 0120
200 66 1112
200 67 0734
LARSON R E 200 69 0178
200 71 0780
200 71 0823
600 70 0098
LARSON T E 200 71 1252
LASALLE R M JR 200 69 0186
LAST D G 200 71 0616
LATHWELL D J 200 71 0648
LATTERELL J J 100 70 0417
LAUNDER M 200 69 0186
LAURA R D 400 71 0305
LAW J P JR 100 70 0051
100 70 0299
LAW JR J P 200 70 1118
LAWRENCE A W 200 71 0655
200 71 0656
LAWRENCE J E 200 71 0642
LAWSON L G 200 71 0602
LAWTON G W 100 71 0444
LEBEDA D L 400 65 1142
LEE E S 100 70 0738
LEE H Y 200 71 0820
LEE Y N 200 71 0795
LEGRAND H E 500 70 0404
LEHNER R 100 65 0334
LEONARD R A 100 71 0509
LEVI D R 200 71 0440
300 70 0073
300 70 0383
LIAO P B 100 70 1237
LIGHT R G 200 71 0858
LILLY J H 100 65 1091
LIN S 300 72 1260
LINGER J L 100 70 1111
LINDSAY W L 200 69 0173
LINGLE J C 100 68 0370
LINN A 400 67 0359
LINTON R E 200 69 0200
LIPPER R I 100 66 0506
100 67 0104
100 71 0681
200 66 0120
200 66 1112
200 67 0734
200 69 0164
200 69 0428
600 71 0271
600 71 0495
LITTLE C O 100 71 0462
LITTLE F J 100 66 0341
LITTLE J A 200 71 0829
LITTLEFIELD L H 100 73 1086
LIVSHUTZ A 100 64 0333
LLOYD R W 100 68 0036
LOEHR R C 100 67 0230
100 67 0233
100 68 0500
100 68 1229
100 69 0037
100 69 0259
100 70 0050
100 70 0372
100 70 0684
100 71 1228
200 66 0139
200 67 1243
200 68 1186
200 69 0161
200 69 0184
200 70 0324
200 70 0670
200 70 1113
200 70 1115
200 71 0606
200 71 0642
200 71 0652
200 71 0653
200 71 0654
200 71 0660
200 71 0781
200 71 0821
LOEHR R C EDITOR 200 69 0157
LOFGREEN G P 200 71 0777
600 72 1074
LONG T A 100 70 0413
200 69 0170
200 69 0196
LONGHOUSE A D 100 70 0691
LORIMOR J C 100 72 1097
200 70 0216
200 70 0224
200 71 0775
LOVELADY H G 100 70 0017
LOVETT J 100 71 0476
100 71 0572

AUTHOR INDEX

LOWMAN B 100 69 0086
LOYACANO A F 600 72 1154
LUDINGTON D C 100 71 0674
200 66 0143
200 71 0642
200 71 0657
200 71 0661
200 71 0794
300 69 0631
300 69 0635
300 71 0674
300 71 0675
400 70 0091
LUEBS R E 100 73 1087
LUKE G W 200 70 0326
LYERLY P J 200 71 0828
600 72 1169
MACARTHUR J 200 71 0813
MACDONALD F W 100 66 0473
100 71 1232
MACKENTHUN K M 200 71 0613
MACKEY D R 500 71 1255
MACKSON C J 200 66 0142
300 70 0206
MADDEN J M 200 71 0773
MAHONEY G W A 200 68 0760
200 71 0733
200 71 0779
200 72 1152
300 71 1257
600 72 1262
MALIK D D 200 66 0129
MANAGEMENT GUIDE COM 300 72 1157
MANES J D 100 71 0464
MANGES H L 200 71 0778
600 71 0271
600 71 0495
600 72 1177
MANN A R 600 72 1071
MANTHEY E W 400 72 1138
400 73 1191
MARLAR J T 300 70 0491
MARRIOTT L F 200 71 0834
MARTIN J D 600 70 0254
MARTIN R D 100 70 0028
100 70 0082
200 70 0716
MARTIN W J 100 71 0291
MARTIN W P 400 70 0070
500 70 0394
MASSIE JR J R 200 73 1083
MATHERS A C 200 70 0223
200 71 0826
300 1077
MATSON W E 300 71 0704
MATTHEW F L 200 69 0563
MAYES H F 600 71 0497
MAYES J L 200 64 0759
200 69 0546
MAYHOSE V B 100 71 0683
MAZURAK A P 600 71 0100
MC WHORTER J C 600 71 0288
MCALLISTER J S V 100 70 0578
MCCALLA T M 100 71 0318
100 71 0573
100 72 1129
200 69 0676
200 70 0216
200 71 0583
200 71 0775
200 71 0776
200 71 0798
200 72 1020
300 70 0010
500 70 0400
500 71 1072
MCCARTNEY M G 100 68 0011
100 71 0460
MCCASKEY T A 200 71 0829
MCCLURE W H 200 66 0145
MCCLURG C A 300 71 0412
MCCOY E 100 65 0334
200 66 0116
200 69 0482
200 69 0518
300 68 1122
MCCROSKEY J E 200 71 0705
600 72 1153
MCEACHRON L W 200 69 0201
MCGHEE T 200 72 1054
MCGHEE T J 100 72 1235
MCILWAIN R 200 71 0835
MCKELL C M 100 70 0340
MCKENNA M F 200 70 0220
MCKIE B 100 70 0110
MCKINNEY R E 200 70 0728
300 67 1253
500 70 0401
MCMANUS J A 100 69 1042
MCMUNN E W 200 71 0618
MCNABB C G 200 69 0562
300 71 0590
MCNABB J 300 72 1085
MEADE T L 400 73 1181
MEEK A M 200 69 0188
MEEK B D 600 69 1239
MEENAGHAN G F 200 70 0232
300 69 1180
300 71 0538
600 70 0255
600 70 0258
MELSTED S W 200 71 0669
MENDEL V E 100 70 0014
200 66 0125
MENEAR J R 200 73 1093
MERKEL J A 100 69 0096
MERRILL W G 200 69 0188
MESSER J W 100 71 0476
100 71 0572
MEYER R C 200 71 0812
MIDDAUGH P R 200 70 1053
200 71 0796
MIDDEN T M 200 71 0860
MIELKE L M 100 72 1097
MIELKE L N 200 70 0216
200 70 0224
200 71 0775
MILLER A L 200 73 1189
MILLER B F 200 69 0173
300 71 0477
400 69 0419
MILLER M H 400 73 1073
MILLER R D 300 70 1084
MILLER R W 100 70 1090
100 71 1092
300 71 0515
MILLER W D 300 71 0269
MILLER WILLIAM D 300 71 0466
MILLS K C 100 69 0108
MINER J R 100 66 0506
100 67 0104
100 67 0302
100 69 0096
100 69 0105
100 70 0049
100 70 0102
100 70 0228
100 70 1227
100 71 0447
100 71 0576
200 64 0759
200 66 0120
200 66 1112
200 67 0734
200 69 0549
200 70 0248
200 70 0737
200 71 0483
200 71 0788
200 71 0790
200 71 0803
200 71 0808
200 71 0855
500 70 0399
600 71 0272
600 71 0496
600 72 1071
MINER J R ED 300 71 0486
MINSHALL N E 100 69 0061
100 70 0042
200 69 0482
MITTEE 300 72 1157
MIYAHARA A Y 100 71 0461
MIYAZAKI S 100 71 1223
MOAWAD S K 100 70 1040
MOHSENIN N N 600 70 0080
MOLDENHAUER W C 500 70 0387
MOLINA J A E 300 70 0475
MONKE E J 200 71 0854
MOORE J A 100 70 0678
200 66 0123
200 66 0128
200 69 0178
200 69 0706
200 69 1116
200 71 0823
500 70 0403
600 68 0471
600 70 0098
MOORE J D 100 70 0418
MOORE W E 200 71 0847
MOORMAN R JR 100 65 0470
MORGAN N O 100 70 0028
100 70 0082
100 70 1090
200 70 0716
200 71 0852
MORRIS G L 200 66 0117
MORRIS W H M 200 66 0152
200 71 0816
MORRISON J L 100 69 0081
MORRISON S M 100 67 1258
100 71 0273
200 69 0195
200 71 0809
MORRISON S R 100 70 0014
200 66 0125
200 71 0777
600 72 1074
MOUM S G 100 69 0707
MUEHLING A J 100 70 0685
200 70 1159
200 71 0607
300 69 0001
300 69 0002
300 69 0003
300 69 0004
300 69 0005
300 69 0006
300 69 0007
300 70 1000
MULKEY L A 600 72 1001
MURPHY L S 100 71 0681
200 71 0778
300 65 0739
300 70 1059
600 72 1177
MURTHY G K 100 71 0572
MUSGRAVE R B 200 69 0201
MYERS E A 200 66 0124
N J TASK FORCE 200 70 0320
NABBEN M 600 72 1151
NARAYAN R S 100 72 1188
NATZ D 400 71 0686
NEFF M 300 71 0628
NELSON D K 100 70 1211
NELSON G L 200 69 0166
NEVINS M P 100 71 0273
200 69 0195
NEWCASTLE UPON TYNE 200 70 0234
NGUDDY P O 300 71 1238
NICHOLS M S 100 65 1219
100 69 0061
100 70 0042
200 66 0116
NICHOLSON H P 500 70 0396
NIENABER J A 100 72 1129
200 72 1015
NIGHTINGALE H I 100 70 1041
NILES C F 200 70 0687
NIPPER W A 600 72 1154
NODWELL J H 200 68 0724
200 69 0175
NORDSTEDT R 700 69 1067
NORDSTEDT R A 200 71 0769
200 71 0782
200 71 0791
NORTON T E 200 69 0182
200 69 0430
600 69 1160
NURNBERGER F Y 200 66 0142
NYE J C 100 71 0588
O BRIEN T 200 69 0547
O CALLAGHAN J R 100 71 0688
O DELL R A 200 69 0180
O DONOGHUE P A J 100 71 0688
OGELSBY W C 100 64 0343
OGILVIE J R 200 69 0176
200 71 0841
OGLESBY R T 200 71 0646
OKEY R W 200 69 0199
200 70 0219
200 71 0818
OLECHOWSKI G C 100 69 0736
OLSEN R J 100 70 0021
100 71 0571
200 69 0482
300 69 1044
300 69 1124
OLSON E A 200 72 1018
300 71 0689
400 71 0298
OMTVEDT I T 200 68 0760
OUD URINE MEAT EGGS 100 71 1221
ORR H L 100 71 0187
100 71 0266
OSCHWALD W R 300 71 1035
OSTRANDER C E 200 66 0122
200 69 0185
200 71 0651
400 71 0575
OSWALD W J 100 72 0746
300 70 0668
OTTOSON HOWARD W 200 72 1029
OVERBY L R 100 60 1078
OVERMAN A R 200 70 0221
200 71 0856
OWENS J D 100 72 1224
OWENS T R 200 68 0434
200 68 0726

AUTHOR INDEX

OWENS T R 200 71 0820
OWINGS W J 100 69 0066
PACKER R A 100 69 0714
PAINE M D 200 71 0705
200 71 0733
200 71 0779
300 71 1257
600 72 1153
PALMER G L 500 70 0400
PARKER B F 100 69 0108
PARKER H W 200 73 1082
200 73 1083
PARSO A A 200 69 0173
PARSONS J E 100 69 0035
PARSONS R A 400 70 0097
PATEL J D 100 67 0448
PAULSON G D 100 69 0690
PAULSON W H 100 71 0571
PAULSON W L 300 69 0093
PAYNE C G 100 66 0479
PAYNE F A 600 72 1076
PAYNE J I 200 70 0250
PEAKALL D B 100 70 1111
PECK J H 100 69 0373
100 69 0374
100 70 0013
PEDERSON R W 200 71 0643
PENDLETON R F 200 71 0650
PERRY C A 400 68 0101
400 71 0753
PERSON H L 600 71 0272
600 72 1071
PETERS D C 500 70 0398
PETERSON J R 500 71 1072
PETERSON M R 300 71 0590
PETERSON N L 200 69 0557
200 69 0561
PETERSON R A 100 70 0691
PETERSON S A 100 68 0306
PFEFFER J T 200 71 0837
200 71 0861
PFOST H B 300 71 0692
PHAR P A 100 71 0462
300 70 0743
PIATT C 100 67 0302
PICKENS L G 100 71 1092
PIERCE R A 200 69 0188
PIERCE R L 200 71 0796
PIMENTEL D 200 71 0645
PITTMAN D 300 70 1248
PLOTKA E D 100 69 0693
100 70 0064
POELMA H R 200 70 0247
200 70 0253
200 71 0859
POINTER C G 200 70 0244
POLIN D 300 71 0628
POLKOWSKI L B 100 71 0261
200 66 0116
200 71 0840
300 68 1122
600 72 1004
POLLOCK K A 100 71 0688
POLSON A 100 71 0307
POMEROY B S 200 71 0836
PONTIF J 600 72 1154
PONTIN R A 100 68 0381
PORTER H C 200 71 0842
PORTER W K 200 69 0523
POS J 100 71 0187
100 71 0266
100 71 0729
200 69 0187
200 71 0824
POWERS W L 100 71 0681
PRATT G L 100 69 0035
100 69 0058
200 71 0640
300 68 1123
PRATT P F 100 71 0450
200 71 0830
PRICE D R 600 72 1031
PRICE F 400 70 0097
PROCTER D E 100 69 0030
PROCTOR D E 200 68 0694
200 68 1187
200 71 0784
PRYOR W J 100 64 0072
100 70 0047
QUARLES C L 100 70 0025
QUICK A J 200 70 0249
QUISENBERRY J H 200 66 0129
RADEMACHER J M 200 69 0181
200 69 0424
200 69 0542
500 70 0410
RALL G D 100 70 0362
RANKIN J D 100 69 0416
READ B JR 100 71 0476
REDDELL D L 200 71 0828
REDDELL D L 600 72 1169
600 73 1147
REELE F N 100 71 0695
REED C H 200 66 0130
200 69 0172
200 70 0325
400 65 0356
REED M J 100 68 0011
REICHERT K A 200 69 0175
REID J T 200 71 0846
REID W S 200 71 0648
REIMAN R 400 71 1196
REKERS R G 100 71 1038
RENEKER R W 300 71 0744
RESNIK A V 200 69 0181
200 69 0424
200 69 0560
RETRUM R 200 70 0321
REY G 300 70 0492
RICHTER J 400 71 1137
RICKETTS RALPH 100 65 0378
RICKLES R N 200 69 0199
200 70 0219
RIC-ACID REAGENTS BL 100 71 1221
RIDLEN S F 400 70 0113
RILEY C T 100 68 0337
100 70 0112
200 70 0235
200 70 0243
400 66 0088
400 68 0449
RIXFORD C E 300 70 0668
ROBBINS J 700 70 1066
ROBBINS J W D 100 69 0060
200 69 0696
200 69 0708
200 71 0807
300 71 0590
300 71 0697
600 71 0493
RUBECK G G 100 69 0375
ROBERTSON A M 100 71 0468
ROBERTSON L S 300 70 0207
ROBINSON J B 200 69 0179
200 71 0824
ROBINSON J J 100 73 1088
ROBINSON K 200 70 0251
200 71 0825
RUBOHN W F 200 69 0431
ROBSON C M 200 69 0167
RODRIGUEZ J G 100 70 0570
ROHLICH G A 500 70 0405
ROLLER W L 100 69 0316
ROLLINS G H 200 71 0829
ROLLO C A 100 63 0436
ROSENFELD R S 100 71 0312
ROSS E 100 71 0461
100 68 0043
ROSS I J 100 69 0108
100 73 1034
200 71 0797
200 71 0860
200 71 1096
600 72 1076
ROZICH F J 200 69 0545
200 69 0558
RUF J A 100 68 1229
RUNDLE W T A 100 65 0067
RUSSELL J 400 70 0579
RUSSELL P 200 71 0667
RUSSELL W 400 65 0485
RUSZLER P L 100 69 0040
SALTER P J 100 67 0041
SAUNDERS R M 100 71 0569
SAVAN M 100 71 0742
SAXON J R 200 70 0251
200 71 0825
SCALF M R 200 70 0498
200 70 0698
200 71 0709
300 72 1085
SCARBOROUGH J H 700 70 1109
SCARBROUGH J H 100 71 0304
SCHAEFER M L 100 71 0572
SCHEFFERLE H E 100 65 0503
100 66 0290
400 65 0439
SCHEFFERLE HENRIETTA 100 65 0699
SCHELTINGA H M J 100 66 0347
100 69 0355
200 66 0156
200 70 0253
SCHLEUSENER P E 200 71 0608
SCHLIEKELMAN R J 200 69 0559
SCHMID L A 200 69 0164
200 69 0564
200 71 0778
SCHMISSEUR W E 200 66 0126
SCHMITZ F L 100 68 0090
SCHNEIDER D L 100 71 0464
SCHOENBURG R B 100 67 0501
SCHOLZ H G 200 71 0768
SCHRAUFNAGEL F H 200 69 0521
SCHULTE D D 200 70 1113
200 71 0781
SCHULTZ D A 200 70 0226
SCHUMAN G E 100 71 0589
200 72 1020
SCHWARTZ W A 200 66 0438
SCHWENGEL F 200 71 0610
SCHWIESOW W F 200 71 0597
200 71 0804
300 68 0352
SCHWIESOW WILLIAM F 300 71 0584
SCOTT D 100 73 1088
SCOTT T W 200 71 0649
SELL J L 100 69 0058
SELTZER W 100 69 0707
SEWELL J I 200 71 0799
200 72 1108
600 72 1149
SHAEFFER J R 200 71 0286
SHAFFER R E 300 70 1192
SHANNON D W F 100 69 0364
SHARMA R M 100 69 0714
SHAW F R 100 65 1091
SHAW J H 400 69 0419
SHEFFIELD C W 200 70 0727
200 70 0755
SHEPPARD C C 200 71 0815
300 71 0621
300 71 0625
300 71 0626
SHEPPARD C C ED 300 70 0204
SHERMAN M 100 73 1165
SHINDALA A 100 71 0304
SIMPSON E C 100 71 1039
SIMPSON J R 200 70 0241
SINGER R H 100 71 0443
SINGH I P 100 70 0024
SINGH P 100 70 0570
SINGH V P 300 72 1070
SKINNER J 200 69 0528
SKINNER J L 400 71 0456
SLETTEN D 100 71 0443
SLINGER S J 100 70 0027
SLONEKER J H 200 72 1030
SMART P 200 70 0728
SMAUS R J 100 72 1235
SMITH G E 200 69 0427
200 69 0429
200 71 0279
400 65 1127
500 71 1072
SMITH G L 200 73 1082
SMITH G R 400 68 0038
SMITH L W 100 70 0342
200 69 0169
200 71 0851
200 73 1093
SMITH R E 200 71 0843
600 72 1001
SMITH R J 200 70 0248
200 71 0803
SMITH S M 200 64 0759
SMITH T R 200 69 0433
SMITH W M 400 71 0293
SMYSER C F 100 69 0376
100 70 0110
SNOEYENBOS G H 100 69 0376
100 70 0110
SOBEL A T 100 71 0674
200 66 0121
200 66 0143
200 69 0189
200 69 0197
200 71 0658
300 69 0631
300 69 0633
300 69 0635
300 71 0671
300 71 0673
300 71 0674
300 71 0675
400 70 0091
400 70 0577
600 72 1031
SOBHAN-ARDAKANI M 300 70 0475
SPAHR S L 300 70 0455
SPLINTER W E 200 72 1025
SPLITTS TOSSER D F 200 71 0642
ST AMANT P P 300 70 0487
STALEY L M 200 71 0801
200 71 0822
STANEK G 200 71 0277
STEAD F M 100 67 1218
STECKEL J E 200 70 0215
STEELE J H 200 66 0118
STEELMAN C D 100 70 0420
STEFANOVIC M P 100 70 0027

AUTHOR INDEX

STEPHENS D F 200 68 0760
STEPHENS E R 300 69 0467
STEVENSON F J 500 70 0393
STEWART B A 100 67 0076
100 68 0730
100 70 0031
200 70 0223
200 71 0826
300 1077
300 67 1250
STEWART R E 200 71 0766
600 69 1006
STEWART T A 200 71 0835
STEWART T B 100 70 0023
STOMBAUGH D P 100 69 0316
STORK E J 100 70 0017
STRATTON F E 100 69 0679
STRAUB C P 300 71 1058
STROSHINE R L 200 71 0787
200 71 0810
STUART D G 100 71 1212
STUBBLEFIELD T M 200 66 0150
STUEDEMANN J A 200 71 0853
SULLIVAN R J 300 69 0317
SURBROOK T C 200 71 0815
300 70 0208
SUZUOKI Z 100 71 0303
SWACKHAMER G L 200 71 0612
SWADEK F N 200 70 0214
200 71 0642
SWANSON N 400 73 1158
SWANSON N P 200 70 0216
200 70 0224
200 71 0703
200 71 0775
200 72 1022
SWEETEN J M 300 71 0301
300 72 1264
600 73 1147
SWITHENBANK C 100 71 1216
TAEUBER C 200 71 0278
TAIGANIDES E P 100 64 0474
100 66 0437
100 69 0057
200 69 0055
200 69 0194
200 69 1167
200 71 0281
200 71 0769
200 71 0787
200 71 0791
200 71 0792
200 71 0802
200 71 0810
200 71 0814
TAKAMIYA G 100 73 1184
TAN K H 100 71 0509
TANAYAMA S 100 71 0303
TASK GROUP 2610P 100 67 0079
TAYLOR A W 100 71 1039
400 67 1226
TAYLOR B 100 70 0570
TAYLOR G S 200 66 0131
TAYLOR J C 200 71 0609
200 71 0844
TAYLOR R B 200 69 0199
TAYLOR R J 100 69 0416
TEAGUE H S 100 69 0316
TEETER H M 200 72 1027
TEN HAVE P 200 71 0839
TER 100 65 0699
THE MICROBIOLOGY OF 100 65 0699
THOMAS J W 200 71 0849
300 70 0213
300 71 0624
THOMAS R E 100 70 0299
200 66 0438
THOMPSON D I 100 71 0444
THOMPSON P D 100 68 0287
THORPE V A 100 71 1221
THYGESON J R 200 71 0813
TIEDE J E 200 71 0796
TIEDJE J M 200 71 0827
TIETJEN C 200 66 0155
TILLSON S A 100 70 0064
TIMMONS D R 100 70 0417
500 70 0388
TIMMONS F L 500 70 0397
TIMMONS J F 200 71 0283
500 70 0409
TOETZ D W 200 71 1234
TOMLINSON T E 100 71 1197
TORRENS R L 100 72 1235
200 72 1054
TOTH S J 200 71 0659
TOWER B A 100 69 0360
TOWNSHEND A R 100 70 0083
200 69 0175
TRAVIS D O 100 71 0681
TSAO G T 300 71 1119
TUCKER R E 200 71 0847
TUCKER T C 100 73 1162
TURMAN E J 200 68 0760
TURNBULL J E 200 71 0772
TURNBULL R 200 69 0550
TURNER D O 200 71 0784
400 71 0731
TURNER M E 100 65 0346
500 68 1259
TUSS J 200 69 0534
UNDERWOOD C 400 68 0033
UNIV OF WISC EXT SER 200 69 0516
UPHOLT W M 200 71 0280
US DEPT INT FWPCA 200 69 0539
USDA-ARS AN SCI DIV 300 71 0511
UTLEY P R 100 71 0441
VALLICOTT D R 300 71 0752
VAN DAM J 400 68 0101
400 71 0753
VANDEBERG G 200 69 0536
VANDERHOLM D H 100 70 0458
VANDONSEL D J 100 71 0484
VARGHESE S 300 71 0628
VEATCH J O 300 64 1110
VEIRS C E 200 71 0586
VELEBIL M 200 71 0771
VENN J A J 200 70 0238
VERDUIN J 500 70 0390
VICKERS A F 200 69 0163
VIETS F G 200 71 0605
300 70 0414
VIETS F G JR 100 67 0076
100 68 0730
100 69 0103
100 71 0589
200 69 0676
400 71 0435
VIETS JR F G 300 67 1250
VILSTRUP R H 200 69 0537
WADLEIGH C H 100 68 1121
300 68 1043
400 69 1225
500 70 0386
WAGNER G H 500 70 0393
WAGNER W D 100 70 0691
WALKER J P 100 71 0187
100 71 0266
200 69 0187
WALKER K C 100 68 1121
WALKER W R 200 70 0225
WALSH L M 200 71 0833
WALTER W G 100 71 1212
WARD D 300 71 0591
WARD J C 200 69 0193
600 69 1160
WARNER A F 200 66 0140
WATSON S 100 70 1037
WATTS A B 100 73 1164
WEBB H J 100 62 1220
WEBB K E 200 71 0847
WEBBER L R 100 66 0063
100 68 0452
100 69 0052
100 71 0507
200 68 0724
200 69 0174
400 69 1045
400 73 1073
WEBSTER N W 200 66 0134
WEETH H J 100 71 0257
WEHBY A J 100 71 0572
WEIBEL S R 100 69 0375
WEIDNER R B 100 69 0375
WEINBERGER L W 200 69 0158
WEISHEIT H 600 72 1148
WELCH F M 200 69 0056
WELLER J B 200 70 0246
WELLS D M 100 69 0071
100 71 1038
200 69 0165
200 69 0183
200 70 0232
300 69 1180
300 71 0538
600 70 0255
600 70 0258
WELLS G D 300 71 1238
WENDER I 300 70 1084
300 71 1081
WERNER J A 300 70 1104
WESCOTT R B 100 70 0362
WESLEY R L 200 71 0617
200 71 0842
WETMORE A 200 71 0733
WHEATLAND A B 100 70 0089
400 64 0358
WHEATON R Z 100 69 0071
200 69 0165
200 69 0183
WHITE C 100 70 0581
WHITE R K 100 69 0057
200 69 0194
200 71 0792
200 71 0802
200 71 0810
200 71 0814
300 73 1009
WHITLEY J R 500 70 0406
WILEY J S 400 64 0379
WILKE J T 100 68 0090
100 69 0061
WILKINS R J 100 69 0045
WILKINSON S R 100 71 0509
200 70 0720
200 71 0853
WILLARDSON L S 600 69 1239
WILLEMS D 200 69 0553
WILLIAMS D J 200 70 0719
200 70 0720
200 71 0853
WILLIAMS H R 400 68 0229
WILLIAMS J B 100 67 0041
WILLIAMS R J B 100 70 1233
WILLRICH T L 100 70 0102
200 66 0137
200 71 0788
500 70 0399
WILLSON G B 200 69 0192
200 71 0793
200 71 0804
200 71 0806
400 71 0309
WILMORE R 400 69 0039
WINDT T A 200 71 0801
200 71 0822
WING J M 200 70 0221
200 71 0856
WITHEROW J L 200 70 0498
200 70 1118
200 71 0709
WITTMUSS H 200 72 1014
WITZ J A 200 71 0705
600 72 1153
WITZ R L 100 69 0058
WITZEL S 300 68 1122
WITZEL S A 100 65 0334
100 68 0090
100 69 0061
100 70 0042
100 71 0261
100 71 0571
200 66 0116
200 69 0482
WOLFORD J 300 70 0207
WOOD A J 100 70 0362
WOOD J M 100 69 0445
WOODING N H 300 71 0457
WOODS W R 100 71 0318
100 71 0573
100 72 1129
200 71 0776
300 70 0010
WOOTEN J W 200 71 0808
YANGGEN D A 200 69 0529
YATES J C 200 71 0615
YAVORSKY P M 300 71 1081
YECK R G 200 71 0608
200 71 0762
200 72 1011
YIH R Y 100 71 1216
YORK L R 100 70 0020
YORK M D 100 70 0018
YOUNG R H F 100 73 1184
YOUNG R J 200 70 0715
200 71 0663
ZABLATZKY H R 100 68 0306
ZALFA A A 100 69 1042
ZALL R R 100 72 1193
ZERFAS J W 200 71 0796
ZINDEL H C 100 70 0020
200 71 0815
200 71 0848
200 71 0849
300 70 0205
300 70 0208
300 70 0209
300 70 0210
300 70 0211
300 70 0212
300 71 0622
300 71 0623
300 71 0624
300 71 0627
300 71 0628
300 72 1182
400 71 0327
ZUKOWSKI T 400 73 1068
ZWERMAN P J 200 69 0201
200 70 0227
200 71 0649

SECTION V

KEYWORD INDEX

200	72	1020	ABANDONED-FEEDLOT- POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
100	67	0103	ABSORPTION NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE F
100	68	0044	ABSORBENT-SUBSTRAT THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	69	0043	ABSORPTION PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
100	69	0096	ABSORPTION IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0105	ABSORPTION AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMAT
100	70	1111	ABSORPTION POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	66	0131	ABSORPTION DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
200	71	0656	ABSORPTION MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION RE
300	71	1114	ABSORPTION TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
300	71	1126	ABSORPTION SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	65	0066	ACCUMULATION THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR
600	72	1004	ACETIC-ACID CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
100	70	0260	ACID GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS
100	70	0418	ACID ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES
200	71	0794	ACIDITY AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN PICKUP
200	71	0801	ACIDITY PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
100	71	1221	ACIDS DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	66	0138	ACIDS DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	64	1240	ACID-BACTERIA THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	68	1121	ACID-MINE-WATER WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
200	70	0253	ACTIVATED TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	71	1033	ACTIVATED-CARBON NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	66	0139	ACTIVATED-SLUDGE CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	68	1187	ACTIVATED-SLUDGE THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	70	0241	ACTIVATED-SLUDGE SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
200	70	0687	ACTIVATED-SLUDGE OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORDS OPERATING-COSTS EFF
200	70	0726	ACTIVATED-SLUDGE ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORDS AEROBIC-TREATMENT WASTE-T
200	71	0667	ACTIVATED-SLUDGE FOOD-PROCESSING WASTEWATER TREATMENT KEYWORDS ANAEROBIC-LAGOON ACTIVATED-SLUDGE IRRIG
200	71	0839	ACTIVATED-SLUDGE AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE KEYWORDS DENITRIFICATION ACTIVATED-SLUDGE L
200	71	0843	ACTIVATED-SLUDGE ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS KEYWORDS ACTIVATED-SLUDGE AN
200	69	0193	ACTIVATION-ENERGY CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
200	71	0440	ACTUAL-DAMAGES LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
100	70	1090	ADDITIVES COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	71	1092	ADDITIVES EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	73	1165	ADDITIVES FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
200	71	0811	ADDITIVES BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
100	70	0231	ADDITIVES THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
300	71	0512	ADDITIVES-POULTRY FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS WITH
300	71	0513	ADDITIVES-SWINE FECAL-RESIDUES FROM FEED ADDITIVES--SWINE KEYWORDS HAZARDS GROWTH-RATES DIETHYSTILBES
400	71	0465	ADDITIVE-RESIDUES FEED ADDITIVE RESIDUES IN POULTRY MANURE KEYWORDS ADDITIVE-RESIDUES POULTRY
200	66	0146	ADG UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
300		1105	ADMINISTRATION RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	67	1249	ADMINISTRATION AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
200	71	0844	ADMINISTRATIVE REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORD ADMINISTRATIVE AG
200	69	0551	ADMINISTRATIVE-AGE MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULAT
200	69	0552	ADMINISTRATIVE-AGE STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	69	0554	ADMINISTRATIVE-AGE MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRA
200	69	0556	ADMINISTRATIVE-AGE STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF A
200	69	0557	ADMINISTRATIVE-AGE STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0558	ADMINISTRATIVE-AGE COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
200	69	0559	ADMINISTRATIVE-AGE FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
200	69	0565	ADMINISTRATIVE-AGE RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT KEYWORDS WASTE-TREATMENT CAT
200	70	1050	ADMINISTRATIVE-AGE THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0611	ADMINISTRATIVE-AGE U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENC
200	71	0613	ADMINISTRATIVE-AGE TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINIST
200	71	0614	ADMINISTRATIVE-AGE SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO
200	71	0615	ADMINISTRATIVE-AGE FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
200	71	0616	ADMINISTRATIVE-AGE THE LAKE MENDOTA WATERSHED PROJECT KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPOR
200	71	0617	ADMINISTRATIVE-AGE THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRAT
200	71	0619	ADMINISTRATIVE-AGE REPORTS AND RECOMMENDATIONS OF WORKING GROUPS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERN
200	71	0620	ADMINISTRATIVE-AGE RECOMMENDATIONS OF NATIONAL MILK PRODUCERS FEDERATION KEYWORDS ADMINISTRATIVE-AGENCIE
300		1105	ADMINISTRATIVE-AGE RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	67	1249	ADMINISTRATIVE-AGE AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	68	1202	ADMINISTRATIVE-AGE OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	69	1060	ADMINISTRATIVE-AGE FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1061	ADMINISTRATIVE-AGE RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	69	1103	ADMINISTRATIVE-AGE ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	70	1247	ADMINISTRATIVE-AGE DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	69	1061	ADOPTION-OF-PRACTI RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
200	69	0518	ADSORPTION HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEA
200	70	0242	ADSORPTION MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	68	1187	AERATED-LAGOON THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	71	0781	AERATED-LAGOON ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
200	70	1113	AERATED-LAGOONS AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1114	AERATED-LAGOONS ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
300	71	0319	AERATED-LAGOONS FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISP
300	72	1157	AERATED-LAGOONS CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
600	72	1071	AERATED-LAGOONS A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1262	AERATED-LAGOONS CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
100	64	0333	AERATION AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	67	0713	AERATION SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	68	0087	AERATION AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
100	69	0035	AERATION TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100	69	0360	AERATION THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
100	70	0089	AERATION TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	70	0094	AERATION THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	70	0094	AERATION THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	70	1230	AERATION LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	0167	AERATION CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0266	AERATION CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0682	AERATION AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KE
100	71	1221	AERATION DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	66	0133	AERATION AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	66	0134	AERATION OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
200	69	0056	AERATION PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200	69	0074	AERATION AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0157	AERATION ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0162	AERATION THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	69	0167	AERATION AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN

200	69	0199	AERATION — RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200	70	0234	AERATION — FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0242	AERATION — MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	70	0251	AERATION — AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	70	0253	AERATION — TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	70	0321	AERATION — WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	70	0728	AERATION — ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	70	1114	AERATION — ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	70	1115	AERATION — CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0762	AERATION — LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0780	AERATION — THE WASTE PATTERN OF BEEF CATTLE ON SLATTED FLOORS KEYWORDS FEED-LOTS CONFINEMENT-PEN
200	71	0792	AERATION — CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200	71	0821	AERATION — AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE
200	71	0822	AERATION — DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
200	71	0823	AERATION — BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW KEYWORDS AERATION CATTLE BOD W
200	71	0824	AERATION — AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71	0835	AERATION — AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILAT
200	71	0836	AERATION — SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
200	71	0840	AERATION — LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FA
200	71	0841	AERATION — SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRI
200	71	0858	AERATION — RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANU
200	71	0861	AERATION — CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
300	65	0757	AERATION — AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	68	1123	AERATION — A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	70	0008	AERATION — AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION
300	71	1119	AERATION — TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
400	70	0097	AERATION — POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
400	70	0111	AERATION — UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	73	1178	AERATION — ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
500	70	0401	AERATION — MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
200	69	0187	AERATOR — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	71	0603	AERATOR — EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
200	64	1240	AEROBACTER-AEROGEN — THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	67	0713	AEROBIC — SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	71	0451	AEROBIC — REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
100	71	0758	AEROBIC — HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
100	72	0746	AEROBIC — RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
200	64	0750	AEROBIC — LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	66	0116	AEROBIC — PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
200	66	0116	AEROBIC — PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
200	66	0136	AEROBIC — ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
200	66	0139	AEROBIC — CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0152	AEROBIC — ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	68	0694	AEROBIC — THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200	69	0055	AEROBIC — MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	69	0187	AEROBIC — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	71	0839	AEROBIC — AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE KEYWORD DENITRIFICATION ACTIVATED-SLUDGE C
300	71	0486	AEROBIC — FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
400	70	0111	AEROBIC — UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	71	0311	AEROBIC — WHY STIRRING MANURE REDUCES ODORS KEYWORDS AEROBIC ANAEROBIC STORAGE ODORS HANDLING
100	71	1047	AEROBIC-BACTERIA — OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
200	69	0190	AEROBIC-BACTERIA — MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
200	70	0670	AEROBIC-BACTERIA — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	71	0806	AEROBIC-BACTERIA — COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
300	72	1264	AEROBIC-BACTERIA — PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
400	67	0359	AEROBIC-BACTERIA — WHIPPING THE MANURE PROBLEM KEYWORDS OXIDATION-DITCH ODOR AEROBIC-BACTERIA ROTOR PROB
400	69	0039	AEROBIC-BACTERIA — LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
400	71	1172	AEROBIC-BACTERIA — OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
100	65	0699	AEROBIC-CONDITIONS — THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	67	0501	AEROBIC-CONDITIONS — INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
100	68	0044	AEROBIC-CONDITIONS — THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
200	69	0056	AEROBIC-CONDITIONS — PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200	69	0157	AEROBIC-CONDITIONS — ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	70	0737	AEROBIC-CONDITIONS — REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	70	1113	AEROBIC-CONDITIONS — AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1114	AEROBIC-CONDITIONS — ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	71	0659	AEROBIC-CONDITIONS — COMPOSTING KEYWORDS ARTIFICIAL-USE HUMUS AEROBIC-CONDITIONS COMPOSTING
200	71	0835	AEROBIC-CONDITIONS — AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILAT
200	71	0836	AEROBIC-CONDITIONS — SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
200	72	1089	AEROBIC-CONDITIONS — A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300	69	1044	AEROBIC-CONDITIONS — IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	AEROBIC-CONDITIONS — EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
400	64	0379	AEROBIC-DECOMPOSIT — A REPORT ON THREE MANURE-COMPOSTING PLANTS KEYWORDS ODOR AEROBIC-DECOMPOSITION AMMON
200	71	0802	AEROBIC-DIGESTER — AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
100	68	0087	AEROBIC-DIGESTION — AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
200	71	0762	AEROBIC-LAGOON — LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0808	AEROBIC-LAGOON — WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
200	71	0821	AEROBIC-LAGOONS — AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE
300	71	0319	AEROBIC-LAGOONS — FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISP
300	71	1238	AEROBIC-LAGOON-TRE — CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
200	69	0165	AEROBIC-STABILIZAT — AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200	69	0184	AEROBIC-STABILIZAT — TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
100	69	0030	AEROBIC-TREATMENT — TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	69	0353	AEROBIC-TREATMENT — OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	69	0355	AEROBIC-TREATMENT — FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
100	69	0361	AEROBIC-TREATMENT — NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
100	71	1228	AEROBIC-TREATMENT — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	68	1186	AEROBIC-TREATMENT — TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	69	0163	AEROBIC-TREATMENT — DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	69	0168	AEROBIC-TREATMENT — AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200	69	1116	AEROBIC-TREATMENT — MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	70	0253	AEROBIC-TREATMENT — TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	70	0728	AEROBIC-TREATMENT — ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	70	0755	AEROBIC-TREATMENT — FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	70	1115	AEROBIC-TREATMENT — CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0652	AEROBIC-TREATMENT — LIQUID WASTE TREATMENT I FUNDAMENTALS KEYWORDS AEROBIC-TREATMENT ANAEROBIC-BIODEGRADAT
200	71	0653	AEROBIC-TREATMENT — LIQUID WASTE TREATMENT II OXIDATION PONDS AND AERATED LAGOONS KEYWORDS AEROBIC-TREATM
200	71	0654	AEROBIC-TREATMENT — LIQUID WASTE TREATMENT III THE OXIDATION DITCH KEYWORDS AEROBIC-TREATMENT DISSOLVED-OX
200	71	0662	AEROBIC-TREATMENT — WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME
200	71	0805	AEROBIC-TREATMENT — HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN

KEYWORD INDEX

200	71	0816	AEROBIC-TREATMENT ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS
200	71	0818	AEROBIC-TREATMENT THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
200	72	1054	AEROBIC-TREATMENT APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
300	67	1253	AEROBIC-TREATMENT WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	68	1123	AEROBIC-TREATMENT A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	69	0001	AEROBIC-TREATMENT SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	1180	AEROBIC-TREATMENT CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	71	0457	AEROBIC-TREATMENT DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300	71	0677	AEROBIC-TREATMENT THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	0732	AEROBIC-TREATMENT CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
300	72	1157	AEROBIC-TREATMENT CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	70	0022	AEROBIC-TREATMENT SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY
600	72	1001	AEROBIC-TREATMENT INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
100	71	1212	AEROGENES EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
300	70	1104	AEROMONAS FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	66	1080	AEROSOLS NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	65	0331	AESTHETICS DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
200	69	0519	AESTHETICS AESTHETICS AND ODORS KEYWORDS HYDROGEN-SULFIDE ANAEROBIC-CONDITIONS ODOR-THRESHOLD AE
300	70	1101	AFTERGROWTH BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
400	70	0357	AGE FROM THE ALS MECHANICAL-CLEANING OF COWSHEDS KEYWORDS DAIRY-CATTLE AGE COSTS SPECIFIC
200	71	0844	AGENCIES REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORD ADMINISTRATIVE-AG
100	68	0036	AGENT OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
200	69	0188	AGITATION PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
300	70	0206	AGITATION POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
400	65	0332	AGITATION HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
100	68	1121	AGRICULTURAL-CHEMI WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
200	71	0645	AGRICULTURAL-CHEMI PESTICIDES AND PEST CONTROL IN THE FUTURE KEYWORDS PEST-CONTROL AGRICULTURAL-CHEMICAL
300	68	1043	AGRICULTURAL-CHEMI WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	71	1107	AGRICULTURAL-CHEMI WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
200	73	1083	AGRICULTURAL-CROP- CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
100	70	1211	AGRICULTURAL-ENGIN ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
200	72	1019	AGRICULTURAL-RESEA PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1028	AGRICULTURAL-RESEA AREA DIRECTORS SUMMARY KEYWORDS FARM-WASTES MANAGEMENT FEED-LOTS US-MEAT-ANIMAL-RESEARC
200	72	1029	AGRICULTURAL-RESEA CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
100	71	1197	AGRICULTURAL-RUNOF NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
200	68	1186	AGRICULTURAL-RUNOF TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	71	0820	AGRICULTURAL-RUNOF COSTS OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FE
200	71	0829	AGRICULTURAL-RUNOF WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
200	72	1054	AGRICULTURAL-RUNOF APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS.
300	71	1107	AGRICULTURAL-RUNOF WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400	71	1196	AGRICULTURAL-RUNOF CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
700	72	1049	AGRICULTURAL-RUNOF ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100	70	1233	AGRICULTURAL-WATER LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	69	1167	AGRICULTURAL-WASTE AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
300	68	1122	AGRICULTURAL-WATER NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	71	1081	AGRICULTURAL-WASTE CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
500	68	1259	AGRICULTURAL-WASTE WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
100	70	1194	AGRICULTURE REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1227	AGRICULTURE AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
200	70	1118	AGRICULTURE WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	71	1094	AGRICULTURE AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1095	AGRICULTURE BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
300	68	1043	AGRICULTURE WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	70	1036	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	70	1201	AGRICULTURE OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300	71	1035	AGRICULTURE IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
300	71	1106	AGRICULTURE MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
400	69	1045	AGRICULTURE AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	73	1063	AGRICULTURE AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
100	69	0707	AIR A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
300	69	0317	AIR AIR POLLUTION ASPECTS OF ODOROUS COMPOUNDS KEYWORDS AIR ODOROUS
200	71	0661	AIR-CIRCULATION ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	69	0186	AIR-CONDITIONING MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
600	72	1074	AIR-CONDITIONING SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
300	71	0626	AIR-CONTAMINATION DRYING OF POULTRY MANURE IN A CAGE-LAYER HOUSE KEYWORDS ODOR ENVIRONMENT AIR-VENTILATI
200	71	0846	AIR-DRIED-CHICKEN- NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
300	71	0671	AIR-DRYING REMOVAL OF WATER FROM ANIMAL MANURES, PART II EFFECTS OF VELOCITY ON AIR DRYING KEYWO
300	71	0673	AIR-DRYING-MANURE OLFACTORY MEASUREMENT OF ANIMAL MANURE ODORS KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0674	AIR-DRYING-MANURE CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0675	AIR-DRYING-MANURE UNDER CAGE DRYING OF POULTRY MANURE KEYWORDS ODOR AIR-DRYING-MANURE CAGE
100	66	1080	AIR-POLLUTION NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	71	0729	AIR-POLLUTION DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
100	72	1188	AIR-POLLUTION IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	73	1087	AIR-POLLUTION ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	73	1184	AIR-POLLUTION ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	69	0157	AIR-POLLUTION ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0516	AIR-POLLUTION PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200	70	0114	AIR-POLLUTION SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	1050	AIR-POLLUTION THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0772	AIR-POLLUTION A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD
200	71	0783	AIR-POLLUTION SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200	71	0790	AIR-POLLUTION IDENTIFICATION OF CARBONYL COMPOUNDS IN A SWINE-BUILDING ATMOSPHERE KEYWORDS ODOR ORG
200	71	0791	AIR-POLLUTION METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS C
200	71	1033	AIR-POLLUTION NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	71	1095	AIR-POLLUTION BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	AIR-POLLUTION ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	72	1010	AIR-POLLUTION PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1011	AIR-POLLUTION NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1012	AIR-POLLUTION REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1013	AIR-POLLUTION POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1019	AIR-POLLUTION PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1020	AIR-POLLUTION POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	73	1083	AIR-POLLUTION CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	69	0300	AIR-POLLUTION WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	70	0205	AIR-POLLUTION INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DI
300	70	0385	AIR-POLLUTION AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	0414	AIR-POLLUTION THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
300	71	1106	AIR-POLLUTION MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	72	1003	AIR-POLLUTION CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
300	72	1264	AIR-POLLUTION PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC

400	71	0435	AIR-POLLUTION	THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION KEYWORDS WASTE-DISPOSAL AIR-POLLUTIO
400	71	1143	AIR-POLLUTION	A LOVELY NEW SCENT FOR MANURE KEYWORDS AIR-POLLUTION SAGEBRUSH FARM-WASTES ODOR
400	71	1144	AIR-POLLUTION	CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
400	72	1173	AIR-POLLUTION	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
600	72	1002	AIR-POLLUTION	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
600	72	1004	AIR-POLLUTION	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
700	69	1067	AIR-POLLUTION	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
200	71	0766	AIR-POLLUTIONPROBL	RESPONSIBILITIES OF A PROFESSIONAL SOCIETY TOWARD URGENT SOCIAL PROBLEMS KEYWORDS TEC
300	70	0385	AIR-PULLUTION-EFFE	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
100	71	0582	AIR-QUALITY	CRITERIA NEEDED TO DESIGN ANIMAL QUARTERS FOR COMFORT AND PRODUCTIVITY KEYWORDS AIR-Q
100	70	0025	AIR-SAMPLER	BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYW
100	70	0027	AIR-TEMPERATURE	EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID
200	69	0178	AIR-TEMPERATURE	STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
300	71	0621	AIR-VENTILATION	POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
300	71	0626	AIR-VENTILATION	DRYING OF POULTRY MANURE IN A CAGE-LAYER HOUSE KEYWORDS ODOR ENVIRONMENT AIR-VENTILATI
300	68	1202	ALABAMA	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
400	71	0293	ALBUMEN	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
100	69	0096	ALCOHOLS	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	72	1188	ALCOHOLS	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	72	1188	ALDEHYDES	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
500	70	0395	ALDRIN	CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
100	70	1040	ALEXANDRIA-EGYPT	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	68	0730	ALFALFA	AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
100	69	0081	ALFALFA	DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWO
100	73	1162	ALFALFA	PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
200	64	1241	ALFALFA	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	69	0169	ALFALFA	INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
300	65	0739	ALFALFA	NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
300	67	1250	ALFALFA	DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
400	73	1183	ALFALFA	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
300	69	1044	ALFALFA-BROMEGRASS	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	ALFALFA-BROMEGRASS	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
100	65	0075	ALGAE	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	65	0334	ALGAE	CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
100	69	0030	ALGAE	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	70	1040	ALGAE	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	70	1251	ALGAE	AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	70	1237	ALGAE	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	68	1187	ALGAE	THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	69	0433	ALGAE	EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	69	0526	ALGAE	NATION-WIDE RESEARCH ON ANIMAL-WASTE-DISPOSAL KEYWORDS GRANTS ALGAE FWPCA NUTRIENTS RE
200	69	1117	ALGAE	WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	71	1097	ALGAE	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	71	1234	ALGAE	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
300	64	1110	ALGAE	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300	68	1122	ALGAE	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	70	0487	ALGAE	NITRATE-REMOVAL FROM AGRICULTURAL WASTEWATER KEYWORDS ALGAE CALIFORNIA DENITRIFICATION
300	70	0668	ALGAE	PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTE KEYWORDS ALGAE RECL
300	70	1101	ALGAE	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
300	71	1106	ALGAE	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	72	1070	ALGAE	PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
400	73	1063	ALGAE	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
500	70	0407	ALGAE	EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
300	70	0487	ALGAE-STRIPPING	NITRATE-REMOVAL FROM AGRICULTURAL WASTEWATER KEYWORDS ALGAE CALIFORNIA DENITRIFICATION
100	70	1194	ALGAL-CONTROL	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	69	1198	ALGAL-GROWTH	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
200	69	0482	ALGAL-GROWTH	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
300	71	0099	ALGAL-SYSTEM	REMOVAL OF NITRATE BY AN ALGAL SYSTEM KEYWORDS REMOVAL NITRATE ALGAL-SYSTEM
100	69	1198	ALGEA	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	68	0306	ALKALINE	ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
100	69	0679	ALKALINE	NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
100	63	0338	ALKALINITY	DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100	65	0503	ALKALINITY	THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	65	0699	ALKALINITY	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
200	66	0139	ALKALINITY	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
600	70	0258	ALKALINITY	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
700	70	1109	ALKALINITY	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	70	0342	ALKALIS	IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION CO
100	71	0681	ALKALI-SOILS	EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
200	71	0583	ALLERGENS	AIR POLLUTION FROM AGRICULTURE KEYWORDS DUST ALLERGENS ODORS PESTICIDES SMOKE
200	66	0127	ALLEYWAYS	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
200	69	0078	ALPHA-FACTOR	OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS .K
100	71	1228	ALTERNATIVES	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	70	0747	ALTERNATIVES	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	71	0662	ALTERNATIVES	WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME
200	71	0733	ALTERNATIVES	ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	72	1018	AMERICAN-SOIL-CONS	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
100	69	0096	AMINES	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0105	AMINES	AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMAT
100	72	1188	AMINES	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
300	69	0467	AMINES	IDENTIFICATION OF FEEDLOT ODORS KEYWORDS AMINES IDENTIFICATION ODORS
100	70	0367	AMINO	NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND D
200	71	0792	AMINO	CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200	71	0809	AMINO-ACID	ENZYME FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOTMANURE KEYWORDS BOD AMINO
200	64	1241	AMINO-ACIDS	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	72	1016	AMINO-ACIDS	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1030	AMINO-ACIDS	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
300	71	0624	AMINO-ACIDS	FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITR
400	71	0293	AMINO-ACIDS	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
600	72	1163	AMINO-ACIDS	ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
100	65	1219	AMMONIA	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	66	1080	AMMONIA	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	69	0057	AMMONIA	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
100	69	0103	AMMONIA	NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE F
100	69	0105	AMMONIA	AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMAT
100	69	0679	AMMONIA	NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
100	69	0707	AMMONIA	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	70	0031	AMMONIA	VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100	70	1037	AMMONIA	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	70	1051	AMMONIA	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR

300	69	1180	ANAEROBIC-DIGESTIO	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	72	1157	ANAEROBIC-DIGESTIO	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
500	68	1259	ANAEROBIC-DIGESTIO	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
600	70	0254	ANAEROBIC-DIGESTIO	AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB
600	70	0258	ANAEROBIC-DIGESTIO	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
600	71	0496	ANAEROBIC-DIGESTIO	DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION
700	70	1109	ANAEROBIC-DIGESTIO	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	67	0230	ANAEROBIC-LAGOON	CATTLE-WASTES - POLLUTION AND POTENTIAL TREATMENT KEYWORDS ANAEROBIC-DIGESTION ANAEROB
100	67	0233	ANAEROBIC-LAGOONS	EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
100	69	0095	ANAEROBIC-LAGOON	BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
200	68	1186	ANAEROBIC-LAGOONS	TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	68	1187	ANAEROBIC-LAGOON	THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	71	0667	ANAEROBIC-LAGOON	FOOD PRUCESSING WASTEWATER TREATMENT KEYWORDS ANAEROBIC-LAGOON ACTIVATED-SLUDGE IRRIG
200	71	0855	ANAEROBIC-LAGOON-E	TREATMENT OF LIVESTOCK-LAGOON EFFLUENT BY SOIL FILTRATION KEYWORD ANAEROBIC-LAGOON-EF
300	71	0319	ANAEROBIC-LAGOONS	FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISP
300	71	0700	ANAEROBIC-LAGOON	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
500	70	0401	ANAEROBIC-LAGOONS	MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
600	72	1262	ANAEROBIC-LAGOONS	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
200	71	0762	ANAEROBIC-TREATMEN	LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
300	71	0486	ANAEROBIC-TREATMEN	FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
100	69	0071	ANALYSIS	ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	71	0303	ANALYSIS	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
100	73	1164	ANALYSIS	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200	66	0153	ANALYSIS	POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
200	66	1112	ANALYSIS	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	71	0781	ANALYSIS	ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
200	71	0811	ANALYSIS	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
200	71	0826	ANALYSIS	CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	71	0834	ANALYSIS	SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
200	71	0861	ANALYSIS	CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
300	69	0634	ANALYSIS	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
300	71	0412	ANALYSIS	THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP
300	71	0538	ANALYSIS	CHARACTERISTICS OF WASTES FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORD RUNOFF QUALITY-CO
300	71	0625	ANALYSIS	THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE K
300	71	0697	ANALYSIS	ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
400	71	0267	ANALYSIS	WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
100	70	1233	ANALYTICAL-TECHNIQ	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	71	1232	ANALYTICAL-TECHNIQ	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	72	1199	ANALYTICAL-TECHNIQ	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1222	ANALYTICAL-TECHNIQ	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
100	72	1235	ANALYTICAL-TECHNIQ	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
100	73	1034	ANALYTICAL-TECHNIQ	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
200	71	0792	ANALYTICAL-TECHNIQ	CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
300	72	1052	ANALYTICAL-TECHNIQ	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
200	70	1113	ANEROBIC-CONDITION	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1113	ANEROBIC-CONDITION	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	69	0186	ANHYDROUS-AMMONIA	MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
100	69	0057	ANIMAL	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
100	69	0265	ANIMAL	PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
100	68	1229	ANIMALS	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	70	0023	ANIMALS	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
100	70	0023	ANIMALS	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
100	70	0024	ANIMALS	PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
100	71	0572	ANIMALS	AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
200	64	1240	ANIMALS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300		1105	ANIMALS	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
200	71	0740	ANIMAL-BEHAVIOR	PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
200	67	1243	ANIMAL-CONFINEMENT	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
400	71	1131	ANIMAL-DENSITY	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
500	71	1255	ANIMAL-DISEASES	DISEASES OF FEEDLOT CATTLE KEYWORDS ANIMAL-DISEASES CATTLE FEED-LOTS FARM-WASTES WATER-
100	69	0376	ANIMAL-FEEDSTUFFS	EVALUATION OF SEVERAL METHODS OF ISOLATING SALMONELLA FROM POULTRY-LITTER AND ANIMAL-F
300	71	1098	ANIMAL-HUSBANDRY	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
300	70	0213	ANIMAL-METABOLISM	ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-
600	72	1153	ANIMAL-METABOLISM	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
100	70	1051	ANIMAL-PARASITES	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	71	1232	ANIMAL-PARASITES	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	72	1016	ANIMAL-PARASITES	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	71	0845	ANIMAL-PATHOLOGY	CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS-NE
200	71	0846	ANIMAL-PATHOLOGY	NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0847	ANIMAL-PATHOLOGY	STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINA
200	72	1017	ANIMAL-PERFORMANCE	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
300	71	0745	ANIMAL-PROCESSING-	ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING
200	67	1243	ANIMAL-PRODUCTION-	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200	69	0539	ANIMAL-PRODUCTION	PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE KEYWORDS CATTLE WATER-POLLUTION FEEDL
100	69	1042	ANIMAL-WASTES	THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
100	70	0019	ANIMAL-WASTES	CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS D
100	70	1217	ANIMAL-WASTES	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	1212	ANIMAL-WASTES	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	72	1215	ANIMAL-WASTES	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
200	67	1243	ANIMAL-WASTES	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
300	46	1207	ANIMAL-WASTES	FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
400	69	1225	ANIMAL-WASTES	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	70	1176	ANIMAL-WASTES	ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
400	72	1166	ANIMAL-WASTES	HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
500	71	1254	ANIMAL-WASTES	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	70	1051	ANIMAL-WASTES-WILD	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
400	71	1196	ANIMAL-WASTES-WILD	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
100	72	1199	ANITBIOTICS-PESTIC	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
300	71	0514	ANITIBIOTICS-BEEF	FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE KEYWORDS DECOMPOSITION DISE
200	69	0524	ANNUAL-COST	CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST I
300	71	1058	ANNUAL-WASTES	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
400	67	0336	ANTHRAX	DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND
200	71	0795	ANTIBIOTIC	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
100	64	0343	ANTIBIOTICS	BOVINE-SALMONELLOSIS IN A FEEDLOT OPERATION KEYWORDS MUD ANTIBIOTICS STAGNANT-WATER
100	69	0265	ANTIBIOTICS	PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
200	69	0696	MNTIBIOTICS	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	71	0811	ANTIBIOTICS	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
300	69	0005	ANTIBIOTICS	SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	71	0511	ANTIBIOTICS	ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
300	71	0512	ANTIBIOTICS	FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS NITR

KEYWORD INDEX

100	70	1251	AMMONIA — AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0576	AMMONIA — CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS
100	71	1214	AMMONIA — THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	73	1087	AMMONIA — ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	70	1237	AMMONIA — POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	64	0750	AMMONIA — LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	64	0739	AMMONIA — STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	69	0184	AMMONIA — TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	69	0190	AMMONIA — MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
200	69	0548	AMMONIA — RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200	70	0223	AMMONIA — NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
200	71	0793	AMMONIA — CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AM
200	71	0794	AMMONIA — AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN MICROF
200	71	0830	AMMONIA — FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
200	71	0857	AMMONIA — NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
200	71	1033	AMMONIA — NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	71	1099	AMMONIA — SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1016	AMMONIA — CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
300	65	0757	AMMONIA — AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	67	1250	AMMONIA — DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	68	0749	AMMONIA — ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	69	0007	AMMONIA — SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	69	0300	AMMONIA — WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	69	0631	AMMONIA — ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	0632	AMMONIA — QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
300	69	0633	AMMONIA — THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
300	69	0635	AMMONIA — GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHA
300	69	0637	AMMONIA — SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC-COMPOUNDS AMMONIA HYDROGEN-
300	70	0414	AMMONIA — THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
300	71	0639	AMMONIA — USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	71	0672	AMMONIA — MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METH
300	71	0692	AMMONIA — EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
300	71	1245	AMMONIA — EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
400	64	0379	AMMONIA — A REPORT ON THREE MANURE-COMPOSTING PLANTS KEYWORDS ODOR AEROBIC-DECOMPOSITION AMMON
400	70	0091	AMMONIA — MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
400	71	1136	AMMONIA — FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	73	1140	AMMONIA — ANOTHER POSSIBLE PROCESS FOR MANURE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT FERT
600	71	0494	AMMONIA — A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
600	72	1004	AMMONIA — CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
300	69	0638	AMMONIA-HYDROGEN-S — ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
100	71	0589	AMMONIA-VOLATILIZA — SOIL MICROBIOLOGY AND BIOCHEMISTRY KEYWORDS NITROGEN AMMONIA-VOLATILIZATION FEEDLOTS
100	68	0306	AMMONIUM — ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
100	68	0730	AMMONIUM — AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
200	71	0801	AMMONIUM — PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
300	71	0269	AMMONIUM — INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
500	70	0393	AMMONIUM — CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
300	70	1059	AMMONIUM-COMPOUNDS — NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	71	1126	AMPHIBIANS — SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	69	0519	ANAEBOBIC-CONDITIO — AESTHETICS AND ODORS KEYWORDS HYDROGEN-SULFIDE ANAEBOBIC-CONDITIONS ODOR-THRESHOLD AE
200	66	0138	ANAERCEIC — DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
500	71	1254	ANAEROBES — ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	68	0306	ANAEROBIC — ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
100	71	0261	ANAEROBIC — ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUD
100	71	0304	ANAEROBIC — STATE OF THE ART REVIEW TREATMENT AND DISPOSAL OF SWINE WASTES KEYWORDS CHEMICAL OXY
100	71	0758	ANAEROBIC — HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
200	64	0750	ANAEROBIC — LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	66	0139	ANAEROBIC — CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0152	ANAEROBIC — ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	69	0055	ANAEROBIC — MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	69	0187	ANAEROBIC — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	70	0237	ANAEROBIC — THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	70	0252	ANAEROBIC — ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
200	70	0670	ANAEROBIC — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0687	ANAEROBIC — OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
200	71	0655	ANAEROBIC — ANAEROBIC BIOLOGICAL WASTE TREATMENT SYSTEMS KEYWORDS METHANE-BACTERIA FARM-LAGOONS AN
200	71	0814	ANAEROBIC — PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
300	69	0001	ANAEROBIC — SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
400	71	0305	ANAEROBIC — RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS
400	71	0311	ANAEROBIC — WHY STIRRING MANURE REDUCES ODORS KEYWORDS AEROBIC ANAEROBIC STORAGE ODORS HANDLING
100	65	0334	ANAEROBIC-BACTERIA — CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
200	69	0190	ANAEROBIC-BACTERIA — MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
400	73	1178	ANAEROBIC-BACTERIA — ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
200	71	0652	ANAEROBIC-BIODEGRA — LIQUID WASTE TREATMENT I FUNDAMENTALS KEYWORDS AEROBIC-TREATMENT ANAEROBIC-BIODEGRADAT
100	64	1200	ANAEROBIC-CONDITIO — PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	68	1229	ANAEROBIC-CONDITIO — ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	73	1034	ANAEROBIC-CONDITIO — TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
200	69	0157	ANAEROBIC-CONDITIO — ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0184	ANAEROBIC-CONDITIO — TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	70	0248	ANAEROBIC-CONDITIO — PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
200	70	0728	ANAEROBIC-CONDITIO — ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	70	0737	ANAEROBIC-CONDITIO — REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	70	1114	ANAEROBIC-CONDITIO — ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	71	0783	ANAEROBIC-CONDITIO — SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
600	73	1065	ANAEROBIC-CONDITIO — EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	72	1048	ANAEROBIC-CONDITIO — SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
100	65	0346	ANAEROBIC-DIGESTIO — LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	65	0378	ANAEROBIC-DIGESTIO — TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTIO
100	67	0230	ANAEROBIC-DIGESTIO — CATTLE-WASTES - POLLUTION AND POTENTIAL TREATMENT KEYWORDS ANAEROBIC-DIGESTION ANAEROB
100	67	0448	ANAEROBIC-DIGESTIO — INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM KEYWORDS ODOR ANAEROBIC-DIGESTION METHAN
100	68	0500	ANAEROBIC-DIGESTIO — ANAEROBIC LAGOONS CONSIDERATIONS IN DESIGN AND APPLICATION KEYWORDS FARM-LAGOONS ANAER
100	69	0030	ANAEROBIC-DIGESTIO — TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	69	0259	ANAEROBIC-DIGESTIO — ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
100	71	1228	ANAEROBIC-DIGESTIO — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	68	0724	ANAEROBIC-DIGESTIO — GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	69	0164	ANAEROBIC-DIGESTIO — SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
200	69	0168	ANAEROBIC-DIGESTIO — AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200	70	0755	ANAEROBIC-DIGESTIO — FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	71	0768	ANAEROBIC-DIGESTIO — SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0843	ANAEROBIC-DIGESTIO — ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS KEYWORD ACTIVATED-SLUDGE AN
200	71	1099	ANAEROBIC-DIGESTIO — SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL

300	71 0622	ANTIBIOTICS	LARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYW
100	71 0266	ANTI-FOAMING-AGENT	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71 1039	APPALACHIAN-MOUNTA	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	69 0086	APPARENT-DIGESTIBI	THE APPARENT-DIGESTIBILITY OF ENERGY AND PROTEIN IN TOPLAN DRIED-POULTRY-MANURE KEYWO
100	65 0346	APPEARANCE	LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	68 0500	APPLICATION	ANAEROBIC LAGOONS CONSIDERATIONS IN DESIGN AND APPLICATION KEYWORDS FARM-LAGOONS ANAER
200	72 1021	APPLICATION-METHOD	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
600	72 1169	APPLICATION-METHOD	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
100	70 0049	APPLICATION-RATE	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
200	68 0724	APPLICATION-RATES	GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	70 0215	APPLICATION-RATES	MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-
300	71 0639	APPLICATION-RATE	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
400	65 0356	APPLICATION-RATES	FURROW MANURE-DISPOSAL KEYWORDS POULTRY APPLICATION-RATES PLOW-FURROW-COVER DISPOSAL
700	72 1048	APPLICATION-RATES	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
500	70 0398	APPLIED-CONTROLS	PESTICIDES AND PEST-MANAGEMENT FOR MAXIMUM-PRODUCTION AND MINIMUM POLLUTION KEYWORDS
100	69 0416	APPLYING	A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
200	72 1025	AQUATIC-ANIMALS	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
300	71 1126	AQUATIC-HABITATS	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	70 0420	AQUATIC-INSECTS	SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGO
100	70 0051	AQUATIC-LIFE	IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
300	71 1126	AQUATIC-LIFE	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	67 1258	AQUATIC-MICROBIOLO	RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
100	70 1217	AQUATIC-MICROBIOLO	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	70 1217	AQUATIC-MICROORGAN	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	65 1219	AQUATIC-PLANTS	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
300	68 1122	AQUATIC-PLANTS	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	71 1098	AQUATIC-PLANTS	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
300	71 1126	AQUATIC-PLANTS	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
400	69 1045	AQUATIC-PLANTS	AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
100	67 1218	AQUATIC-SYSTEM	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
500	70 0397	AQUATIC-WEEDS	HERBICIDE RESIDUES IN AGRICULTURAL WATER FROM CONTROL OF AQUATIC AND BANK WEEDS KEYWOR
100	70 1194	AQUATIC-WEED-CONTR	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	72 1215	AQUEOUS-SOLUTIONS	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	72 1097	AQUIFER	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
400	71 1174	AQUIFER	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
600	72 1169	AQUIFER	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
100	70 1041	AQUIFERS	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
400	69 0016	AQUIFERS	FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
600	73 1147	AQUIFERS	SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
100	70 1233	ARABLE-LAND	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
300	72 1260	AREAS	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
100	70 0112	AREATRENDS	CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
200	70 1118	ARID-LANDS	WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
300	70 1192	ARID-LANDS	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70 0492	ARID-REGIONS	DISTILLATION OF WASTEWATERS A WATER-RESOURCE FOR ARID-REGIONS KEYWORDS EFFLUENT-REUS
100	73 1162	ARIZONA	PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
200	66 0150	ARIZONA	PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
400	73 1183	ARIZONA	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
400	73 1191	ARIZONA	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
200	70 0217	ARKANSAS	POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
300	46 1207	ARKANSAS	FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
100	60 1078	ARSANILIC-ACID	EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
100	60 1078	ARSENIC	EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
100	69 0081	ARSENIC	DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWO
100	71 0572	ARSENIC	AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
200	73 1093	ARSENIC	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
100	71 1214	ARSENIC-COMPOUNDS	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	71 0660	ARTIFICAL-USE	UTILIZATION OF AGRICULTURAL WASTES KEYWORDS WASTE-BYPRODUCTS ARTIFICAL-USE WASTE-DISP
400	71 0568	ARTIFICAL-USE	DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DIS
200	68 1242	ARTIFICIAL-RECHARG	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	71 0659	ARTIFICIAL-USE	COMPOSTING KEYWORDS ARTIFICIAL-USE HUMUS AEROBIC-CONDITIONS COMPOSTING
200	71 0615	ASCS	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
200	71 0616	ASCS	THE LAKE MENDOTA WATERSHED PROJECT KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPOR
400	72 1173	ASH	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
200	66 0150	ASPECTS	PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	70 0240	ASPECTS	WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
200	71 0664	ASPECTS	ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
300	46 1207	ASPECTS	FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
200	69 0195	ASSAY	ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE KEYW
100	71 0572	ASSESSMENT	AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
200	71 0611	ASSISTANCE	U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENC
200	71 0612	ASSISTANCE	PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
200	71 0613	ASSISTANCE	TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINIST
200	71 0614	ASSISTANCE	SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO
200	71 0615	ASSISTANCE	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
300	71 1107	ASSOCIATED-COSTS	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
100	65 1219	ATMOSPHERE	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	66 1080	ATMOSPHERE	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
300	70 0385	ATMOSPHERE	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
100	66 0479	ATMOSPHERIC-AMMONI	THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
100	69 0316	ATMOSPHERIC-AMMONI	EFFECTS OF ATMOSPHERIC AMMONIA ON THE PIG KEYWORDS EFFECTS ATMOSPHERIC-AMMONIA PIG
100	73 1087	ATMOSPHERIC-NH3	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	71 1221	ATOMIC-ABSORPTION-	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
300	71 1055	ATTITUDES	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	70 0023	ATTRACTION	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
100	71 1213	AUCALIGENES-FAECAL	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	64 0474	AUGER	PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
100	73 1034	AUTOCLAVES	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
300	70 1101	AUTOGONISTIC-EFFEC	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
700	70 1256	AUTOMATIC-DATA-COL	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
100	71 1213	AUTOMATION	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	72 1215	AUTOMATION	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
300	71 1100	AUTOMATION	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300	70 0385	AUTOMOBILE-EXHAUST	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
100	67 0041	AVAILABLE-WATER-CA	THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
100	71 0307	AVIAN	ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS-ARMIGERA AND ITS PERISTENCE IN AVIAN FECES
300	70 1101	AXEMIC-CULTURES	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
200	64 1240	BACILLUS-COLI	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
600	72 1163	BACILLUS-MEGATERIU	ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
100	71 1092	BACILLUS-THURINGIE	EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS

200	64	1240	BACTERPROCEEDINGS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	65	0503	BACTERIA	THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	65	0699	BACTERIA	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	66	0290	BACTERIA	CORYNEFORM BACTERIA POULTRY DEEP LITTER KEYWORDS CORYNEFORM BACTERIA POULTRY LITTER
100	70	0049	BACTERIA	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100	70	1217	BACTERIA	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	0291	BACTERIA	COMPARISON OF MEDIA FOR ISOLATION OF SALMONELLAE AND SHIGELLAE FROM FECAL SPECIMENS KE
100	71	0451	BACTERIA	REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
100	71	0476	BACTERIA	THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER KEYWORDS FUNGUS PH BACTERIA MOLD POULTR
100	71	0722	BACTERIA	THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
100	71	0742	BACTERIA	INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES A
100	71	1212	BACTERIA	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	73	1164	BACTERIA	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200	64	1240	BACTERIA	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	64	1241	BACTERIA	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	66	0120	BACTERIA	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0132	BACTERIA	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
200	66	0135	BACTERIA	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200	66	0137	BACTERIA	PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	66	1112	BACTERIA	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	69	0518	BACTERIA	HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEA
200	69	1102	BACTERIA	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	70	0239	BACTERIA	FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI
200	70	0252	BACTERIA	ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
200	70	0718	BACTERIA	WATER UTILIZATION IN PROCESSING PLANTS KEYWORDS BOD POULTRY BACTERIA INDUSTRIAL-WASTE
200	71	0783	BACTERIA	SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200	71	1099	BACTERIA	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1108	BACTERIA	EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300	67	0701	BACTERIA	WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300	68	0702	BACTERIA	BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
300	69	0300	BACTERIA	WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	71	0486	BACTERIA	FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
300	71	0511	BACTERIA	ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
300	72	1070	BACTERIA	PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
300	72	1182	BACTERIA	BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
400	65	0439	BACTERIA	THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC
400	68	0032	BACTERIA	NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
400	73	1068	BACTERIA	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
500	70	0402	BACTERIA	DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATE
600	72	1071	BACTERIA	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1163	BACTERIA	ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
100	71	0567	BACTERIAL	BACTERIAL AND FUNGAL FLORA OF SEAGULL DROPPINGS IN JERSEY KEYWORDS BACTERIAL FLORA SEA
100	70	0025	BACTERIAL-CONTAMIN	BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYW
100	69	0360	BACTERIAL-POPULATI	THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
200	69	1102	BACTERIAL-REMOVAL	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	70	1053	BACTERIA-E-COLI	BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
100	69	0707	BACTERICIDES	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
500	71	1254	BACTERIODACEAE	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
500	71	1254	BACTERIODES-FRAGIL	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	71	1232	BACTERIOLOGICAL-AN	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	71	0641	BACTERIOLOGICAL-AN	BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
200	71	1099	BACTERIOPHAGE	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	64	1240	BACTERIUM-COLI	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	66	0153	BAGGING	POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
600	71	0496	BALANCE	DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION
400	73	1063	BALANCE-OF-NATURE	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
700	71	1120	BALANCE-OF-NATURE	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
100	73	1162	BARLEY	PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
100	68	0452	BARNYARD	GROUNDWATER CONTAMINATION KEYWORDS NITROGEN BARNYARD GROUNDWATER CONTAMINATION
100	69	0052	BARNYARD	NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-N
100	70	1195	BARNYARD	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	73	1190	BASAL-DIET	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
200	69	0521	BASE-FLOW	WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
400	68	0033	BASIN	IRRIGATING WITH ANIMAL WASTE KEYWORDS SPRINKLER-IRRIGATION SEWAGE-DISPOSAL EFFLUENT H
200	71	0640	BASINS	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
400	73	1158	BASINS	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
300	71	1126	BASS	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	72	1129	BATCH-SYSTEM	BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
100	63	1064	BAYER	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	63	1064	BAYER	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	63	1064	BAYER	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	63	1064	BAYER-29493	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	69	1231	BAYS	POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
200	66	0126	BEDDING	MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING KEYWORDS CATTLE CONFINEME
600	72	1150	BEDDING	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
600	72	1156	BEDDING	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
100	70	0047	BEEF	PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
100	70	0372	BEEF	DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GRO
200	69	0178	BEEF	STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
200	69	0184	BEEF	TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	69	0676	BEEF	CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS KEYWORDS RUNOFF GR
200	69	0706	BEEF	HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	71	0705	BEEF	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
300	69	0300	BEEF	WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
600	70	0098	BEEF	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
600	70	0254	BEEF	AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB
600	70	0258	BEEF	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
600	70	0258	BEEF	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
100	69	0035	BEEF-CATTLE	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
300	71	1245	BEEF-CATTLE	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	71	1047	BEEF-CATTLE-WASTES	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	70	0083	BEEF-FEEDLOT	BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BE
600	72	1262	BEEF-HOUSING-SYSTE	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
300	71	1257	BEEF-WASTE	EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
300	71	1257	BEEF-WASTE-MANAGEM	EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
100	66	0063	BEHAVIOR	SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
200	66	0125	BEHAVIOR	SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
200	71	0276	BENEFICIAL-USE	THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOG
200	71	0280	BENEFICIAL-USE	PESTICIDES KEYWORDS DDT HAZARDS BENEFICIAL-USE HEALTH PESTICIDES
300	68	0256	BENEFICIAL-USE	USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENE

100	67	1218	BENEFITS	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
200	71	0282	BENEFITS	SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHED
200	71	0283	BENEFITS	ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS B
300	70	1192	BENEFITS	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
500	70	0409	BENEFITS	ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
100	72	1199	BIOACCUMULATION	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1199	BIOASSAY	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1215	BIOASSAY	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
500	71	1254	BIOASSAY	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	65	0263	BIOCHEMICAL	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	66	0437	BIOCHEMICAL	PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	68	1229	BIOCHEMICAL-OXYGEN	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	70	1040	BIOCHEMICAL-OXYGEN	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	70	1051	BIOCHEMICAL-OXYGEN	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	71	0688	BIOCHEMICAL-OXYGEN	CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100	71	1047	BIOCHEMICAL-OXYGEN	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	71	1214	BIOCHEMICAL-OXYGEN	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	72	0746	BIOCHEMICAL-OXYGEN	RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
100	72	1193	BIOCHEMICAL-OXYGEN	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100	72	1235	BIOCHEMICAL-OXYGEN	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
100	73	1184	BIOCHEMICAL-OXYGEN	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	64	0750	BIOCHEMICAL-OXYGEN	LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	64	0759	BIOCHEMICAL-OXYGEN	STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	69	0696	BIOCHEMICAL-OXYGEN	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	70	0687	BIOCHEMICAL-OXYGEN	OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
200	70	0728	BIOCHEMICAL-OXYGEN	ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	70	0755	BIOCHEMICAL-OXYGEN	FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	70	1113	BIOCHEMICAL-OXYGEN	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1114	BIOCHEMICAL-OXYGEN	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	71	0821	BIOCHEMICAL-OXYGEN	AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE
200	71	0843	BIOCHEMICAL-OXYGEN	ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS KEYWORD ACTIVATED-SLUDGE AN
200	71	1099	BIOCHEMICAL-OXYGEN	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1054	BIOCHEMICAL-OXYGEN	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
300	69	0735	BIOCHEMICAL-OXYGEN	SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-
300	69	1125	BIOCHEMICAL-OXYGEN	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	69	1180	BIOCHEMICAL-OXYGEN	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	70	0384	BIOCHEMICAL-OXYGEN	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	71	0677	BIOCHEMICAL-OXYGEN	THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	1055	BIOCHEMICAL-OXYGEN	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	73	1009	BIOCHEMICAL-OXYGEN	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
500	68	1259	BIOCHEMICAL-OXYGEN	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
600	69	1160	BIOCHEMICAL-OXYGEN	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
600	72	1001	BIOCHEMICAL-OXYGEN	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
700	70	1046	BIOCHEMICAL-OXYGEN	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
700	70	1066	BIOCHEMICAL-OXYGEN	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1109	BIOCHEMICAL-OXYGEN	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
700	71	1120	BIOCHEMICAL-OXYGEN	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SUME CENTRAL NEW JERSEY STR
100	72	1224	BIOCHEMICAL-TESTS	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	64	1240	BIOCHEMISTRY	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	69	0373	BIOCONTROL	ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CAL
200	71	0276	BIOCONTROL	THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOG
300	71	1106	BIOCONTROL	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
100	66	0437	BIODEGRADATION	PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	69	0030	BIODEGRADATION	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	70	0028	BIODEGRADATION	HOUSEFLY LARVAE BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS KEYWORDS
100	71	0273	BIODEGRADATION	ROLE OF EXCRETED CHLORTETRACYCLINE IN MODIFYING THE DECOMPOSITION PROCESS IN FEEDLOT WA
200	66	0132	BIODEGRADATION	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
200	69	0056	BIODEGRADATION	PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200	69	0195	BIODEGRADATION	ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE KEYW
200	70	0716	BIODEGRADATION	BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	70	1115	BIODEGRADATION	CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0824	BIODEGRADATION	AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71	0837	BIODEGRADATION	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
200	71	1099	BIODEGRADATION	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
700	70	1066	BIODEGRADATION	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
600	72	1153	BIOENERGETICS	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
100	70	1217	BIOINDICATORS	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
200	71	0832	BIOINDICATORS	GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SA
300	70	1104	BIOINDICATORS	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTRDS-BIOLOGY
100	65	0334	BIOLOGICAL	CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
100	66	0063	BIOLOGICAL	SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100	69	0040	BIOLOGICAL	PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
100	71	0348	BIOLOGICAL	BIOLOGICAL FLY CONTROL IN DEEP PITS KEYWORDS POULTRY BIOLOGICAL FLY PITS
200	71	0278	BIOLOGICAL-CONCENT	THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOG
400	73	1191	BIOLOGICAL-FLY-CON	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
100	71	1232	BIOLOGICAL-OXYGEN-	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	70	0747	BIOLOGICAL-PROPERT	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	72	1016	BIOLOGICAL-PROPERT	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
100	71	1221	BIOLOGICAL-SAMPLES	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	72	1199	BIOLOGICAL-SAMPLES	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1215	BIOLOGICAL-SAMPLES	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	72	1222	BIOLOGICAL-SAMPLES	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
300	71	1100	BIOLOGICAL-SAMPLES	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
500	71	1254	BIOLOGICAL-SAMPLES	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
200	70	0325	BIOLOGICAL-SYSTEMS	RECYCLING AND UTILIZATION OF BIODEGRADABLE-WASTES IN THE SOIL KEYWORDS BIOLOGICAL-SYST
100	66	0347	BIOLOGICAL-TREATME	AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDAT
100	70	1040	BIOLOGICAL-TREATME	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	70	1227	BIOLOGICAL-TREATME	AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	70	1230	BIOLOGICAL-TREATME	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
200	69	0162	BIOLOGICAL-TREATME	THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	69	0525	BIOLOGICAL-TREATME	ENGINEERING-RESEARCH ON FARM-ANIMAL-MANURE KEYWORDS ODORS BIOLOGICAL-TREATMENT WASTE-
200	69	1102	BIOLOGICAL-TREATME	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY D
200	70	0219	BIOLOGICAL-TREATME	THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
200	70	0234	BIOLOGICAL-TREATME	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0755	BIOLOGICAL-TREATME	FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	72	1054	BIOLOGICAL-TREATME	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
300	68	1123	BIOLOGICAL-TREATME	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	71	1119	BIOLOGICAL-TREATME	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
300	71	1238	BIOLOGICAL-TREATME	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
600	70	0254	BIOLOGICAL-TREATME	AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB

KEYWORD INDEX

200	69	0056	BIOMASS
100	65	1219	BIOSPHERE
100	71	1092	BIOTROL-BTB-183
300	72	1085	BIO-CHEMICAL-OXYGE
200	64	1240	BIRDS
300	71	1100	BIRDS
600	72	1163	BIURET-REACTION
400	65	0485	BLOAT
100	66	0479	BLOOD
100	71	1221	BLOOD
100	71	1223	BLOOD
100	72	1215	BLOOD
100	73	1086	BLOOD
100	73	1086	BLOOD-XANTHOPHYLL-
300	70	1101	BLUE-GREEN-ALGAE
300	69	1210	BOATING
100	62	0292	BOD
100	62	0480	BOD
100	63	0338	BOD
100	64	0474	BOD
100	65	0075	BOD
100	65	0334	BOD
100	65	0346	BOD
100	65	0378	BOD
100	66	0347	BOD
100	66	0473	BOD
100	66	0506	BOD
100	68	0087	BOD
100	68	0106	BOD
100	68	0337	BOD
100	68	0381	BOD
100	69	0030	BOD
100	69	0035	BOD
100	69	0037	BOD
100	69	0071	BOD
100	69	0259	BOD
100	69	0353	BOD
100	69	0355	BOD
100	69	0360	BOD
100	70	0051	BOD
100	70	0089	BOD
100	70	0369	BOD
100	70	0458	BOD
100	70	0585	BOD
100	71	0273	BOD
100	71	0318	BOD
100	71	0574	BOD
100	71	0682	BOD
200	66	0115	BOD
200	66	0116	BOD
200	66	0117	BOD
200	66	0133	BOD
200	66	0134	BOD
200	66	0135	BOD
200	66	0138	BOD
200	66	0139	BOD
200	66	0144	BOD
200	66	0152	BOD
200	66	0156	BOD
200	69	0055	BOD
200	69	0074	BOD
200	69	0157	BOD
200	69	0160	BOD
200	69	0162	BOD
200	69	0163	BOD
200	69	0164	BOD
200	69	0168	BOD
200	69	0176	BOD
200	69	0177	BOD
200	69	0178	BOD
200	69	0180	BOD
200	69	0182	BOD
200	69	0183	BOD
200	69	0184	BOD
200	69	0187	BOD
200	69	0193	BOD
200	69	0194	BOD
200	69	0199	BOD
200	69	0423	BOD
200	69	0424	BOD
200	69	0425	BOD
200	69	0428	BOD
200	69	0430	BOD
200	69	0548	BOD
200	69	0708	BOD
200	70	0214	BOD
200	70	0218	BOD
200	70	0219	BOD
200	70	0234	BOD
200	70	0240	BOD
200	70	0241	BOD
200	70	0242	BOD
200	70	0243	BOD
200	70	0251	BOD
200	70	0252	BOD
200	70	0253	BOD
200	70	0717	BOD
200	70	0718	BOD
200	71	0669	BOD
200	71	0770	BOD

PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-
THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS KEYWORDS POULTRY BLOOD DURSBAN CHOLIN
AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAIN
CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTIO
AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDAT
BOD OF CAPTIVE WILD ANIMAL WASTES KEYWORDS ZOO TOTAL-SOLID BOD WASTES
CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE
AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUD
USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
BOD POSES PROBLEMS FOR POULTRY GROWERS AND PROCESSORS KEYWORDS BOD PROBLEMS POULTRY GR
ROLE OF EXCRETED CHLORTETRACYCLINE IN MODIFYING THE DECOMPOSITION PROCESS IN FEEDLOT WA
RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS
AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KE
MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
TYPICAL VARIATIONS ENCOUNTERED IN THE MEASUREMENT OF OXYGEN DEMAND OF ANIMAL WASTES KE
RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
ANIMAL WASTE RUNOFF-A MAJOR WATER QUALITY CHALLENGE KEYWORDS RUNOFF BOD POLLUTANT-IDE
ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-R
CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DIT
THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT KEYWORDS BOD SEW
WATER UTILIZATION IN PROCESSING PLANTS KEYWORDS BOD POULTRY BACTERIA INDUSTRIAL-WASTE
ANIMAL AND HUMAN METABOLIC WASTES KEYWORDS BOD PE METABOLIC-WASTES
LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER

200	71	0773	BOD	MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
200	71	0774	BOD	MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200	71	0776	BOD	CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDL
200	71	0781	BOD	ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
200	71	0782	BOD	MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
200	71	0785	BOD	A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200	71	0786	BOD	THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200	71	0787	BOD	IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOI
200	71	0801	BOD	PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
200	71	0802	BOD	AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
200	71	0807	BOD	QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
200	71	0809	BOD	ENZYME FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOTMANURE KEYWORDS BOD AMINO
200	71	0810	BOD	WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD
200	71	0811	BOD	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
200	71	0822	BOD	DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
200	71	0823	BOD	BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW KEYWORDS AERATION CATTLE BOD W
200	71	0829	BOD	WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
300	62	0754	BOD	NOTES ON WATER POLLUTION WASTE WATERS FROM FARMS KEYWORDS FARM-WASTES IRRIGATION BOD
300	65	0757	BOD	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	67	0701	BOD	WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300	67	0710	BOD	FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
300	69	0005	BOD	SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	69	0006	BOD	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	69	0062	BOD	MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	69	0093	BOD	HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
300	70	0008	BOD	AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION
300	70	0009	BOD	LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION
300	71	0486	BOD	FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
400	64	0358	BOD	TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400	70	0092	BOD	SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
400	71	0295	BOD	OXIDATION DITCH IN CAGE LAYER HOUSE KEYWORDS POULTRY BOD N-IRELAND ODOR OXIDATION-DI
500	70	0399	BOD	LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
500	70	0407	BOD	EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
600	70	0098	BOD	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
600	70	0258	BOD	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
600	71	0493	BOD	NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
600	72	1156	BOD	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
700	69	0712	BOD	CATTLE FEEDLOT WASTE CHARACTERISTICS KEYWORDS FEEDLOTS BOD HYDROGEN-ION-CONCENTRATION
700	70	0231	BOD	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
300	71	1107	BODIES-OF-WATER	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	70	0211	BODY-WEIGHT	THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE ON PRODUCTION, FEED-EFFICIENCY, BODY-WEI
100	69	0095	BOD-REDUCTION	BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
100	72	1215	BONE	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
300	71	0515	BORON	FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
300	71	1126	BORON	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	64	1200	BOSMINIDAE	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
200	70	0727	BOTTOM-SEDIMENTS	EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
300	71	1055	BOTTOM-SEDIMENTS	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	64	0345	BOVINE	BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
100	71	0441	BOVINE	METHODS OF SAMPLE PREPARATION FOR CHEMICAL DETERMINATION OF CHROMIC OXIDE IN BOVINE FEC
100	72	1215	BRAIN	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	71	0472	BRITAIN	A YEAR IN THE LIFE OF A SLURRY COMPOUND KEYWORDS STORAGE BRITAIN
100	71	1197	BRITAIN	NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	68	0036	BROILER	OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
100	71	0461	BROILER	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	68	0043	BROILER	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS FUMIGATION BROILER LITTER
200	71	0853	BROILER	RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
100	68	0502	BROILERS	MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
100	71	0460	BROILERS	EFFECT OF TYPE OF HOUSING AND LITTER ON PRODUCTION OF BROILERS KEYWORDS EFFECT LITTER
100	69	0081	BROILER-CHICKENS	DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWO
300	69	1125	BROILER-FARMS	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
200	71	0847	BROILER-LITTER	STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINA
400	71	1134	BRUSH-CONTROL	FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
200	71	0767	BUDGETING	PUTTING IT ALL TOGETHER KEYWORDS FEDERAL-GOVERNMENTS STATE-GOVERNMENTS BUDGETING DESI
200	72	1022	BUFFER-STRIPS	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
100	69	0353	BUILDINGS	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
200	70	0234	BUILDINGS	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0246	BUILDINGS	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
400	70	0046	BUILDING-CODES	FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BU
300	70	1000	BUILDING-DESIGN	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
400	72	1171	BUILDING-MATERIALS	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
100	68	0306	BUILD-UP	ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
400	68	0101	BULK	MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
100	64	0371	BULK-DENSITY	THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
300	70	1104	BULLHEADS	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTRUS-BIOLOGY
100	63	1064	BUTONATE	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
200	69	0564	BYPRODUCTS	RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL KEYWORDS BYPRODUCTS POLLUTION-ABATEMENT
200	71	0281	BYPRODUCTS	LIVESTOCK-WASTE KEYWORDS COPROLOGY BYPRODUCTS PRODUCTION
100	69	0376	BY-PRODUCTS	EVALUATION OF SEVERAL METHODS OF ISOLATING SALMONELLA FROM POULTRY-LITTER AND ANIMAL-F
100	70	0110	BY-PRODUCTS	ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
200	70	0747	BY-PRODUCTS	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	71	0817	BY-PRODUCTS	MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALU
200	73	1082	BY-PRODUCTS	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	BY-PRODUCTS	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	71	0744	BY-PRODUCTS	ANIMAL SLAUGHTERING AND PROCESSING KEYWORDS REGULATIONS BY-PRODUCTS SOLID-WASTES INDU
300	71	0745	BY-PRODUCTS	ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING
400	71	0568	BY-PRODUCTS	DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DIS
200	71	0603	BIO-FILTER	EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
100	64	0333	C	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
600	70	0254	C	AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB
600	70	0258	C	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
100	69	0310	CADMIUM-HYDROXIDE-	IMPROVEMENT IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION KEYW
100	62	0480	CAGE	CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
300	71	0675	CAGE	UNDER CAGE DRYING OF POULTRY MANURE KEYWORDS ODOR AIR-DRYING-MANURE CAGE
100	69	0058	CAGED-LAYER-HOUSES	REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES KEYWORDS RECIRCULATED-WATER STORA
100	68	0044	CAGES	THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AERUBIC-CONDITIONS
100	73	1162	CALCAREOUS-SOILS	PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
100	68	0502	CALCIUM	MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
100	68	1121	CALCIUM	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
200	70	0720	CALCIUM	PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-

200	73	1062	CALCIUM	CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
300	71	0269	CALCIUM	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
300	71	0630	CALCIUM	A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWO
400	71	0293	CALCIUM	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
100	73	1190	CALCUIM	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
100	71	1221	CALIBRATIONS	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	69	0373	CALIFORNIA	ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CAL
100	70	0340	CALIFORNIA	FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE KEYWORDS POULTRY CROP-RESPONSE
100	70	1041	CALIFORNIA	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	70	1237	CALIFORNIA	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	73	1062	CALIFORNIA	CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
300	70	0487	CALIFORNIA	NITRATE-REMOVAL FROM AGRICULTURAL WASTEWATER KEYWORDS ALGAE CALIFORNIA DENITRIFICATION
400	71	0294	CALIFORNIA	MANURE MITES IN INTEGRATED FLY CONTROL KEYWORDS POULTRY CALIFORNIA FLY-CONTROL
400	71	0330	CALIFORNIA	SCHEDULE MANURE REMOVAL TO AVOID FLY BREEDING KEYWORDS CALIFORNIA POULTRY ODORS FLY
400	72	1138	CALIFORNIA	HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
400	73	1145	CALIFORNIA	FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
400	73	1168	CALIFORNIA	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
600	69	1239	CALIFORNIA	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
600	72	1074	CALIFORNIA	SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
100	70	0017	CALORIMETRY	AN IMPROVED METHOD FOR PREPARATION OF FECES FOR BOMB CALORIMETRY KEYWORDS LYOPHILIZE
100	71	1212	CAMPING	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	70	0094	CANADA	THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
300	72	1157	CANADA	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1157	CANADIAN-LEGISLATI	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
200	70	0727	CANALS	EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
400	69	1045	CANAL-LAKE-ONTARIO	AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
300	70	0490	CANAL-SEEPAGE	SALINITY-CONTROL IN RETURN-FLOW FROM IRRIGATED AREAS A DEMONSTRATION-PROJECT KEYWORDS
300	70	1247	CANNERIES	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
600	69	1006	CANNULAE	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
200	66	0123	CAPACITY	PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELEC
400	71	0267	CAPITAL	WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
200	70	0241	CAPITAL-COST	SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
200	70	0219	CAPITAL-COSTS	THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
200	64	1240	CARBOHYDRATES	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69	0196	CARBOHYDRATES	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
100	63	0338	CARBON	DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
200	69	0162	CARBON	THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	71	0805	CARBON	HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
200	71	0810	CARBON	WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD
300	69	0635	CARBON	GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHA
100	69	0096	CARBONYLS	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	72	1188	CARBONYLS	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	69	0057	CARBON-DIOXIDE	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
200	64	1240	CARBON-DIOXIDE	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	70	0223	CARBON-DIOXIDE	NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
300	69	0007	CARBON-DIOXIDE	SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	69	0634	CARBON-DIOXIDE	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
300	69	0638	CARBON-DIOXIDE	ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
300	71	0672	CARBON-DIOXIDE	MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METH
400	73	1063	CARBON-DIOXIDE	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
300	70	1084	CARBON-MONOXIDE	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71	1081	CARBON-MONOXIDE	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	69	0170	CARCASS-CHARACTERI	THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
200	66	0146	CARCAS-DATA	UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
200	71	0601	CAROLINA	PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULA
400	66	0354	CARRIERS	SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS
200	64	1241	CASEIN	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
300	71	1081	CATALYSTS	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	66	0147	CATFISHES	COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	66	0141	CATHODES	REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
200	71	0805	CATION-EXCHANGE	HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
200	72	1023	CATONIC-NUTRIENTS	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
100	63	0338	CATTLE	DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100	65	0334	CATTLE	CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
100	67	0713	CATTLE	SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	68	0077	CATTLE	FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
100	68	0730	CATTLE	AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
100	69	0707	CATTLE	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	69	0714	CATTLE	EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
100	70	0014	CATTLE	INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GA
100	70	0570	CATTLE	MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
100	70	1090	CATTLE	COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	70	1211	CATTLE	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
100	70	1227	CATTLE	AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	70	1251	CATTLE	AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0257	CATTLE	DRINKING OF SULFATE-WATER BY CATTLE KEYWORDS GROWTH-RATES SODIUM-CHLORIDE TOXICITY CA
100	71	0573	CATTLE	METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS
100	71	0574	CATTLE	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS
100	71	0751	CATTLE	ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	71	1047	CATTLE	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	71	1092	CATTLE	EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	72	1097	CATTLE	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
100	72	1129	CATTLE	BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
100	72	1188	CATTLE	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	72	1193	CATTLE	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100	72	1235	CATTLE	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
100	73	1086	CATTLE	THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
100	73	1087	CATTLE	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	73	1263	CATTLE	CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
200	64	0759	CATTLE	STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	64	1240	CATTLE	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	64	1241	CATTLE	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	66	0115	CATTLE	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0120	CATTLE	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0121	CATTLE	PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200	66	0126	CATTLE	MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING KEYWORDS CATTLE CONFINEME
200	66	0127	CATTLE	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
200	66	0139	CATTLE	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0145	CATTLE	VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	66	0146	CATTLE	UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN

200	66	0147	CATTLE	COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	66	0148	CATTLE	ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
200	66	0150	CATTLE	PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	66	0155	CATTLE	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
200	66	1112	CATTLE	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	67	0734	CATTLE	CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	67	1243	CATTLE	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200	68	0726	CATTLE	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES
200	68	1186	CATTLE	TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	68	1187	CATTLE	THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	69	0157	CATTLE	ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0165	CATTLE	AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200	69	0169	CATTLE	INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
200	69	0171	CATTLE	CATTLE MANURE- REUSE THROUGH WASTELAGE FEEDING KEYWORDS FEEDS PERFORMANCES WASTELAGE
200	69	0193	CATTLE	CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
200	69	0195	CATTLE	ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE KEYW
200	69	0199	CATTLE	RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200	69	0427	CATTLE	MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NU
200	69	0516	CATTLE	PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200	69	0522	CATTLE	FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE
200	69	0539	CATTLE	PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE KEYWORDS CATTLE WATER-POLLUTION FEEDL
200	69	0540	CATTLE	INDUSTRY AND THE ENVIRONMENT-FEEDLOT WASTE MANAGEMENT KEYWORDS REGULATION CATTLE ECOS
200	69	0541	CATTLE	FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0543	CATTLE	INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
200	69	0544	CATTLE	HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200	69	0545	CATTLE	HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200	69	0546	CATTLE	THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0547	CATTLE	CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	69	0549	CATTLE	THE UNIVERSITIES ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS RUNOFF CATTLE RESEARCH-A
200	69	0550	CATTLE	HOW TO GAIN PUBLIC SUPPORT KEYWORDS RUNOFF POLLUTION-ABATEMENT CATTLE
200	69	0552	CATTLE	STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	69	0554	CATTLE	MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRA
200	69	0555	CATTLE	STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS
200	69	0556	CATTLE	STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF A
200	69	0557	CATTLE	STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0558	CATTLE	COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOTS POLLUTION C
200	69	0559	CATTLE	FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
200	69	0561	CATTLE	INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUN
200	69	0562	CATTLE	ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
200	69	0563	CATTLE	A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION KEYWORDS CATTLE RUN
200	69	0564	CATTLE	RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL KEYWORDS BYPRODUCTS POLLUTION-ABATEMENT
200	69	0565	CATTLE	RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT KEYWORDS WASTE-TREATMENT CAT
200	69	1116	CATTLE	MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	70	0054	CATTLE	POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
200	70	0219	CATTLE	THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
200	70	0245	CATTLE	MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
200	70	0670	CATTLE	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0719	CATTLE	FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE P
200	70	1175	CATTLE	ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200	71	0593	CATTLE	ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL-
200	71	0605	CATTLE	CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
200	71	0664	CATTLE	ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
200	71	0665	CATTLE	WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
200	71	0705	CATTLE	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
200	71	0709	CATTLE	BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
200	71	0762	CATTLE	LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0771	CATTLE	TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA KEYWORDS
200	71	0772	CATTLE	A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD
200	71	0773	CATTLE	MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
200	71	0776	CATTLE	CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDL
200	71	0779	CATTLE	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200	71	0782	CATTLE	MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
200	71	0784	CATTLE	A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINE
200	71	0786	CATTLE	THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200	71	0788	CATTLE	LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200	71	0789	CATTLE	ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
200	71	0795	CATTLE	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
200	71	0796	CATTLE	DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0797	CATTLE	GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
200	71	0801	CATTLE	PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
200	71	0806	CATTLE	COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
200	71	0814	CATTLE	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
200	71	0819	CATTLE	ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
200	71	0820	CATTLE	COSTS OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FE
200	71	0823	CATTLE	BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW KEYWORDS AERATION CATTLE BOD W
200	71	0826	CATTLE	CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	71	0829	CATTLE	WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
200	71	0830	CATTLE	FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
200	71	0833	CATTLE	EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
200	71	0834	CATTLE	SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
200	71	0836	CATTLE	SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
200	71	0840	CATTLE	LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FA
200	71	0846	CATTLE	NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0847	CATTLE	STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINA
200	71	0851	CATTLE	NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	72	1015	CATTLE	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
200	72	1018	CATTLE	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1019	CATTLE	PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1021	CATTLE	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1022	CATTLE	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200	72	1023	CATTLE	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	72	1024	CATTLE	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1025	CATTLE	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1030	CATTLE	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
200	72	1054	CATTLE	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
200	72	1152	CATTLE	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CRUMBING AND THERMAL ENVIROMENT DURING A FAL
200	73	1062	CATTLE	CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
200	73	1082	CATTLE	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	CATTLE	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
200	73	1189	CATTLE	A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F

300	1077	CATTLE	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	1105	CATTLE	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300 30	1205	CATTLE	SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300 64	1110	CATTLE	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300 67	0701	CATTLE	WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300 67	0711	CATTLE	THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
300 67	1249	CATTLE	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300 68	1202	CATTLE	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300 68	1209	CATTLE	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300 69	0062	CATTLE	MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300 69	1060	CATTLE	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300 69	1061	CATTLE	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300 69	1180	CATTLE	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300 69	1180	CATTLE	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300 69	1203	CATTLE	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300 70	0208	CATTLE	DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
300 70	0384	CATTLE	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300 70	0414	CATTLE	THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
300 70	0743	CATTLE	GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
300 70	1192	CATTLE	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300 70	1247	CATTLE	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300 70	1248	CATTLE	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300 71	0466	CATTLE	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
300 71	0515	CATTLE	FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
300 71	0584	CATTLE	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
300 71	0624	CATTLE	FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITR
300 71	0627	CATTLE	DRIED POULTRY WASTE AS A PROTEIN SOURCE FOR FEEDLOT CATTLE KEYWORDS FEED-EFFECIENCY R
300 71	0692	CATTLE	EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
300 71	0700	CATTLE	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
300 71	1008	CATTLE	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300 71	1100	CATTLE	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300 71	1246	CATTLE	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300 71	1261	CATTLE	INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
300 72	1085	CATTLE	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
300 73	1009	CATTLE	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400 66	0354	CATTLE	SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS
400 68	0015	CATTLE	CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION KEYWORDS LAGOON POND FUR
400 68	0101	CATTLE	MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
400 70	0092	CATTLE	SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
400 71	0264	CATTLE	HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE-DISPOSAL WASTE-DUMPS FAR
400 71	0686	CATTLE	NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF KEYWORDS CATTLE WASTE-TREATMENT SUSPEN
400 71	0753	CATTLE	MANURE CAN BE PROCESSED AND SOLD AT A PROFIT KEYWORD FEEDLOT CATTLE MARKET-VALUE WAST
400 71	1131	CATTLE	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
400 71	1172	CATTLE	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400 71	1174	CATTLE	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400 71	1196	CATTLE	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400 72	1032	CATTLE	NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
400 72	1138	CATTLE	HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
400 72	1166	CATTLE	HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400 72	1173	CATTLE	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
400 72	1179	CATTLE	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
400 73	1007	CATTLE	FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
400 73	1068	CATTLE	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400 73	1158	CATTLE	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
400 73	1183	CATTLE	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
400 73	1191	CATTLE	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
500 71	1255	CATTLE	DISEASES OF FEEDLOT CATTLE KEYWORDS ANIMAL-DISEASES CATTLE FEED-LOTS FARM-WASTES WATER-
600 69	1006	CATTLE	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
600 69	1160	CATTLE	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
600 72	1004	CATTLE	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600 72	1074	CATTLE	SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
600 72	1148	CATTLE	DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
600 72	1149	CATTLE	MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
600 72	1153	CATTLE	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
600 72	1154	CATTLE	WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
600 72	1156	CATTLE	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600 72	1169	CATTLE	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600 72	1177	CATTLE	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
600 72	1262	CATTLE	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
600 73	1065	CATTLE	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
600 73	1075	CATTLE	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
600 73	1147	CATTLE	SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
300 71	0538	CATTLE-CONFINEMENT	CHARACTERISTICS OF WASTES FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORD RUNOFF QUALITY-CO
100 71	0307	CATTLE-EGRET	ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS-ARMIGERA AND ITS PERISTENCE IN AVIAN FECES
400 65	0485	CATTLE-FEED	POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-
400 70	0029	CATTLE-FEED	DRIED POULTRY MANURE AS CATTLE FEED KEYWORDS DRYING NUTRITIONAL-VALUE
100 72	1235	CATTLE-FEEDLOT-RUN	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
300 71	0466	CATTLE-LOAD	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
100 69	0416	CATTLE-SLURRY	A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
100 68	0087	CATTLE-WASTE	AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
400 71	0262	CATTLE-WASTE	WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE-DISPOSAL CATTLE-WASTE STORAGE-WAS
100 67	0230	CATTLE-WASTES	CATTLE-WASTES - POLLUTION AND POTENTIAL TREATMENT KEYWORDS ANAEROBIC-DIGESTION ANAEROB
100 68	0036	CAUSATIVE	OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
500 71	1254	CELLULOLYTIC-BACTE	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
200 66	0136	CELLULOSE	ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
200 71	0851	CELLULOSE	NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
400 71	1134	CELLULOSE	FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
300 70	1084	CELLULOSIC-WASTES	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300 71	1119	CELL-GROWTH	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
100 70	0342	CELL-WALL	IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION CO
100 72	1222	CENTRIFUGATION	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200 71	0860	CENTRIFUGATION	DEWATERING POULTRY MANURE BY CENTRIFUGATION KEYWORD CENTRIFUGATION DEWATERING POULTRY
200 71	0861	CENTRIFUGATION	CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
200 72	1021	CENTRIFUGATION	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200 72	1030	CENTRIFUGATION	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
100 72	1199	CENTYRIFUGATION	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
300 67	1250	CEREAL-CROPS	DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
100 64	1200	CERIODAPHNIA	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100 69	1198	CETRITUS	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100 71	0454	CHANGE	SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION

200	66	0139	CHARACTERISTIC	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
100	62	0480	CHARACTERISTICS	CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
100	71	0758	CHARACTERISTICS	HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
200	66	0134	CHARACTERISTICS	OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
200	69	0193	CHARACTERISTICS	CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
200	69	0517	CHARACTERISTICS	QUANTITIES AND CHARACTERISTICS OF FARM ANIMAL-WASTES KEYWORDS WATER-POLLUTION POPULAT
200	71	0776	CHARACTERISTICS	CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDL
200	71	0801	CHARACTERISTICS	PUMPING CHARACTERISTICS, BICLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
200	73	1082	CHARACTERISTICS	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300	70	0010	CHARACTERISTICS	THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WAST
300	71	0538	CHARACTERISTICS	CHARACTERISTICS OF WASTES FRCM SCUTHWESTERN CATTLE FEEDLCTS KEYWORD RUNOFF QUALITY-CO
400	71	0463	CHARACTERISTICS	CHEMICAL COMPOSITION OF POULTRY MANURE KEYWORDS CHEMICAL POULTRY CHARACTERISTICS
700	69	0712	CHARACTERISTICS	CATTLE FEEDLOT WASTE CHARACTERISTICS KEYWORDS FEEDLOTS BOD HYDROGEN-ION-CONCENTRATION
200	69	0164	CHARACTERIZATION	SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
100	69	1198	CHARCOAL	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
200	73	1083	CHAR-PRODUCT	CONTINUOUS SOLID WASTE RETCRT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	53	1206	CHEMCONTROL	POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
100	65	0334	CHEMICAL	CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
100	71	0303	CHEMICAL	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
100	71	0304	CHEMICAL	STATE OF THE ART REVIEW TREATMENT AND DISPOSAL OF SWINE WASTES KEYWORDS CHEMICAL OXY
100	71	0681	CHEMICAL	EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
200	70	0243	CHEMICAL	MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	71	0661	CHEMICAL	ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71	0791	CHEMICAL	METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS C
200	71	0861	CHEMICAL	CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
400	71	0463	CHEMICAL	CHEMICAL COMPOSITION OF POULTRY MANURE KEYWORDS CHEMICAL POULTRY CHARACTERISTICS
100	69	0508	CHEMICALS	AIR POLLUTION FROM ANIMAL WASTES,DETERMINATION OF MALODORS BY GAS CHRCMATOGRAPHIC AND O
100	70	0019	CHEMICALS	CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS D
100	70	0051	CHEMICALS	IMPACT OF AGRICULTURAL PCLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	70	1237	CHEMICALS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	69	0432	CHEMICALS	AGRICULTURE AS A SOURCE CF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
200	69	1167	CHEMICALS	AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
300	70	1036	CHEMICALS	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
100	70	1111	CHEMICAL-ANALYSIS	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100	71	1212	CHEMICAL-ANALYSIS	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1216	CHEMICAL-ANALYSIS	IDENTIFICATION OF METABOLITES OF N- 1,1-DIMETHYIPROPYNL -3,5-DICHIOROBENZAMINE IN RAT A
100	71	1221	CHEMICAL-ANALYSIS	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	72	1215	CHEMICAL-ANALYSIS	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	72	1222	CHEMICAL-ANALYSIS	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200	71	0774	CHEMICAL-ANALYSIS	MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200	71	0814	CHEMICAL-ANALYSIS	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
200	71	1252	CHEMICAL-ANALYSIS	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	70	0010	CHEMICAL-ANALYSIS	THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WAST
300	71	0466	CHEMICAL-ANALYSIS	INFILTRATION RATES AND GRCUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
300	71	1100	CHEMICAL-ANALYSIS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300	72	1182	CHEMICAL-ANALYSIS	BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
100	70	0034	CHEMICAL-ANAYSIS	A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND
100	73	1034	CHEMICAL-CHANGES	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
600	72	1076	CHEMICAL-CHANGES	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
200	71	0657	CHEMICAL-DEGRADATI	SOLIDS DESTRUCTION OR SEVERE TREATMENT KEYWORDS INCINERATION SOLID-WASTES CHEMICAL-DE
200	71	0667	CHEMICAL-DEGRADATI	FOOD PROCESSING WASTEWATER TREATMENT KEYWORDS ANAEROBIC-LAGOON ACTIVATED-SLUDGE IRRIG
200	71	0851	CHEMICAL-DEGRADATI	NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
300	69	0634	CHEMICAL-DETECTION	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
200	66	0132	CHEMICAL-ENVIRONME	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
100	70	1051	CHEMICAL-OXYGEN-DE	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	71	0688	CHEMICAL-OXYGEN-DE	CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100	71	1047	CHEMICAL-OXYGEN-DE	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	72	0746	CHEMICAL-OXYGEN-DE	RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
100	72	1235	CHEMICAL-OXYGEN-DE	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
100	70	1237	CHEMICAL-OXYGEN-DE	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	64	0750	CHEMICAL-OXYGEN-DE	LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	64	0759	CHEMICAL-OXYGEN-DE	STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	69	0696	CHEMICAL-OXYGEN-DE	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	71	0841	CHEMICAL-OXYGEN-DE	SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRI
200	72	1054	CHEMICAL-OXYGEN-DE	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
300	71	0639	CHEMICAL-OXYGEN-DE	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	72	1085	CHEMICAL-OXYGEN	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
300	72	1170	CHEMICAL-OXYGEN-DE	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
500	73	1075	CHEMICAL-OXYGEN-DE	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
700	70	1109	CHEMICAL-OXYGEN-DE	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
700	72	1048	CHEMICAL-OXYGEN-DE	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
100	65	1079	CHEMICAL-PROPERTIE	UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	70	1111	CHEMICAL-PROPERTIE	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	66	1112	CHEMICAL-PROPERTIE	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	70	0747	CHEMICAL-PROPERTIE	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	72	1016	CHEMICAL-PROPERTIE	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1021	CHEMICAL-PROPERTIE	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1023	CHEMICAL-PROPERTIE	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	73	1093	CHEMICAL-PROPERTIE	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
300	70	0207	CHEMICAL-PROPERTIE	THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMIC
500	71	1072	CHEMICAL-PROPERTIE	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	72	1004	CHEMICAL-PROPERTIE	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600	72	1156	CHEMICAL-PROPERTIE	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	73	1075	CHEMICAL-PROPERTIE	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100	71	1221	CHEMICAL-REACTIONS	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	71	1221	CHEMICAL-RECOVERY	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	70	1111	CHEMICAL-STRUCTURE	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	71	0814	CHEMICAL-TREATMENT	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
700	71	1120	CHEMICAL-WASTE	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SUME CENTRAL NEW JERSEY STR
300	71	1107	CHEMICAL-WASTES	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
500	70	0393	CHEMISTRY	CHEMISTRY OF NITROGEN IN SCILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
500	70	0395	CHEMISTRY	CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
300	69	0632	CHICKEN	QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
300	69	0633	CHICKEN	THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
300	69	0635	CHICKEN	GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHA
300	70	0207	CHICKEN	THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMIC
100	64	0072	CHICKENS	A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
400	71	0568	CHICKENS	DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DIS
400	71	0293	CHICKEN-HOUSING	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
300	71	0622	CHICKEN-MANURE	EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYW

100	64	1200	CHIRONOMUS	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
200	71	1234	CHLORELLA	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
300	71	0269	CHLORIDE	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
100	71	1214	CHLORIDES	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	71	1236	CHLORIDES	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
200	71	0830	CHLORIDES	FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
300	72	1170	CHLORIDES	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
100	62	1220	CHLORINATED-HYDROC	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	63	1064	CHLORINATED-HYDROC	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	70	1111	CHLORINATED-HYDROC	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300	71	1055	CHLORINATED-HYDROC	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	63	0289	CHLORINATION	TREATMENT OF LONG-ISLAND DUCK FARM WASTES KEYWORDS CHLORINATION COLIFORMS TREATMENT DU
100	71	0451	CHLORINATION	REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
100	71	1232	CHLORINATION	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	70	0242	CHLORINATION	MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	70	1113	CHLORINATION	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	71	0656	CHLORINATION	CHLORINATION OF WASTEWATER EFFLUENTS KEYWORDS DISINFECTION WATER-TREATMENT PUBLIC-HEA
200	71	1033	CHLORINATION	NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
100	68	0442	CHLORINE	CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS
300	69	0638	CHLORINE	ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
200	69	0195	CHLORODETRACYCLINE	ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE KEYW
200	71	1234	CHLOROPHYLL	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
500	70	0407	CHLOROPHYLL	EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
700	70	0231	CHLOROTETRACYCLINE	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
100	55	0328	CHLORTETRACYCLINE	EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	72	1199	CHLORTETRACYLINE	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	70	0034	CHOLESTEROL	A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND
100	71	1223	CHOLIN-ESTERASE	EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS KEYWORDS POULTRY BLOOD DURSBAN CHOLIN
100	69	0096	CHROMATOGRAPHY	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0105	CHROMATOGRAPHY	AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMAT
100	69	0693	CHROMATOGRAPHY	IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
200	64	1241	CHROMATOGRAPHY	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	71	0792	CHROMATOGRAPHY	CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200	72	1013	CHROMATOGRAPHY	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
300	71	0672	CHROMATOGRAPHY	MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METH
400	70	0091	CHROMATOGRAPHY	MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
100	71	0441	CHROMIC-OXIDE	METHODS OF SAMPLE PREPARATION FOR CHEMICAL DETERMINATION OF CHROMIC OXIDE IN BOVINE FEC
100	73	1263	CHROMIC-OXIDE	CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
100	64	1200	CHYDORIDAE	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	72	1224	CIOCHEMICAL-OXYGEN	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
300	69	0636	CIRCULATION	PARTICULATE MATTER KEYWORDS CIRCULATION GAS-CHROMATOGRAPHYFILTER-PADS POULTRY-DUST OD
600	72	1031	CIRCULATION-FANS	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
200	71	0278	CITIES	POPULATION GROWTH-RATE SHOULDNT GET ALL THE BLAME KEYWORDS FERTILITY CITIES RESOURCES
200	71	0598	CIVIL-LAW	MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
100	64	1200	CLADOCERA	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	70	1194	CLADOPHORA	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	69	0199	CLARIFIER	RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
600	73	1065	CLARION-WEBSTER-SO	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
100	70	1233	CLAYS	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	66	0129	CLAYS	WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
500	70	0388	CLAYS	CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORG
700	72	1048	CLAYS	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
100	72	1224	CLAY-LOAM	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	71	0854	CLAY-LOAM	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
100	69	0058	CLEANING	REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES KEYWORDS RECIRCULATED-WATER STORA
200	70	0244	CLEANING	MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
600	72	1002	CLEAN-AIR-ACT	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
100	64	1200	CLIMATES	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
300	73	1009	CLIMATES	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
600	72	1154	CLIMATES	WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
600	72	1262	CLIMATES	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
200	66	0127	CLIMATIC-CONDITION	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
300	72	1070	CLIMATIC-ZONES	PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
400	66	0354	CLINICAL-SIGNS	SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS
200	69	0192	CLOGGING	POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200	71	0641	CLOSTRIDIUM	BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
300	70	1104	CLOSTRIDIUM	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
500	71	1254	CLOSTRIDIUM	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	60	0059	CN-RATIO	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
200	69	0193	COAGULATION	CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
200	70	0218	COAGULATION	REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DIT
300	68	1123	COAGULATION	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
200	70	1113	COALGULATION	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
100	63	0338	COD	DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100	65	0075	COD	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	65	0378	COD	TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTIO
100	66	0347	COD	AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDAT
100	66	0506	COD	CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE
100	67	0104	COD	MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
100	67	0713	COD	SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	68	0087	COD	AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
100	69	0030	COD	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	69	0035	COD	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100	69	0259	COD	ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
100	69	0353	COD	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	69	0355	COD	FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
100	70	0049	COD	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100	70	0051	COD	IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	70	0089	COD	TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	70	0458	COD	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	71	0318	COD	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
100	71	0574	COD	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS
100	71	0576	COD	CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS
200	66	0115	COD	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0116	COD	PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
200	66	0133	COD	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	66	0138	COD	DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	66	0139	COD	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0152	COD	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	69	0056	COD	PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS

200	69	0157	COD — ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0160	COD — EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
200	69	0164	COD — SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
200	69	0167	COD — AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
200	69	0176	COD — DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
200	69	0177	COD — FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0178	COD — STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
200	69	0180	COD — FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
200	69	0184	COD — TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	69	0199	COD — RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200	69	0425	COD — ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	69	0708	COD — TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
200	70	0214	COD — RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0234	COD — FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0242	COD — MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	70	0251	COD — AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	71	0773	COD — MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
200	71	0776	COD — CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDL
200	71	0778	COD — LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200	71	0785	COD — A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200	71	0787	COD — IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOI
200	71	0803	COD — MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
200	71	0807	COD — QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
200	71	0808	COD — WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
300	65	0757	COD — AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	67	0710	COD — FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
300	69	0005	COD — SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	69	0062	COD — MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	70	0009	COD — LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION
300	71	0486	COD — FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
500	70	0399	COD — LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
600	70	0098	COD — BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
600	70	0258	COD — GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
600	72	1156	COD — SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
700	70	0231	COD — THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
200	72	1017	COLD — WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
400	71	1131	COLD-BARN — FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
200	69	0178	COLD-CLIMATE — STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
200	71	0772	COLD-CLIMATE — A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD
300	46	1207	COLD-SPRINGS — FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
100	70	1230	COLIFORM — LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
200	66	1112	COLIFORM — CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	71	07[illegible]	COLIFORM — TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200	71	0796	COLIFORM — DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0807	COLIFORM — QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
300	67	0701	COLIFORM — WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
100	62	0382	COLIFORMS — TYPE DISTRIBUTION OF COLIFORM BACTERIA IN THE FECES OF WARM-BLOODED ANIMALS KEYWORDS
100	63	0289	COLIFORMS — TREATMENT OF LONG-ISLAND DUCK FARM WASTES KEYWORDS CHLORINATION COLIFORMS TREATMENT DU
100	68	1229	COLIFORMS — ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	69	0375	COLIFORMS — RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
100	70	1217	COLIFORMS — APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	1212	COLIFORMS — EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1232	COLIFORMS — WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	71	1236	COLIFORMS — MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
200	64	1240	COLIFORMS — THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	66	0117	COLIFORMS — DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
200	66	0120	COLIFORMS — STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0144	COLIFORMS — TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200	67	0734	COLIFORMS — CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	69	0518	COLIFORMS — HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEA
200	69	0696	COLIFORMS — QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	70	1053	COLIFORMS — BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
200	71	0641	COLIFORMS — BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
200	71	0846	COLIFORMS — NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0858	COLIFORMS — RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANU
200	72	1023	COLIFORMS — CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	72	1108	COLIFORMS — EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300	68	0702	COLIFORMS — BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
300	72	1085	COLIFORMS — CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
600	71	0493	COLIFORMS — NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
100	72	1222	COLLABORATIVE-STUD — PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
100	65	0344	COLLECTION — THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
100	69	0310	COLLECTION — IMPROVEMENT IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION KEYW
100	69	0690	COLLECTION — AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM T
100	71	0462	COLLECTION — NUTRIENT DIGESTIBILITY USING FECAL COLLECTION APPARATUS AND INDICATOR METHOD FOR STEERS
200	66	0133	COLLECTION — AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
400	71	0339	COLLECTION — FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
500	70	0403	COLLECTION — ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
100	70	0012	COLLECTION-PIT — CONTROL OF HOUSE FLIES IN SWINE FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL K
200	69	0193	COLLOIDAL-PROPERTI — CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
100	73	1034	COLONY-COUNTING — TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
300	64	1110	COLOR — LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
100	68	0730	COLORADO — AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
100	70	1251	COLORADO — AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	70	1237	COLORADO — POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	69	0545	COLORADO — HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200	69	0558	COLORADO — COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
300	67	1250	COLORADO — DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	67	1250	COLORADO — DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	68	0741	COLORADO — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	68	0741	COLORADO — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	71	0700	COLORADO — LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
100	70	0020	COLOR-AND-ODOR-OBS — EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
100	72	1215	COMBUSTION — AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
200	66	0143	COMBUSTION — DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUEL
300	68	0741	COMN — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
100	69	1231	COMMERCIAL-FISHING — POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
300	71	1100	COMMERCIAL-FISH — DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
200	70	0225	COMMON-LAW — LEGAL-RESTRAINTS ON AGRICULTURAL-POLLUTION KEYWORDS ODORS WATER-POLLUTION PESTICIDES
200	69	0203	COMMUNICATION — WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT

200	71	0618	COMMUNICATION	COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION KEYWORDS COMMUNICATION TECHNOLOGY POLIT
200	71	0615	COMMUNITY	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
100	71	0291	COMPARISON	COMPARISON OF MEDIA FOR ISOLATION OF SALMONELLAE AND SHIGELLAE FROM FECAL SPECIMENS KE
200	70	0249	COMPARISON	LAND DISPOSAL AND STORAGE OF FARM WASTES 1 PLANNING AND CHOICE OF SYSTEM KEYWORDS DF
300	71	1056	COMPETING-USES	AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
100	63	0436	COMPOSITION	POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	69	0108	COMPOSITION	EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
200	70	0237	COMPOSITION	THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
300	70	0400	COMPOSITION	MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTIL
100	71	0451	COMPOST	REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
100	63	0059	COMPOSTING	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
100	64	0333	COMPOSTING	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	67	0501	COMPOSTING	INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
100	70	0050	COMPOSTING	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0094	COMPOSTING	THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	71	0729	COMPOSTING	DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
100	73	1184	COMPOSTING	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	66	0115	COMPOSTING	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0128	COMPOSTING	MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPM
200	69	0055	COMPOSTING	MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	71	0659	COMPOSTING	COMPOSTING KEYWORDS ARTIFICIAL-USE HUMUS AEROBIC-CONDITIONS COMPOSTING
200	71	0805	COMPOSTING	HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
200	71	0806	COMPOSTING	COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
200	71	0817	COMPOSTING	MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALU
200	71	1096	COMPOSTING	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
300	68	0256	COMPOSTING	USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENE
300	71	0319	COMPOSTING	FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISP
300	72	1157	COMPOSTING	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	71	0349	COMPOSTING	MAXI-MIXING FOR MANURE DISPOSAL KEYWORDS POULTRY COMPOSTING MIXING DISPOSAL
600	70	0254	COMPOSTING	AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB
600	70	0258	COMPOSTING	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
200	69	0165	COMPOSTING-PROCESS	AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200	71	0646	COMPOUNDS	FARM LAND RUNOFF KEYWORDS NITROGEN-COMPOUNDS PHOSPHORUS- COMPOUNDS SOIL-EROSION ROUND
300	70	0206	COMPRESSED-AIR	POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
100	71	1213	COMPUTER-MODELS	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	71	0769	COMPUTER-MODELS	A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
100	71	1213	COMPUTER-PROGRAMS	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	71	0779	COMPUTER-PROGRAM	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
100	67	0104	CONCENTRATION	MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
100	70	0270	CONCENTRATION	RAPID CONCENTRATION OF STRONGYLE EGGS FROM EQUINE FECES FOR IN VITRO STUDIES KEYWORDS
100	71	0468	CONCENTRATION	EFFECT OF VENTILATION ON THE GAS CONCENTRATION IN A PART- SLATTED PIGGERY KEYWORDS EFF
100	70	0026	CONCENTRATIONS	A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
200	69	0175	CONCENTRATIONS	STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
500	70	0396	CONCENTRATIONS	THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATION
200	70	0728	CONCRETE-SLATS	ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
100	68	0036	CONDEMNATION	OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
200	66	0140	CONDITIONERS	DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
100	70	0260	CONDITIONS	GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS
100	70	1041	CONDUCTIVITY	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
200	71	1234	CONDUCTIVITY	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200	72	1016	CONDUCTIVITY	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1021	CONDUCTIVITY	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
600	69	1160	CONDUCTIVITY	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
200	70	1118	CONFERENCES	WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	71	1099	CONFERENCES	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
100	69	0706	CONFINED	HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
100	69	0096	CONFINEMENT	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	70	0050	CONFINEMENT	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0102	CONFINEMENT	POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
200	64	0750	CONFINEMENT	LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	66	0119	CONFINEMENT	BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES KEYWORDS FILTH-FLIES CONFINEMENT
200	66	0122	CONFINEMENT	METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	66	0125	CONFINEMENT	SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
200	66	0126	CONFINEMENT	MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING KEYWORDS CATTLE CONFINEME
200	66	0129	CONFINEMENT	WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
200	69	0078	CONFINEMENT	OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
200	69	0177	CONFINEMENT	FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0562	CONFINEMENT	ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
200	71	0816	CONFINEMENT	ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS
300	69	0003	CONFINEMENT	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	69	0004	CONFINEMENT	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
200	69	0175	CONFINEMENT-HOUSIN	STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
100	62	1220	CONFINEMENT-PENS	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	70	0014	CONFINEMENT-PENS	INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GA
100	71	0266	CONFINEMENT-PENS	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0574	CONFINEMENT-PENS	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS
100	71	0576	CONFINEMENT-PENS	CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS
100	71	0695	CONFINEMENT-PENS	CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS KEYWORD CONFI
100	71	0688	CONFINEMENT-PENS	CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100	71	1047	CONFINEMENT-PENS	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	71	1236	CONFINEMENT-PENS	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
200	68	0434	CONFINEMENT-PENS	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS CONFINEME
200	68	0694	CONFINEMENT-PENS	THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200	68	0724	CONFINEMENT-PENS	GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	68	0725	CONFINEMENT-PENS	POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAG
200	68	0760	CONFINEMENT-PENS	HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
200	69	0560	CONFINEMENT-PENS	ANIMAL WASTE MANAGEMENT-QUESTIONS AND ANSWERS KEYWORDS RUNOFF CONFINEMENT-PENS REGULAT
200	69	0561	CONFINEMENT-PENS	INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUN
200	69	1167	CONFINEMENT-PENS	AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
200	70	0244	CONFINEMENT-PENS	MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
200	70	0245	CONFINEMENT-PENS	MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
200	70	0670	CONFINEMENT-PENS	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0728	CONFINEMENT-PENS	ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	70	1115	CONFINEMENT-PENS	CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0603	CONFINEMENT-PENS	EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
200	71	0605	CONFINEMENT-PENS	CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
200	71	0607	CONFINEMENT-PENS	SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEME
200	71	0733	CONFINEMENT-PENS	ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0763	CONFINEMENT-PENS	ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
200	71	0772	CONFINEMENT-PENS	A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD

200	71	0779	CONFINEMENT-PENS	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200	71	0780	CONFINEMENT-PENS	THE WASTE PATTERN OF BEEF CATTLE ON SLATTED FLOORS KEYWORDS FEED-LOTS CONFINEMENT-PEN
200	71	0784	CONFINEMENT-PENS	A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINE
200	71	0786	CONFINEMENT-PENS	THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200	71	0803	CONFINEMENT-PENS	MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
200	71	0819	CONFINEMENT-PENS	ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
200	71	0820	CONFINEMENT-PENS	COSTS OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FE
200	72	1012	CONFINEMENT-PENS	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1024	CONFINEMENT-PENS	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1025	CONFINEMENT-PENS	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1029	CONFINEMENT-PENS	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
300	65	0757	CONFINEMENT-PENS	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	67	0710	CONFINEMENT-PENS	FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
300	68	0741	CONFINEMENT-PENS	RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	68	0749	CONFINEMENT-PENS	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	69	0001	CONFINEMENT-PENS	SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	0062	CONFINEMENT-PENS	MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	69	0735	CONFINEMENT-PENS	SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-
300	69	1061	CONFINEMENT-PENS	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	70	0414	CONFINEMENT-PENS	THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
300	70	1036	CONFINEMENT-PENS	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	70	1247	CONFINEMENT-PENS	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0584	CONFINEMENT-PENS	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
300	71	1246	CONFINEMENT-PENS	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300	72	1085	CONFINEMENT-PENS	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
400	71	0293	CONFINEMENT-PENS	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	1131	CONFINEMENT-PENS	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
400	71	1144	CONFINEMENT-PENS	CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
400	72	1138	CONFINEMENT-PENS	HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
400	73	1178	CONFINEMENT-PENS	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
400	73	1183	CONFINEMENT-PENS	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
600	73	1065	CONFINEMENT-PENS	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	70	1109	CONFINEMENT-PENS	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
200	66	0115	CONFINMENT	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	71	0610	CONGRESS	WATER POLLUTION AND THE FARMER KEYWORDS RUNOFF COSTS PESTICIDES GOVERNMENT-FINANCE CO
300	71	1055	CONIFEROUS-FORESTS	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
400	70	0069	CONNECTICUT	CONNECTICUT REQUIREMENTS FOR LIQUID MANURE DISPOSAL KEYWORDS REGULATIONS POLLUTANTS C
200	71	0284	CONSERVANCY-DISTRI	CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONS
200	70	1050	CONSERVATION	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	1094	CONSERVATION	AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	66	0131	CONSTRUCT	DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
300	71	0752	CONSTRUCTION-COSTS	ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES
300	70	1000	CONSTRUCTION-METHO	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
300	70	0384	CONSUMPTION	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	0488	CONSUMPTIVE-USE	THE EFFECTS OF SALINITY-STANDARDS ON IRRIGATED-AGRICULTURE IN THE COLORADO-RIVER-BASIN
600	72	1001	CONTACT-TIME	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
100	64	0345	CONTAMINATED	BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
100	68	0452	CONTAMINATION	GROUNDWATER CONTAMINATION KEYWORDS NITROGEN BARNYARD GROUNDWATER CONTAMINATION
100	70	0065	CONTAMINATION	AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
100	73	1164	CONTAMINATION	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
400	70	0577	CONTENT	BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
200	69	0201	CONTINUOUS-CORN	ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
100	72	1129	CONTINUOUS-FLOW	BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
300	71	1081	CONTINUOUS-REACTOR	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	73	1083	CONTINUOUS-REFUSE-	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
100	63	0436	CONTROL	POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	70	0012	CONTROL	CONTROL OF HOUSE FLIES IN SWINE FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL K
100	71	0314	CONTROL	GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDEN
100	71	0454	CONTROL	SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION
100	71	0674	CONTROL	CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS ODORS POULTRY WATER-CONTENT CONTR
200	68	0725	CONTROL	POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAG
200	68	1186	CONTROL	TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	69	0175	CONTROL	STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
200	69	0183	CONTROL	THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	69	0543	CONTROL	INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
200	69	0546	CONTROL	THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0547	CONTROL	CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	69	0549	CONTROL	THE UNIVERSITIES ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS RUNOFF CATTLE RESEARCH-A
200	69	0551	CONTROL	MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULAT
200	69	0552	CONTROL	STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	69	0553	CONTROL	STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0555	CONTROL	STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS
200	69	0556	CONTROL	STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF A
200	69	0557	CONTROL	STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0558	CONTROL	COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
200	69	0559	CONTROL	FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
200	69	0564	CONTROL	RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL KEYWORDS BYPRODUCTS POLLUTION-ABATEMENT
200	69	1116	CONTROL	MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	69	1185	CONTROL	ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0232	CONTROL	CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORDS RUNOFF IRRIGATI
200	70	0498	CONTROL	WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	71	0283	CONTROL	ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS B
200	71	0285	CONTROL	POLLUTION-CONTROL DECISIONS - WHO SHOULD MAKE THEM KEYWORDS INDIVIDUAL-RIGHTS LEGISLA
200	71	0286	CONTROL	AGRICULTURAL-BENEFITS FROM URBAN POLLUTION-CONTROL KEYWORDS SEWAGE-TREATMENT TREATMEN
200	71	0594	CONTROL	IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200	71	0598	CONTROL	MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200	71	0601	CONTROL	PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULA
200	71	0613	CONTROL	TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINIST
200	71	0645	CONTROL	PESTICIDES AND PEST CONTROL IN THE FUTURE KEYWORDS PEST-CONTROL AGRICULTURAL-CHEMICAL
200	71	0661	CONTROL	ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71	0709	CONTROL	BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
200	71	0791	CONTROL	METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS C
200	71	0793	CONTROL	CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AM
200	71	0820	CONTROL	COSTS OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FE
200	71	0837	CONTROL	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
300	67	1249	CONTROL	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	68	0741	CONTROL	RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	68	1209	CONTROL	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	0093	CONTROL	HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
300	70	0384	CONTROL	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO

KEYWORD INDEX

300	70	0490	CONTROL	SALINITY-CONTROL IN RETURN-FLOW FROM IRRIGATED AREAS A DEMONSTRATION-PROJECT KEYWORDS
300	70	1192	CONTROL	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1201	CONTROL	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300	71	0301	CONTROL	STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDE
300	71	0674	CONTROL	CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0700	CONTROL	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
400	71	0309	CONTROL	CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POUL
400	71	0456	CONTROL	TRY TO KEEP ODORS UNDER CONTROL KEYWORDS ODORS CONTROL
400	71	1135	CONTROL	ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
500	70	0397	CONTROL	HERBICIDE RESIDUES IN AGRICULTURAL WATER FROM CONTROL OF AQUATIC AND BANK WEEDS KEYWOR
400	73	1181	CONTROLLED-ENVIRON	SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND
100	65	0470	CONTROLLING	CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
300	69	0638	CONTROLS	ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
400	71	0505	CONTROLS	CONFINEMENT-REARING OF TURKEYS KEYWORDS VENTILATION MANAGEMENT PSYCHROMETRICS CONTROL
100	70	0013	CONTROL-OF-FLIES	INFLUENCE OF POULTRY-MANURE-REMOVAL SCHEDULES ON VARIOUS DIPTERA LARVAE AND SELECTED AN
300	70	0491	CONTROL-PROBLEMS	WATER-QUALITY CONTROL PROBLEMS IN INLAND-SINKS KEYWORDS SALINITY EUTROPHICATION PYRAMI
200	70	0747	CONTROL-SYSTEMS	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	71	0662	CONVENTIONAL-HANDL	WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME
300	71	1081	CONVERSION	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
100	71	0695	COOLING	CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS KEYWORD CONFI
200	68	0760	COOLING	HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
100	71	1214	COPPER	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	71	0811	COPPER	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
700	70	0231	COPPER	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
200	71	0281	COPROLOGY	LIVESTOCK-WASTE KEYWORDS COPROLOGY BYPRODUCTS PRODUCTION
100	70	0023	COPROPHAGOUS-BEETL	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
200	66	0115	COPROPHAGY	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0147	COPROPHAGY	COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	66	0148	COPROPHAGY	ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
300	67	1250	CORES	DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
200	69	0173	CORN	USE OF POULTRY MANURE FOR CORRECTION OF ZN AND FE DEFICIENCIES IN PLANTS KEYWORDS FER
200	70	0222	CORN	THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200	71	0778	CORN	LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
300	70	0204	CORN	POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	70	0475	CORN	LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
400	73	1073	CORN	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
600	72	1177	CORN-FIELD	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
600	73	1065	CORN-FIELD	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
100	70	0421	CORN-ROOTWORM	EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNE
300	67	1250	CORRALS	DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
200	69	0196	CORRELATION-ANALYS	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
200	69	0708	CORRELATION-ANALYS	TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
300	69	0004	CORROSION	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
100	66	0290	CORYNEFORM	CORYNEFORM BACTERIA POULTRY DEEP LITTER KEYWORDS CORYNEFORM BACTERIA POULTRY LITTER
100	70	0019	COST	CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS D
200	66	0151	COST	ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	66	0152	COST	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	66	0156	COST	BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
300	70	0743	COST	GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
400	71	0267	COST	WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
400	71	0267	COST	WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
400	71	0504	COST	COST OF DEHYDRATING POULTRY MANURE KEYWORDS SHELF-LIFE FERTILIZERS EQUIPMENT COST DEH
100	65	0366	COSTS	LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	66	0347	COSTS	AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDAT
100	70	0047	COSTS	PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
100	70	0340	COSTS	FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE KEYWORDS POULTRY CROP-RESPONSE
100	70	0342	COSTS	IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION CO
100	70	0368	COSTS	AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
100	70	0510	COSTS	CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FER
100	70	1194	COSTS	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	71	0574	COSTS	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS
100	71	0680	COSTS	ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE KEYWORDS TRANSPORTATION PROCES
100	71	1047	COSTS	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
200	69	0157	COSTS	ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0186	COSTS	MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
200	69	0200	COSTS	THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200	69	0202	COSTS	ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
200	69	0427	COSTS	MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NU
200	70	0114	COSTS	SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0234	COSTS	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0235	COSTS	ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
200	70	0243	COSTS	MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	70	0245	COSTS	MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
200	70	0246	COSTS	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
200	70	0247	COSTS	BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
200	70	0250	COSTS	LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
200	70	0253	COSTS	TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	70	0321	COSTS	WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	71	0274	COSTS	WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
200	71	0283	COSTS	ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS B
200	71	0610	COSTS	WATER POLLUTION AND THE FARMER KEYWORDS RUNOFF COSTS PESTICIDES GOVERNMENT-FINANCE CO
200	71	0816	COSTS	ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS
200	71	0818	COSTS	THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
200	71	0819	COSTS	ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
200	71	0820	COSTS	COSTS OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FE
200	71	0839	COSTS	AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE KEYWORD DENITRIFICATION ACTIVATED-SLUDGE C
200	71	0846	COSTS	NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0850	COSTS	THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYC
200	71	1094	COSTS	AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	73	1082	COSTS	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300	69	0006	COSTS	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	70	0208	COSTS	DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
300	70	0384	COSTS	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	71	0704	COSTS	PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
400	66	0088	COSTS	POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
400	70	0097	COSTS	POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
400	70	0111	COSTS	UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	70	0351	COSTS	DAIRY-SET-UP FOR 200 COWS KEYWORDS LAGOON COSTS FREE-STALL-HOUSING EVAPORATIVE-LAGOON
400	70	0357	COSTS	FROM THE ALS MECHANICAL-CLEANING OF COWSHEDS KEYWORDS DAIRY-CATTLE AGE COSTS SPECIFIC
400	71	0267	COSTS	WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F

KEYWORD INDEX

500 70 0409 COSTS ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
300 71 1056 COST-ALLOCATION AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
200 69 0199 COST-ANALYSIS RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200 70 1113 COST-ANALYSIS AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
300 71 1056 COST-ANALYSIS AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
700 72 1049 COST-ANALYSIS ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
200 69 0158 COST-BENEFIT-RATIO REFLECTIONS ON POLLUTION CONTROL KEYWORDS WATER-QUALITY COST-BENEFIT-RATIO ENVIRONMEN
200 71 0733 COST-COMPARISONS ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200 71 0828 COST-COMPARISONS DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-P
300 70 1192 COST-SHARING IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300 71 0752 COST-SHARING ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES
100 73 1162 COTTON PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
100 70 1090 COUMAPHOS COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100 65 1091 COUMAPHOS-ORAL-DRE TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
400 71 0315 COW IF COW MANURE BREAKS DOWN DDT KEYWORDS COW DDT
400 73 1068 COWDOMINIUM NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400 73 1068 COWMEL NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400 71 0293 COW-MANURE SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400 72 1138 COW-TOILET HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
200 71 0617 CO-OPEXTENSION-SER THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRAT
100 63 1064 CO-RAL TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
300 70 1104 CRABS FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
600 69 1006 CRANIOTOMY HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
200 71 0612 CREDIT PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
100 64 0345 CREEK-WATER BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
100 69 0037 CRITERIA WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
100 71 0582 CRITERIA CRITERIA NEEDED TO DESIGN ANIMAL QUARTERS FOR COMFORT AND PRODUCTIVITY KEYWORDS AIR-Q
100 71 0571 CROP EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES
200 71 0775 CROP TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200 71 0856 CROP GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTIL
300 71 0412 CROP THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP
300 1077 CROPLANDS SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
100 70 0417 CROPS ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100 70 1227 CROPS AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
200 68 0724 CROPS GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200 71 0798 CROPS THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS
200 71 1252 CROPS NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300 49 1210 CROPS MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300 68 1122 CROPS NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
500 71 1072 CROPS HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
100 62 1220 CROP-PRODUCTION WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
200 71 0828 CROP-PRODUCTION DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-P
200 72 1029 CROP-PRODUCTION CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
300 71 1035 CROP-PRODUCTION IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
300 71 1035 CROP-PRODUCTION-TE IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
100 70 0048 CROP-RESPONSE SOIL FERTILITY UNDER CONTINUOUS CULTIVATION IN NORTHERN NIGERIA I THE ROLE OF ORGANIC
100 70 0340 CROP-RESPONSE FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE KEYWORDS POULTRY CROP-RESPONSE
100 70 1037 CROP-RESPONSE NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
200 71 0648 CROP-RESPONSE FERTILIZER PRACTICES WHICH MINIMIZE NUTRIENT LOSS KEYWORDS FERTILIZER-REQUIREMENTS CR
200 71 0826 CROP-RESPONSE CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200 71 0828 CROP-RESPONSE DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-P
200 71 0831 CROP-RESPONSE EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYW
200 71 0833 CROP-RESPONSE EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
200 71 0853 CROP-RESPONSE RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE D
600 71 0271 CROP-RESPONSE GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS KEYWORDS DISPOSAL CR
200 69 0174 CROP-UTILIZATION THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
600 72 1169 CROP-YIELD CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
100 70 0024 CROSS-INFECTIONS PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
200 72 1152 CROWDING PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
100 65 1079 CRUDE-PROTEIN UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100 68 0502 CRUDE-PROTEIN MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
600 72 1169 CULTIVATION CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
700 72 1049 CULTIVATION ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100 70 0018 CULTURES SALMONELLA SPP AND SEROTYPES OF ESCHERICHIA COLI ISOLATED FROM THE LESSER MEALWORM CO
100 71 1212 CULTURES EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
300 70 1101 CULTURES BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
500 71 1254 CULTURES ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
500 71 1254 CULTURE-MEDIA ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100 69 1198 CURRENTS-WATER CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
300 70 0455 CURRENT-TECHNOLOGY ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
200 69 0162 CUTLOCK THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200 71 1234 CYANOPHYTA SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200 71 0833 CYCLING EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
100 73 1162 CYCLING-NUTRIENTS PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
300 71 1126 CYCLING-NUTRIENTS SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
400 72 1166 CYCLING-NUTRIENTS HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
300 71 1119 CYTOLOGICAL-STUDIE TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
200 71 0771 CZECHOSLOVAKIA TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA KEYWORDS
100 67 0713 D SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100 65 0346 DAIRY LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100 67 0713 DAIRY SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100 69 0030 DAIRY TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100 69 0445 DAIRY EFFLUENT DISPOSAL KEYWORDS DAIRY NEW-ZEALAND EFFLUENT
100 71 0450 DAIRY NITRATE AND SALT IN SOILS AND GROUND-WATERS FROM LAND DISPOSAL OF DAIRY MANURE KEYWORD
200 66 0134 DAIRY OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
200 68 0694 DAIRY THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200 69 0056 DAIRY PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200 69 0167 DAIRY AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
200 69 0201 DAIRY ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
200 69 0202 DAIRY ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
200 69 0522 DAIRY FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE
200 69 0524 DAIRY CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST I
200 69 0706 DAIRY HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200 70 0221 DAIRY LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
200 70 0222 DAIRY THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200 70 0227 DAIRY RATES OF WATER-INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY-MANURE KEYWORDS ROT
200 71 0665 DAIRY WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
200 71 0782 DAIRY MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
200 71 0792 DAIRY CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200 71 0806 DAIRY COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C

200	71	0838	DAIRY NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WA
200	71	0850	DAIRY THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYC
400	64	0358	DAIRY TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400	71	0731	DAIRY DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPO
600	72	1156	DAIRY SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
100	65	0344	DAIRY-CATTLE THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
100	68	1229	DAIRY-CATTLE ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
200	69	0188	DAIRY-CATTLE PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
300	70	0384	DAIRY-CATTLE THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
400	65	0332	DAIRY-CATTLE HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
400	70	0357	DAIRY-CATTLE FROM THE ALS MECHANICAL-CLEANING OF COWSHEDS KEYWORDS DAIRY-CATTLE AGE COSTS SPECIFIC
100	68	1229	DAIRY-INDUSTRY ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	70	1040	DAIRY-INDUSTRY STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	70	1090	DAIRY-INDUSTRY COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	70	1227	DAIRY-INDUSTRY AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	71	1214	DAIRY-INDUSTRY THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	72	1193	DAIRY-INDUSTRY CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100	73	1087	DAIRY-INDUSTRY ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
200	68	1187	DAIRY-INDUSTRY THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	70	0755	DAIRY-INDUSTRY FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	71	0604	DAIRY-INDUSTRY STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71	1095	DAIRY-INDUSTRY BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
300	46	1208	DAIRY-INDUSTRY GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	71	0732	DAIRY-INDUSTRY CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
400	73	1168	DAIRY-INDUSTRY CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
400	73	1178	DAIRY-INDUSTRY ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	72	1004	DAIRY-INDUSTRY CORRELATING OIL AND ODORCUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600	72	1148	DAIRY-INDUSTRY DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
100	65	0331	DAIRY-MANURE DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
200	66	0135	DAIRY-MANURE TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200	69	0552	DAKOTA STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	70	0054	DAKOTA POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
300	46	1207	DAMAGES FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
300	49	1210	DAMAGES MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	68	1202	DAMAGES OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	68	1209	DAMAGES ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	70	0073	DAMAGES STOCKMEN S LIABILITY UNDER THE MISSOURI NUISANCE LAW KEYWORDS ODOR NOISE LAWSUITS DAMA
300	46	1207	DAMAGES-LEGAL-ASPE FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
400	68	0038	DAMS PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
100	64	1200	DAPHNIA PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	64	1200	DAPHNIIDAE PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
200	71	0841	DARIY SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRI
200	64	1241	DASYTRICHA PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	71	1213	DATA A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
300	67	0711	DATA THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
600	71	0272	DATA A DOSING-SIPHON FOR DISCHARGING CLEANING-WATER INTO FLUSHING-GUTTERS KEYWORDS DESIGN
100	71	1039	DATA-COLLECTIONS NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
200	66	1112	DATA-COLLECTION CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
300	72	1052	DATA-COLLECTIONS EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
100	72	1222	DATA-INTERPRETATIO PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
100	71	1213	DATA-PROCEDDING A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	62	1220	DDT WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	70	1111	DDT POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	71	0276	DDT THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOG
200	71	0280	DDT PESTICIDES KEYWORDS DDT HAZARDS BENEFICIAL-USE HEALTH PESTICIDES
200	71	1094	DDT AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
300	72	1260	DDT NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	71	0293	DDT SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	0315	DDT IF COW MANURE BREAKS DOWN DDT KEYWORDS COW DDT
500	70	0395	DDT CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
500	70	0396	DDT THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATION
200	69	0520	DEAD-ANIMALS-DISPOS DEAD-ANIMALS AND HOW THEY CONTRIBUTE TO POLLUTION OF THE ENVIRONMENT KEYWORDS DEAD-AN
300	72	1157	DEAD-BIRD-DISPOSAL CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
200	72	1015	DEBRIS-BASIN DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
200	70	1050	DECISION-MAKING THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
300	26	1204	DECI-SIONS OHIO STOCK FOOD COMPANY V GINILING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
400	65	0439	DECOMPOSING THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC
200	71	1252	DECOMPOSING-ORGANI NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	46	1208	DECOMPOSING-ORGANI GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
700	71	1120	DECOMPOSING-ORGANI SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
200	71	0809	DECOMPOSITION ENZYME FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOTMANURE KEYWORDS BOD AMINO
300	71	0514	DECOMPOSITION FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE KEYWORDS DECOMPOSITION DISE
400	71	0305	DECOMPOSITION RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS
500	70	0400	DECOMPOSITION MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTIL
500	70	0401	DECOMPOSITION MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
200	71	0828	DEEP-TILLAGE DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-P
300	64	1110	DEFINITIONS LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLON FISHKILL LAKES
100	64	1200	DEFORESTATION PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	66	0063	DEGRADATION SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100	67	0501	DEGRADATION INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
200	66	0587	DEGRADATION HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO
200	72	1023	DEGRADATION CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
600	72	1156	DEGRADATION-DECOMP SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
300	71	0629	DEHYDRATED-FECES THE EFFECTS OF CONTINUALLY RECYCLING DEHYDRATED POULTRY WASTES DPW ON THE PERFORMANCE
100	70	0020	DEHYDRATED-POULTRY EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
200	71	0848	DEHYDRATED-POULTRY DEHYDRATED POULTRY WASTE DPW AS A FEEDSTUFF IN POULTRY RATIONS KEYWORD RECYCLING NU
300	70	0211	DEHYDRATED-POULTRY THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE ON PRODUCTION, FEED-EFFICIENCY, BODY-WEI
400	71	0504	DEHYDRATING-POULTR COST OF DEHYDRATING POULTRY MANURE KEYWORDS SHELF-LIFE FERTILIZERS EQUIPMENT COST DEH
100	65	0470	DEHYDRATION CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
100	71	0748	DEHYDRATION THE ELIMINATION OF ODOR FROM THE EFFLUENT GASES OF CHICKEN MANURE DRYING PLANT KEYWORD
200	69	0055	DEHYDRATION MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	69	0186	DEHYDRATION MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
200	70	0715	DEHYDRATION OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	71	0651	DEHYDRATION ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMEN
200	71	0658	DEHYDRATION MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION RE
200	71	0768	DEHYDRATION SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0783	DEHYDRATION SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200	71	1096	DEHYDRATION ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
300	70	0204	DEHYDRATION POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	70	0209	DEHYDRATION THE UTILIZATION OF POULTRY-WASTE AS A FEEDSTUFF FOR GROWING CHICKS KEYWORDS DEHYDRATI

300	71	0628	DEHYDRATION — THE METABOLIZEABLE ENERGY VALUE OF DRIED POULTRY WASTE KEYWORDS NUTRIENT DEHYDRATION
300	71	0630	DEHYDRATION — A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWO
300	71	1106	DEHYDRATION — MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	72	1157	DEHYDRATION — CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1182	DEHYDRATION — BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
400	71	0313	DEHYDRATION — TYPES OF MANURE DRYERS KEYWORDS DEHYDRATION EQUIPMENT
600	71	0497	DEHYDRATION — DEHYDRATION OF ANIMAL WASTES KEYWORDS FARM-WASTES DEHYDRATION FERTILIZERS
300	53	1206	DELAWARE — POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
700	70	1046	DELAWARE — AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
100	65	0263	DEMAND — REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	66	0437	DEMAND — PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	71	0304	DEMAND — STATE OF THE ART REVIEW TREATMENT AND DISPOSAL OF SWINE WASTES KEYWORDS CHEMICAL OXY
200	71	0787	DEMAND — IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOI
300	72	1085	DEMAND — CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
300	70	0492	DEMINERALIZATION — DISTILLATION OF WASTEWATERS A WATER-RESOURCE FOR ARID-REGIONS KEYWORDS EFFLUENT-REUS
100	65	0263	DENITRIFICATION — REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	65	1219	DENITRIFICATION — NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	70	0021	DENITRIFICATION — EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
100	70	0050	DENITRIFICATION — TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
200	69	0179	DENITRIFICATION — CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO
200	70	0218	DENITRIFICATION — REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DIT
200	70	0727	DENITRIFICATION — EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200	70	0737	DENITRIFICATION — REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	71	0818	DENITRIFICATION — THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
200	71	0824	DENITRIFICATION — AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71	0827	DENITRIFICATION — A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM
200	71	0830	DENITRIFICATION — FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
200	71	0838	DENITRIFICATION — NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WA
200	71	0839	DENITRIFICATION — AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE KEYWORD DENITRIFICATION ACTIVATED-SLUDGE C
200	71	1033	DENITRIFICATION — NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
300	70	0487	DENITRIFICATION — NITRATE-REMOVAL FROM AGRICULTURAL WASTEWATER KEYWORDS ALGAE CALIFORNIA DENITRIFICATION
300	71	0639	DENITRIFICATION — USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	71	1058	DENITRIFICATION — DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
400	69	0016	DENITRIFICATION — FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
400	73	1073	DENITRIFICATION — NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
400	73	1181	DENITRIFICATION-CO — SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND
600	69	1239	DENITRIFICATION — DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
700	70	1256	DENITRIFICATION — MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
700	72	1048	DENITRIFICATION — SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
300	70	0208	DENSITY — DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
600	73	1075	DENSITY — THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100	71	1228	DENTRIFICATION — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	70	1115	DENTRIFICATION — CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
300	68	1122	DENTRIFICATION — NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	68	0741	DENVER — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
100	70	0019	DEODORANTS — CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS D
200	69	0482	DEOXYGENATION — THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	72	1018	DEPARTMENT-OF-ENVI — EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1019	DEPARTMENT-OF-ENVI — PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
300	49	1210	DEPRECIATION — MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	68	0741	DEPT — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
100	70	0094	DEPTH — THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
300	69	0002	DEPTH — SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	70	0488	DESALINATION — THE EFFECTS OF SALINITY-STANDARDS ON IRRIGATED-AGRICULTURE IN THE COLORADO-RIVER-BASIN
100	68	0500	DESIGN — ANAEROBIC LAGOONS CONSIDERATIONS IN DESIGN AND APPLICATION KEYWORDS FARM-LAGOONS ANAER
100	70	0458	DESIGN — USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	71	0582	DESIGN — CRITERIA NEEDED TO DESIGN ANIMAL QUARTERS FOR COMFORT AND PRODUCTIVITY KEYWORDS AIR-Q
100	71	0721	DESIGN — HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOF
100	71	0729	DESIGN — DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
200	66	0138	DESIGN — DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	69	0163	DESIGN — DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	69	0183	DESIGN — THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	69	0428	DESIGN — DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-R
200	70	0219	DESIGN — THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
200	70	0244	DESIGN — MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
200	70	0246	DESIGN — BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO.
200	70	0247	DESIGN — BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
200	70	0248	DESIGN — PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
200	71	0597	DESIGN — STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0767	DESIGN — PUTTING IT ALL TOGETHER KEYWORDS FEDERAL-GOVERNMENTS STATE-GOVERNMENTS BUDGETING DESI
200	71	0822	DESIGN — DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
300	69	0006	DESIGN — SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	71	0590	DESIGN — THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT KEYWORDS LAGOONS DESIGN IRRIGATION M
300	72	1157	DESIGN — CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
600	69	1005	DESIGN — FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	71	0272	DESIGN — A DOSING-SIPHON FOR DISCHARGING CLEANING-WATER INTO FLUSHING-GUTTERS KEYWORDS DESIGN
100	62	0499	DESIGN-CRITERIA — MANURE LAGOONS DESIGN CRITERIA AND MANAGEMENT KEYWORDS FARM-LAGOONS DESIGN-CRITERIA SI
100	65	0366	DESIGN-CRITERIA — LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	69	0353	DESIGN-CRITERIA — OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	71	0266	DESIGN-CRITERIA — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	1232	DESIGN-CRITERIA — WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	69	0756	DESIGN-CRITERIA — SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
200	70	0241	DESIGN-CRITERIA — SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
200	70	0247	DESIGN-CRITERIA — BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
200	70	0747	DESIGN-CRITERIA — ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	70	1113	DESIGN-CRITERIA — AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	71	0733	DESIGN-CRITERIA — ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0740	DESIGN-CRITERIA — PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
300	71	0486	DESIGN-CRITERIA — FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
300	71	0752	DESIGN-CRITERIA — ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES
300	72	1003	DESIGN-CRITERIA — CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
400	70	0092	DESIGN-CRITERIA — SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
500	68	1259	DESIGN-CRITERIA — WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
500	70	0401	DESIGN-CRITERIA — MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
200	69	0423	DESIGN-DATA — 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	70	0252	DESIGN-DATA — ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
600	72	1001	DESIGN-EQUATIONS — INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
200	69	0159	DESIGN-STANDARDS — ENVIRONMENTAL POLLUTION--NOW AND IN THE YEARS AHEAD KEYWORDS LEGAL-ASPECTS DESIGN-STA
600	71	0496	DESORPTION — DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION
100	70	0026	DETECTION — A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT

200	71	0836	DETECTION
100	72	1199	DETECTION-LIMITS
200	66	0144	DETENTION-PONDS
200	69	0191	DETENTION-TIME
100	67	0079	DETERGENTS
500	70	0390	DETERGENTS
300	69	0632	DETERMINATION
300	69	0633	DETERMINATION
200	66	0140	DEWATERING
200	66	0141	DEWATERING
200	66	0142	DEWATERING
200	71	0859	DEWATERING
200	71	0860	DEWATERING
100	64	0474	DIAPHRAGM-PUMP
100	64	0345	DIARRHEA
100	70	0570	DIAZINON
500	70	0395	DIELDRIN
300	70	1101	DIEOFF-RATES
100	70	0367	DIET
300	70	0204	DIET
300	71	0621	DIET
300	71	0622	DIET
300	71	0628	DIET
100	71	0273	DIETARY-ANTIBIOTIC
300	71	0513	DIETHYISTILBESTROL
100	60	1078	DIETS
100	66	0422	DIETS
100	66	0479	DIETS
100	69	0086	DIETS
100	69	0361	DIETS
100	70	0020	DIETS
100	70	0413	DIETS
100	73	1086	DIETS
100	73	1068	DIETS
200	66	0129	DIETS
300	70	0209	DIETS
300	70	0210	DIETS
300	71	0511	DIETS
300	71	0512	DIETS
400	71	0327	DIETS
700	69	1067	DIFFUSION
500	71	1072	DIGESTED-SLUDGE
100	65	1079	DIGESTIBILITY
100	71	0462	DIGESTIBILITY
200	73	1062	DIGESTIBILITY
200	73	1093	DIGESTIBILITY
300	70	0213	DIGESTIBILITY
300	72	1146	DIGESTIBILITY
100	69	0045	DIGESTIBILITY-COEF
100	65	0263	DIGESTION
100	66	0422	DIGESTION
100	68	0044	DIGESTION
100	68	0306	DIGESTION
100	68	0306	DIGESTION
100	70	0342	DIGESTION
100	70	0413	DIGESTION
100	71	0261	DIGESTION
100	71	0304	DIGESTION
100	72	1215	DIGESTION
100	72	1222	DIGESTION
200	64	1241	DIGESTION
200	69	0074	DIGESTION
200	69	0184	DIGESTION
200	70	0252	DIGESTION
200	71	0838	DIGESTION
300	70	0206	DIGESTION
300	71	0486	DIGESTION
600	73	1075	DIGESTION
200	66	0146	DIGESTION-COEFFICI
200	66	0147	DIGESTION-COEFFICI
200	69	0170	DIGESTION-COEFFICI
200	73	1062	DIGESTION-STALLS
100	65	0066	DIGESTION-TANKS
100	65	0378	DIGESTION-TANKS
200	66	0148	DIGESTION-TANKS
200	71	0603	DIGESTION-TANKS
200	70	0727	DIKES
400	73	1158	DIKES
100	73	1034	DILUTION
300	69	0633	DILUTION
300	70	0492	DILUTION
400	68	0032	DILUTION
300	71	1238	DIMENSIONAL-ANALYS
300	69	0004	DIMENSIONS
300	69	0635	DIOXIDE
200	64	1241	DIPLOCOCCUS
100	71	1213	DIPLOCOCCUS-PHEUMO
200	64	1241	DIPLODINIUM-ECAUDA
100	63	1064	DIPTEREX
100	67	0104	DISCHARGE
200	69	0696	DISCHARGE
200	70	0216	DISCHARGE
100	72	1224	DISCHARGE-WATER
400	71	1196	DISCHARGE-WATER
100	62	0292	DISEASE
100	68	0036	DISEASE
100	69	0265	DISEASE
100	69	0265	DISEASE
200	70	0234	DISEASE
200	70	0238	DISEASE

SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
SIGNIFICANCE OF PHOSPHORUS IN WATER-SUPPLIES KEYWORDS NUTRIENTS FERTILIZER DETERGENTS
QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING E
THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY KEYWORD SIEVE-ANALYSIS SEDIMEN
DEWATERING POULTRY MANURE BY CENTRIFUGATION KEYWORD CENTRIFUGATION DEWATERING POULTRY
PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND D
POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYW
THE METABOLIZEABLE ENERGY VALUE OF DRIED POULTRY WASTE KEYWORDS NUTRIENT DEHYDRATION
ROLE OF EXCRETED CHLORTETRACYCLINE IN MODIFYING THE DECOMPOSITION PROCESS IN FEEDLOT WA
FECAL-RESIDUES FROM FEED ADDITIVES--SWINE KEYWORDS HAZARDS GROWTH-RATES DIETHYISTILBES
EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
THE APPARENT-DIGESTIBILITY OF ENERGY AND PROTEIN IN TOPLAN DRIED-POULTRY-MANURE KEYWO
NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
THE UTILIZATION OF POULTRY-WASTE AS A FEEDSTUFF FOR GROWING CHICKS KEYWORDS DEHYDRATI
THE RESULT OF FEEDING DRIED-POULTRY-WASTE TO LAYING HENS ON EGG-PRODUCTION AND FEED-CON
ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS NITR
RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
NUTRIENT DIGESTIBILITY USING FECAL COLLECTION APPARATUS AND INDICATOR METHOD FOR STEERS
CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-
FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS KEYWORDS FARM-WASTES SHEEP FEED-LOTS PROT
THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRA
REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION CO
VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUD
STATE OF THE ART REVIEW TREATMENT AND DISPOSAL OF SWINE WASTES KEYWORDS CHEMICAL OXY
AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WA
POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR
TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTID
ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
DISTILLATION OF WASTEWATERS A WATER-RESOURCE FOR ARID-REGIONS KEYWORDS EFFLUENT-REUS
NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHA
PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
GROUNDWATER QUALITY AND FLUCTUATIONS IN A SHALLOW UNCONFINED AQUIFER UNDER A LEVEL FEED
FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAIN
OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE

KEYWORD INDEX

200	70	0239	DISEASE
300	70	0205	DISEASE
300	71	0511	DISEASE
300	71	0514	DISEASE
500	70	0402	DISEASE
100	69	0416	DISEASES
100	70	0047	DISEASES
100	73	1164	DISEASES
200	66	0113	DISEASES
200	67	1243	DISEASES
300	70	1104	DISEASES
300	71	0486	DISEASES
400	67	0336	DISEASE-HAZARD
100	68	0036	DISINFECTION
100	71	1232	DISINFECTION
200	71	0656	DISINFECTION
200	71	0666	DISINFECTION
100	70	1051	DISOLVED-OXYGEN
200	71	1234	DISPERSION
100	60	0059	DISPOSAL
100	65	0067	DISPOSAL
100	65	0331	DISPOSAL
100	65	0366	DISPOSAL
100	65	0470	DISPOSAL
100	66	0063	DISPOSAL
100	66	0478	DISPOSAL
100	68	0106	DISPOSAL
100	68	0306	DISPOSAL
100	68	0481	DISPOSAL
100	69	0416	DISPOSAL
100	70	0049	DISPOSAL
100	70	0051	DISPOSAL
100	70	0065	DISPOSAL
100	70	0089	DISPOSAL
100	70	0112	DISPOSAL
100	70	0368	DISPOSAL
100	70	0510	DISPOSAL
100	70	0578	DISPOSAL
100	71	0507	DISPOSAL
100	71	0680	DISPOSAL
100	71	0683	DISPOSAL
100	71	1228	DISPOSAL
100	71	1228	DISPOSAL
200	66	0115	DISPOSAL
200	66	0122	DISPOSAL
200	66	0124	DISPOSAL
200	66	0125	DISPOSAL
200	66	0126	DISPOSAL
200	66	0127	DISPOSAL
200	66	0128	DISPOSAL
200	66	0129	DISPOSAL
200	66	0130	DISPOSAL
200	66	0131	DISPOSAL
200	66	0138	DISPOSAL
200	66	0139	DISPOSAL
200	66	0148	DISPOSAL
200	66	0151	DISPOSAL
200	66	0152	DISPOSAL
200	66	0154	DISPOSAL
200	66	0155	DISPOSAL
200	68	0724	DISPOSAL
200	69	0055	DISPOSAL
200	69	0172	DISPOSAL
200	69	0174	DISPOSAL
200	69	0176	DISPOSAL
200	69	0185	DISPOSAL
200	69	0423	DISPOSAL
200	69	0425	DISPOSAL
200	69	0427	DISPOSAL
200	69	0706	DISPOSAL
200	70	0219	DISPOSAL
200	70	0221	DISPOSAL
200	70	0234	DISPOSAL
200	70	0235	DISPOSAL
200	70	0236	DISPOSAL
200	70	0237	DISPOSAL
200	70	0237	DISPOSAL
200	70	0240	DISPOSAL
200	70	0242	DISPOSAL
200	70	0243	DISPOSAL
200	70	0245	DISPOSAL
200	70	0246	DISPOSAL
200	70	0247	DISPOSAL
200	70	0248	DISPOSAL
200	70	0249	DISPOSAL
200	70	0250	DISPOSAL
200	70	0253	DISPOSAL
200	70	0321	DISPOSAL
200	70	0324	DISPOSAL
200	70	0670	DISPOSAL
200	70	0715	DISPOSAL
200	71	0612	DISPOSAL
200	71	0614	DISPOSAL
200	71	0640	DISPOSAL
200	71	0649	DISPOSAL
200	71	0666	DISPOSAL
200	71	0733	DISPOSAL
200	71	0769	DISPOSAL
200	71	0778	DISPOSAL
200	71	0784	DISPOSAL

FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI
INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DI
ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE KEYWORDS DECOMPOSITION DISE
DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATE
A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND
OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
CHLORINATION OF WASTEWATER EFFLUENTS KEYWORDS DISINFECTION WATER-TREATMENT PUBLIC-HEA
PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE W
A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FER
COLLECTION AND DISPOSAL OF FARM WASTES KEYWORDS N-IRELAND GASES SLURRY DISPOSAL
ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLL
ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE KEYWORDS TRANSPORTATION PROCES
ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING KEYWORDS CATTLE CONFINEME
CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPM
WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMI
PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD
THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NU
HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DU ODOR COSTS EQUIPMENT
ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK
THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
LAND DISPOSAL AND STORAGE OF FARM WASTES 1 PLANNING AND CHOICE OF SYSTEM KEYWORDS EF
LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
DISPOSAL OF SOLID AGRICULTURAL-WASTES - CONCEPTS AND PRINCIPLES KEYWORDS RESEARCH-NEE
ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO
HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
LAND DISPOSAL OF MANURE IN RELATION TO WATER QUALITY KEYWORDS FERTILIZATION SURFACE-R
PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINE

200	71	0826	DISPOSAL	CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	71	0828	DISPOSAL	DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-P
200	71	0829	DISPOSAL	WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
200	71	0830	DISPOSAL	FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
200	71	0834	DISPOSAL	SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
200	71	0842	DISPOSAL	THE USE OF OXIDATION PONDS FOR POULTRY PROCESSING WASTE DISPOSAL KEYWORD INDUSTRIAL-W
200	71	0853	DISPOSAL	RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
300	46	1208	DISPOSAL	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	65	0053	DISPOSAL	FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
300	67	0710	DISPOSAL	FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
300	67	1253	DISPOSAL	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	68	0352	DISPOSAL	DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SE
300	69	0062	DISPOSAL	MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	70	0455	DISPOSAL	ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
300	70	0592	DISPOSAL	PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300	71	0457	DISPOSAL	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300	71	0486	DISPOSAL	FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
300	71	0697	DISPOSAL	ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
300	71	0700	DISPOSAL	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
400	64	0335	DISPOSAL	EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRI
400	65	0356	DISPOSAL	FURROW MANURE-DISPOSAL KEYWORDS POULTRY APPLICATION-RATES PLOW-FURROW-COVER DISPOSAL
400	66	0088	DISPOSAL	POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
400	67	0336	DISPOSAL	DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND
400	69	0039	DISPOSAL	LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
400	69	0419	DISPOSAL	DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400	70	0046	DISPOSAL	FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BU
400	70	0069	DISPOSAL	CONNECTICUT REQUIREMENTS FOR LIQUID MANURE DISPOSAL KEYWORDS REGULATIONS POLLUTANTS C
400	70	0070	DISPOSAL	SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
400	70	0111	DISPOSAL	UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	71	0267	DISPOSAL	WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
400	71	0329	DISPOSAL	DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HA
400	71	0339	DISPOSAL	FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
400	71	0349	DISPOSAL	MAXI-MIXING FOR MANURE DISPOSAL KEYWORDS POULTRY COMPOSTING MIXING DISPOSAL
400	71	0446	DISPOSAL	BASIC POINTS TO CONSIDER IN MANURE DISPOSAL PROBLEM KEYWORDS DISPOSAL
400	71	0568	DISPOSAL	DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DIS
500	68	1259	DISPOSAL	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
500	70	0400	DISPOSAL	MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTIL
500	70	0401	DISPOSAL	MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
500	70	0403	DISPOSAL	ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
600	71	0271	DISPOSAL	GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS KEYWORDS DISPOSAL CR
600	71	0493	DISPOSAL	NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
600	71	0495	DISPOSAL	CONTAMINATION OF SURFACE WATERS FROM PLOWED-IN FEEDLOT MANURE KEYWORDS FARM-WASTES DI
700	68	0330	DISPOSAL	CONFINED SWINE MANURE DISPOSAL KEYWORDS OXIDATION-DITCH ROTOR-DESIGN OXYGEN-TRANSFER
200	72	1015	DISPOSAL-AREA	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
200	71	0663	DISPOSAL-METHODS	INTEGRATION OF COMPONENTS INTO A SYSTEM KEYWORDS WATER-QUALITY-ACT FERTILIZERS DISPOS
200	69	0160	DISPOSAL-REQUIREME	EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
300	71	0319	DISPOSAL-SYSTEMS	FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISP
400	71	0731	DISPOSING	DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPO
200	66	0134	DISSOLVED	OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
100	69	1231	DISSOLVED-OXYGEN	POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	0051	DISSOLVED-OXYGEN	IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	70	1237	DISSOLVED-OXYGEN	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	70	1113	DISSOLVED-OXYGEN	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	71	0653	DISSOLVED-OXYGEN	LIQUID WASTE TREATMENT II OXIDATION PONDS AND AERATED LAGOONS KEYWORDS AEROBIC-TREATM
200	71	0654	DISSOLVED-OXYGEN	LIQUID WASTE TREATMENT III THE OXIDATION DITCH KEYWORDS AEROBIC-TREATMENT DISSOLVED-OX
200	71	1099	DISSOLVED-OXYGEN	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1108	DISSOLVED-OXYGEN	EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300	71	1055	DISSOLVED-OXYGEN	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	71	1245	DISSOLVED-OXYGEN	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	70	1237	DISSOLVED-SOLIDS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	69	0193	DISSOLVED-SOLIDS	CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
300	70	1192	DISSOLVED-SOLIDS	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
600	69	1160	DISSOLVED-SOLIDS	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
100	73	1087	DISTILLABLE-NITROG	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
300	70	0492	DISTILLATION	DISTILLATION OF WASTEWATERS A WATER-RESOURCE FOR ARID-REGIONS KEYWORDS EFFLUENT-REUS
100	62	0382	DISTRIBUTION	TYPE DISTRIBUTION OF COLIFORM BACTERIA IN THE FECES OF WARM-BLOODED ANIMALS KEYWORDS
100	67	0079	DISTRIBUTION	SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	69	0081	DISTRIBUTION	DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWO
200	66	0124	DISTRIBUTION	ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
200	70	0250	DISTRIBUTION	LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
300	70	0384	DISTRIBUTION	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	46	1208	DISTRIBUTION-SYSTE	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
100	68	0106	DITCHES	OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
200	71	0615	DITCHES	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
400	72	1179	DIVERSION-STRUCTUR	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
100	70	0051	DO	IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	71	0318	DO	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
200	69	0074	DO	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0078	DO	OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
200	69	0157	DO	ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0163	DO	DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	69	0166	DO	ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
200	69	0180	DO	FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
200	70	0234	DO	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
300	69	0093	DO	HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
600	70	0098	DO	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
100	68	0296	DOG	A NEW APPROACH TO CAGE WASTE DISPOSAL IN A CANINE LABORATORY KEYWORDS DOG FLUSHING
400	69	0419	DOMESTICA	DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
100	70	1233	DOMESTIC-ANIMALS	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
300		1105	DOMESTIC-ANIMALS	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	67	1249	DOMESTIC-ANIMALS	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	68	1122	DOMESTIC-ANIMALS	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	68	1123	DOMESTIC-ANIMALS	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	70	0385	DOMESTIC-ANIMALS	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	1201	DOMESTIC-ANIMALS	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
100	67	0079	DOMESTIC-WASTES	SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	70	1217	DOMESTIC-WASTES	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	0484	DOMESTIC-WASTES	RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
200	71	1252	DOMESTIC-WASTES	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	46	1208	DOMESTIC-WASTES	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO

300	70	1036	DOMESTIC-WASTES AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
700	71	1120	DOMESTIC-WASTES SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
300	30	1205	DOMESTIC-WATER SUMNER V OBELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	70	0209	DPW THE UTILIZATION OF POULTRY-WASTE AS A FEEDSTUFF FOR GROWING CHICKS KEYWORDS DEHYDRATI
100	62	0292	DRAINAGE AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAIN
100	70	1194	DRAINAGE REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1233	DRAINAGE LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	73	1069	DRAINAGE MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
200	71	0284	DRAINAGE CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONS
200	72	1015	DRAINAGE DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
700	70	1066	DRAINAGE WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
200	70	0727	DRAINAGE-EFFECTS EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
300	71	0466	DRAINAGE-SYSTEM INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
100	71	1197	DRAINAGE-WATER NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	72	1224	DRAINAGE-WATER FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	70	0727	DRAINAGE-WATER EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
600	69	1239	DRAINS DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
400	71	0327	DRIED-POULTRY RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
100	69	0086	DRIED-POULTRY-MANU THE APPARENT-DIGESTIBILITY OF ENERGY AND PROTEIN IN TOPLAN DRIED-POULTRY-MANURE KEYWO
100	70	1051	DRUGS POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
300	70	0208	DRYER-OPERATION DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
100	64	0371	DRYING THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
100	68	0287	DRYING METHODS FOR DISPOSAL OF POULTRY MANURE KEYWORDS NEW ZEALAND IRRIGATION DRYING STORAGE
100	68	0337	DRYING A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	70	0017	DRYING AN IMPROVED METHOD FOR PREPARATION OF FECES FOR BOMB CALORIMETRY KEYWORDS LYOPHILIZE
100	70	0050	DRYING TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0107	DRYING DRYING POULTRY MANURE INSIDE THE POULTRY HOUSE KEYWORDS DRYING POULTRY MANURE
100	70	0368	DRYING AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
100	73	1184	DRYING ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	68	0724	DRYING GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	70	0670	DRYING ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0716	DRYING BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	71	0606	DRYING POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY
200	71	0640	DRYING HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
200	71	0658	DRYING MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION RE
200	71	0661	DRYING ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71	0762	DRYING LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0768	DRYING SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0783	DRYING SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200	71	0813	DRYING THROUGH-CIRCULATION DRYING OF MANURE IN SUPERHEATED STEAM KEYWORDS MOISTURE-CONTENT OD
200	71	0815	DRYING DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
200	71	0850	DRYING THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYC
200	71	0851	DRYING NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	71	0852	DRYING BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES THEIR NUTRITIONAL VALUE TO THE GROWING CH
200	73	1083	DRYING CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	71	0623	DRYING ECONOMICS OF DRIED POULTRY WASTE DPW AS A FEED INGREDIENT OR A FERTILIZER KEYWORDS
300	71	0624	DRYING FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITR
300	71	0673	DRYING OLFACTORY MEASUREMENT OF ANIMAL MANURE ODORS KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0674	DRYING CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
400	70	0029	DRYING DRIED POULTRY MANURE AS CATTLE FEED KEYWORDS DRYING NUTRITIONAL-VALUE
400	70	0111	DRYING UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	70	0415	DRYING TURNING WASTES INTO PROFITS KEYWORDS WASTE-TREATMENT POULTRY DRYING ODOR-CONTROL WAST
400	70	0577	DRYING BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
400	72	1130	DRYING THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
600	68	0471	DRYING ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION KEYWORDS
600	72	1031	DRYING-COSTS ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	73	1075	DRYING-RATES THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
300	71	0625	DRYING-TEMPERATURE THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE K
100	68	0502	DRY-MATTER MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
100	69	0364	DRY-MATTER LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
300	70	0213	DRY-MATTER ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-
100	73	1263	DRY-MATTER-DISPEST CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
300	70	1192	DRY-SEASONS IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
100	63	0289	DUCK TREATMENT OF LONG-ISLAND DUCK FARM WASTES KEYWORDS CHLORINATION COLIFORMS TREATMENT DU
200	66	0144	DUCK TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200	71	0666	DUCK PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
200	71	0781	DUCK ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
200	66	0117	DUCKS DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
300	64	1110	DUCKS LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
100	73	1128	DUCKWEED USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
200	70	1113	DUCK-WASTES AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
400	70	0268	DUMPS MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL ULTIMATE-DISPOSAL WASTE-STORAGE F
400	71	0435	DUMPS THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION KEYWORDS WASTE-DISPOSAL AIR-POLLUTIO
300	69	0004	DURABILITY CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
100	71	1223	DURSBAN EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS KEYWORDS POULTRY BLOOD DURSBAN CHOLIN
100	73	1165	DURSBAN FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
200	69	0192	DUST POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200	71	0583	DUST AIR POLLUTION FROM AGRICULTURE KEYWORDS DUST ALLERGENS ODORS PESTICIDES SMOKE
200	71	0777	DUST FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0793	DUST CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AM
200	71	0802	DUST AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
300	70	0414	DUST THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
400	71	0309	DUST CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POUL
100	63	0436	DUSTS POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
300	53	1206	DYE-STUFFS POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
100	69	1231	ECOLOGY POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	71	0454	ECOLOGY SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION
300	71	1126	ECOLOGY SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	69	0201	ECONOMIC ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
300	71	0677	ECONOMIC THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
500	70	0409	ECONOMIC ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
100	69	1231	ECONOMICS POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	1194	ECONOMICS REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	71	1214	ECONOMICS THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	66	0115	ECONOMICS MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0148	ECONOMICS ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
200	66	0153	ECONOMICS POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
200	68	0434	ECONOMICS ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS CONFINEME
200	68	0726	ECONOMICS ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES
200	69	0157	ECONOMICS ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON

200	69	0543	ECONOMICS INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
200	69	1185	ECONOMICS ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0114	ECONOMICS SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0220	ECONOMICS THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
200	70	0235	ECONOMICS ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
200	70	0498	ECONOMICS WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	70	0715	ECONOMICS OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	71	0762	ECONOMICS LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0763	ECONOMICS ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
200	71	0764	ECONOMICS FUTURE PROSPECTS FOR ANIMAL AGRICULTURE KEYWORDS ECONOMICS INCOME FARM-WASTES NUTRIEN
200	71	1094	ECONOMICS AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	72	1018	ECONOMICS EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	73	1083	ECONOMICS CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	67	0710	ECONOMICS FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
300	70	0384	ECONOMICS THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	0743	ECONOMICS GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
300	71	0623	ECONOMICS ECONOMICS OF DRIED POULTRY WASTE DPW AS A FEED INGREDIENT OR A FERTILIZER KEYWORDS
300	71	0704	ECONOMICS PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
300	71	1261	ECONOMICS INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
400	69	1225	ECONOMICS CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	70	0111	ECONOMICS UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	73	1007	ECONOMICS FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
400	73	1068	ECONOMICS NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
700	70	1046	ECONOMICS AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
700	72	1049	ECONOMICS ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
200	69	0198	ECONOMIC-EFFICIENC LIVESTOCK PRODUCTION VS ENVIRONMENTAL QUALITY - AN IMPASSE KEYWORDS ECONOMIC-EFFICIEN
300	71	1056	ECONOMIC-EFFICIENC AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
200	70	0747	ECONOMIC-FEASIBILT ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	71	0612	ECONOMIC-FEASIBILI PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
200	71	0619	ECONOMIC-FEASIBILI REPORTS AND RECOMMENDATIONS OF WORKING GROUPS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERN
200	71	0816	ECONOMIC-FEASIBILI ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS
200	71	0818	ECONOMIC-FEASIBILI THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
100	70	1194	ECONOMIC-JUSTIFICA REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
300	49	1210	ECONOMIC-RENT MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
200	69	0540	ECOSYSTEMS INDUSTRY AND THE ENVIRONMENT-FEEDLOT WASTE MANAGEMENT KEYWORDS REGULATION CATTLE ECOS
200	71	0643	ECOSYSTEMS AGRICULTURE S RESPONSIBILITIES IN A CLEAN ENVIRONMENT KEYWORDS POLLUTION-ABATEMENT ECO
200	71	0645	ECOSYSTEMS PESTICIDES AND PEST CONTROL IN THE FUTURE KEYWORDS PEST-CONTROL AGRICULTURAL-CHEMICAL
300	71	1126	ECOSYSTEMS SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	69	0535	EDUCATION WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POL
200	69	0536	EDUCATION ROLE OF UNIVERSITY-EXTENSION KEYWORDS ENVIRONMENT EDUCATION UNIVERSITIES WATER-POLLUT
200	69	0537	EDUCATION WHERE DO WE GO FROM HERE KEYWORDS ENVIRONMENT TECHNOLOGY EDUCATION
200	71	0618	EDUCATION COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION KEYWORDS COMMUNICATION TECHNOLOGY POLIT
300	71	1055	EDUCATION ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	68	0307	EFFECT EFFECT SOIL TEMPERATURE PHOSPHORUS MANURES
100	70	0020	EFFECT EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
100	70	0027	EFFECT EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID
100	70	0691	EFFECT THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS
100	71	0460	EFFECT EFFECT OF TYPE OF HOUSING AND LITTER ON PRODUCTION OF BROILERS KEYWORDS EFFECT LITTER
100	71	0468	EFFECT EFFECT OF VENTILATION ON THE GAS CONCENTRATION IN A PART- SLATTED PIGGERY KEYWORDS EFF
100	71	0571	EFFECT EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES
100	71	0681	EFFECT EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
200	69	0183	EFFECT THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	69	0433	EFFECT EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	71	0831	EFFECT EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYW
200	71	0833	EFFECT EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
300	70	0010	EFFECT THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WAST
300	70	0207	EFFECT THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMIC
300	70	0211	EFFECT THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE ON PRODUCTION, FEED-EFFICIENCY, BODY-WEI
300	71	0692	EFFECT EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
400	71	0305	EFFECT RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS
100	55	0328	EFFECTS EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	63	0436	EFFECTS POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	65	0066	EFFECTS THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR
100	65	0377	EFFECTS EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	67	0041	EFFECTS THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
100	69	0057	EFFECTS THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
100	69	0108	EFFECTS EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
100	69	0316	EFFECTS EFFECTS OF ATMOSPHERIC AMMONIA ON THE PIG KEYWORDS EFFECTS ATMOSPHERIC-AMMONIA PIG
100	70	0420	EFFECTS SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGO
100	70	0421	EFFECTS EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNE
200	68	0760	EFFECTS HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
200	69	0482	EFFECTS THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	69	1117	EFFECTS WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	70	0249	EFFECTS LAND DISPOSAL AND STORAGE OF FARM WASTES 1 PLANNING AND CHOICE OF SYSTEM KEYWORDS EF
200	70	0727	EFFECTS EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
300	68	1202	EFFECTS OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	68	1209	EFFECTS ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	70	0488	EFFECTS THE EFFECTS OF SALINITY-STANDARDS ON IRRIGATED-AGRICULTURE IN THE COLORADO-RIVER-BASIN
300	70	1036	EFFECTS AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	71	0671	EFFECTS REMOVAL OF WATER FROM ANIMAL MANURES, PART II EFFECTS OF VELOCITY ON AIR DRYING KEYWO
300	71	0629	EFFECTS THE EFFECTS OF CONTINUALLY RECYCLING DEHYDRATED POULTRY WASTES DPW ON THE PERFORMANCE
300	71	1245	EFFECTS EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
400	71	0293	EFFECTS SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	1139	EFFECTS HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
500	70	0405	EFFECTS EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
500	70	0406	EFFECTS EFFECTS OF AGRICULTURAL-POLLUTANTS ON RECREATIONAL-USES OF SURFACE-WATERS KEYWORDS R
500	70	0407	EFFECTS EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
600	70	0255	EFFECTS EFFECTS OF MANURE-DEPTHS ON RUNOFF FROM SOUTHWESTERN CATTLE-FEEDLOTS KEYWORDS RAINFAL
600	71	0494	EFFECTS A MODEL STUDY TO DETERMINE THE EFFECTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
100	65	0331	EFFICIENCIES DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
100	68	1229	EFFICIENCIES ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
200	66	0123	EFFICIENCIES PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELEC
200	69	0180	EFFICIENCIES FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
200	69	1102	EFFICIENCIES MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
400	65	0485	EFFICIENCIES POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-
100	70	1230	EFFICIENCY LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	65	0067	EFFLUENT EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
100	67	0230	EFFLUENT CATTLE-WASTES - POLLUTION AND POTENTIAL TREATMENT KEYWORDS ANAEROBIC-DIGESTION ANAEROB
100	68	0381	EFFLUENT WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100	69	0445	EFFLUENT EFFLUENT DISPOSAL KEYWORDS DAIRY NEW-ZEALAND EFFLUENT

KEYWORD INDEX

200 69 0199	EFFLUENT	RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200 70 0214	EFFLUENT	RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200 70 0221	EFFLUENT	LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
300 69 0006	EFFLUENT	SWINE WASTE MANAGEMENT-OXICATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
400 68 0033	EFFLUENT	IRRIGATING WITH ANIMAL WASTE KEYWORDS SPRINKLER-IRRIGATION SEWAGE-DISPOSAL EFFLUENT H
400 71 1172	EFFLUENT	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400 73 1168	EFFLUENT	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
400 73 1183	EFFLUENT	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
600 72 1071	EFFLUENT	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
700 69 1067	EFFLUENT	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700 70 1066	EFFLUENT	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
100 66 0341	EFFLUENTS	AGRICULTURE AND THE PREVENTION OF RIVER-POLLUTION, AS EXPERIENCED IN THE WEST-OF-SCOTLA
100 68 0077	EFFLUENTS	FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
100 69 0030	EFFLUENTS	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100 69 0035	EFFLUENTS	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100 69 0037	EFFLUENTS	WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
100 71 1228	EFFLUENTS	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100 72 1193	EFFLUENTS	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100 70 1237	EFFLUENTS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200 66 0135	EFFLUENTS	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200 66 0149	EFFLUENTS	EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
200 69 0168	EFFLUENTS	AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200 70 0687	EFFLUENTS	OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
200 72 1021	EFFLUENTS	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200 72 1022	EFFLUENTS	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
300 71 0457	EFFLUENTS	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300 71 0732	EFFLUENTS	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
300 71 1058	EFFLUENTS	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
400 68 0032	EFFLUENTS	NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
600 73 1065	EFFLUENTS	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700 70 1256	EFFLUENTS	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
100 67 0233	EFFLUENT-QUALITY	EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
300 70 0492	EFFLUENT-REUSE	DISTILLATION OF WASTEWATERS A WATER-RESOURCE FOR ARID-REGIONS KEYWORDS EFFLUENT-REUS
200 71 0598	EFFLUENT-STANDARDS	MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
100 70 0021	EGG	EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
100 66 0479	EGGS	THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
100 71 1221	EGGS	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100 72 1199	EGGS	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100 73 1164	EGGS	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200 66 0129	EGGS	WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
300 70 0204	EGGS	POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
400 70 0113	EGGS	LOCATING A POULTRY ENTERPRISE KEYWORDS NEIGHBORS EGGS
400 71 0293	EGGS	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
100 70 0025	EGG-HATCHABILITY	BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYW
100 71 0266	EGG-PRODUCTION	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS.
300 70 0210	EGG-PRODUCTION	THE RESULT OF FEEDING DRIED-POULTRY-WASTE TO LAYING HENS ON EGG-PRODUCTION AND FEED-CON
400 71 0293	EGG-PRODUCTION	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
100 71 0266	EGG-QUALITY	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
400 71 0293	EGG-QUALITY	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400 71 0293	EGG-SHELLS	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
300 70 0211	EGG-WEIGHT	THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE ON PRODUCTION, FEED-EFFICIENCY, BODY-WEI
600 69 1239	ELECTRICAL-CONDUCT	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
600 73 1065	ELECTRICAL-CONDUCT	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
100 70 1211	ELECTRICAL-GROUNDI	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
100 70 1211	ELECTRICAL-NETWORK	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
100 70 1211	ELECTRICAL-POTENTI	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
200 73 1082	ELECTRICITY	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
100 70 1211	ELECTRIC-CURRENTS	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
100 68 0106	ELECTRIC-POWER-COS	OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
700 70 1256	ELECTROMAGNETIC	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
200 66 0141	ELECTRO-OSMOSIS	REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
200 66 0142	ELECTRO-OSMOSIS	REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING E
200 66 0587	ELUTION-WATER	HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO
100 68 1121	ENDRIN	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100 66 0422	ENERGY	PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
100 69 0364	ENERGY	LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
100 73 1088	ENERGY	OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
200 73 1083	ENERGY	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
600 72 1153	ENERGY	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
200 71 0705	ENERGY-TRANSFER	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
100 58 0580	ENGINEERING	ENGINEERING PRINCIPLES IN HANDLING LIQUID MATERIALS KEYWORDS PUMPS ENGINEERING LIQUID
200 71 0766	ENGINEERING	RESPONSIBILITIES OF A PROFESSIONAL SOCIETY TOWARD URGENT SOCIAL PROBLEMS KEYWORDS TEC
200 71 0767	ENGINEERING	PUTTING IT ALL TOGETHER KEYWORDS FEDERAL-GOVERNMENTS STATE-GOVERNMENTS BUDGETING DESI
600 73 1075	ENGINEERING	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100 73 1069	ENGLAND	MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
400 64 0358	ENGLAND	TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400 66 0354	ENGLAND	SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS
400 67 0336	ENGLAND	DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND
400 68 0449	ENGLAND	WASTES FROM THE POULTRY INDUSTRY KEYWORDS ENGLAND POULTRY
500 71 1254	ENRICHMENT	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100 65 0699	ENTERIC-BACTERIS	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100 71 1212	ENTERIC-BACTERIA	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100 71 1213	ENTERIC-BACTERIA	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100 72 1224	ENTERIC-BACTERIA	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200 70 1053	ENTERIC-BACTERIA	BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
300 70 1101	ENTERIC-BACTERIA	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
300 71 0732	ENTERIC-BACTERIA	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
500 71 1254	ENTERIC-BACTERIA	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100 71 1212	ENTEROBACTER	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100 72 1224	ENTEROCOCCI	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200 69 0518	ENTEROCOCCI	HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEA
200 71 0812	ENTERVIRUS	PORCINE ENTEROVIRUS SURVIVAL AND ANAEROBIC SLUDGE DIGESTION KEYWORDS VIRUSES SWINE SLU
200 64 1241	ENTODINIUM-SIMPLEX	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
500 71 1254	ENUMRATION	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
200 68 1244	ENVIROMENTAL-SANIT	SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
300 71 1055	ENVIRONM	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
200 66 0115	ENVIRONMENT	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200 69 0158	ENVIRONMENT	REFLECTIONS ON POLLUTION CONTROL KEYWORDS WATER-QUALITY COST-BENEFIT-RATIO ENVIRONMEN
200 69 0516	ENVIRONMENT	PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200 69 0536	ENVIRONMENT	ROLE OF UNIVERSITY-EXTENSION KEYWORDS ENVIRONMENT EDUCATION UNIVERSITIES WATER-POLLUT

KEYWORD INDEX

200	69	0537	ENVIRONMENT WHERE DO WE GO FROM HERE KEYWORDS ENVIRONMENT TECHNOLOGY EDUCATION
200	70	0322	ENVIRONMENT FUNDING FOR AGRICULTURAL-WASTE RESEARCH KEYWORDS GRANTS USDA RESEARCH-FUNDS ENVIRONME
200	70	0326	ENVIRONMENT AGRICULTURAL-WASTE RESEARCH-NEEDS KEYWORDS ENVIRONMENT ODOR WASTE-HANDLING SURVEYS RE
200	71	0275	ENVIRONMENT THE CITIZENS-VIEW OF POLLUTION KEYWORDS ENVIRONMENT
300	71	0626	ENVIRONMENT DRYING OF POULTRY MANURE IN A CAGE-LAYER HOUSE KEYWORDS ODOR ENVIRONMENT AIR-VENTILATI
300	71	1035	ENVIRONMENT IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
300	71	1106	ENVIRONMENT MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
500	70	0386	ENVIRONMENT INTRODUCTION ISSUES IN FOOD-PRODUCTION AND CLEAN WATER KEYWORDS ENVIRONMENT FEEDLOTS
500	70	0411	ENVIRONMENT ACCOMPLISHMENTS AND GOALS KEYWORDS WATER-POLLUTION WATER-QUALITY FWPCA STANDARDS ENVI
100	63	0436	ENVIRONMENTAL POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	63	0436	ENVIRONMENTAL POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	71	0454	ENVIRONMENTAL SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION
200	68	0760	ENVIRONMENTAL-CONT HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
100	70	1037	ENVIRONMENTAL-EFFE NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	72	1224	ENVIRONMENTAL-EFFE FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	71	0740	ENVIRONMENTAL-EFFE PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
300	67	1253	ENVIRONMENTAL-ENGI WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	70	0592	ENVIRONMENTAL-EFFE PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300	70	1192	ENVIRONMENTAL-EFFE IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	71	0732	ENVIRONMENTAL-EFFE CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
200	72	1012	ENVIRONMENTAL-PROT REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1022	ENVIRONMENTAL-PROT RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200	72	1029	ENVIRONMENTAL-PROT CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
200	69	0161	ENVIRONMENTAL-QUAL THE CHALLENGE OF ANIMAL WASTE MANAGEMENT KEYWORDS ODORS WASTE-TREATMENT WASTE-MANAGEM
200	71	0283	ENVIRONMENTAL-QUAL ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS B
200	71	1095	ENVIRONMENTAL-QUAL BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
300	71	1035	ENVIRONMENTAL-QUAL IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
200	70	1050	ENVIRONMENTAL-SANI THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0604	ENVIRONMENTAL-SANI STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71	0274	ENVIRONMENT-QUALIT WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
200	70	1050	ENVIRONMNETAL-EFFE THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
100	71	0569	ENZYMATIC-EVALUATI ENZYMATIC EVALUATION OF PROCESSES FOR IMPROVING AGRICULTURAL WASTES FOR RUMINANT FEEDS
200	71	0809	ENZYME ENZYME FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOTMANURE KEYWORDS BOD AMINO
100	73	1155	ENZYMES THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
200	71	0594	EPA IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200	71	0595	EPA ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION E
200	71	0596	EPA SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
200	71	0613	EPA TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINIST
200	71	0619	EPA REPORTS AND RECOMMENDATIONS OF WORKING GROUPS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERN
200	64	1241	EPIDINIUM-ECAUDATU PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	72	1224	EQUATIONS FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	69	0166	EQUATIONS ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
100	69	0353	EQUIPMENT OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	70	0368	EQUIPMENT AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
100	71	0266	EQUIPMENT CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	66	0115	EQUIPMENT MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0128	EQUIPMENT MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPM
200	66	0148	EQUIPMENT ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
200	66	0154	EQUIPMENT FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMI
200	69	0056	EQUIPMENT PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200	69	0078	EQUIPMENT OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
200	69	0172	EQUIPMENT SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD
200	69	0423	EQUIPMENT 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0430	EQUIPMENT CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
200	70	0234	EQUIPMENT FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0242	EQUIPMENT MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	70	0248	EQUIPMENT PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
200	70	0250	EQUIPMENT LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
200	70	0251	EQUIPMENT AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
300	65	0053	EQUIPMENT FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
300	72	1157	EQUIPMENT CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	64	0335	EQUIPMENT EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRI
400	70	0097	EQUIPMENT POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
400	71	0313	EQUIPMENT TYPES OF MANURE DRYERS KEYWORDS DEHYDRATION EQUIPMENT
400	71	0504	EQUIPMENT COST OF DEHYDRATING POULTRY MANURE KEYWORDS SHELF-LIFE FERTILIZERS EQUIPMENT COST DEH
400	73	1145	EQUIPMENT FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
600	71	0272	EQUIPMENT A DOSING-SIPHON FOR DISCHARGING CLEANING-WATER INTO FLUSHING-GUTTERS KEYWORDS DESIGN
100	70	1195	EROSION AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	70	1233	EROSION LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	69	0429	EROSION CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROG
200	69	0431	EROSION MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	69	0433	EROSION EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	70	0224	EROSION HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
200	71	0282	EROSION SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHED
200	71	1095	EROSION BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	EROSION ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
300	72	1260	EROSION NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	71	1196	EROSION CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
300	71	1106	EROSION-CONTROL MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
500	70	0389	EROSION-CONTROL LAND AND WATER-MANAGEMENT FOR MINIMIZING SEDIMENT KEYWORDS SOIL-EROSION SEDIMENT-YIELD
600	72	1163	ESCHERICHIA-COLI ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
300	68	1122	ESSENTIAL-NUTRIENT NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
100	69	0094	ESTERS IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	72	1188	ESTERS IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
300	70	0385	ESTHETIC-EFFECTS AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
100	64	1200	ESTHWAITE-WATER-EN PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	69	0693	ESTROGEN IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
100	69	0693	ESTRONE IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
200	66	0154	EUROPE FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMI
100	64	1200	EUTROPHICATION PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	68	1121	EUTROPHICATION WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	0679	EUTROPHICATION NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
100	69	1231	EUTROPHICATION POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	1194	EUTROPHICATION REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1251	EUTROPHICATION AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	1039	EUTROPHICATION NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1197	EUTROPHICATION NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
200	69	0424	EUTROPHICATION ANIMAL WASTE RUNOFF-A MAJOR WATER QUALITY CHALLENGE KEYWORDS RUNOFF BOD POLLUTANT-IDE
200	69	0429	EUTROPHICATION CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROG
200	69	0482	EUTROPHICATION THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT

200	69	0527	EUTROPHICATION — WATER-RESOURCES-CENTER RESEARCH ON ANIMAL-WASTES AND WATER-QUALITY KEYWORDS EUTROPHIC
200	69	1117	EUTROPHICATION — WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	70	0727	EUTROPHICATION — EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200	71	0279	EUTROPHICATION — POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS KEYWORDS *NITRATE EUTROPHICATI*
200	71	0606	EUTROPHICATION — POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY
200	71	0642	EUTROPHICATION — AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
200	71	0649	EUTROPHICATION — LAND DISPOSAL OF MANURE IN RELATION TO WATER QUALITY KEYWORDS FERTILIZATION SURFACE-R
200	71	1099	EUTROPHICATION — SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300	64	1110	EUTROPHICATION — LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300	68	1122	EUTROPHICATION — NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	69	1125	EUTROPHICATION — ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	70	0491	EUTROPHICATION — WATER-QUALITY CONTROL PROBLEMS IN INLAND-SINKS KEYWORDS SALINITY EUTROPHICATION PYRAMI
300	70	0592	EUTROPHICATION — PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300	70	1036	EUTROPHICATION — AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	71	0591	EUTROPHICATION — AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN KEYWORDS RUNOFF PESTICIDES EUTROPHICAT
300	71	1055	EUTROPHICATION — ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	71	1107	EUTROPHICATION — WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400	67	1226	EUTROPHICATION — PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
400	69	1045	EUTROPHICATION — AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	69	1225	EUTROPHICATION — CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	73	1063	EUTROPHICATION — AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
500	70	0405	EUTROPHICATION — EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
700	71	1120	EUTROPHICATION — SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
200	66	0149	EVALUATING — EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
100	69	0040	EVALUATION — PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
100	69	0376	EVALUATION — EVALUATION OF *SEVERAL METHODS OF ISOLATING* SALMONELLA FROM POULTRY-LITTER AND ANIMAL-F
100	69	0714	EVALUATION — EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
100	72	1199	EVALUATION — IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
300	71	1056	EVALUATION — AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
100	71	1232	EVAPORATION — WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	70	0224	EVAPORATION — HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
200	70	1114	EVAPORATION — ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	70	1118	EVAPORATION — WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	71	0777	EVAPORATION — FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
300	68	0741	EVAPORATION — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
400	70	0351	EVAPORATIVE-LAGOON — DAIRY-SET-UP FOR 200 COWS KEYWORDS LAGOON COSTS FREE-STALL-HOUSING EVAPORATIVE-LAGOON
100	69	0108	EXCRETA — EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
100	69	0361	EXCRETA — NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
100	69	0364	EXCRETA — LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
100	69	0693	EXCRETION — IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
100	70	0112	MXCRETION — CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
200	66	0129	EXCRETION — WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
300	71	0514	EXCRETION-DATA — FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE KEYWORDS DECOMPOSITION DISE
600	72	1031	EXHAUST-FANS — ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
200	66	0141	EXPELLED-WATER — REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
200	66	0142	EXPELLED-WATER — REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING E
200	71	0619	EXTENSION-SERVICE — REPORTS AND RECOMMENDATIONS OF WORKING GROUPS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERN
500	70	0409	*EXTERNALITIES* — *ECONOMIC-ASPECTS* KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
100	71	0464	EXTRACTION — EXTRACTION OF BILE ACIDS FROM RAT FECES CONTAINING CHOLESTYRAMINE KEYWORDS EXTRACTION
600	72	1163	EXTRACTION — ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
600	72	1076	EXTRUSION — HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
100	62	0382	E-COLI — TYPE DISTRIBUTION OF COLIFORM BACTERIA IN THE FECES OF WARM-BLOODED ANIMALS KEYWORDS
100	65	0075	E-COLI — HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	69	0360	E-COLI — THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
100	71	1212	E-COLI — EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1213	E-COLI — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	72	1224	E-COLI — FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	64	1240	E-COLI — THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	70	1053	E-COLI — BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
200	71	0795	E-COLI — ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
300	70	1104	E-COLI — FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	71	0484	E-COLI — RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
200	69	0756	FACILITIES — SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
400	70	0268	FACILITIES — MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL UITIMATE-DISPOSAL WASTE-STORAGE F
100	69	0375	FACTOR — RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
400	71	0267	FACTORS — WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
100	73	1155	FAECEL-LIQUOR — THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	64	0072	FAECES — A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
100	69	0045	FAECES — THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRA
300	69	0004	FAILURE — CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
100	68	0306	FAILURES — ANAEROBIC DIGESTION FAILURES KEYWORDS *DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUFL*
200	66	0148	FALLEN-STOCK — ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
300	71	1106	FALLOUT — MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
200	66	0154	FAMILY-FARM — FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMI
100	63	1064	FAMOPHOS — TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	65	1091	FANNIA-CANICULARIS — TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
600	72	1154	FANS — WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
100	63	0436	FARM — POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	66	0437	FARM — PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	70	0413	FARM — VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
100	70	0418	FARM — ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
100	72	1097	FARM — NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
100	72	1188	FARM — IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
200	69	0541	FARM — FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0547	FARM — CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	71	0819	FARM — ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
400	69	0419	FARM — DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400	71	1135	FARM — ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
100	70	1195	FARMS — AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	71	1039	FARMS — NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
300	26	1204	FARMS — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	67	1249	FARMS — AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69	1125	FARMS — *ANIMAL WASTE DISPOSAL* PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
100	66	0478	FARMWASTES — LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
300	68	1043	FARM-AND-FORESTRY- — WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
200	71	1033	FARM-ANIMALS — NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
400	73	1063	FARM-ANIMALS — AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
200	71	0612	FARM-CREDIT-SYSTEM — PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
400	73	1068	FARM-ECOLOGY-COMPA — NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
100	71	1214	FARM-INCOME — THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION

100	62	0499	FARM-LAGOONS MANURE LAGOONS DESIGN CRITERIA AND MANAGEMENT KEYWORDS FARM-LAGOONS DESIGN-CRITERIA SI
100	62	1220	FARM-LAGOONS WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	68	0500	FARM-LAGOONS ANAEROBIC LAGOONS CONSIDERATIONS IN DESIGN AND APPLICATION KEYWORDS FARM-LAGOONS ANAER
100	73	1128	FARM-LAGOONS USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
200	70	1115	FARM-LAGOONS CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0655	FARM-LAGOONS ANAEROBIC BIOLOGICAL WASTE TREATMENT SYSTEMS KEYWORDS METHANE-BACTERIA FARM-LAGOONS AN
200	71	0733	FARM-LAGOONS ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0840	FARM-LAGOONS LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FA
300	67	1253	FARM-LAGOONS WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	71	0697	FARM-LAGOONS ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
300	72	1157	FARM-LAGOONS CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
600	72	1148	FARM-LAGOONS DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
100	62	1220	FARM-MANAGEMENT WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	71	1214	FARM-MANAGEMENT THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	68	1186	FARM-MANAGEMENT TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	68	1187	FARM-MANAGEMENT THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	70	0670	FARM-MANAGEMENT ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
300	68	1043	FARM-MANAGEMENT WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	70	1248	FARM-MANAGEMENT LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	1035	FARM-MANAGEMENT IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
400	73	1183	FARM-MANAGEMENT CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
700	70	1109	FARM-MANAGEMENT AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	70	0042	FARM-OPERTIONS STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
400	70	1176	FARM-PRACTICES ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
200	71	1094	FARM-PRICES AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	70	0720	FARM-WASTE PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0821	FARM-WASTE AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE
200	72	1011	FARM-WASTE NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
300	68	1122	FARM-WASTE NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
400	72	1179	FARM-WASTE THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
100	60	1078	FARM-WASTES EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
100	62	1220	FARM-WASTES WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	63	1064	FARM-WASTES TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	65	0699	FARM-WASTES THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	65	1079	FARM-WASTES UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	65	1091	FARM-WASTES TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
100	66	1080	FARM-WASTES NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	69	1042	FARM-WASTES THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
100	69	1231	FARM-WASTES POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	1037	FARM-WASTES NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	70	1040	FARM-WASTES STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	70	1041	FARM-WASTES STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	70	1090	FARM-WASTES COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	70	1251	FARM-WASTES AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0266	FARM-WASTES CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0447	FARM-WASTES LIVESTOCK WASTES - ANNUAL LITERATURE REVIEW KEYWORDS LITERATURE LIVESTOCK FARM-WASTES
100	71	0484	FARM-WASTES RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
100	71	1038	FARM-WASTES CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100	71	1039	FARM-WASTES NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1047	FARM-WASTES OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	71	1092	FARM-WASTES EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	71	1197	FARM-WASTES NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	71	1214	FARM-WASTES THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	71	1228	FARM-WASTES ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100	71	1236	FARM-WASTES MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100	72	1129	FARM-WASTES BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
100	72	1193	FARM-WASTES CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100	72	1224	FARM-WASTES FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
100	72	1235	FARM-WASTES BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
100	73	1034	FARM-WASTES TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
100	73	1069	FARM-WASTES MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100	73	1086	FARM-WASTES THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
100	73	1087	FARM-WASTES ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	73	1128	FARM-WASTES USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
100	73	1164	FARM-WASTES SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
100	73	1165	FARM-WASTES FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
100	73	1184	FARM-WASTES ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
100	73	1263	FARM-WASTES CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
200	66	1112	FARM-WASTES CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	67	0734	FARM-WASTES CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	68	0694	FARM-WASTES THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200	68	0726	FARM-WASTES ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES
200	68	1186	FARM-WASTES TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	68	1187	FARM-WASTES THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	69	0516	FARM-WASTES PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200	69	1116	FARM-WASTES MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	69	1117	FARM-WASTES WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	69	1185	FARM-WASTES ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0670	FARM-WASTES ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	1053	FARM-WASTES BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
200	70	1113	FARM-WASTES AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1114	FARM-WASTES ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	70	1115	FARM-WASTES CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	70	1118	FARM-WASTES WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	70	1159	FARM-WASTES METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	71	0763	FARM-WASTES ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
200	71	0764	FARM-WASTES FUTURE PROSPECTS FOR ANIMAL AGRICULTURE KEYWORDS ECONOMICS INCOME FARM-WASTES NUTRIEN
200	71	0771	FARM-WASTES TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA KEYWORDS
200	71	0779	FARM-WASTES EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200	71	0795	FARM-WASTES ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
200	71	0846	FARM-WASTES NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0851	FARM-WASTES NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	71	0857	FARM-WASTES NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
200	71	1094	FARM-WASTES AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1095	FARM-WASTES BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	FARM-WASTES ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	71	1234	FARM-WASTES SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200	72	1010	FARM-WASTES PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1012	FARM-WASTES REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1013	FARM-WASTES POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI

200	72	1014	FARM-WASTES	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1015	FARM-WASTES	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
200	72	1016	FARM-WASTES	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1017	FARM-WASTES	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200	72	1018	FARM-WASTES	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1019	FARM-WASTES	PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1020	FARM-WASTES	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1021	FARM-WASTES	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1022	FARM-WASTES	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200	72	1023	FARM-WASTES	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	72	1025	FARM-WASTES	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1026	FARM-WASTES	REGIONAL ADMINISTRATORS SUMMARY KEYWORDS FARM-WASTES RESEARCH
200	72	1028	FARM-WASTES	AREA DIRECTORS SUMMARY KEYWORDS FARM-WASTES MANAGEMENT FEED-LOTS US-MEAT-ANIMAL-RESEARC
200	72	1029	FARM-WASTES	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
200	72	1030	FARM-WASTES	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
200	72	1054	FARM-WASTES	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
200	72	1089	FARM-WASTES	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
200	72	1108	FARM-WASTES	EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
200	72	1152	FARM-WASTES	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
200	73	1062	FARM-WASTES	CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
200	73	1082	FARM-WASTES	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	FARM-WASTES	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
200	73	1093	FARM-WASTES	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
200	73	1189	FARM-WASTES	A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300		1077	FARM-WASTES	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300		1105	FARM-WASTES	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	26	1204	FARM-WASTES	OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	46	1207	FARM-WASTES	FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
300	46	1208	FARM-WASTES	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	62	0754	FARM-WASTES	NOTES ON WATER POLLUTION WASTE WATERS FROM FARMS KEYWORDS FARM-WASTES IRRIGATION BOD
300	67	1249	FARM-WASTES	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	67	1253	FARM-WASTES	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	68	0741	FARM-WASTES	RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	68	1043	FARM-WASTES	WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	68	1123	FARM-WASTES	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	68	1209	FARM-WASTES	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	1044	FARM-WASTES	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1060	FARM-WASTES	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1061	FARM-WASTES	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	69	1103	FARM-WASTES	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	69	1124	FARM-WASTES	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	69	1125	FARM-WASTES	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	69	1180	FARM-WASTES	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	69	1203	FARM-WASTES	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	0384	FARM-WASTES	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	0385	FARM-WASTES	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	1000	FARM-WASTES	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
300	70	1036	FARM-WASTES	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	70	1059	FARM-WASTES	NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	70	1247	FARM-WASTES	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	70	1248	FARM-WASTES	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0584	FARM-WASTES	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
300	71	0677	FARM-WASTES	THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	1008	FARM-WASTES	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300	71	1035	FARM-WASTES	IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY KEYWORDS
300	71	1081	FARM-WASTES	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
300	71	1106	FARM-WASTES	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	71	1107	FARM-WASTES	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	71	1119	FARM-WASTES	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
300	71	1246	FARM-WASTES	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300	72	1003	FARM-WASTES	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
300	72	1052	FARM-WASTES	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
300	72	1070	FARM-WASTES	PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
300	72	1085	FARM-WASTES	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
300	72	1146	FARM-WASTES	FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS KEYWORDS FARM-WASTES SHEEP FEED-LOTS PROT
300	72	1157	FARM-WASTES	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1170	FARM-WASTES	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
300	72	1182	FARM-WASTES	BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
300	72	1260	FARM-WASTES	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
300	72	1264	FARM-WASTES	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
300	73	1009	FARM-WASTES	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400	65	1127	FARM-WASTES	WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400	65	1141	FARM-WASTES	NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
400	69	1045	FARM-WASTES	AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	70	0268	FARM-WASTES	MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL UITIMATE-DISPOSAL WASTE-STORAGE F
400	70	0308	FARM-WASTES	DEEP PIT SLAT-FLOOR BREEDING HOUSE KEYWORDS POULTRY FARM-WASTES SLOTTED-FLOOR VENTILA
400	70	1132	FARM-WASTES	THE GREAT MANURE DILEMMA KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT RECYCLING FARM-WASTES
400	70	1133	FARM-WASTES	POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	71	0264	FARM-WASTES	HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE-DISPOSAL WASTE-DUMPS FAR
400	71	0293	FARM-WASTES	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	0297	FARM-WASTES	BROODER-GROW CAGES OVER DEEP PIT KEYWORDS POULTRY FARM-WASTES VENTILATION PIT STORAGE
400	71	0298	FARM-WASTES	MANAGING SWINE WASTES TO PREVENT POLLUTION KEYWORDS FARM-WASTES HOGS WASTE-WATER-DISP
400	71	0327	FARM-WASTES	RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
400	71	0686	FARM-WASTES	NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF KEYWORDS CATTLE WASTE-TREATMENT SUSPEN
400	71	0731	FARM-WASTES	DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPO
400	71	1131	FARM-WASTES	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
400	71	1134	FARM-WASTES	FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
400	71	1136	FARM-WASTES	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	71	1137	FARM-WASTES	REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEED
400	71	1139	FARM-WASTES	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
400	71	1143	FARM-WASTES	A LOVELY NEW SCENT FOR MANURE KEYWORDS AIR-POLLUTION SAGEBRUSH FARM-WASTES ODOR
400	71	1144	FARM-WASTES	CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
400	71	1174	FARM-WASTES	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	72	1032	FARM-WASTES	NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
400	72	1130	FARM-WASTES	THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
400	72	1138	FARM-WASTES	HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
400	72	1171	FARM-WASTES	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
400	72	1173	FARM-WASTES	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEEL-LOTS LAGOONS OXYGEN NITROGEN
400	73	1007	FARM-WASTES	FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
400	73	1063	FARM-WASTES	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES

400	73	1068	FARM-WASTES	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400	73	1073	FARM-WASTES	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
400	73	1140	FARM-WASTES	ANOTHER POSSIBLE PROCESS FOR MANURE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT FERT
400	73	1145	FARM-WASTES	FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
400	73	1168	FARM-WASTES	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
400	73	1178	FARM-WASTES	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
400	73	1183	FARM-WASTES	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
400	73	1191	FARM-WASTES	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
500	71	1072	FARM-WASTES	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
500	71	1255	FARM-WASTES	DISEASES OF FEEDLOT CATTLE KEYWORDS ANIMAL-DISEASES CATTLE FEED-LOTS FARM-WASTES WATER-
600	69	1005	FARM-WASTES	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	71	0495	FARM-WASTES	CONTAMINATION OF SURFACE WATERS FROM PLOWED-IN FEEDLOT MANURE KEYWORDS FARM-WASTES DI
600	71	0496	FARM-WASTES	DESORPTION OF AMMONIA FROM ANAERCBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION
600	71	0497	FARM-WASTES	DEHYDRATION OF ANIMAL WASTES KEYWORDS FARM-WASTES DEHYDRATION FERTILIZERS
600	72	1001	FARM-WASTES	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
600	72	1002	FARM-WASTES	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
600	72	1004	FARM-WASTES	CORRELATING OIL AND ODORDUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600	72	1031	FARM-WASTES	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1071	FARM-WASTES	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1076	FARM-WASTES	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
600	72	1148	FARM-WASTES	DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
600	72	1149	FARM-WASTES	MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
600	72	1153	FARM-WASTES	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
600	72	1154	FARM-WASTES	WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
600	72	1156	FARM-WASTES	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	72	1169	FARM-WASTES	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600	72	1177	FARM-WASTES	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
600	73	1065	FARM-WASTES	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
600	73	1075	FARM-WASTES	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
600	73	1147	FARM-WASTES	SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
700	69	1067	FARM-WASTES	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700	70	1066	FARM-WASTES	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1109	FARM-WASTES	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
700	71	1120	FARM-WASTES	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
700	72	1048	FARM-WASTES	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
100	68	0077	FARM-WASTE-DISPOSA	FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
200	70	0244	FARROWING	MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
300	70	1000	FARROWING-HOUSE	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
300	70	0210	FAT	THE RESULT OF FEEDING DRIED-POULTRY-WASTE TO LAYING HENS ON EGG-PRODUCTION AND FEED-CON
100	71	0303	FATE	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
100	71	0682	FATTY-ACID	AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KE
700	70	0231	FECAL	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
100	73	1263	FECAL-DRY-MATTER	CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
100	73	1190	FECAL-EXCRETION	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
200	66	0136	FECAL-MATERIAL	ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
100	62	0382	FECAL-POLLUTION	TYPE DISTRIBUTION OF COLIFORM BACTERIA IN THE FECES OF WARM-BLOODED ANIMALS KEYWORDS
300	71	0512	FECAL-RESIDUES	FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS NITR
300	71	0513	FECAL-RESIDUES	FECAL-RESIDUES FROM FEED ADDITIVES--SWINE KEYWORDS HAZARDS GROWTH-RATES DIETHYISTILBES
300	71	0514	FECAL-RESIDUES	FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE KEYWORDS DECOMPOSITION DISE
300	71	0515	FECAL-RESIDUES	FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
100	68	0044	FECES	THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	69	0714	FECES	EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
100	70	0023	FECES	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
100	70	0034	FECES	A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND
100	70	1051	FECES	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	71	1232	FECES	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	72	1215	FECES	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
200	64	1240	FECES	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	66	0155	FECES	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
300	71	0625	FECES	THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE K
200	70	1050	FEDERAL-GOVERNMENT	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0765	FEDERAL-GOVERNMENT	ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWO
200	71	0767	FEDERAL-GOVERNMENT	PUTTING IT ALL TOGETHER KEYWORDS FEDERAL-GOVERNMENTS STATE-GOVERNMENTS BUDGETING DESI
300	68	1202	FEDERAL-GOVERNMENT	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	71	0301	FEDERAL-GOVERNMENT	STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDE
300	71	0689	FEDERAL-GOVERNMENT	WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MA
300	71	1107	FEDERAL-GOVERNMENT	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
200	71	0663	FEDERAL-REGULATION	INTEGRATION OF COMPONENTS INTO A SYSTEM KEYWORDS WATER-QUALITY-ACT FERTILIZERS DISPOS
200	71	0597	FEDERAL-WATER-QUAL	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
100	71	0312	FEDES	REDUCTION AND ESTERIFICATION OF CHOLESTEROL AND SITOSTEROL BY HOMOGENATES OF FECES KEY
100	69	0108	FEED	EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
100	69	0361	FEED	NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
100	70	0418	FEED	ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
100	71	0572	FEED	AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
100	71	0748	FEED	THE ELIMINATION OF ODOR FROM THE EFFLUENT GASES OF CHICKEN MANURE DRYING PLANT KEYWORD
100	71	0688	FEED	CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
200	66	0115	FEED	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	71	0797	FEED	GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
300	70	0204	FEED	POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	70	0743	FEED	GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
300	71	0692	FEED	EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
400	71	1135	FEED	ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
100	60	1078	FEEDING	EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
100	71	0751	FEEDING	ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
200	70	0719	FEEDING	FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE P
400	73	1191	FEEDING-OUT-AND-FI	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
100	64	0343	FEEDLOT	BOVINE-SALMONELLOSIS IN A FEEDLOT OPERATION KEYWORDS MUD ANTIBIOTICS STAGNANT-WATER
100	66	0506	FEEDLOT	CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE
100	67	0104	FEEDLOT	MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
100	67	0302	FEEDLOT	SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF KEYWORDS SALMONELLA INFANTIS FEEDLOT RUNO
100	70	0738	FEEDLOT	MODELING FEEDLOT POLLUTION I ANALOG SIMULATION KEYWORDS RUNOFF MODELING FEEDLOT
100	71	0573	FEEDLOT	METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS
100	71	0758	FEEDLOT	HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
200	64	0759	FEEDLOT	STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	66	0115	FEEDLOT	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0125	FEEDLOT	SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
200	69	0181	FEEDLOT	FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200	69	0182	FEEDLOT	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
200	69	0426	FEEDLOT	REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
200	69	0430	FEEDLOT	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ

200	69	0547	FEEDLOT CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	69	0551	FEEDLOT MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULAT
200	69	0559	FEEDLOT FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
200	69	0561	FEEDLOT INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUN
200	70	0216	FEEDLOT GROUNDWATER QUALITY AND FLUCTUATIONS IN A SHALLOW UNCONFINED AQUIFER UNDER A LEVEL FEED
200	70	0223	FEEDLOT NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
200	71	0599	FEEDLOT THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0602	FEEDLOT STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS RUNOFF LAWS FEEDLOT V
200	71	0709	FEEDLOT BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
200	71	0777	FEEDLOT FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0778	FEEDLOT LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200	71	0779	FEEDLOT EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
300	67	0710	FEEDLOT FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
300	71	0301	FEEDLOT STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDE
300	72	1085	FEEDLOT CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
400	70	0092	FEEDLOT SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
400	71	0753	FEEDLOT MANURE CAN BE PROCESSED AND SOLD AT A PROFIT KEYWORD FEEDLOT CATTLE MARKET-VALUE WAST
100	65	0470	FEEDLOTS CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
100	67	0076	FEEDLOTS NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS KEYWORDS NITRATES WATER-
100	67	0230	FEEDLOTS CATTLE-WASTES - POLLUTION AND POTENTIAL TREATMENT KEYWORDS ANAEROBIC-DIGESTION ANAEROB
100	69	0103	FEEDLOTS NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE F
100	70	0047	FEEDLOTS PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
100	70	1251	FEEDLOTS AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0318	FEEDLOTS RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
100	71	0589	FEEDLOTS SOIL MICROBIOLOGY AND BIOCHEMISTRY KEYWORDS NITROGEN AMMONIA-VOLATILIZATION FEEDLOTS
200	66	0120	FEEDLOTS STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0150	FEEDLOTS PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	67	0734	FEEDLOTS CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	69	0157	FEEDLOTS ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0548	FEEDLOTS RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200	69	0553	FEEDLOTS STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0676	FEEDLOTS CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS KEYWORDS RUNOFF GR
200	70	0054	FEEDLOTS POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
200	70	0214	FEEDLOTS RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0224	FEEDLOTS HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
200	70	0232	FEEDLOTS CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORDS RUNOFF IRRIGATI
200	70	0498	FEEDLOTS WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	71	0586	FEEDLOTS CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT KEYWORDS LIVESTOCK-WASTES WATER
200	71	0596	FEEDLOTS SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
200	71	0597	FEEDLOTS STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0598	FEEDLOTS MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200	71	0703	FEEDLOTS FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0798	FEEDLOTS THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS
200	71	0826	FEEDLOTS CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	71	0827	FEEDLOTS A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM
200	71	0845	FEEDLOTS CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS NE
200	71	1234	FEEDLOTS SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200	72	1013	FEEDLOTS POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1108	FEEDLOTS EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
200	73	1082	FEEDLOTS COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300	67	1250	FEEDLOTS DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	68	0741	FEEDLOTS RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	69	0300	FEEDLOTS WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	69	1125	FEEDLOTS ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	70	0384	FEEDLOTS THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	1059	FEEDLOTS NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	71	0584	FEEDLOTS STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
300	71	0677	FEEDLOTS THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	0689	FEEDLOTS WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MA
300	71	0692	FEEDLOTS EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
300	71	1245	FEEDLOTS EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
400	69	0016	FEEDLOTS FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
400	71	1196	FEEDLOTS CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400	73	1007	FEEDLOTS FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
500	70	0386	FEEDLOTS INTRODUCTION ISSUES IN FOOD-PRODUCTION AND CLEAN WATER KEYWORDS ENVIRONMENT FEEDLOTS
500	70	0399	FEEDLOTS LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
500	70	0410	FEEDLOTS ALLIANCE FOR ACTION KEYWORDS WATER-POLLUTION FEEDLOTS REGISTRATION INVENTORY WASTE-MA
600	72	1001	FEEDLOTS INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
700	69	0712	FEEDLOTS CATTLE FEEDLOT WASTE CHARACTERISTICS KEYWORDS FEEDLOTS BOD HYDROGEN-ION-CONCENTRATION
100	71	1236	FEEDLOT-CATTLE MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
300	71	1257	FEEDLOT-DESIGN EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
100	69	0071	FEEDLOT-LAYOUT ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
200	69	0183	FEEDLOT-LAYOUT THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
600	71	0495	FEEDLOT-MANURE CONTAMINATION OF SURFACE WATERS FROM PLOWED-IN FEEDLOT MANURE KEYWORDS FARM-WASTES DI
200	69	0170	FEEDLOT-PERFORMANC THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
200	69	0539	FEEDLOT-POLLUTION- PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE KEYWORDS CATTLE WATER-POLLUTION FEEDL
300	71	1057	FEEDLOT-POLLUTION EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
200	69	0539	FEEDLOT-REGULATION PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE KEYWORDS CATTLE WATER-POLLUTION FEEDL
300	69	0093	FEEDLOT-RUNOFF HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
300	71	0466	FEEDLOT-RUNOFF INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
100	67	0233	FEEDLOT-WASTES EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
300	71	0466	FEEDPEN-RUNOFF-SLO INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
100	55	0328	FEEDS EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	65	1079	FEEDS UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	66	0422	FEEDS PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
100	70	0082	FEEDS HOUSE FLY PUPAE AS FOOD FOR POULTRY KEYWORDS FEEDS NUTRIENTS MUSCA-DOMESTICA
100	70	1090	FEEDS COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	71	0569	FEEDS ENZYMATIC EVALUATION OF PROCESSES FOR IMPROVING AGRICULTURAL WASTES FOR RUMINANT FEEDS
100	71	0751	FEEDS ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	71	1092	FEEDS EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	71	1221	FEEDS DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	72	1199	FEEDS IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	73	1128	FEEDS USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
100	73	1165	FEEDS FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
200	66	0145	FEEDS VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	66	0147	FEEDS COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	69	0170	FEEDS THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
200	69	0171	FEEDS CATTLE MANURE- REUSE THROUGH WASTELAGE FEEDING KEYWORDS FEEDS PERFORMANCES WASTELAGE
200	72	1089	FEEDS A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
200	72	1152	FEEDS PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIRONMENT DURING A FAL

200	73	1093	FEEDS	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
300		1105	FEEDS	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	71	1098	FEEDS	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
400	71	0293	FEEDS	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	1134	FEEDS	FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
400	71	1172	FEEDS	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400	72	1130	FEEDS	THE OPCCU DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
400	73	1068	FEEDS	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400	73	1145	FEEDS	FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
400	73	1145	FEEDS	FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
600	73	1075	FEEDS	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
400	71	0686	FEEDSTUFF	NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF KEYWORDS CATTLE WASTE-TREATMENT SUSPEN
200	73	1093	FEED-ADDITIVES	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
300	71	0511	FEED-ADDITIVES	ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
100	71	0461	FEED-CONVERSION	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
200	69	0187	FEED-CONVERSION	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
300	70	0210	FEED-CONVERSION	THE RESULT OF FEEDING DRIED-POULTRY-WASTE TO LAYING HENS ON EGG-PRODUCTION AND FEED-CON
300	71	0627	FEED-EFFECIENCY	DRIED POULTRY WASTE AS A PROTEIN SOURCE FOR FEEDLOT CATTLE KEYWORDS FEED-EFFECIENCY R
100	70	0014	FEED-EFFICIENCY	INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GA
200	66	0125	FEED-EFFICIENCY	SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
300	70	0209	FEED-EFFICIENCY	THE UTILIZATION OF POULTRY-WASTE AS A FEEDSTUFF FOR GROWING CHICKS KEYWORDS DEHYDRATI
300	71	0621	FEED-EFFICIENCY	POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
300	71	1261	FEED-GRAINS	INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
200	71	0789	FEED-LOT	ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
200	72	1022	FEED-LOT	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
100	62	1220	FEED-LOTS	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	63	1064	FEED-LOTS	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	68	0730	FEED-LOTS	AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
100	70	1227	FEED-LOTS	AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	71	1197	FEED-LOTS	NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	72	1097	FEED-LOTS	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
100	72	1129	FEED-LOTS	BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
100	72	1188	FEED-LOTS	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	72	1235	FEED-LOTS	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
100	73	1087	FEED-LOTS	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
200	68	0726	FEED-LOTS	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES
200	69	1185	FEED-LOTS	ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	1175	FEED-LOTS	ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200	71	0773	FEED-LOTS	MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
200	71	0776	FEED-LOTS	CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDL
200	71	0780	FEED-LOTS	THE WASTE PATTERN OF BEEF CATTLE ON SLATTED FLOORS KEYWORDS FEED-LOTS CONFINEMENT-PEN
200	72	1010	FEED-LOTS	PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1011	FEED-LOTS	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1014	FEED-LOTS	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1015	FEED-LOTS	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
200	72	1017	FEED-LOTS	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200	72	1018	FEED-LOTS	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1019	FEED-LOTS	PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1020	FEED-LOTS	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1021	FEED-LOTS	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1023	FEED-LOTS	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	72	1024	FEED-LOTS	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1025	FEED-LOTS	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1028	FEED-LOTS	AREA DIRECTORS SUMMARY KEYWORDS FARM-WASTES MANAGEMENT FEED-LOTS US-MEAT-ANIMAL-RESEARC
200	72	1029	FEED-LOTS	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
200	72	1030	FEED-LOTS	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
200	72	1054	FEED-LOTS	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
200	73	1189	FEED-LOTS	A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300		1077	FEED-LOTS	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	67	0711	FEED-LOTS	THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
300	69	1180	FEED-LOTS	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	70	1000	FEED-LOTS	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
300	71	0700	FEED-LOTS	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
300	71	1008	FEED-LOTS	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300	71	1261	FEED-LOTS	INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
300	72	1003	FEED-LOTS	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
300	72	1146	FEED-LOTS	FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS KEYWORDS FARM-WASTES SHEEP FEED-LOTS PROT
300	72	1264	FEED-LOTS	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
300	73	1009	FEED-LOTS	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400	65	1127	FEED-LOTS	WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400	65	1141	FEED-LOTS	NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
400	67	1226	FEED-LOTS	PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
400	70	1133	FEED-LOTS	POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	71	1131	FEED-LOTS	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
400	71	1134	FEED-LOTS	FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
400	71	1136	FEED-LOTS	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	71	1137	FEED-LOTS	REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEED
400	71	1139	FEED-LOTS	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
400	71	1144	FEED-LOTS	CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
400	71	1174	FEED-LOTS	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	72	1032	FEED-LOTS	NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
400	72	1138	FEED-LOTS	HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
400	72	1171	FEED-LOTS	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
400	72	1173	FEED-LOTS	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
400	72	1179	FEED-LOTS	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
400	73	1063	FEED-LOTS	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400	73	1068	FEED-LOTS	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400	73	1140	FEED-LOTS	ANOTHER POSSIBLE PROCESS FOR MANURE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT FERT
400	73	1145	FEED-LOTS	FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
400	73	1158	FEED-LOTS	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
400	73	1183	FEED-LOTS	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
400	73	1191	FEED-LOTS	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
500	71	1255	FEED-LOTS	DISEASES OF FEEDLOT CATTLE KEYWORDS ANIMAL-DISEASES CATTLE FEED-LOTS FARM-WASTES WATER-
600	69	1005	FEED-LOTS	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	69	1160	FEED-LOTS	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
600	72	1002	FEED-LOTS	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
600	72	1071	FEED-LOTS	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1074	FEED-LOTS	SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
600	72	1149	FEED-LOTS	MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
600	72	1153	FEED-LOTS	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS

600	72	1154	FEED-LOTS WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
600	72	1177	FEED-LOTS DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
600	72	1262	FEED-LOTS CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
600	73	1147	FEED-LOTS SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
700	69	1067	FEED-LOTS ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
200	69	0164	FEED-RATION SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
100	69	0361	FEED-VALUE NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
200	71	0600	FEED-YARD-ACT STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
100	73	1190	FEMUR-DEPOSITION NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
100	72	1215	FERBAM AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	55	0328	FERMENTATION EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	70	0342	FERMENTATION IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION CO
100	70	0418	FERMENTATION ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
100	73	1034	FERMENTATION TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
200	64	1240	FERMENTATION THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	64	1241	FERMENTATION PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	69	0169	FERMENTATION INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
200	71	1099	FERMENTATION SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
400	71	0305	FERMENTATION RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS
100	73	1034	FERMENTOR-SAMPLING TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
100	70	0025	FERTILITY BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYW
100	73	1162	FERTILITY PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
200	70	0237	FERTILITY THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	70	0720	FERTILITY PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0278	FERTILITY POPULATION GROWTH-RATE SHOULDNT GET ALL THE BLAME KEYWORDS FERTILITY CITIES RESOURCES
100	62	1220	FERTILIZATION WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	65	1219	FERTILIZATION NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
200	70	0222	FERTILIZATION THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200	71	0604	FERTILIZATION STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71	0608	FERTILIZATION RECYCLING OF ANIMAL WASTES KEYWORDS REUSE FERTILIZATION NUTRITION PHOSPHORUS NITROGEN
200	71	0648	FERTILIZATION FERTILIZER PRACTICES WHICH MINIMIZE NUTRIENT LOSS KEYWORDS FERTILIZER-REQUIREMENTS CR
200	71	0649	FERTILIZATION LAND DISPOSAL OF MANURE IN RELATION TO WATER QUALITY KEYWORDS FERTILIZATION SURFACE-R
200	71	0660	FERTILIZATION UTILIZATION OF AGRICULTURAL WASTES KEYWORDS WASTE-BYPRODUCTS ARTIFICAL-USE WASTE-DISP
200	71	0831	FERTILIZATION EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYW
200	71	0832	FERTILIZATION GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SA
200	71	0833	FERTILIZATION EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
200	71	0834	FERTILIZATION SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
300	70	1059	FERTILIZATION NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
100	60	0059	FERTILIZER THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
100	68	0044	FERTILIZER THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	68	0730	FERTILIZER AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
100	70	0042	FERTILIZER STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
100	71	0721	FERTILIZER HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOF
200	66	0149	FERTILIZER EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
200	66	0151	FERTILIZER ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	66	0153	FERTILIZER POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
200	66	0155	FERTILIZER PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
200	69	0157	FERTILIZER ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0186	FERTILIZER MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
200	69	0202	FERTILIZER ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
200	69	0427	FERTILIZER MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NU
200	70	0226	FERTILIZER A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
200	70	0227	FERTILIZER RATES OF WATER-INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY-MANURE KEYWORDS ROT
200	70	0498	FERTILIZER WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	70	0670	FERTILIZER ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0716	FERTILIZER BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	70	0719	FERTILIZER FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE P
200	71	0594	FERTILIZER IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
300	67	0710	FERTILIZER FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECOND
400	71	0731	FERTILIZER DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPO
400	73	1007	FERTILIZER FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
500	70	0386	FERTILIZER INTRODUCTION ISSUES IN FOOD-PRODUCTION AND CLEAN WATER KEYWORDS ENVIRONMENT FEEDLOTS
500	70	0390	FERTILIZER SIGNIFICANCE OF PHOSPHORUS IN WATER-SUPPLIES KEYWORDS NUTRIENTS FERTILIZER DETERGENTS
500	70	0400	FERTILIZER MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTIL
100	62	1220	FERTILIZERS WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	65	0377	FERTILIZERS EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	65	1079	FERTILIZERS UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	66	1080	FERTILIZERS NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	67	0079	FERTILIZERS SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	67	0448	FERTILIZERS INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM KEYWORDS ODOR ANAEROBIC-DIGESTION METHAN
100	68	1121	FERTILIZERS WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	0060	FERTILIZERS RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTI
100	69	0061	FERTILIZERS SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	69	1042	FERTILIZERS THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
100	70	0051	FERTILIZERS IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	70	0365	FERTILIZERS AGRICULTURE FACES NEW CHALLANGES IN CURRENT ENVIRONMENTAL CRISIS KEYWORDS WATER SALIN
100	70	0417	FERTILIZERS ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100	70	0510	FERTILIZERS CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FER
100	70	1037	FERTILIZERS NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	70	1041	FERTILIZERS STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	70	1194	FERTILIZERS REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1233	FERTILIZERS LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	71	1039	FERTILIZERS NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1197	FERTILIZERS NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	71	1214	FERTILIZERS THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	73	1069	FERTILIZERS MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
200	69	0173	FERTILIZERS USE OF POULTRY MANURE FOR CORRECTION OF ZN AND FE DEFICIENCIES IN PLANTS KEYWORDS FER
200	69	0200	FERTILIZERS THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200	69	0201	FERTILIZERS ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
200	69	0423	MERTILIZERS 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0429	FERTILIZERS CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROG
200	69	0431	FERTILIZERS MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	69	0482	FERTILIZERS THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	70	0214	FERTILIZERS RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0220	FERTILIZERS THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
200	70	0243	FERTILIZERS MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	71	0663	FERTILIZERS INTEGRATION OF COMPONENTS INTO A SYSTEM KEYWORDS WATER-QUALITY-ACT FERTILIZERS DISPOS
200	71	0816	FERTILIZERS ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS
200	71	0817	FERTILIZERS MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALU
200	71	0853	FERTILIZERS RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O

200	71	0854	FERTILIZERS — MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
200	71	0856	FERTILIZERS — GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTIL
200	71	1033	FERTILIZERS — NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	71	1094	FERTILIZERS — AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1095	FERTILIZERS — BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1252	FERTILIZERS — NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200	73	1082	FERTILIZERS — COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1189	FERTILIZERS — A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300	65	0739	FERTILIZERS — NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
300	68	0256	FERTILIZERS — USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENE
300	68	1043	FERTILIZERS — WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	68	1122	FERTILIZERS — NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	70	0592	FERTILIZERS — PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300	70	1036	FERTILIZERS — AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	70	1059	FERTILIZERS — NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	70	1192	FERTILIZERS — *IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-*
300	71	0591	FERTILIZERS — AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN KEYWORDS RUNOFF PESTICIDES EUTROPHICAT
300	71	1058	FERTILIZERS — DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300	72	1157	FERTILIZERS — CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1260	FERTILIZERS — NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	65	1127	FERTILIZERS — WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400	66	0088	FERTILIZERS — POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
400	68	0229	FERTILIZERS — THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTIO
400	69	0016	FERTILIZERS — FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
400	69	1045	FERTILIZERS — AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	69	1225	FERTILIZERS — CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	70	0070	FERTILIZERS — SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
400	70	1176	FERTILIZERS — ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
400	71	0504	FERTILIZERS — COST OF DEHYDRATING POULTRY MANURE KEYWORDS SHELF-LIFE FERTILIZERS EQUIPMENT COST DEH
400	71	1174	FERTILIZERS — *LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L*
400	71	1196	FERTILIZERS — CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400	72	1130	FERTILIZERS — THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
400	72	1166	FERTILIZERS — HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400	73	1063	FERTILIZERS — AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400	73	1140	FERTILIZERS — ANOTHER POSSIBLE PROCESS FOR MANURE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT FERT
400	73	1168	FERTILIZERS — CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
400	73	1183	FERTILIZERS — CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
500	70	0408	FERTILIZERS — LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
500	71	1072	FERTILIZERS — HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	71	0497	FERTILIZERS — DEHYDRATION OF ANIMAL WASTES KEYWORDS FARM-WASTES DEHYDRATION FERTILIZERS
600	72	1031	FERTILIZERS — ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1169	FERTILIZERS — CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600	73	1147	FERTILIZERS — SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
700	69	1067	FERTILIZERS — *ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W*
700	71	1120	FERTILIZERS — SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
300	69	1044	FERTILIZER-NITROGE — IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	FERTILIZER-NITROGE — EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
200	71	0648	FERTILIZER-REQUIRE — FERTILIZER PRACTICES WHICH MINIMIZE NUTRIENT LOSS KEYWORDS FERTILIZER-REQUIREMENTS CR
300	69	0005	FERTILIZER-VALUE — SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	71	1107	FERTILIZERS — WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
200	71	0279	FERTILIZERS — POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS KEYWORDS NITRATE EUTROPHICATI
200	70	0719	FESCUE — FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE P
200	70	0720	FESCUE — PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0853	FESCUE-PASTURES — RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
300	67	1250	FIELDS — DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
100	67	0041	FIELD-CAPACITY — THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
300	69	1180	FIELD-CROPS — CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
200	72	1022	FIELD-DISPOSAL — RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
100	70	0021	FIELD-MOISTURE-CAP — EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
100	65	0067	FIELD-SPREADING — EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
200	71	0604	FIELD-SPREADING — *STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR*
200	71	0606	FIELD-SPREADING — POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY
200	71	0607	FIELD-SPREADING — SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEME
300	70	1101	FIELD-STUDIES — BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
100	68	1229	FIELD-STUDY — ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
200	71	0793	FILTERING-SYSTEM — CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AM
300	68	1123	FILTERING-SYSTEMS — A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
100	69	0363	FILTERS — ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROM
200	66	0149	FILTERS — EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
200	69	0192	FILTERS — POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200	72	1025	FILTERS — OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
300	70	0489	FILTERS — *WATER-QUALITY REQUIREMENTS AND RE-USE OF WASTEWATER EFFLUENTS KEYWORDS NUTRIENT-REMOV*
400	68	0032	FILTERS — NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
400	71	0309	FILTERS — CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POUL
200	71	1099	FILTERS-EQUIPMENT — *SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL*
200	66	0119	FILTH-FLIES — BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES KEYWORDS FILTH-FLIES CONFINEMENT
100	71	1212	FILTRATION — EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	72	1222	FILTRATION — PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
100	72	1224	FILTRATION — FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	68	1242	FILTRATION — THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	72	1030	FILTRATION — RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
300	68	1123	FILTRATION — A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
100	70	1194	FINANCING — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	71	0612	FINANCING — PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
300	71	1246	FINANCING — FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300	70	1000	FINISHING-BUILDING — *EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS*
100	62	1220	FISH — WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	70	0051	FISH — IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	71	0742	FISH — *INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES A*
100	71	1221	FISH — DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	64	0759	FISH — STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
300	49	1210	FISH — MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	70	1104	FISH — FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTORS-BIOLOGY
300	71	1098	FISH — BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
300	71	1100	FISH — DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
500	70	0406	FISH — EFFECTS OF AGRICULTURAL-POLLUTANTS ON RECREATIONAL-USES OF SURFACE-WATERS KEYWORDS R
100	69	1231	FISHERIES — POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	1194	FISHERIES — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
300	71	1245	FISHFILL — EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	68	1121	FISHKILL — *WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS*

KEYWORD INDEX

200 67 1243	FISHKILL	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200 69 0482	FISHKILL	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200 71 0641	FISHKILL	BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
300 64 1110	FISHKILL	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300 67 0701	FISHKILL	WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300 71 1057	FISHKILL	EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
100 71 0742	FISH-DISEASES	INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES A
100 70 1051	FISH-HATCHERIES	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100 71 0742	FISH-HATCHERIES	INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES A
100 70 1237	FISH-HATCHERIES	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200 69 0541	FISH-KILL	FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200 69 0542	FISH-KILL	ANIMAL WASTE POLLUTION-OVERVIEW OF THE PROBLEM KEYWORDS RUNOFF GROUNDWATER FISH-KILL
200 69 0543	FISH-KILL	INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
100 70 1194	FISH-KILLS	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100 71 0742	FISH-MANAGEMENT	INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES A
200 69 1117	FISH-POPULATION	WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
300 71 1098	FISH-PROTEIN	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
100 66 1080	FIXATION	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
500 70 0393	FIXATION	CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
600 72 1076	FLASH-VOLITALIZATI	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
100 65 1091	FLIES	TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
200 66 0119	FLIES	BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES KEYWORDS FILTH-FLIES CONFINEMENT
200 66 0130	FLIES	DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
400 69 0039	FLOATING-AERATOR	LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
200 70 1113	FLOCCULATION	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
300 68 1123	FLOCCULATION	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300 72 1170	FLOOD-IRRIGATION	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
400 73 1158	FLOOD-PROTECTION	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
100 70 0691	FLOORING	THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS
100 71 0567	FLORA	BACTERIAL AND FUNGAL FLORA OF SEAGULL DROPPINGS IN JERSEY KEYWORDS BACTERIAL FLORA SEA
200 70 0755	FLORICA	FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
300 69 0093	FLOW	HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
200 66 0121	FLOWABILITY	PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200 71 0703	FLOWMETERS	FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
300 70 0488	FLOW-AUGMENTATION	THE EFFECTS OF SALINITY-STANDARDS ON IRRIGATED-AGRICULTURE IN THE COLORADO-RIVER-BASIN
300 71 0732	FLOW-CHARACTERISTI	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
600 70 0080	FLOW-CHARACTERISTI	FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
300 71 0745	FLOW-CONTROL	ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING
100 69 0052	FLOW-NET	NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-N
100 72 1224	FLOW-RATES	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
600 72 1001	FLOW-RATES	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
200 72 1015	FLUMES	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
100 68 0296	FLUSHING	A NEW APPROACH TO CAGE WASTE DISPOSAL IN A CANINE LABORATORY KEYWORDS DOG FLUSHING
300 69 1180	FLUSHING	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
100 69 0058	FLUSHING-GUTTERS	REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES KEYWORDS RECIRCULATED-WATER STORA
100 70 0089	FLUSHING-GUTTER	TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
200 70 0234	FLUSHING-GUTTER	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200 70 0248	FLUSHING-GUTTER	PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
300 68 0352	FLUSHING-GUTTERS	DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SE
400 70 0097	FLUSHING-GUTTER	POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
400 71 0339	FLUSHING-GUTTER	FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
600 71 0272	FLUSHING-GUTTERS	A DOSING-SIPHON FOR DISCHARGING CLEANING-WATER INTO FLUSHING-GUTTERS KEYWORDS DESIGN
600 72 1071	FLUSHING-GUTTER	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100 70 0570	FLY	MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
100 71 0348	FLY	BIOLOGICAL FLY CONTROL IN DEEP PITS KEYWORDS POULTRY BIOLOGICAL FLY PITS
400 71 0350	FLY	SCHEDULE MANURE REMOVAL TO AVOID FLY BREEDING KEYWORDS CALIFORNIA POULTRY ODORS FLY
100 64 0371	FLY-BREEDING	THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
100 67 0501	FLY-CONTROL	INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
100 71 1092	FLY-CONTROL	EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100 73 1165	FLY-CONTROL	FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
300 71 0515	FLY-CONTROL	FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
400 71 0294	FLY-CONTROL	MANURE MITES IN INTEGRATED FLY CONTROL KEYWORDS POULTRY CALIFORNIA FLY-CONTROL
400 73 1191	FLY-PARASITES	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
300 71 0477	FLY-PUPAE	BIOLOGICAL CONVERSION OF ANIMAL WASTES TO NUTRIENTS KEYWORDS POULTRY FLY-PUPAE NUTRIENT
100 68 0106	FOAMING	OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
100 70 0089	FOAMING	TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
200 69 0193	FOAMING	CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
300 68 0749	FOAMING	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300 69 0006	FOAMING	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300 71 1119	FOAMING	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
600 70 0098	FOAMING	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
200 69 0192	FOAM-PAD-FILTERS	POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200 70 0222	FOLIAR-APPLICATION	THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200 64 1240	FOODS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300 70 1247	FOODS	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300 71 1100	FOODS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
500 71 1254	FOODS	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100 70 1051	FOOD-ABUNDANCE	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
400 71 1172	FOOD-AND-DRUG-ADMI	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400 73 1068	FOOD-AND-DRUG-ADMI	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
100 70 1111	FOOD-CHAINS	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300 69 1125	FOOD-PRODUCTION-WA	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
100 69 0045	FORAGE	THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRA
600 72 1169	FORAGE	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600 72 1177	FORAGE-YIELDS	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
200 73 1062	FORCED-AIR-OVENS	CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
200 70 0715	FORCED-DRYING	OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
300 68 1043	FORESTRY	WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
100 71 1039	FORESTS	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
200 70 1050	FOREST-MANAGEMENT	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
300 68 1043	FOREST-MANAGEMENT	WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
200 72 1030	FRACTIONATING	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
100 69 0364	FREEZE-DRYING	LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
600 72 1163	FREEZE-THAW-TESTS	ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
200 66 0124	FREEZING	ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
600 68 0471	FREEZING	ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION KEYWORDS
200 66 0121	FREEZING-POINT	PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
600 72 1150	FREE-STALL-BARN	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
200 69 0188	FREE-STALL-HOUSING	PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
400 70 0351	FREE-STALL-HOUSING	DAIRY-SET-UP FOR 200 COWS KEYWORDS LAGOON COSTS FREE-STALL-HOUSING EVAPORATIVE-LAGOON

100	70	1041	FRESNO-CALIF	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	70	0042	FROZEN-GROUND	STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
300	68	1122	FROZEN-GROUND	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
100	68	0087	FS	AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
100	73	1155	FUCOSE	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
200	73	1083	FUEL	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
100	67	0079	FUELS	SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
200	73	1082	FUELS	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300	70	1084	FUELS	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
100	71	0461	FUMIGATION	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	68	0043	FUMIGATION	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS FUMIGATION BROILER LITTER
200	70	0320	FUNDING	AGRICULTURAL-WASTES IN AN URBAN-ENVIRONMENT KEYWORDS ODOR LEGISLATION FUNDING RESEARC
100	65	0699	FUNGI	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
200	66	0132	FUNGI	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
200	71	0775	FUNGI	TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200	71	1099	FUNGI	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
500	70	0402	FUNGI	DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATE
500	71	1254	FUNGI	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
600	72	1071	FUNGI	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100	71	0476	FUNGUS	THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER KEYWORDS FUNGUS PH BACTERIA MOLD POULTR
300	70	1084	FURNACE	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
200	66	0130	FURROWS	DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
400	68	0015	FURROW-IRRIGATION	CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION KEYWORDS LAGOON POND FUR
500	71	1254	FUSIFORMIS	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
500	71	1254	FUSOBACTERIA	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	70	0678	FUTURE	THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT KEYWORDS REUSE ODOR POLLUTION FUTURE MANAG
100	70	1194	FUTURE-TRENDS	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	69	0160	FWPCA	EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
200	69	0432	FWPCA	AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
200	69	0526	FWPCA	NATION-WIDE RESEARCH ON ANIMAL-WASTE-DISPOSAL KEYWORDS GRANTS ALGAE FWPCA NUTRIENTS RE
200	69	0530	FWPCA	THE ROLE OF THE FEDERAL WATER-POLLUTION CONTROL ADMINISTRATION IN FARM-ANIMAL-WASTE AND
500	70	0411	FWPCA	ACCOMPLISHMENTS AND GOALS KEYWORDS WATER-POLLUTION WATER-QUALITY FWPCA STANDARDS ENVI
200	66	0125	GAINS	SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
200	68	0725	GAINS	POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAG
200	72	1017	GAINS	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
300	26	1204	GARBAGE-DUMPS	OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
100	71	0468	GAS	EFFECT OF VENTILATION ON THE GAS CONCENTRATION IN A PART- SLATTED PIGGERY KEYWORDS EFF
200	66	0137	GAS	PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	69	0055	GAS	MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
300	70	1084	GAS	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
100	66	0437	GASES	PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	70	0085	GASES	DANGEROUS GASES IN AGRICULTURE KEYWORDS SLURRIES STORAGE GASES
100	70	0578	GASES	COLLECTION AND DISPOSAL OF FARM WASTES KEYWORDS N-IRELAND GASES SLURRY DISPOSAL
100	70	0685	GASES	GASES AND ODORS FROM STORED SWINE WASTES AMMONIA MANURE METHANE CARBON-DIOXIDE HYDROGEN
100	71	0314	GASES	GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDEN
200	64	1240	GASES	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69	0074	GASES	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	70	0238	GASES	THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	70	0246	GASES	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
200	73	1082	GASES	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300	68	0749	GASES	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	70	0455	GASES	ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
300	71	1055	GASES	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
400	73	1178	GASES	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	70	0258	GASES	GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
300	69	1060	GASOLINE	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	GASOLINE	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
100	73	1155	GASTRO-INTESTINAL-	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	70	1111	GAS-CHROMATOGRAPHY	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100	72	1188	GAS-CHROMATOGRAPHY	IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
300	69	0631	GAS-CHROMATOGRAPHY	ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	0632	GAS-CHROMATOGRAPHY	QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
300	69	0636	GAS-CHROMATOGRAPHY	PARTICULATE MATTER KEYWORDS CIRCULATION GAS-CHROMATOGRAPHYFILTER-PADS POULTRY-DUST OD
100	69	0363	GAS-CHROMOTOGRAPHY	ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROM
400	65	1142	GAS-CONCENTRATIONS	WASTE CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS KEYWORDS VENTILATION SWINE-
100	63	1064	GENERAL-CHEMICAL-4	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
200	69	0055	GENERATION	MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	66	0129	GENETICS	WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
300	71	1106	GENETICS	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
100	66	1080	GEOCHEMISTRY	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
300	71	1055	GEOCHEMISTRY	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
200	64	1240	GEOGRAPHICAL-REGIO	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300	70	0384	GEOGRAPHICAL-REGIO	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
200	69	0523	GEOLOGY	WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN W
200	66	0155	GERMANY	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
300	69	1180	GERMINATION	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
100	73	1088	GESTATION	OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
100	71	1236	GLACIAL-DRIFT	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
200	64	1240	GLUCOSE	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69	0528	GOALS	THERES HOPE AHEAD KEYWORDS ODOR LAND-USE GOALS POPULATION
200	71	0283	GOALS	ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS B
200	71	0796	GOATS	DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0770	GOVERNMENTS	LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER
200	71	0789	GOVERNMENTS	ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
100	70	0065	GOVERNMENT-ACTION	AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
300	71	0704	GOVERNMENT-AGENCIE	PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
200	70	1050	GOVERNMENT-FINANCE	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0610	GOVERNMENT-FINANCE	WATER POLLUTION AND THE FARMER KEYWORDS RUNOFF COSTS PESTICIDES GOVERNMENT-FINANCE CO
200	71	0611	GOVERNMENT-SUPPORT	U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENC
200	71	0613	GOVERNMENT-SUPPORT	TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINIST
200	71	0614	GOVERNMENT-SUPPORT	SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO
200	71	0615	GOVERNMENT-SUPPORT	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
200	71	0616	GOVERNMENT-SUPPORT	THE LAKE MENDOTA WATERSHED PROJECT KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPOR
200	71	0619	GOVERNMENT-SUPPORT	REPORTS AND RECOMMENDATIONS OF WORKING GROUPS KEYWORDS ADMINISTRATIVE-AGENCIES GOVERN
200	71	0620	GOVERNMENT-SUPPORT	RECOMMENDATIONS OF NATIONAL MILK PRODUCERS FEDERATION KEYWORDS ADMINISTRATIVE-AGENCIE
300	71	0752	GOVERNMENT-SUPPORT	ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES
400	69	1225	GOVERNMENT-SUPPORT	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
200	69	0203	GOVT	WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT
200	69	0529	GOVT-PROGRAMPROGRA	INTRODUCTION TO FEDERAL STATE AND LOCAL ACTION-PROGRAMS TO SOLVE ANIMAL-WASTE-DISPOSAL
100	69	0108	GRAIN	EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI

200	71	0806	GRAIN	COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
200	71	0805	GRAINS	HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
200	64	1240	GRAINS-CROPS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	71	0826	GRAIN-SORGHUM	CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	69	0423	GRANTS	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0432	GRANTS	AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
200	69	0526	GRANTS	NATION-WIDE RESEARCH ON ANIMAL-WASTE-DISPOSAL KEYWORDS GRANTS ALGAE FWPCA NUTRIENTS RE
200	70	0322	GRANTS	FUNDING FOR AGRICULTURAL-WASTE RESEARCH KEYWORDS GRANTS USDA RESEARCH-FUNDS ENVIRONME
100	70	0581	GRASS	BROILER LITTER ON WELSH COAL TIPS KEYWORDS GRASS
200	69	0169	GRASS	INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
100	69	0045	GRASSES	THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRA
100	70	1037	GRASSES	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
200	66	0149	GRASSES	EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
100	70	1233	GRASSLANDS	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
400	66	0380	GRASS-BELTS	TWO BILLION TONS OF - WHAT KEYWORDS ORGANIC-WASTES VOLUME ORGANIC-MATTER GRASS-BELTS P
200	70	0720	GRASS-TETANY	PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	72	1022	GRAVITY	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
100	69	1231	GREAT-SOUTH-BAY-LO	POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
200	71	0805	GREENHOUSES	HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
600	72	1177	GREENSBERG-SILITY-	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
300	70	1101	GREEN-ALGAE	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
200	69	0186	GROSS-PROFIT	MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
100	65	1219	GROUNDWATER	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	66	1080	GROUNDWATER	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	68	0452	GROUNDWATER	GROUNDWATER CONTAMINATION KEYWORDS NITROGEN BARNYARD GROUNDWATER CONTAMINATION
100	69	0052	GROUNDWATER	NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-N
100	69	0060	GROUNDWATER	RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTI
100	69	0081	GROUNDWATER	DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWO
100	69	1198	GROUNDWATER	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	70	0372	GROUNDWATER	DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GRO
100	70	1041	GROUNDWATER	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	71	1236	GROUNDWATER	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100	72	1097	GROUNDWATER	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
200	69	0174	GROUNDWATER	THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
200	69	0181	GROUNDWATER	FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200	69	0482	GROUNDWATER	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	69	0542	GROUNDWATER	ANIMAL WASTE POLLUTION-OVERVIEW OF THE PROBLEM KEYWORDS RUNOFF GROUNDWATER FISH-KILL
200	69	0543	GROUNDWATER	INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
200	69	0676	GROUNDWATER	CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS KEYWORDS RUNOFF GR
200	70	0216	GROUNDWATER	GROUNDWATER QUALITY AND FLUCTUATIONS IN A SHALLOW UNCONFINED AQUIFER UNDER A LEVEL FEED
200	70	0221	GROUNDWATER	LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
200	70	1118	GROUNDWATER	WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	71	0770	GROUNDWATER	LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER
200	71	0832	GROUNDWATER	GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SA
200	71	1252	GROUNDWATER	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200	72	1011	GROUNDWATER	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1013	GROUNDWATER	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1020	GROUNDWATER	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1021	GROUNDWATER	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
300	67	1250	GROUNDWATER	DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	68	1122	GROUNDWATER	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	69	1044	GROUNDWATER	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	GROUNDWATER	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	70	1059	GROUNDWATER	NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	71	0269	GROUNDWATER	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
300	71	0466	GROUNDWATER	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
300	71	1008	GROUNDWATER	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300	72	1052	GROUNDWATER	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
400	67	1226	GROUNDWATER	PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
400	73	1073	GROUNDWATER	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
500	70	0391	GROUNDWATER	BEHAVIOR OF SOIL AND FERTILIZER-PHOSPHORUS IN RELATION TO WATER-POLLUTION KEYWORDS PH
500	70	0392	GROUNDWATER	SOURCES-OF-NITROGEN IN WATER-SUPPLIES KEYWORDS NITRATES GROUNDWATER SURFACE-WATER INF
500	70	0405	GROUNDWATER	EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
600	69	1239	GROUNDWATER	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
600	72	1149	GROUNDWATER	MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
600	73	1147	GROUNDWATER	SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
200	71	0782	GROUNDWATERAEROBIC	MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
300	70	0414	GROUNDWATERS	THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
200	71	0605	GROUNDWATER-FERTIL	CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
200	68	1242	GROUNDWATER-MOVEME	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
100	73	1184	GROUNDWATER-POLLUT	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
300	72	1170	GROUNDWATER-POLLUT	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
400	72	1166	GROUNDWATER-POLLUT	HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
600	72	1148	GROUNDWATER-POLLUT	DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
300	71	0639	GROUNDWATER-SYSTEM	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	68	1122	GROUND-WATER	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	69	1103	GROUND-WATER	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
600	72	1169	GROUND-WATER	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
100	71	0450	GROUND-WATERS	NITRATE AND SALT IN SOILS AND GROUND-WATERS FROM LAND DISPOSAL OF DAIRY MANURE KEYWORD
100	70	0585	GROWERS	BOD POSES PROBLEMS FOR POULTRY GROWERS AND PROCESSORS KEYWORDS BOD PROBLEMS POULTRY GR
100	70	0260	GROWTH	GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS
200	73	1093	GROWTH	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
600	71	0271	GROWTH-CHAMBERS	GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS KEYWORDS DISPOSAL CR
200	71	0797	GROWTH-RATE	GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
100	71	0257	GROWTH-RATES	DRINKING OF SULFATE-WATER BY CATTLE KEYWORDS GROWTH-RATES SODIUM-CHLORIDE TOXICITY CA
300	71	0513	GROWTH-RATES	FECAL-RESIDUES FROM FEED ADDITIVES--SWINE KEYWORDS HAZARDS GROWTH-RATES DIETHYISTILBES
400	73	1073	GUELPH-SANDY-LOAM	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
300	68	0741	GUIDELINES	RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	70	0743	GUIDELINES	GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
100	70	0023	HABITATS	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
300	71	1057	HABITATS	EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
100	65	0366	HANDLING	LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
200	66	0122	HANDLING	METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	66	0123	HANDLING	PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELEC
200	69	0706	HANDLING	HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	70	0220	HANDLING	THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
200	70	0250	HANDLING	LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
200	71	0640	HANDLING	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
200	71	0651	HANDLING	ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMEN
200	71	0662	HANDLING	WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME

200	71	0771	HANDLING — TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA KEYWORDS
200	71	0802	HANDLING — AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
300	65	0053	HANDLING — FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
300	70	0206	HANDLING — POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
400	66	0088	HANDLING — POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
400	70	0579	HANDLING — OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION KEYWORDS
400	71	0262	HANDLING — WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE-DISPOSAL CATTLE-WASTE STORAGE-WAS
400	71	0311	HANDLING — WHY STIRRING MANURE REDUCES ODORS KEYWORDS AEROBIC ANAEROBIC STORAGE ODORS HANDLING
400	71	0264	HANDLING-METHODS — HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE-DISPOSAL WASTE-DUMPS FAR
400	71	0575	HANDLING-SYSTEMS — POULTRY WASTE HANDLING SYSTEMS KEYWORDS POULTRY HANDLING-SYSTEMS
400	71	0329	HATCHERY — DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HA
100	70	1237	HATCHERY-EFFLUENTS — POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
100	70	0020	HAUGH-UNIT — EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
100	73	1184	HAWAII — ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	71	0806	HAY — COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
100	69	0416	HAZARDS — A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
200	68	1244	HAZARDS — SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
200	71	0280	HAZARDS — PESTICIDES KEYWORDS DDT HAZARDS BENEFICIAL-USE HEALTH PESTICIDES
300	71	0511	HAZARDS — ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
300	71	0513	HAZARDS — FECAL-RESIDUES FROM FEED ADDITIVES--SWINE KEYWORDS HAZARDS GROWTH-RATES DIETHYISTILBES
400	65	0485	HAZARDS — POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-
200	64	1240	HEALTH — THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	66	0115	HEALTH — MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0118	HEALTH — HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
200	70	0234	HEALTH — FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0238	HEALTH — THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	70	0239	HEALTH — FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI
200	71	0280	HEALTH — PESTICIDES KEYWORDS DDT HAZARDS BENEFICIAL-USE HEALTH PESTICIDES
200	71	0664	HEALTH — ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
200	71	0853	HEALTH — RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
200	66	0127	HEALTH-AUTHORITIES — CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
200	69	0518	HEALTH-PROBLEMS — HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEA
300	68	0741	HEALTH, — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
100	72	1215	HEART — AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
200	66	0143	HEAT-BALANCE — DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUEL
200	66	0136	HEAT-OF-COMPOSTING — ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
600	72	1074	HEAT-STRESS — SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
300	71	1100	HEAVY-METALS — DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
200	72	1021	HENS — APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
100	70	0028	HEN-EXCRETA — HOUSEFLY LARVAE BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS KEYWORDS
100	71	1038	HERBICIDES — CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
200	69	1185	HERBICIDES — ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
300	71	0591	HERBICIDES — AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN KEYWORDS RUNOFF PESTICIDES EUTROPHICAT
100	70	1111	HERRINGS — POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300	71	1100	HERRINGS — DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	73	1155	HEXOSE — THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
600	72	1031	HIGH-RISE-POULTRY- — ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
100	73	1155	HISTOLOGY — THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	64	0474	HOG — PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
100	68	0442	HOG — CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS
100	71	0451	HOG — REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
200	70	0220	HOG — THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
200	70	0687	HOG — OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
100	62	1220	HOGS — WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	65	0378	HOGS — TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTIO
100	66	0347	HOGS — AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDAT
100	68	0106	HOGS — OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
100	69	0353	HOGS — OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	69	0714	HOGS — EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
100	70	0102	HOGS — POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
100	70	0367	HOGS — NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND D
100	71	0576	HOGS — CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS
100	72	1224	HOGS — FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	68	1186	HOGS — TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	69	0157	HOGS — ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0180	HOGS — FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
200	69	0425	HOGS — ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	69	0516	HOGS — PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200	69	0522	HOGS — FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE
200	69	0756	HOGS — SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
200	69	1116	HOGS — MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	70	1159	HOGS — METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	71	0819	HOGS — ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
200	71	0822	HOGS — DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
200	71	0861	HOGS — CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
200	72	1018	HOGS — EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1018	HOGS — EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1019	HOGS — PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1024	HOGS — WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1025	HOGS — OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
300	26	1204	HOGS — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	46	1207	HOGS — FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
300	53	1206	HOGS — POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	67	1253	HOGS — WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	69	1060	HOGS — FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	HOGS — FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	0208	HOGS — DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
300	70	0384	HOGS — THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	1000	HOGS — EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
300	70	1247	HOGS — DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	70	1248	HOGS — LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	72	1170	HOGS — POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
400	64	0358	HOGS — TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400	68	0033	HOGS — IRRIGATING WITH ANIMAL WASTE KEYWORDS SPRINKLER-IRRIGATION SEWAGE-DISPOSAL EFFLUENT H
400	70	0579	HOGS — OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION KEYWORDS
400	71	0298	HOGS — MANAGING SWINE WASTES TO PREVENT POLLUTION KEYWORDS FARM-WASTES HOGS WASTE-WATER-DISP
400	71	0339	HOGS — FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
400	72	1166	HOGS — HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
600	72	1001	HOGS — INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
600	72	1071	HOGS — A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS

600	73	1065	HOGS	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	70	1066	HOGS	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1109	HOGS	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
700	72	1048	HOGS	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200	71	0827	HOGSSYSTEM	A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM
300	67	1253	HOG-FARM-WASTES	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	70	1000	HOG-PRODUCTION-SYS	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
100	65	0075	HOG-WASTE-DISPOSAL	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
200	72	1015	HOLDING-POND	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
100	70	0050	HOLDING-TANKS	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	69	0355	HOLLAND	FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
200	66	0156	HOLLAND	BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
200	64	1241	HOLOTRICHS	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
300	71	0511	HORMONES	ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
100	63	1064	HORN-FLIES-HAEMATO	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
200	72	1025	HORSES	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
100	70	0023	HOSTS	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
100	65	0344	HOUSED	THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
200	72	1024	HOUSED-CONFINEMENT	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
100	60	0059	HOUSEFLY	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
600	70	0254	HOUSEFLY	AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB
100	70	0012	HOUSE-FLIES	CONTROL OF HOUSE FLIES IN SWINE FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL K
100	70	1090	HOUSE-FLIES	COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	63	1064	HOUSE-FLIES-MUSCA-	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	71	0683	HOUSING	ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
200	70	0247	HOUSING	BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
300	69	0001	HOUSING	SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	0003	HOUSING	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	69	0004	HOUSING	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
100	68	0077	HOUSING-SYSTEMS	FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
100	70	1194	HUMAN-DISEASES	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	64	1240	HUMAN-DISEASES	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
500	71	1072	HUMAN-WASTES	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
100	70	0691	HUMIDITY	THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS
100	73	1087	HUMIDITY	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
200	69	0197	HUMIDITY	REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
300	69	0634	HUMIDITY	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
600	69	1006	HUMIDITY	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
200	71	0659	HUMUS	COMPOSTING KEYWORDS ARTIFICIAL-USE HUMUS AEROBIC-CONDITIONS COMPOSTING
200	71	0808	HYACINTHS	WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
100	71	1212	HYALITE-WATERSHED	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
600	72	1071	HYDRAULIC-CLEANING	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
200	71	0762	HYDRAULIC-STRUCTUR	LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0803	HYDRAULIC-TRANSPOR	MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
300	71	1238	HYDRAULIC-TRANSPOR	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
200	71	0792	HYDROCARBON	CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
100	69	0310	HYDROGEN	IMPROVEMENT IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION KEYW
200	64	1240	HYDROGEN	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300	69	0632	HYDROGEN	QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
100	65	0699	HYDROGEN-ION-CONCE	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	69	1198	HYDROGEN-ION-CONCE	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	70	1051	HYDROGEN-ION-CONCE	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	71	0688	HYDROGEN-ION-CONCE	CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
110	70	1237	HYDROGEN-ION-CONCE	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	71	0792	HYDROGEN-ION-CONCE	CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200	71	0797	HYDROGEN-ION-CONCE	GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
700	69	0712	HYDROGEN-ION-CONCE	CATTLE FEEDLOT WASTE CHARACTERISTICS KEYWORDS FEEDLOTS BOD HYDROGEN-ION-CONCENTRATION
700	70	1109	HYDROGEN-ION-CONCE	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	69	0057	HYDROGEN-SULFIDE	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
200	64	1240	HYDROGEN-SULFIDE	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69	0190	HYDROGEN-SULFIDE	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
200	69	0191	HYDROGEN-SULFIDE	CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
200	69	0519	HYDROGEN-SULFIDE	AESTHETICS AND ODORS KEYWORDS HYDROGEN-SULFIDE ANAEBOBIC-CONDITIONS ODOR-THRESHOLD AE
200	71	0837	HYDROGEN-SULFIDE	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
300	69	0007	HYDROGEN-SULFIDE	SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	69	0631	HYDROGEN-SULFIDE	ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	0634	HYDROGEN-SULFIDE	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
300	69	0637	HYDROGEN-SULFIDE	SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC-COMPOUNDS AMMONIA HYDROGEN-
300	71	0672	HYDROGEN-SULFIDE	MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METH
400	70	0091	HYDROGEN-SULFIDE	MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
600	72	1004	HYDROGEN-SULFIDE	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
300	69	0735	HYDROGEN-ION-CONCE	SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-
100	69	0060	HYDROGEOLOGY	RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTI
100	67	0104	HYDROGRAPHS	MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
200	69	0182	HYDROGRAPHS	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
700	70	1066	HYDROGRAPHS	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
300	69	0093	HYDROLOGIC	HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
200	71	1252	HYDROLOGIC-CYCLE	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	69	1103	HYDROLOGIC-CYCLE	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
700	70	1066	HYDROLOGIC-SYSTEMS	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
100	70	0299	HYDROLOGY	HYDROLOGY OF SPRAY-RUNOFF WASTEWATER TREATMENT KEYWORDS HYDROLOGY WASTE-WATER-TREATME
200	69	0430	HYDROLOGY	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
300	71	1055	HYDROLOGY	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
600	69	1005	HYDROLOGY	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
100	73	1155	HYDROLYSIS	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	64	1200	HYPOLIMNION	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
600	69	1006	HYPOTHALMIC-HEATIN	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
600	69	1006	HYPOTHALMIC-TEMPER	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
600	69	1006	HYPOTHALMUS	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
100	69	1198	IDAHO	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	69	0096	IDENTIFICATION	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0693	IDENTIFICATION	IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
100	70	0065	IDENTIFICATION	AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
100	71	0314	IDENTIFICATION	GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDEN
300	69	0467	IDENTIFICATION	IDENTIFICATION OF FEEDLOT ODORS KEYWORDS AMINES IDENTIFICATION ODORS
200	71	1252	ILLINOIS	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200	72	1030	ILLINOIS	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
300	72	1260	ILLINOIS	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	71	1144	ILLINOIS	CONFINEMENT FEEDING P[illegible]NS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
100	69	0374	IMMATURE-DIPTERA	ARTHROPOD-PREDATORS [illegible]E DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CAL

100	68	0036	IMMUNITY OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
300	46	1207	IMPAIRED-WATER-QUA FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
200	67	0734	IMPOUNDING CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
100	69	0679	IMPOUNDMENTS NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
300	71	1245	IMPOUNDMENTS EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	70	0089	INCINERATION TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	73	1184	INCINERATION ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	66	0143	INCINERATION DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUEL
200	69	0185	INCINERATION WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
200	70	0219	INCINERATION THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
200	70	0670	INCINERATION ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	71	0657	INCINERATION SOLIDS DESTRUCTION OR SEVERE TREATMENT KEYWORDS INCINERATION SOLID-WASTES CHEMICAL-DE
200	71	0658	INCINERATION MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION RE
300	72	1157	INCINERATION CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	71	0329	INCINERATION DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HA
600	72	1001	INCLINED-PLANE INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
200	71	0764	INCOME FUTURE PROSPECTS FOR ANIMAL AGRICULTURE KEYWORDS ECONOMICS INCOME FARM-WASTES NUTRIEN
100	69	0045	INCUBATION THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRA
200	70	0223	INCUBATION NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
300	69	1044	INCUBATION IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	INCUBATION EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	72	1182	INCUBATION BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
100	70	0064	INDEX-COMPOUND URINARY CREATININE AS AN INDEX COMPOUND FOR ESTIMATING RATE OF STEROIDS IN THE DOMESTIC
300	72	1070	INDIA PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
200	70	0687	INDIANA OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
100	70	0110	INDICATORS ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
100	71	0484	INDICATORS RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
200	71	0285	INDIVIDUAL-RIGHTS POLLUTION-CONTROL DECISIONS - WHO SHOULD MAKE THEM KEYWORDS INDIVIDUAL-RIGHTS LEGISLA
100	65	0066	INDOOR THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR
100	69	0360	INDOOR THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
200	71	0274	INDUCEMENTS WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
300	70	1247	INDUSTRIAL-PLANTS DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
100	67	0079	INDUSTRIAL-WASTES SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	67	1218	INDUSTRIAL-WASTES FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100	68	1229	INDUSTRIAL-WASTES ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	70	1227	INDUSTRIAL-WASTES AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	70	1230	INDUSTRIAL-WASTES LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
200	70	0718	INDUSTRIAL-WASTES WATER UTILIZATION IN PROCESSING PLANTS KEYWORDS BOD POULTRY BACTERIA INDUSTRIAL-WASTE
200	71	0647	INDUSTRIAL-WASTES ENVIRONMENTAL PROBLEMS IN THE FOOD PROCESSING INDUSTRY KEYWORDS LIQUID-WASTES INDUSTRI
200	71	0842	INDUSTRIAL-WASTES THE USE OF OXIDATION PONDS FOR POULTRY PROCESSING WASTE DISPOSAL KEYWORD INDUSTRIAL-W
200	71	1033	INDUSTRIAL-WASTES NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	71	1252	INDUSTRIAL-WASTES NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	53	1206	INDUSTRIAL-WASTES POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1043	INDUSTRIAL-WASTES WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	69	1060	INDUSTRIAL-WASTES FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1103	INDUSTRIAL-WASTES ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	69	1203	INDUSTRIAL-WASTES FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	1247	INDUSTRIAL-WASTES DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0744	INDUSTRIAL-WASTES ANIMAL SLAUGHTERING AND PROCESSING KEYWORDS REGULATIONS BY-PRODUCTS SOLID-WASTES INDU
300	71	0745	INDUSTRIAL-WASTES ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING
300	71	1100	INDUSTRIAL-WASTES DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
400	69	1225	INDUSTRIAL-WASTES CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
700	71	1120	INDUSTRIAL-WASTES SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
200	70	1050	INDUSTRIES THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
700	70	1046	INDUSTRIES AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
200	71	1033	INDUSTRY NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
100	67	0302	INFANTIS SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF KEYWORDS SALMONELLA INFANTIS FEEDLOT RUNO
100	64	0345	INFECTION BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
100	65	0346	INFILTRATION LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	68	0481	INFILTRATION RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE W
100	68	1121	INFILTRATION WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	70	0102	INFILTRATION POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
200	68	1242	INFILTRATION THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	70	0224	INFILTRATION HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
200	70	0227	INFILTRATION RATES OF WATER-INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY-MANURE KEYWORDS ROT
200	70	1114	INFILTRATION ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	72	1022	INFILTRATION RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
300	71	0466	INFILTRATION INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
500	68	1259	INFILTRATION WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
500	70	0392	INFILTRATION SOURCES-OF-NITROGEN IN WATER-SUPPLIES KEYWORDS NITRATES GROUNDWATER SURFACE-WATER INF
300	71	0269	INFILTRATION-RATES INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
300	72	1052	INFILTRATION-RATES EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
600	72	1148	INFILTRATION-RATES DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
100	66	0479	INFLUENCE THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
100	70	0014	INFLUENCE INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GA
100	70	0094	INFLUENCE THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
700	70	1066	INFLUENT WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1256	INFLUENT MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
100	71	0509	INFRARED-ANALYSIS THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT
300	70	0385	INGESTION AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	0385	INHALATION AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
100	70	1194	INHIBITORS REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
300	69	0002	INLETS SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
200	72	1018	INLETS-WATERWAYS EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
100	68	0044	INOCULATION THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	73	1034	INOCULATION TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
100	73	1164	INOCULATION SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200	66	0132	INOCULATION REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
100	68	1121	INORGANIC-COMPOUND WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
200	67	1243	INORGANIC-POLLUTIO THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
100	62	1220	INSECTICIDES WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	63	1064	INSECTICIDES TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	65	1091	INSECTICIDES TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
100	70	0570	INSECTICIDES MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
100	70	1090	INSECTICIDES COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
200	71	1094	INSECTICIDES AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1095	INSECTICIDES BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	INSECTICIDES ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
300	68	1202	INSECTICIDES OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
500	70	0395	INSECTICIDES CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL

100	70	0028	INSECTS HOUSEFLY LARVAE BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS KEYWORDS
200	71	0852	INSECTS BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES THEIR NUTRITIONAL VALUE TO THE GROWING CH
300	70	0205	INSECTS INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DI
300	71	1106	INSECT-ATTRACTANTS MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
100	70	0570	INSECT-CONTROL MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
300	71	1106	INSECT-CONTROL MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
500	68	1259	INSECT-CONTROL WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATID
500	70	0395	INSECT-CONTROL CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
300	71	1106	INSECT-RESISTANCE MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
200	64	1240	INSPECTION THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	71	0598	INSPECTION MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200	71	0822	INSTALLATION DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
600	69	1239	INSTALLATION DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
200	70	0219	INSTALLATION-COSTS THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
400	72	1179	INSTALLATION-COSTS THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
600	70	0469	INSTRUMENTATION WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
700	70	1256	INSTRUMENTATION MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
200	69	0196	INSULATION THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
400	72	1171	INSULATION MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
200	69	0182	INTENSITY CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
200	70	0227	INTENSITY RATES OF WATER-INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY-MANURE KEYWORDS ROT
600	72	1002	INTENSITY USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
200	70	0236	INTENSIVE-FARMNATU ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK
100	72	1222	INTERLABORATORY-TE PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200	69	0184	INTERMITTENT-LOADI TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	71	0609	INTER-AGENCY-COOPE REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
200	69	0544	INVENTORY HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200	69	0545	INVENTORY HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200	69	0561	INVENTORY INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUN
500	70	0410	INVENTORY ALLIANCE FOR ACTION KEYWORDS WATER-POLLUTION FEEDLOTS REGISTRATION INVENTORY WASTE-MA
100	67	0501	INVESTIGATIONS INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
100	70	0024	INVESTIGATIONS PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
200	69	0544	INVESTIGATIONS HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200	69	0545	INVESTIGATIONS HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200	69	0546	INVESTIGATIONS THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0524	INVESTMENT CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST I
200	70	0715	INVESTMENT OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
400	71	0267	INVESTMENTS WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
600	72	1031	IN-HOUSE-DRYING ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
300	71	0466	IONIZATION INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
200	70	0217	IONS POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200	71	1234	IONS SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200	69	0425	IOWA ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	69	0559	IOWA FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
200	71	0284	IOWA CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONS
200	72	1017	IOWA WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
300	69	1061	IOWA RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	71	1056	IOWA AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
400	71	1136	IOWA FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	71	1172	IOWA OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
600	72	1071	IOWA A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1163	IOWA ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
600	73	1065	IOWA EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	72	1049	IOWA ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100	69	1198	IRON CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
300	71	1100	IRRADIATION DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300	70	0490	IRRIGATED SALINITY-CONTROL IN RETURN-FLOW FROM IRRIGATED AREAS A DEMONSTRATION-PROJECT KEYWORDS
300	70	0488	IRRIGATED-AGRICULT THE EFFECTS OF SALINITY-STANDARDS ON IRRIGATED-AGRICULTURE IN THE COLORADO-RIVER-BASIN
300	67	1250	IRRIGATED-LAND DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
100	68	0077	IRRIGATION FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
100	68	0287	IRRIGATION METHODS FOR DISPOSAL OF POULTRY MANURE KEYWORDS NEW ZEALAND IRRIGATION DRYING STORAGE
100	68	1121	IRRIGATION WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	70	0049	IRRIGATION USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100	70	0051	IRRIGATION IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION
100	70	0458	IRRIGATION USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOS
100	71	0681	IRRIGATION EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYW
100	72	1097	IRRIGATION NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
200	66	0115	IRRIGATION MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0152	IRRIGATION ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	69	0176	IRRIGATION DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
200	69	0431	IRRIGATION MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	69	0541	IRRIGATION FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0547	IRRIGATION CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	70	0232	IRRIGATION CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORDS RUNOFF IRRIGATI
200	70	0237	IRRIGATION THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	70	0250	IRRIGATION LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
200	70	0737	IRRIGATION REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	70	1118	IRRIGATION WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	70	1159	IRRIGATION METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	71	0667	IRRIGATION FOOD PROCESSING WASTEWATER TREATMENT KEYWORDS ANAEROBIC-LAGOON ACTIVATED-SLUDGE IRRIG
200	71	0778	IRRIGATION LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200	71	0801	IRRIGATION PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
200	71	0826	IRRIGATION CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	71	0850	IRRIGATION THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYC
200	72	1014	IRRIGATION APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1021	IRRIGATION APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1022	IRRIGATION RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
300	62	0754	IRRIGATION NOTES ON WATER POLLUTION WASTE WATERS FROM FARMS KEYWORDS FARM-WASTES IRRIGATION BOD
300	67	0701	IRRIGATION WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300	68	1122	IRRIGATION NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	69	1180	IRRIGATION CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	70	0008	IRRIGATION AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION
300	70	0475	IRRIGATION LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
300	70	0743	IRRIGATION GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
300	70	1059	IRRIGATION NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	71	0590	IRRIGATION THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT KEYWORDS LAGOONS DESIGN IRRIGATION M
300	71	0639	IRRIGATION USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	71	1008	IRRIGATION ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300	71	1106	IRRIGATION MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	73	1009	IRRIGATION STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES

400	64	0358	IRRIGATION — TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400	67	1226	IRRIGATION — PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
400	72	1032	IRRIGATION — NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
400	72	1179	IRRIGATION — THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
400	73	1007	IRRIGATION — FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
400	73	1073	IRRIGATION — NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
500	71	1072	IRRIGATION — HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	69	1239	IRRIGATION — DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
600	71	0288	IRRIGATION — FIELD CROP IRRIGATION WITH OXIDATION POND EFFLUENT KEYWORDS MISSISSIPPI IRRIGATION OXI
600	72	1169	IRRIGATION — CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600	72	1177	IRRIGATION — DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
600	73	1065	IRRIGATION — EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	72	1048	IRRIGATION — SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200	70	1118	IRRIGATION-EFFECTS — WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	66	0124	IRRIGATION-HEADS — ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
200	71	0607	IRRIGATION-PRACTIC — SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEME
300	70	1036	IRRIGATION-PRACTIC — AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
400	73	1168	IRRIGATION-STORAGE — CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
200	71	0770	IRRIGATION-SYSTEMS — LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER
400	71	1174	IRRIGATION-SYSTEMS — LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	73	1158	IRRIGATION-SYSTEMS — DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
400	73	1183	IRRIGATION-SYSTEM — CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
600	72	1149	IRRIGATION-SYSTEMS — MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
100	70	1041	IRRIGATION-WATER — STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
200	68	1242	IRRIGATION-WATER — THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	68	1244	IRRIGATION-WATER — SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
400	71	1196	IRRIGATION-WATER — CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
100	69	0105	ISOLATION — AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMAT
100	70	0026	ISOLATION — A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
100	70	0110	ISOLATION — ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
100	71	0291	ISOLATION — COMPARISON OF MEDIA FOR ISOLATION OF SALMONELLAE AND SHIGELLAE FROM FECAL SPECIMENS KE
100	71	0307	ISOLATION — ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS-ARMIGERA AND ITS PERISTENCE IN AVIAN FECES
500	71	1254	ISOLATION — ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
700	70	1256	ISOTHERMS — MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
200	64	1241	ISOTRICHA-INTESTIN — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	64	1241	ISOTRICHA-PROSTOMA — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	64	1241	ISOTRICHS — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	70	1237	JORDAN-RIVER-MICH — POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	66	0142	JOULE-HEATING — REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING E
300	26	1204	JUDICIAL — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	30	1205	JUDICIAL-DECISIONS — SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	46	1208	JUDICIAL-DECISIONS — GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	49	1210	JUDICIAL-DECISIONS — MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	53	1206	JUDICIAL-DECISION — POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1202	JUDICIAL-DECISIONS — OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	68	1209	JUDICIAL-DECISIONS — ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
100	65	0377	K — EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	68	0337	K — A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	69	0061	K — SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	70	0042	K — STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
200	70	0214	K — RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0226	M — A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
300	70	0475	K — LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
400	70	0070	K — SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
100	67	0233	KANSAS — EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
200	64	0759	KANSAS — STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	67	0734	KANSAS — CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	67	1243	KANSAS — THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200	69	0543	KANSAS — INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
200	69	0546	KANSAS — THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0555	KANSAS — STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS
200	70	0498	KANSAS — WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	72	1013	KANSAS — POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1014	KANSAS — APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
300	67	1249	KANSAS — AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	68	1209	KANSAS — ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	70	0743	KANSAS — GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
300	71	1107	KANSAS — WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400	68	0038	KANSAS — PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
100	62	0480	KENNEL — CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
200	71	1094	KENTUCKY — AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1095	KENTUCKY — BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	KENTUCKY — ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
300	46	1208	KENTUCKY — GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
600	73	1075	KENTUCKY — THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100	72	1215	KIDNEYS — AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
200	71	0651	KINGDOM — ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMEN
200	66	0120	KJELDAHL-NITROGEN — STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0138	KJELDAHL-NITROGEN — DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	66	0139	KJELDAHL-NITROGEN — CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	69	0167	KJELDAHL-NITROGEN — AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
100	71	1213	KLEBSIELLA — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	71	1213	KLEBSIELLA-PHEUMON — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	71	0618	KNOWLEDGE — COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION KEYWORDS COMMUNICATION TECHNOLOGY POLIT
300	71	0412	LAB — THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP
100	65	0067	LABOR — EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
100	70	0102	LABOR — POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
200	66	0115	LABOR — MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0126	LABOR — MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING KEYWORDS CATTLE CONFINEME
200	69	0202	LABOR — ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
200	69	0524	LABOR — CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST I
200	69	0706	LABOR — HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	70	0687	LABOR — OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
400	69	0039	LABOR — LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
400	72	1032	LABORATORIES — NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
100	55	0328	LABORATORY — EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	65	0378	LABORATORY — TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTIO
100	66	0478	LABORATORY — LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
100	70	0034	LABORATORY — A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND
100	70	0270	LABORATORY — RAPID CONCENTRATION OF STRONGYLE EGGS FROM EQUINE FECES FOR IN VITRO STUDIES KEYWORDS

100	71	0303	LABORATORY	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
200	66	0135	LABORATORY	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
100	62	0480	LABORATORY-ANIMALS	CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
100	71	1232	LABORATORY-ANIMALS	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
300	70	0365	LABORATORY-STUDIES	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	1101	LABORATORY-STUDIES	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
100	65	0503	LABORATORY-TESTS	THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	65	0699	LABORATORY-TESTS	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	70	0369	LABORATORY-TESTS,T	ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUD
100	71	1216	LABORATORY-TESTS	IDENTIFICATION OF METABOLITES OF N- 1,1-DIMETHYIPROPYNL -3,5-DICHIOROBENZAMINE IN RAT A
200	66	0139	LABORATORY-TESTS	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0141	LABORATORY-TESTS	REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
200	66	0143	LABORATORY-TEST	DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUEL
200	66	1112	LABORATORY-TESTS	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
100	65	0699	LACTOBACILLUS	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
200	72	1108	LAGGOONS	EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
100	72	0746	LAGOON	RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
200	64	0750	LAGOON	LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	66	0149	LAGOON	EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
200	68	0694	LAGOON	THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200	69	0074	LAGOON	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	70	0218	LAGOON	REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DIT
200	70	0253	LAGOON	TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	70	0737	LAGOON	REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	71	0593	LAGOON	ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL
200	71	0777	LAGOON	FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0778	LAGOON	LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200	71	0782	LAGOON	MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
200	71	0796	LAGOON	DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0811	LAGOON	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
300	67	0701	LAGOON	WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300	69	0300	LAGOON	WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	71	0639	LAGOON	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	71	0700	LAGOON	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
400	68	0015	LAGOON	CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION KEYWORDS LAGOON POND FUR
400	69	0039	LAGOON	LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
400	70	0351	LAGOON	DAIRY-SET-UP FOR 200 COWS KEYWORDS LAGOON COSTS FREE-STALL-HOUSING EVAPORATIVE-LAGOON
700	70	0231	LAGOON	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
100	65	0075	LAGOONING	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	69	0030	LAGOONING	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	65	0346	LAGOONS	LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	65	0378	LAGOONS	TREATMENT OF LIVESTOCK-WASTE - A LABORATORY STUDY KEYWORDS BOD COD ANAEROBIC-DIGESTIO
100	66	0478	LAGOONS	LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
100	68	1229	LAGOONS	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	69	0259	LAGOONS	ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
100	69	0353	LAGOONS	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	70	0012	LAGOONS	CONTROL OF HOUSE FLIES IN SWINE FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL K
100	70	0049	LAGOONS	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100	70	0050	LAGOONS	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0102	LAGOONS	POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
100	70	0420	LAGOONS	SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGO
100	70	1230	LAGOONS	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	0443	LAGOONS	SULFUR BACTERIA IN RED LAGOONS KEYWORDS ODOR SULFUR-BACTERIA LAGOONS
100	71	0507	LAGOONS	ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLL
100	71	0758	LAGOONS	HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
200	66	0128	LAGOONS	MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPM
200	66	0132	LAGOONS	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
200	66	0138	LAGOONS	DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	66	0139	LAGOONS	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0151	LAGOONS	ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	69	0175	LAGOONS	STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
200	69	0176	LAGOONS	DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
200	69	0431	LAGOONS	MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	69	0541	LAGOONS	FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0547	LAGOONS	CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	69	0696	LAGOONS	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	69	1102	LAGOONS	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	70	0054	LAGOONS	POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
200	70	0234	LAGOONS	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0238	LAGOONS	THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	70	0246	LAGOONS	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
200	70	0251	LAGOONS	AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	70	0321	LAGOONS	WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	70	1159	LAGOONS	METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	71	0617	LAGOONS	THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRAT
200	71	0653	LAGOONS	LIQUID WASTE TREATMENT II OXIDATION PONDS AND AERATED LAGOONS KEYWORDS AEROBIC-TREATM
200	71	0819	LAGOONS	ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
200	71	1096	LAGOONS	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	72	1019	LAGOONS	PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1023	LAGOONS	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
300	69	0002	LAGOONS	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	69	0062	LAGOONS	MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	70	0455	LAGOONS	ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
300	70	1192	LAGOONS	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	71	0457	LAGOONS	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300	71	0590	LAGOONS	THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT KEYWORDS LAGOONS DESIGN IRRIGATION M
300	72	1003	LAGOONS	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
300	72	1070	LAGOONS	PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
300	72	1264	LAGOONS	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
400	70	0022	LAGOONS	SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY
400	70	0111	LAGOONS	UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	71	0731	LAGOONS	DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPO
400	71	1174	LAGOONS	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	72	1173	LAGOONS	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
400	72	1179	LAGOONS	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
500	70	0399	LAGOONS	LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
500	70	0401	LAGOONS	MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
500	70	0403	LAGOONS	ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
500	71	1072	LAGOONS	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	71	0496	LAGOONS	DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION

600	73	1065	LAGOONS — EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	70	1066	LAGOONS — WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	72	1048	LAGOONS — SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
400	70	0097	LAGOON-DESIGN — POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
500	70	0399	LAGOON-EFFLUENT — LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
200	66	0137	LAGOON-FEEDING — PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	66	0116	LAGOON-FLORA — PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
100	67	0233	LAGOON-OPERATION — EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
200	71	0843	LAG-TIME — ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS KEYWORD ACTIVATED-SLUDGE AN
300	68	0702	LAKE — BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
100	64	1200	LAKES — PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	71	1038	LAKES — CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
200	71	1099	LAKES — SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300	64	1110	LAKES — LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300	71	1055	LAKES — ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
400	73	1063	LAKES — AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
100	70	1195	LAKE-ERIE — AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
300	69	1044	LAKE-EUTROPHICATIO — IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	LAKE-EUTROPHICATIO — EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
100	62	0292	LAND — AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAIN
100	71	0758	LAND — HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
200	70	1050	LAND — THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	68	0724	LANDFILLS — GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	72	1029	LAND-APPLICATION — CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
600	71	0100	LAND-APPLICATION — ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT KEYWORDS LAND-APPLICATION RUNOFF PER
100	70	0083	LAND-DISPOSAL — BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BE
100	71	0450	LAND-DISPOSAL — NITRATE AND SALT IN SOILS AND GROUND-WATERS FROM LAND DISPOSAL OF DAIRY MANURE KEYWORD
100	71	1228	LAND-DISPOSAL — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	69	0175	LAND-DISPOSAL — STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
200	69	0200	LAND-DISPOSAL — THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200	69	0201	LAND-DISPOSAL — ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
200	69	0521	LAND-DISPOSAL — WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
200	70	0114	LAND-DISPOSAL — SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0324	LAND-DISPOSAL — DISPOSAL OF SOLID AGRICULTURAL-WASTES - CONCEPTS AND PRINCIPLES KEYWORDS RESEARCH-NEE
300	71	0319	LAND-DISPOSAL — FARM WASTE DISPOSAL-SYSTEMS AEROBIC-LAGOONS AERATED-LAGOONS ANAEROBIC-LAGOONS LAND-DISP
100	70	1037	LAND-MANAGEMENT — NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	70	0510	LAND-NEEDED — CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FER
100	70	0458	LAND-REQUIREMENTS — USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	73	1184	LAND-SPREADING — ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	71	0605	LAND-SPREADING — CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
200	71	0642	LAND-SPREADING — AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
200	69	0200	LAND-USE — THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200	69	0528	LAND-USE — THERES HOPE AHEAD KEYWORDS ODOR LAND-USE GOALS POPULATION
200	69	0535	LAND-USE — WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POL
200	70	0243	LAND-USE — MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	71	1096	LAND-USE — ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	72	1108	LAND-USE — EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
100	63	1064	LARVAE — TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	70	1090	LARVAE — COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	71	1092	LARVAE — EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	73	1165	LARVAE — FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
200	70	0716	LARVAE — BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	71	0852	MARVAE — BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES THEIR NUTRITIONAL VALUE TO THE GROWING CH
100	65	1091	LARVAL-MORTALITY — TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
300	71	0515	LARVICIDES — FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
200	70	0240	LAW — WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
300	70	0383	LAW — PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION
200	71	0593	LAWS — ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL
200	71	0594	LAWS — IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200	71	0595	LAWS — ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION E
200	71	0596	LAWS — SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
200	71	0597	LAWS — STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0599	LAWS — THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0600	LAWS — STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
200	71	0601	LAWS — PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULA
200	71	0602	LAWS — STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS RUNOFF LAWS FEEDLOT V
300	71	0584	LAWS — STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
200	71	0440	LAWSUITS — LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
300	70	0073	LAWSUITS — STOCKMEN S LIABILITY UNDER THE MISSOURI NUISANCE LAW KEYWORDS ODOR NOISE LAWSUITS DAMA
200	71	0788	LAW-SUITS — LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200	69	0187	LAYER — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	64	0371	LAYERS — THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
200	66	0129	LAYING-BIRDS — WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
100	68	0381	LAYOUT — WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100	66	1080	LEACHING — NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	67	0076	LEACHING — NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS KEYWORDS NITRATES WATER-
100	70	1233	LEACHING — LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	71	1039	LEACHING — NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1197	LEACHING — NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
200	69	0429	LEACHING — CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROG
200	71	0826	LEACHING — CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200	71	0830	LEACHING — FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
200	71	0854	LEACHING — MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
200	71	0856	LEACHING — GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTIL
200	71	0857	LEACHING — NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
300		1077	LEACHING — SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	70	1036	LEACHING — AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	71	1107	LEACHING — WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400	73	1168	LEACHING — CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
500	70	0393	LEACHING — CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
500	71	1072	LEACHING — HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	69	1239	LEACHING — DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
700	71	1120	LEACHING — SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
400	73	1168	LEAKAGE — CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
300	71	1261	LEAST-COST-SHIPMEN — INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
100	69	0095	LEAST-SQUARES — BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
100	70	1194	LEE-RI — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	66	0150	LEGAL — PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	70	0240	LEGAL — WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
200	71	0664	LEGAL — ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE

300	46	1207	LEGAL — FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
500	70	0408	LEGAL — LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
200	71	0789	LEGAL-ASPECT — ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
100	65	0470	LEGAL-ASPECTS — CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
100	69	1042	LEGAL-ASPECTS — THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
100	70	0228	LEGAL-ASPECTS — RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
100	70	1217	LEGAL-ASPECTS — APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	1228	LEGAL-ASPECTS — ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	68	1186	LEGAL-ASPECTS — TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	69	0157	LEGAL-ASPECTS — ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0159	LEGAL-ASPECTS — ENVIRONMENTAL POLLUTION--NOW AND IN THE YEARS AHEAD KEYWORDS LEGAL-ASPECTS DESIGN-STA
200	69	0160	LEGAL-ASPECTS — EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
200	69	0426	LEGAL-ASPECTS — REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
200	69	0431	LEGAL-ASPECTS — MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	69	0756	LEGAL-ASPECTS — SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
200	70	0235	LEGAL-ASPECTS — ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
200	70	1050	LEGAL-ASPECTS — THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0598	LEGAL-ASPECTS — MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200	71	0609	LEGAL-ASPECTS — REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
200	71	0788	LEGAL-ASPECTS — LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200	72	1019	LEGAL-ASPECTS — PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
300		1105	LEGAL-ASPECTS — RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	26	1204	LEGAL-ASPECTS — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	30	1205	LEGAL-ASPECTS — SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	46	1208	LEGAL-ASPECTS — GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	67	1249	LEGAL-ASPECTS — AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	68	1202	LEGAL-ASPECTS — OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	68	1209	LEGAL-ASPECTS — ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	1061	LEGAL-ASPECTS — RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	70	1192	LEGAL-ASPECTS — IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1201	LEGAL-ASPECTS — OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300	70	1247	LEGAL-ASPECTS — DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0301	LEGAL-ASPECTS — STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDE
300	71	0704	LEGAL-ASPECTS — PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
300	71	1055	LEGAL-ASPECTS — ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	71	1056	LEGAL-ASPECTS — AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
300	71	1107	LEGAL-ASPECTS — WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	72	1157	LEGAL-ASPECTS — CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	65	0485	LEGAL-ASPECTS — POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFIGIENCIES RATE-
400	70	0068	LEGAL-ASPECTS — POSSIBLE DEFENSES AGAINST NUISANCE COMPLAINTS KEYWORDS LEGAL-ASPECTS POULTRY NUISANCE
400	70	1133	LEGAL-ASPECTS — POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	71	1137	LEGAL-ASPECTS — REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEED
400	71	1196	LEGAL-ASPECTS — CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400	72	1166	LEGAL-ASPECTS — HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
300	69	0001	LEGAL-IMPLICATIONS — SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	70	0383	LEGAL-PROCEDURE — PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION
100	69	0037	LEGISLATION — WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
100	70	0084	LEGISLATION — FATTY ACID CONTENT AS A MEASURE OF THE ODOUR POTENTIAL OF STORED LIQUID POULTRY MANURE
100	71	0454	LEGISLATION — SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION
200	69	0157	LEGISLATION — ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0181	LEGISLATION — FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200	69	0423	LEGISLATION — 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0426	LEGISLATION — REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
200	69	0432	LEGISLATION — AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
200	69	0533	LEGISLATION — THE REGULATORY ROLE OF THE DEPARTMENT OF NATURAL-RESOURCES KEYWORDS LEGISLATION POLLU
200	69	0544	LEGISLATION — HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200	69	0545	LEGISLATION — HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200	69	0546	LEGISLATION — THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0551	LEGISLATION — MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULAT
200	69	0552	LEGISLATION — STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	69	0555	LEGISLATION — STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS
200	69	0558	LEGISLATION — COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
200	69	0562	LEGISLATION — ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
200	69	0563	LEGISLATION — A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION KEYWORDS CATTLE RUN
200	69	0566	LEGISLATION — DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM KEYWORDS REGULATIONS LEGISLATION
200	70	0114	LEGISLATION — SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0225	LEGISLATION — LEGAL-RESTRAINTS ON AGRICULTURAL-POLLUTION KEYWORDS DOORS WATER-POLLUTION PESTICIDES
200	70	0236	LEGISLATION — ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK
200	70	0239	LEGISLATION — FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI
200	70	0241	LEGISLATION — SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
200	70	0320	LEGISLATION — AGRICULTURAL-WASTES IN AN URBAN-ENVIRONMENT KEYWORDS ODOR LEGISLATION FUNDING RESEARC
200	70	1050	LEGISLATION — THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0284	LEGISLATION — CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONS
200	71	0285	LEGISLATION — POLLUTION-CONTROL DECISIONS - WHO SHOULD MAKE THEM KEYWORDS INDIVIDUAL-RIGHTS LEGISLA
200	71	0593	LEGISLATION — ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL
200	71	0844	LEGISLATION — REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORD ADMINISTRATIVE AG
300		1105	LEGISLATION — RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	53	1206	LEGISLATION — POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	69	1061	LEGISLATION — RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	70	0385	LEGISLATION — AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	1192	LEGISLATION — IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1201	LEGISLATION — OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300	70	1247	LEGISLATION — DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0457	LEGISLATION — DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300	71	0584	LEGISLATION — STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
300	71	1107	LEGISLATION — WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	71	1246	LEGISLATION — FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
100	70	1037	LEGUMES — NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
300	65	0739	LEGUMES — NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
200	71	1234	LEMNA — SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
100	73	1128	LEMNACEAE — USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
200	71	0836	LEPTOSPIRES — SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
100	64	1200	LEPTODORIDAE — PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
300	70	1104	LEPTOSPIRA — FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
300	69	0007	LETHAL-SITUATIONS — SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
100	68	0036	LEUCOSIS — OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
200	71	0440	LICENSING — LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
200	71	0740	LIGHT-INTENSITY — PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
300	71	1245	LIGHT-PENETRATION — EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
200	71	0851	LIGNINS — NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS

300	71	1061	LIGNINS	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
100	62	1220	LIME	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	68	0442	LIME	CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS
100	70	0048	LIMITING-FACTORS	SOIL FERTILITY UNDER CONTINUOUS CULTIVATION IN NORTHERN NIGERIA I THE ROLE OF ORGANIC
300	71	1056	LINEAR-PROGRAMMING	AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
100	68	0381	LININGS	WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
200	64	1241	LIPIDS	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
500	71	1254	LIPOLYTIC-BACTERIA	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	58	0580	LIQUID	ENGINEERING PRINCIPLES IN HANDLING LIQUID MATERIALS KEYWORDS PUMPS ENGINEERING LIQUID
100	59	0459	LIQUID	LIQUID MANURE FOR MIDWEST SWINE PRODUCTION KEYWORDS LIQUID MANURE MIDWEST
100	65	0366	LIQUID	LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	68	0442	LIQUID	CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS
100	70	0065	LIQUID	AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
200	71	0665	LIQUID	WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
200	71	0824	LIQUID	AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71	0827	LIQUID	A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM
200	71	0834	LIQUID	SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
200	71	0837	LIQUID	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
100	70	1195	LIQUIDS	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
200	71	0779	LIQUID-FLUSH-SYSTE	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
300	71	1081	LIQUID-FUELS	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	70	0323	LIQUID-HANDLING	AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-
100	71	0266	LIQUID-MANURE	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	66	0130	LIQUID-MANURE	DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
200	69	0202	LIQUID-MANURE	ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
600	72	1150	LIQUID-MANURE-SYST	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
100	72	1215	LIQUID-SCINTILLATI	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	71	0573	LIQUID-STORAGE	METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS
600	72	1150	LIQUID-STORAGE-SYS	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
200	66	0121	LIQUID-WASTE	PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200	66	0151	LIQUID-WASTE	ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	69	0430	LIQUID-WASTE	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
200	71	0642	LIQUID-WASTE	AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
200	71	0772	LIQUID-WASTE	A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD
200	71	0795	LIQUID-WASTE	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
100	70	1233	LIQUID-WASTES	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	66	0155	LIQUID-WASTES	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
200	70	0737	LIQUID-WASTES	REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	71	0647	LIQUID-WASTES	ENVIRONMENTAL PROBLEMS IN THE FOOD PROCESSING INDUSTRY KEYWORDS LIQUID-WASTES INDUSTRI
200	71	0662	LIQUID-WASTES	WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME
200	71	0768	LIQUID-WASTES	SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0785	LIQUID-WASTES	A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200	71	0799	LIQUID-WASTES	AGITATION IN LIQUID MANURE TANKS KEYWORDS LIQUID-WASTES PUMPS SLURRIES MODEL-STUDIES
200	71	0800	LIQUID-WASTES	MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE KEYWORDS L
300	70	1247	LIQUID-WASTES	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0457	LIQUID-WASTES	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
400	70	0111	LIQUID-WASTES	UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
600	72	1004	LIQUIFIED-WASTE-MA	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
100	71	0314	LITERATURE	GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDEN
100	71	0447	LITERATURE	LIVESTOCK WASTES - ANNUAL LITERATURE REVIEW KEYWORDS LITERATURE LIVESTOCK FARM-WASTES
100	71	0751	LITERATURE	ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	71	0758	LITERATURE	HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
300	71	0486	LITERATURE	FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
600	70	0469	LITERATURE	WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
300	71	0511	LITERATURE-REVIEW	ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
100	66	0290	LITTER	CORYNEFORM BACTERIA POULTRY DEEP LITTER KEYWORDS CORYNEFORM BACTERIA POULTRY LITTER
100	68	0011	LITTER	THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
100	68	0036	LITTER	OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK'S
100	68	0337	LITTER	A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	71	0461	LITTER	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	69	0040	LITTER	PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
100	70	0018	LITTER	SALMONELLA SPP AND SEROTYPES OF ESCHERICHIA COLI ISOLATED FROM THE LESSER MEALWORM CO
100	68	0043	LITTER	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS FUMIGATION BROILER LITTER
100	71	0460	LITTER	EFFECT OF TYPE OF HOUSING AND LITTER ON PRODUCTION OF BROILERS KEYWORDS EFFECT LITTER
200	66	0145	LITTER	VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	69	0196	LITTER	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
200	70	0720	LITTER	PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0771	LITTER	TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA KEYWORDS
200	71	0853	LITTER	RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
200	66	0136	LITTERLIFE	ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
100	66	0422	LITTERS	PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
100	70	0025	LITTER-HOUSES	BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYW
100	72	1199	LIVER	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1215	LIVER	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	62	1220	LIVESTOCK	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	65	0344	LIVESTOCK	THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
100	66	0437	LIVESTOCK	PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	67	1258	LIVESTOCK	RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
100	69	1198	LIVESTOCK	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	70	0051	LIVESTOCK	IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	70	1194	LIVESTOCK	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1195	LIVESTOCK	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	70	1233	LIVESTOCK	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	71	0447	LIVESTOCK	LIVESTOCK WASTES - ANNUAL LITERATURE REVIEW KEYWORDS LITERATURE LIVESTOCK FARM-WASTES
100	71	1214	LIVESTOCK	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	73	1034	LIVESTOCK	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
100	73	1128	LIVESTOCK	USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
100	73	1184	LIVESTOCK	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	66	0147	LIVESTOCK	COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	69	0432	LIVESTOCK	AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
200	69	1185	LIVESTOCK	ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0246	LIVESTOCK	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
200	70	1050	LIVESTOCK	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0599	LIVESTOCK	THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0600	LIVESTOCK	STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
200	71	0609	LIVESTOCK	REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
200	71	0640	LIVESTOCK	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
200	71	1095	LIVESTOCK	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	LIVESTOCK	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	71	1252	LIVESTOCK	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS

200	72	1010	LIVESTOCK	PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1011	LIVESTOCK	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1012	LIVESTOCK	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1013	LIVESTOCK	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1014	LIVESTOCK	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1020	LIVESTOCK	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1024	LIVESTOCK	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1029	LIVESTOCK	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
300	49	1210	LIVESTOCK	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	65	0739	LIVESTOCK	NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
300	68	1209	LIVESTOCK	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	1061	LIVESTOCK	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	69	1125	LIVESTOCK	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	70	1201	LIVESTOCK	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300	70	1247	LIVESTOCK	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	70	1248	LIVESTOCK	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0689	LIVESTOCK	WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MA
300	71	1106	LIVESTOCK	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	71	1107	LIVESTOCK	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	71	1246	LIVESTOCK	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300	72	1157	LIVESTOCK	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	69	1225	LIVESTOCK	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	70	1132	LIVESTOCK	THE GREAT MANURE DILEMMA KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT RECYCLING FARM-WASTES
400	70	1133	LIVESTOCK	POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	71	1136	LIVESTOCK	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	73	1063	LIVESTOCK	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400	73	1178	LIVESTOCK	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	69	1005	LIVESTOCK	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	72	1002	LIVESTOCK	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
700	69	1067	LIVESTOCK	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
500	68	1259	LIVESTOCK-MANURE-C	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
100	65	1219	LIVESTOCK-POISONIN	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
200	71	0586	LIVESTOCK-WASTES	CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT KEYWORDS LIVESTOCK-WASTES WATER
200	72	1011	LIVESTOCK-WASTE-MA	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
300	46	1208	LIVESTOCK-WASTES	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	69	1125	LIVESTOCK-WASTE-DI	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	69	1125	LIVESTOCK-WASTES-C	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	71	1055	LIVESTOCK-WASTES	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	71	1238	LIVESTOCK-WASTE	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
300	71	1238	LIVESTOCK-WASTE	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
300	65	0053	LOADERS	FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
100	67	0233	LOADING	EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
200	66	0127	LOADING	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
200	69	0056	LOADING	PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200	69	0163	LOADING-PARAMETER	DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	66	0135	LOADING-RATE	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
100	68	0087	LOADING-RATES	AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
100	70	0369	LOADING-RATES	ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUD
200	69	0167	LOADING-RATES	AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
200	70	0241	LOADING-RATES	SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
300	69	0002	LOADING-RATES	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	70	0009	LOADING-RATES	LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION
200	71	0612	LOANS	PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
200	71	0594	LOCAL-GOVERNMENTS	IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200	71	0765	LOCAL-GOVERNMENTS	ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWO
200	70	0054	LOCATING	POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
300	69	0002	LOCATION	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
200	66	0117	LONG-ISLAND	DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
100	69	0364	LOSSES	LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
100	69	0679	LOSSES	NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
200	66	0152	LOSSES	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
400	71	1135	LOTS	ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
100	71	1232	LOUISIANA	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
600	72	1154	LOUISIANA	WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
300	71	1081	LOW-SULFUR-OIL	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
100	71	1212	LUMBERING	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
200	70	1050	LUMBERING	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
100	72	1215	LUNGS	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	70	0017	LYOPHILIZE	AN IMPROVED METHOD FOR PREPARATION OF FECES FOR BOMB CALORIMETRY KEYWORDS LYOPHILIZE
200	70	0215	LYSIMETER	MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-
100	70	1233	LYSIMETERS	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	66	0438	LYSIMETERS	SOIL CHEMICAL CHANGES AND INFILTRATION RATE REDUCTION UNDER SEWAGE SPREADING KEYWORDS
400	73	1073	LYSIMETERS	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
100	69	0714	MACCONKEY-BROTH	EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
300	65	0053	MACHINERY	FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
300	71	1245	MACROBENTHOS	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	68	1121	MAGNESIUM	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	1198	MAGNESIUM	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
200	70	0720	MAGNESIUM	PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
100	73	1190	MAGNESUIM	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
300	72	1052	MAINE	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
600	72	1071	MAINTENANCE	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100	70	1111	MALLARD-DUCK	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	69	0560	MAMAGEMENT	ANIMAL WASTE MANAGEMENT-QUESTIONS AND ANSWERS KEYWORDS RUNOFF CONFINEMENT-PENS REGULAT
100	60	0059	MANAGEMENT	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
100	62	0499	MANAGEMENT	MANURE LAGOONS DESIGN CRITERIA AND MANAGEMENT KEYWORDS FARM-LAGOONS DESIGN-CRITERIA SI
100	70	0228	MANAGEMENT	RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
100	70	0678	MANAGEMENT	THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT KEYWORDS REUSE ODOR POLLUTION FUTURE MANAG
100	71	0507	MANAGEMENT	ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLL
200	66	0115	MANAGEMENT	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0127	MANAGEMENT	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
200	66	0130	MANAGEMENT	DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS CDOR SLURRIES FURROWS FLIES L
200	68	0694	MANAGEMENT	THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200	68	1186	MANAGEMENT	TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	68	1187	MANAGEMENT	THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	69	0055	MANAGEMENT	MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	69	0183	MANAGEMENT	THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	69	0185	MANAGEMENT	WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
200	69	0423	MANAGEMENT	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0425	MANAGEMENT	ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF

200	69	0426	MANAGEMENT REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
200	69	0427	MANAGEMENT MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NU
200	69	0428	MANAGEMENT DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-R
200	69	0530	MANAGEMENT THE ROLE OF THE FEDERAL WATER-POLLUTION CONTROL ADMINISTRATION IN FARM-ANIMAL-WASTE AND
200	69	0540	MANAGEMENT INDUSTRY AND THE ENVIRONMENT-FEEDLOT WASTE MANAGEMENT KEYWORDS REGULATION CATTLE ECOS
200	69	0548	MANAGEMENT RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200	69	0554	MANAGEMENT MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRA
200	69	0565	MANAGEMENT RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT KEYWORDS WASTE-TREATMENT CAT
200	69	0566	MANAGEMENT DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM KEYWORDS REGULATIONS LEGISLATION
200	69	0756	MANAGEMENT SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
200	69	1167	MANAGEMENT AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
200	69	1185	MANAGEMENT ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0246	MANAGEMENT BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
200	70	0249	MANAGEMENT LAND DISPOSAL AND STORAGE OF FARM WASTES 1 PLANNING AND CHOICE OF SYSTEM KEYWORDS EF
200	70	0687	MANAGEMENT OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
200	70	0717	MANAGEMENT PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT KEYWORDS BOD SEW
200	70	0747	MANAGEMENT ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	70	1159	MANAGEMENT METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	71	0586	MANAGEMENT CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT KEYWORDS LIVESTOCK-WASTES WATER
200	71	0593	MANAGEMENT ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL
200	71	0595	MANAGEMENT ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION E
200	71	0597	MANAGEMENT STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0600	MANAGEMENT STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
200	71	0602	MANAGEMENT STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS RUNOFF LAWS FEEDLOT V
200	71	0603	MANAGEMENT EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
200	71	0604	MANAGEMENT STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71	0606	MANAGEMENT POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY
200	71	0607	MANAGEMENT SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEME
200	71	0665	MANAGEMENT WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
200	71	0703	MANAGEMENT FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0709	MANAGEMENT BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
200	71	0733	MANAGEMENT ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0765	MANAGEMENT ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWO
200	71	0770	MANAGEMENT LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER
200	71	0774	MANAGEMENT MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200	71	0777	MANAGEMENT FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0798	MANAGEMENT THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS
200	71	0803	MANAGEMENT MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
200	72	1010	MANAGEMENT PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1012	MANAGEMENT REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1023	MANAGEMENT CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	72	1028	MANAGEMENT AREA DIRECTORS SUMMARY KEYWORDS FARM-WASTES MANAGEMENT FEED-LOTS US-MEAT-ANIMAL-RESEARC
300	69	0001	MANAGEMENT SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	0002	MANAGEMENT SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	69	0003	MANAGEMENT CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	69	0007	MANAGEMENT SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	69	0062	MANAGEMENT MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	69	0300	MANAGEMENT WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	69	0631	MANAGEMENT ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	1180	MANAGEMENT CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	70	0009	MANAGEMENT LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION
300	71	0486	MANAGEMENT FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
300	71	0590	MANAGEMENT THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT KEYWORDS LAGOONS DESIGN IRRIGATION M
300	71	0674	MANAGEMENT CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0689	MANAGEMENT WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MA
300	71	1055	MANAGEMENT ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	71	1106	MANAGEMENT MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	71	1246	MANAGEMENT FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300	72	1157	MANAGEMENT CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	68	0229	MANAGEMENT THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTIO
400	71	0267	MANAGEMENT WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
400	71	0505	MANAGEMENT CONFINEMENT-REARING OF TURKEYS KEYWORDS VENTILATION MANAGEMENT PSYCHROMETRICS CONTROL
500	70	0394	MANAGEMENT FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION
500	70	0403	MANAGEMENT ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
600	71	0493	MANAGEMENT NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
600	72	1149	MANAGEMENT MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
600	72	1262	MANAGEMENT CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
400	68	0101	MANAGEMENT-COSTS MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
300	69	0006	MANAGEMENT-OXIDATI SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	69	0005	MANAGEMENT-PROPERT SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
400	71	0298	MANAGING MANAGING SWINE WASTES TO PREVENT POLLUTION KEYWORDS FARM-WASTES HOGS WASTE-WATER-DISP
200	64	1241	MANOMETERS PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	59	0459	MANURE LIQUID MANURE FOR MIDWEST SWINE PRODUCTION KEYWORDS LIQUID MANURE MIDWEST
100	65	0066	MANURE THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR
100	65	0344	MANURE THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
100	67	0041	MANURE THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
100	67	0713	MANURE SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	68	0442	MANURE CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS
100	70	0107	MANURE DRYING POULTRY MANURE INSIDE THE POULTRY HOUSE KEYWORDS DRYING POULTRY MANURE
100	70	0510	MANURE CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FER
100	70	1227	MANURE AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	71	0571	MANURE EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES
200	66	0146	MANURE UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
200	66	0150	MANURE PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	68	0725	MANURE POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAG
200	68	1186	MANURE TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	68	1187	MANURE THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	71	0860	MANURE DEWATERING POULTRY MANURE BY CENTRIFUGATION KEYWORD CENTRIFUGATION DEWATERING POULTRY
400	67	1226	MANURE PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
100	68	0307	MANURES EFFECT SOIL TEMPERATURE PHOSPHORUS MANURES
100	70	0048	MANURES SOIL FERTILITY UNDER CONTINUOUS CULTIVATION IN NORTHERN NIGERIA I THE ROLE OF ORGANIC
100	70	0021	MANURE-APPLICATION EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
100	70	0421	MANURE-APPLICATION EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNE
200	71	0800	MANURE-CONSISTANCY MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE KEYWORDS L
200	69	0524	MANURE-DISPOSAL CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST I
300	72	1003	MANURE-MOUNDS CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
100	69	0707	MANURE-ODOR A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	70	0685	MANURE-ODORS GASES AND ODORS FROM STORED SWINE WASTES AMMONIA MANURE METHANE CARBON-DIOXIDE HYDROGEN
200	70	0224	MANURE-PACK HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
300	69	1125	MANURE-PRODUCTION ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W

200	71	0800	MANURE-PUMP	MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE KEYWORDS L
100	65	0331	MANURE-SCRAPER	DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
500	68	1259	MANURE-STABILIZATI	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
600	72	1156	MANURE-STACKING	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
300	72	1157	MANURE-UTILIZATION	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	70	0070	MANURE-VALUE	SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
300	72	1085	MANURE-WASTES	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
100	68	0036	MAREK	OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
300	71	1100	MARINE	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300	71	1100	MARINE-ANIMALS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
200	72	1029	MARKETING	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
400	68	0101	MARKETING	MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
200	71	0817	MARKET-VALUE	MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALU
300	49	1210	MARKET-VALUE	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
400	71	0753	MARKET-VALUE	MANURE CAN BE PROCESSED AND SOLD AT A PROFIT KEYWORD FEEDLOT CATTLE MARKET-VALUE WAST
300	72	1170	MARYLAND	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
100	70	0019	MASKING-AGENTS	CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS D
100	65	1091	MASSACHUSETTS	TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
200	69	0078	MASS-TRANSFER	OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
600	71	0496	MASS-TRANSFER	DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION
300	69	0004	MATERIALS	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
200	70	1113	MATHEMATICAL-MODEL	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	71	0705	MATHEMATICAL-MODEL	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
200	71	0769	MATHEMATICAL-MODEL	A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
300	71	1058	MATHEMATICAL-MODEL	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
600	72	1153	MATHEMATICAL-MODEL	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
100	71	0509	MATTER	THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT
400	65	0439	MATTER	THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC
100	70	0065	MEASURE	AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
200	69	0189	MEASUREMENT	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
200	69	0194	MEASUREMENT	TYPICAL VARIATIONS ENCOUNTERED IN THE MEASUREMENT OF OXYGEN DEMAND OF ANIMAL WASTES KE
200	71	0773	MEASUREMENT	MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
300	71	0672	MEASUREMENT	MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METH
300	71	0673	MEASUREMENT	OLFACTORY MEASUREMENT OF ANIMAL MANURE ODORS KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
500	70	0409	MEASUREMENT	ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
600	72	1002	MEASUREMENT	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
100	71	1221	MEAT	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	72	1022	MEAT-ANIMAL-RESEAR	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200	72	1024	MEAT-ANIMAL-RESEAR	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
100	72	1224	MEMBRANES	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
100	69	0057	MENACE	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
100	69	0096	MERCAPTANS	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	71	1221	MERCURY	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
300	71	1100	MERCURY	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	71	1216	METABOLIC-PATHWAYS	IDENTIFICATION OF METABOLITES OF N- 1,1-DIMETHYIPROPYNL -3,5-DICHIOROBENZAMINE IN RAT A
100	70	0027	METABOLIC-RESPONSE	EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID
200	71	0669	METABOLIC-WASTES	ANIMAL AND HUMAN METABOLIC WASTES KEYWORDS BOD PE METABOLIC-WASTES
100	65	1079	METABOLISM	UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	66	0422	METABOLISM	PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
100	73	1190	METABOLISM	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
100	73	1263	METABOLISM	CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
200	64	1241	METABOLISM	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	71	0705	METABOLISM	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
100	69	0690	METABOLISM-CAGE	AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM T
100	71	0303	METABOLITES	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
100	64	0072	METABOLIZABLE-ENER	A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
300	69	0004	METAL	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
100	67	0448	METHANE	INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM KEYWORDS ODOR ANAEROBIC-DIGESTION METHAN
100	69	0057	METHANE	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
200	69	0164	METHANE	SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
200	70	0252	METHANE	ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
300	69	0007	METHANE	SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	69	0635	METHANE	GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHA
300	69	0735	METHANE	SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND. KEYWORD SETTLING-
300	71	0672	METHANE	MEASUREMENT OF MANURE GASES BY GAS CHROMATOGRAPHY KEYWORDS AMMONIA CARBON-DIOXIDE METH
200	71	0655	METHANE-BACTERIA	ANAEROBIC BIOLOGICAL WASTE TREATMENT SYSTEMS KEYWORDS METHANE-BACTERIA FARM-LAGOONS AN
300	70	0487	METHANOL	NITRATE-REMOVAL FROM AGRICULTURAL WASTEWATER KEYWORDS ALGAE CALIFORNIA DENITRIFICATION
200	69	0429	METHEMOGLOBIN	CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROG
100	65	1219	METHEMOGLOBINEMIA	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	69	0690	METHOD	AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM T
100	69	0707	METHOD	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	70	0017	METHOD	AN IMPROVED METHOD FOR PREPARATION OF FECES FOR BOMB CALORIMETRY KEYWORDS LYOPHILIZE
100	70	0026	METHOD	A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
100	71	0441	METHOD	METHODS OF SAMPLE PREPARATION FOR CHEMICAL DETERMINATION OF CHROMIC OXIDE IN BOVINE FEC
100	71	0462	METHOD	NUTRIENT DIGESTIBILITY USING FECAL COLLECTION APPARATUS AND INDICATOR METHOD FOR STEERS
100	71	0571	METHOD	EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES
100	71	0573	METHOD	METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS
200	66	0122	METHOD	METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	69	0172	METHOD	SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD
200	70	0226	METHOD	A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
200	71	0800	METHOD	MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE KEYWORDS L
100	72	1199	METHODOLOGY	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1222	METHODOLOGY	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
100	69	0707	METHOGEN	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	72	1199	METHOLOLOGY	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1222	METHOL-VALIDATION	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
300	71	1100	METHYL-MERCURY	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	73	1155	METHYL-PENTOSE	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
200	66	0150	METROPOLITAN-AREAS	PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
100	70	1237	MICHIGAN	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	71	0286	MICHIGAN	AGRICULTURAL-BENEFITS FROM URBAN POLLUTION-CONTROL KEYWORDS SEWAGE-TREATMENT TREATMEN
300	70	0207	MICHIGAN	THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMIC
300	71	0622	MICHIGAN	EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYW
300	72	1182	MICHIGAN	BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
500	71	1254	MICROAEROPHILIC-VI	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
200	69	0676	MICROBIAL	CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS KEYWORDS RUNOFF GR
200	71	0797	MICROBIAL	GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
300	69	0300	MICROBIAL	WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	70	0414	MICROBIAL	THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
400	71	0305	MICROBIAL	RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS

500	71	1072	MICROBIAL-COMPOSIT	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
200	71	0809	MICROBIAL-DEGRADAT	ENZYME FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOTMANURE KEYWORDS BOD AMINO
200	71	1096	MICROBIAL-DISPOSAL	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
100	73	1034	MICROBIAL-GROWTH	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
600	72	1076	MICROBIAL-ORGANISM	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
200	72	1023	MICROBIAL-PROPERTI	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
100	65	0503	MICROBIOLOGY	THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	65	0699	MICROBIOLOGY	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
200	69	1102	MICROBIOLOGY	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLCGICAL-TREATMENT MICROBIOLOGY O
200	71	0794	MICROFLORA	AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN MICROF
300	71	0692	MICROFLORA	EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
200	72	1021	MICRONUTRIENTS	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	69	0173	MICRONUTRIENT-DEFI	USE OF POULTRY MANURE FOR CORRECTION OF ZN AND FE DEFICIENCIES IN PLANTS KEYWORDS FER
100	55	0328	MICROORGANISMS	EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	69	0360	MICROORGANISMS	THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
100	70	0094	MICROORGANISMS	THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	70	0362	MICROORGANISMS	DISTRIBUTION OF BACTERIA IN FECES OF SWINE KEYWORDS MICROORGANISMS PATTERNS SWINE
100	71	1213	MICROORGANISMS	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	66	0136	MICROORGANISMS	ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
200	69	1102	MICROORGANISMS	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	71	0785	MICROORGANISMS	A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200	71	0795	MICROORGANISMS	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
200	71	0796	MICROORGANISMS	DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0797	MICROORGANISMS	GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
200	71	0845	MICROORGANISMS	CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS NE
200	71	1099	MICROORGANISMS	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300	68	1043	MICROORGANISMS	WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	71	1126	MICROORGANISMS	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
400	70	0097	MICROORGANISMS	POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
500	70	0393	MICROORGANISMS	CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
1500	70	0400	MICROORGANISMS	MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTIL
500	70	0401	MICROORGANISMS	MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
200	64	1240	MICRO-ORGANISMS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
700	71	1120	MIDDLESEX-COUNTY-N	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
100	64	1200	MIDGES	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	59	0459	MIDWEST	LIQUID MANURE FOR MIDWEST SWINE PRODUCTION KEYWORDS LIQUID MANURE MIDWEST
200	71	0779	MIDWEST	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
100	70	1090	MILK	COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	72	1199	MILK	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
200	64	1240	MILK	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300	71	1100	MILK	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	68	1229	MILKING-PARLOR	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	71	1221	MILK-POULTRY	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	72	1199	MILK-PRODUCTS	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	65	1219	MINERALIZATION	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
200	69	0196	MINERALOGY	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
100	69	0037	MINIMUM-REMOVAL-EF	WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
700	72	1049	MINIMUM-TILLAGE	ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
200	70	1050	MINING	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
300	71	1098	MINK	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
200	69	0544	MINNESOTA	HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200	69	1116	MINNESOTA	MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	71	0599	MINNESOTA	THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	72	1017	MINNESOTA	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
300	69	1125	MINNESOTA	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	71	1058	MINNESOTA	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
200	69	0158	MISCONCEPTION	REFLECTIONS ON POLLUTION CONTROL KEYWORDS WATER-QUALITY COST-BENEFIT-RATIO ENVIRONMEN
600	71	0288	MISSISSIPPI	FIELD CROP IRRIGATION WITH OXIDATION POND EFFLUENT KEYWORDS MISSISSIPPI IRRIGATION OXI
200	69	0554	MISSOURI	MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRA
200	72	1017	MISSOURI	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200	73	1189	MISSOURI	A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300	65	0739	MISSOURI	NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
300	70	0073	MISSOURI	STOCKMEN S LIABILITY UNDER THE MISSOURI NUISANCE LAW KEYWORDS ODOR NOISE LAWSUITS DAMA
300	70	0383	MISSOURI	PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION
300	71	0590	MISSOURI	THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT KEYWORDS LAGOONS DESIGN IRRIGATION M
300	71	1107	MISSOURI	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400	65	1127	MISSOURI	WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400	65	1141	MISSOURI	NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
400	72	1179	MISSOURI	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
300	71	1246	MISSOURI-RIVER	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
200	71	0277	MIS-USE	THE FARMERS CONCERN KEYWORDS PESTICIDES WATER-POLLUTION PANIC-POWER MIS-USE RESISTA
100	70	0421	MITE-PRECATION	EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNE
100	69	0095	MIXED-LIQUOR	BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
200	70	0252	MIXING	ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
200	70	1113	MIXING	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
400	64	0335	MIXING	EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRI
400	71	0349	MIXING	MAXI-MIXING FOR MANURE DISPOSAL KEYWORDS POULTRY COMPOSTING MIXING DISPOSAL
200	66	0152	MODEL	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	69	0166	MODEL	ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
200	71	0781	MODEL	ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
100	70	0738	MODELING	MODELING FEEDLOT POLLUTION I ANALOG SIMULATION KEYWORDS RUNOFF MODELING FEEDLOT
200	66	0119	MODELS	BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES KEYWORDS FILTH-FLIES CONFINEMENT
100	69	0095	MODEL-STUDIES	BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
100	70	1233	MODEL-STUDIES	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	71	0705	MODEL-STUDIES	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
200	71	0791	MODEL-STUDIES	METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS C
200	71	0799	MODEL-STUDIES	AGITATION IN LIQUID MANURE TANKS KEYWORDS LIQUID-WASTES PUMPS SLURRIES MODEL-STUDIES
300	71	1055	MODEL-STUDIES	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	71	1056	MODEL-STUDIES	AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
300	71	1058	MODEL-STUDIES	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
600	71	0494	MODEL-STUDIES	A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
200	70	0241	MOGDEN-FORMULA	SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
100	64	0333	MOISTURE	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	65	0503	MOISTURE	THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	67	0041	MOISTURE	THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
100	69	0040	MOISTURE	PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
200	69	0196	MOISTURE	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
400	70	0091	MOISTURE	MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
400	70	0577	MOISTURE	BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
600	72	1031	MOISTURE	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR

100	64	0371	MOISTURE-CONTENT THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
100	65	0377	MOISTURE-CONTENT EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	65	0699	MOISTURE-CONTENT THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	68	0337	MOISTURE-CONTENT A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	68	0502	MOISTURE-CONTENT MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
100	70	0031	MOISTURE-CONTENT VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100	70	0691	MOISTURE-CONTENT THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS
200	69	0165	MOISTURE-CONTENT AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200	69	0197	MOISTURE-CONTENT REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
200	70	0323	MOISTURE-CONTENT AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-
200	71	0703	MOISTURE-CONTENT FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0813	MOISTURE-CONTENT THROUGH-CIRCULATION DRYING OF MANURE IN SUPERHEATED STEAM KEYWORDS MOISTURE-CONTENT UD
300	69	0633	MOISTURE-CONTENT THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
300	70	0208	MOISTURE-CONTENT DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
300	71	0630	MOISTURE-CONTENT A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWO
300	72	1264	MOISTURE-CONTENTS PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
400	70	0109	MOISTURE-CONTENT SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS
600	70	0080	MOISTURE-CONTENT FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
600	72	1076	MOISTURE-CONTENT HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
600	72	1169	MOISTURE-CONTENT CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600	73	1075	MOISTURE-CONTENT THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
600	72	1262	MOISTURE-DEFICIT CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
200	66	0141	MOISTURE-DISTRIBUT REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
100	71	0476	MOLD THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER KEYWORDS FUNGUS PH BACTERIA MOLD POULTR
100	71	1212	MONTANA EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
200	69	0553	MONTANA STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	70	1175	MONTANA ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200	73	1189	MONTANA A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
200	64	1240	MORPHOLOGY THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	71	0461	MORTALITY FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	69	0374	MORTALITY ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CAL
100	70	1090	MORTALITY COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	71	1092	MORTALITY EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
200	69	0185	MORTALITY WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
200	69	0187	MORTALITY CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
500	68	1259	MOSQUITOES WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
100	70	0026	MOTILITY-FLASK A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
200	72	1014	MOUNDING APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1017	MOUNDING WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200	72	1023	MOUNDING CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
100	71	1212	MOUNTAINS EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	0318	MOVEMENT RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
200	71	0854	MOVEMENT MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
500	70	0404	MOVEMENT MOVEMENT OF AGRICULTURAL-POLLUTANTS WITH GROUNDWATER KEYWORDS WATER-POLLUTION ZONE-OF-
700	70	1256	MOVEMENT MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
200	66	0144	MPN TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
100	64	0343	MUD BOVINE-SALMONELLOSIS IN A FEEDLOT OPERATION KEYWORDS MUD ANTIBIOTICS STAGNANT-WATER
400	71	1139	MUD HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
100	71	0484	MUD-WATER-INTERFAC RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
300	26	1204	MUNCIPAL-WASTES OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
100	68	0306	MUNICIPAL ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
200	66	0140	MUNICIPAL DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
200	73	1083	MUNICIPAL-REFUSE CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
100	67	1218	MUNICIPAL-WASTES FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
200	68	1242	MUNICIPAL-WASTES THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	68	1242	MUNICIPAL-WASTE-RE THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	68	1244	MUNICIPAL-WASTES SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
200	69	1117	MUNICIPAL-WASTES WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	69	1167	MUNICIPAL-WASTES AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
200	70	0717	MUNICIPAL-WASTES PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT KEYWORDS BOD SEW
200	73	1082	MUNICIPAL-WASTES COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
400	69	1225	MUNICIPAL-WASTES CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
200	69	0160	MUNINCIPAL-WASTES EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
400	69	0419	MUSCA DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
100	70	0082	MUSCA-DOMESTICA HOUSE FLY PUPAE AS FOOD FOR POULTRY KEYWORDS FEEDS NUTRIENTS MUSCA-DOMESTICA
100	70	1090	MUSCA-DOMESTICA-L COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE KEYWORDS
100	71	1092	MUSCA-DOMESTICA-L EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	72	1199	MUSCLE IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1215	MUSCLE AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	70	1111	MUSSELS POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300	70	1104	MYCOBACTERIUM FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTORS-BIOLOGY
100	71	1212	MYSTIC-WATERSHED EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	64	0333	N AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	64	0474	N PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
100	65	0377	N EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	68	0337	N A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	69	0061	N SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	70	0042	N STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
200	70	0214	N RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0226	N A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
300	70	0475	N LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
400	70	0070	N SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
600	70	0254	N AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE KEYWORDS C N HOUSEFLY COMPOSTING ANAEROB
600	70	0258	N GAS PRODUCTION FROM BEEF CATTLE WASTES KEYWORDS ANAEROBIC-DIGESTION GASES COD COMPOST
200	69	0169	NAOH INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
200	70	1050	NATIONAL-ENVIRONME THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	69	0158	NATIONAL-POLICY REFLECTIONS ON POLLUTION CONTROL KEYWORDS WATER-QUALITY COST-BENEFIT-RATIO ENVIRONMEN
300	67	1250	NATIVE-GRASSES DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
200	70	1050	NATURAL-RESOURCES THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
100	66	0506	NATURE CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE
100	71	0509	NATURE THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT
200	70	0235	NATURE ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
100	72	1097	NEBRASKA NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
200	70	0224	NEBRASKA HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
200	72	1010	NEBRASKA PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1011	NEBRASKA NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1013	NEBRASKA POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1014	NEBRASKA APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1015	NEBRASKA DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
200	72	1017	NEBRASKA WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT

200 72 1018 NEBRASKA EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200 72 1019 NEBRASKA PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200 72 1022 NEBRASKA RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200 72 1024 NEBRASKA WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200 72 1025 NEBRASKA OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200 72 1029 NEBRASKA CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
300 1105 NEBRASKA RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300 71 0689 NEBRASKA WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MA
300 71 1008 NEBRASKA ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
400 71 1135 NEBRASKA ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
400 71 1174 NEBRASKA LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400 72 1032 NEBRASKA NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
400 73 1158 NEBRASKA DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
200 72 1018 NEBRASKA-LIVESTOCK EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
100 70 0368 NEEDS AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
100 65 0470 NEIGHBORS CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
100 70 0368 NEIGHBORS AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
400 70 0113 NEIGHBORS LOCATING A POULTRY ENTERPRISE KEYWORDS NEIGHBORS EGGS
200 71 0845 NEMATODES CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS NE
100 71 0451 NETHERLANDS REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
300 71 1100 NEUTRON-ACTIVATION DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100 68 0287 NEW METHODS FOR DISPOSAL OF POULTRY MANURE KEYWORDS NEW ZEALAND IRRIGATION DRYING STORAGE
600 70 0080 NEWTONIAN-FLUIDS FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
700 71 1120 NEW-JERSEY SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
400 71 1196 NEW-MEXICO CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
600 72 1031 NEW-YORK ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
100 69 0445 NEW-ZEALAND EFFLUENT DISPOSAL KEYWORDS DAIRY NEW-ZEALAND EFFLUENT
700 72 1049 NISHNABOTNA-RIVER- ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100 69 0052 NITRATE NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-N
100 70 0031 NITRATE VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100 71 0450 NITRATE NITRATE AND SALT IN SOILS AND GROUND-WATERS FROM LAND DISPOSAL OF DAIRY MANURE KEYWORD
200 69 0423 NITRATE 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200 70 0216 NITRATE GROUNDWATER QUALITY AND FLUCTUATIONS IN A SHALLOW UNCONFINED AQUIFER UNDER A LEVEL FEED
200 70 0221 NITRATE LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
200 70 0222 NITRATE THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200 70 0223 NITRATE NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
200 71 0279 NITRATE POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS KEYWORDS NITRATE EUTROPHICATI
300 65 0739 NITRATE NITRATE AND WATER KEYWORD FERTILIZERS LEGUMES MISSOURI ALFALFA LIVESTOCK NITRATE
300 65 0757 NITRATE AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300 67 0711 NITRATE THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
300 71 0099 NITRATE REMOVAL OF NITRATE BY AN ALGAL SYSTEM KEYWORDS REMOVAL NITRATE ALGAL-SYSTEM
500 70 0405 NITRATE EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
100 62 1220 NITRATES WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100 67 0076 NITRATES NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS KEYWORDS NITRATES WATER-
100 68 1121 NITRATES WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100 69 1198 NITRATES CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100 70 0049 NITRATES USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100 70 1037 NITRATES NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100 70 1041 NITRATES STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100 70 1051 NITRATES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100 70 1195 NITRATES AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100 70 1233 NITRATES LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100 71 1038 NITRATES CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100 71 1039 NITRATES NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100 71 1197 NITRATES NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100 71 1236 NITRATES MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100 72 1097 NITRATES NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
100 72 1193 NITRATES CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100 70 1237 NITRATES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200 69 0168 NITRATES AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200 69 0174 NITRATES THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
200 69 0184 NITRATES TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200 69 0482 NITRATES THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200 69 0521 NITRATES WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
200 69 0534 NITRATES COLUMBIA-COUNTY PROGRAM KEYWORDS POLLUTION-ABATEMENT ODOR ZONING NITRATES PROGRAM
200 69 0548 NITRATES RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200 69 0696 NITRATES QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200 70 0217 NITRATES POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200 70 0670 NITRATES ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200 70 0727 NITRATES EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200 71 0826 NITRATES CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
200 71 0830 NITRATES FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
200 71 1094 NITRATES AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200 71 1099 NITRATES SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200 71 1234 NITRATES SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200 71 1252 NITRATES NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200 72 1013 NITRATES POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200 72 1014 NITRATES APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200 72 1016 NITRATES CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200 72 1020 NITRATES POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200 72 1021 NITRATES APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200 72 1108 NITRATES EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300 1077 NITRATES SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300 67 1250 NITRATES DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300 68 1122 NITRATES NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300 70 0414 NITRATES THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
300 70 0475 NITRATES LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
300 70 1059 NITRATES NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300 71 0466 NITRATES INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
300 71 0639 NITRATES USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300 71 1008 NITRATES ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300 71 1106 NITRATES MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300 71 1107 NITRATES WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400 65 1127 NITRATES WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400 65 1141 NITRATES NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
400 69 0016 NITRATES FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
400 70 1176 NITRATES ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
400 72 1166 NITRATES HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400 73 1063 NITRATES AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400 73 1073 NITRATES NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS

400	73	1168	NITRATES	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
500	70	0392	NITRATES	SOURCES-OF-NITROGEN IN WATER-SUPPLIES KEYWORDS NITRATES GROUNDWATER SURFACE-WATER INF
500	70	0393	NITRATES	CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
500	70	0394	NITRATES	FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION
500	71	1072	NITRATES	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	69	1239	NITRATES	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
600	72	1169	NITRATES	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
700	69	1067	NITRATES	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700	71	1120	NITRATES	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
400	65	1141	NITRATE-CYANOSIS	NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
300	70	0010	NITRATE-MOVEMENT	THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WAST
300	70	1059	NITRATE-MOVEMENT	NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
200	70	0720	NITRATE-POISONING	PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	1033	NITRIC-ACID	NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
100	70	0021	NITRIFICATION	EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
100	70	0050	NITRIFICATION	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	71	1220	NITRIFICATION	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	69	0179	NITRIFICATION	CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO
200	70	0223	NITRIFICATION	NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
200	70	0727	NITRIFICATION	EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200	70	1115	NITRIFICATION	CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0824	NITRIFICATION	AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71	0827	NITRIFICATION	A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM
200	71	0838	NITRIFICATION	NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WA
300	68	1122	NITRIFICATION	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	69	1044	NITRIFICATION	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	NITRIFICATION	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
400	71	0305	NITRIFICATION	RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES KEYWORDS
700	71	1120	NITRIFICATION	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
200	71	0818	NITRIPICATIOT	THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
100	72	1193	NITRITES	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
200	69	0184	NITRITES	TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	69	0482	NITRITES	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
500	70	0392	NITRITES	SOURCES-OF-NITROGEN IN WATER-SUPPLIES KEYWORDS NITRATES GROUNDWATER SURFACE-WATER INF
500	70	0393	NITRITES	CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
300	71	0512	NITROFURANS	FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS NITR
100	63	0338	NITROGEN	DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100	64	0072	NITROGEN	A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
100	65	1079	NITROGEN	UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	65	1219	NITROGEN	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	66	1080	NITROGEN	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	67	0713	NITROGEN	SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	68	0044	NITROGEN	THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	68	0452	NITROGEN	GROUNDWATER CONTAMINATION KEYWORDS NITROGEN BARNYARD GROUNDWATER CONTAMINATION
100	69	0071	NITROGEN	ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	69	0355	NITROGEN	FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
100	69	0364	NITROGEN	LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
100	69	0679	NITROGEN	NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
100	70	0049	NITROGEN	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100	70	0050	NITROGEN	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0367	NITROGEN	NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND D
100	70	0413	NITROGEN	VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
100	70	0458	NITROGEN	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	70	1037	NITROGEN	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	70	1194	NITROGEN	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1233	NITROGEN	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	70	1251	NITROGEN	AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0266	NITROGEN	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0318	NITROGEN	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
100	71	0589	NITROGEN	SOIL MICROBIOLOGY AND BIOCHEMISTRY KEYWORDS NITROGEN AMMONIA-VOLATILIZATION FEEDLOTS
100	71	1039	NITROGEN	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1197	NITROGEN	NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	71	1214	NITROGEN	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	72	0746	NITROGEN	RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
100	73	1069	NITROGEN	MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100	73	1087	NITROGEN	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	73	1155	NITROGEN	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	73	1162	NITROGEN	PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
100	73	1184	NITROGEN	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	64	0750	NITROGEN	LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	64	0759	NITROGEN	STREAM POLLUTION FROM FEECLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	66	0115	NITROGEN	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0120	NITROGEN	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0155	NITROGEN	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
200	66	0156	NITROGEN	BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
200	66	1112	NITROGEN	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	68	0724	NITROGEN	GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	69	0162	NITROGEN	THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	69	0165	NITROGEN	AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200	69	0170	NITROGEN	THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
200	69	0183	NITROGEN	THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	69	0185	NITROGEN	WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
200	69	0196	NITROGEN	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
200	69	0199	NITROGEN	RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200	69	0200	NITROGEN	THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200	69	0429	NITROGEN	CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION KEYWORDS EUTROPHICATION EROSION NITROG
200	69	0433	NITROGEN	EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	69	0521	NITROGEN	WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
200	69	1116	NITROGEN	MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	70	0222	NITROGEN	THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200	70	0720	NITROGEN	PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0608	NITROGEN	RECYCLING OF ANIMAL WASTES KEYWORDS REUSE FERTILIZATION NUTRITION PHOSPHORUS NITROGEN
200	71	0774	NITROGEN	MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200	71	0775	NITROGEN	TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200	71	0776	NITROGEN	CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR,UNPAVED, BEEF CATTLE FEEDL
200	71	0777	NITROGEN	FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0778	NITROGEN	LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200	71	0782	NITROGEN	MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
200	71	0784	NITROGEN	A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINE
200	71	0785	NITROGEN	A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT

200	71	0786	NITROGEN THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200	71	0794	NITROGEN AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN MICROF
200	71	0796	NITROGEN DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0798	NITROGEN THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS
200	71	0805	NITROGEN HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
200	71	0808	NITROGEN WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
200	71	0810	NITROGEN WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD
200	71	1033	NITROGEN NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	72	1012	NITROGEN REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	73	1062	NITROGEN CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
200	73	1093	NITROGEN DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
200	73	1189	NITROGEN A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300	62	0754	NITROGEN NOTES ON WATER POLLUTION WASTE WATERS FROM FARMS KEYWORDS FARM-WASTES IRRIGATION BOD
300	69	0005	NITROGEN SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	69	0632	NITROGEN QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
300	69	1180	NITROGEN CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	70	0592	NITROGEN PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300	70	1059	NITROGEN NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300	71	0269	NITROGEN INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
300	71	0624	NITROGEN FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITR
300	71	0700	NITROGEN LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
300	71	0732	NITROGEN CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWOAD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
300	71	1058	NITROGEN DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300	72	1052	NITROGEN EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
300	72	1157	NITROGEN CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1170	NITROGEN POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
300	72	1260	NITROGEN NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
300	73	1009	NITROGEN STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400	65	0439	NITROGEN THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC
400	69	1045	NITROGEN AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	69	1225	NITROGEN CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	70	0577	NITROGEN BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
400	72	1173	NITROGEN NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
500	70	0388	NITROGEN CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORG
500	70	0394	NITROGEN FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION
500	70	0405	NITROGEN EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
500	70	0407	NITROGEN EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
600	70	0098	NITROGEN BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
600	71	0493	NITROGEN NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
600	71	0496	NITROGEN DESORPTION OF AMMONIA FROM ANAEROBIC LAGOONS KEYWORDS FARM-WASTES ANAEROBIC-DIGESTION
600	72	1156	NITROGEN SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	72	1163	NITROGEN ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
600	72	1177	NITROGEN DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
700	70	1066	NITROGEN WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1109	NITROGEN AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
700	72	1048	NITROGEN SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200	66	0156	NITROGEN-BALANCE BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
100	67	0079	NITROGEN-COMPOUNDS SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	72	1222	NITROGEN-COMPOUNDS PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200	70	1115	NITROGEN-COMPOUNDS CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0646	NITROGEN-COMPOUNDS FARM LAND RUNOFF KEYWORDS NITROGEN-COMPOUNDS PHOSPHORUS- COMPOUNDS SOIL-EROSION RUNO
200	71	1099	NITROGEN-COMPOUNDS SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	71	1252	NITROGEN-COMPOUNDS NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	70	1036	NITROGEN-COMPOUNDS AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
100	66	1080	NITROGEN-CYCLE NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	70	1037	NITROGEN-CYCLE NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
200	70	0325	NITROGEN-CYCLE RECYCLING AND UTILIZATION OF BIODEGRADABLE-WASTES IN THE SOIL KEYWORDS BIOLOGICAL-SYST
200	71	0838	NITROGEN-CYCLE NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WA
300	68	1122	NITROGEN-CYCLE NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
700	71	1120	NITROGEN-CYCLE SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
100	65	1219	NITROGEN-DEPOSITS NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
200	67	1243	NITROGEN-DRAINAGE THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
100	69	0103	NITROGEN-ENRIGHMEN NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE F
100	65	1219	NITROGEN-FIXATION NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	70	1037	NITROGEN-FIXATION NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
200	71	1234	NITROGEN-FIXATION SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
300	71	1058	NITROGEN-FIXATION DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
100	65	1219	NITROGEN-FIXING-BA NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	70	1037	NITROGEN-FIXING-VA NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
500	71	1254	NITROGEN-FIXING-BA ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	70	1233	NITROGEN-LOSSES LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	69	0174	NITROGEN-POLLUTION THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
200	70	1115	NITROGEN-REMOVAL CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
100	65	1079	NITROGEN-RETENTION UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	73	1088	NITROGEN-RETENTION OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
300	71	1057	NOCOMIS-ASPER EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
300	70	0073	NOISE STOCKMEN S LIABILITY UNDER THE MISSOURI NUISANCE LAW KEYWORDS ODOR NOISE LAWSUITS DAMA
400	70	0046	NOISE FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BU
100	73	1087	NONDISTILLABLE-NIT ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
300	71	1246	NON-STRUCTURAL-ALT FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
200	71	0601	NORTH PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULA
700	70	1066	NORTH-CAROLINA WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
200	69	0557	NORTH-DAKOTA STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	71	0641	NORTH-DAKOTA BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
200	72	1014	NORTH-DAKOTA APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-F
300	69	1060	NORTH-DAKOTA FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	NORTH-DAKOTA FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	71	1057	NOTOKUS-PLACIDUS EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
300	71	1057	NOTROPIS-CAMURUS EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
300	71	1057	NOTROPIS-LUTRENSIS EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
300	71	1057	NOTROPIS-RUBELLUS EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
300	71	1057	NOTURUS-NOCTURNUS EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
200	70	0234	NUISANCE FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD CO ODOR COSTS EQUIPMENT
200	70	0239	NUISANCE FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI
400	70	0068	NUISANCE POSSIBLE DEFENSES AGAINST NUISANCE COMPLAINTS KEYWORDS LEGAL-ASPECTS POULTRY NUISANCE
500	70	0408	NUISANCE LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
400	70	0046	NUISANCES FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BU
200	71	0440	NUISANCE-LAW LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
300	46	1208	NUISANCE-WATER-LAW GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	70	1000	NURSURY-BUILDING EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS

100	71	1038	NUTIRENTS	CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100	71	0751	NUTRIENT	ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	72	0746	NUTRIENT	RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
200	69	0427	NUTRIENT	MANAGEMENT OF ANIMAL FEEDLOT WASTES - LAND SPREADING AS A DISPOSAL PROCESS KEYWORDS NU
200	70	0498	NUTRIENT	WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	71	0857	NUTRIENT	NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
300	71	0628	NUTRIENT	THE METABOLIZEABLE ENERGY VALUE OF DRIED POULTRY WASTE KEYWORDS NUTRIENT DEHYDRATION
300	71	0629	NUTRIENT	THE EFFECTS OF CONTINUALLY RECYCLING DEHYDRATED POULTRY WASTES DPW ON THE PERFORMANCE
100	65	0263	NUTRIENTS	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	68	0090	NUTRIENTS	WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS
100	68	0370	NUTRIENTS	EFFECT OF SOIL TEMPERATURE ON THE AVAILABILITY OF PHOSPHOROUS IN ANIMAL MANURES KEYWOR
100	68	1121	NUTRIENTS	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	0259	NUTRIENTS	ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
100	69	0355	NUTRIENTS	FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
100	70	0050	NUTRIENTS	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0082	NUTRIENTS	HOUSE FLY PUPAE AS FOOD FOR POULTRY KEYWORDS FEEDS NUTRIENTS MUSCA-DOMESTICA
100	70	0112	NUTRIENTS	CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
100	70	0372	NUTRIENTS	DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GRO
100	70	0510	NUTRIENTS	CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS KEYWORDS COSTS FER
100	70	1230	NUTRIENTS	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	0453	NUTRIENTS	PLANT NUTRIENTS AND WATER QUALITY KEYWORDS NUTRIENTS WATER-QUALITY
100	71	0721	NUTRIENTS	HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOF
100	71	0688	NUTRIENTS	CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100	71	1039	NUTRIENTS	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1212	NUTRIENTS	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1228	NUTRIENTS	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100	71	1236	NUTRIENTS	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100	72	1193	NUTRIENTS	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100	73	1069	NUTRIENTS	MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100	70	1237	NUTRIENTS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	66	0146	NUTRIENTS	UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
200	66	0148	NUTRIENTS	ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
200	66	0149	NUTRIENTS	EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
200	66	0149	NUTRIENTS	EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO A
200	66	0151	NUTRIENTS	ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	66	0152	NUTRIENTS	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	69	0423	NUTRIENTS	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0428	NUTRIENTS	DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-R
200	69	0433	NUTRIENTS	EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	69	0482	NUTRIENTS	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	69	0526	NUTRIENTS	NATION-WIDE RESEARCH ON ANIMAL-WASTE-DISPOSAL KEYWORDS GRANTS ALGAE FWPCA NUTRIENTS RE
200	69	1117	NUTRIENTS	WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	70	0214	NUTRIENTS	RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0215	NUTRIENTS	MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-
200	70	0217	NUTRIENTS	POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200	70	0222	NUTRIENTS	THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200	70	0226	NUTRIENTS	A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
200	70	0237	NUTRIENTS	THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	70	0727	NUTRIENTS	EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200	70	1118	NUTRIENTS	WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	71	0763	NUTRIENTS	ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
200	71	0769	NUTRIENTS	A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
200	71	0816	NUTRIENTS	ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS AEROBIC-TREATMENT COSTS
200	71	0817	NUTRIENTS	MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALU
200	71	0833	NUTRIENTS	EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
200	71	0861	NUTRIENTS	CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
200	71	1099	NUTRIENTS	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1012	NUTRIENTS	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1016	NUTRIENTS	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1024	NUTRIENTS	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1089	NUTRIENTS	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300	69	0005	NUTRIENTS	SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	69	0062	NUTRIENTS	MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
300	70	0204	NUTRIENTS	POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	70	0208	NUTRIENTS	DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
300	70	0592	NUTRIENTS	PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300	71	0477	NUTRIENTS	BIOLOGICAL CONVERSION OF ANIMAL WASTES TO NUTRIENTS KEYWORDS POULTRY FLY-PUPAE NUTRIENT
300	71	0621	NUTRIENTS	POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
300	71	0622	NUTRIENTS	EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYW
300	71	1058	NUTRIENTS	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300	71	1106	NUTRIENTS	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	71	1107	NUTRIENTS	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	71	1245	NUTRIENTS	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
300	72	1070	NUTRIENTS	PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
300	72	1085	NUTRIENTS	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
400	66	0088	NUTRIENTS	POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
400	69	1045	NUTRIENTS	AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	70	1176	NUTRIENTS	ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
400	72	1179	NUTRIENTS	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
400	73	1063	NUTRIENTS	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400	73	1068	NUTRIENTS	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
500	70	0390	NUTRIENTS	SIGNIFICANCE OF PHOSPHORUS IN WATER-SUPPLIES KEYWORDS NUTRIENTS FERTILIZER DETERGENTS
600	72	1031	NUTRIENTS	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1071	NUTRIENTS	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1156	NUTRIENTS	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	72	1169	NUTRIENTS	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600	73	1065	NUTRIENTS	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	69	1067	NUTRIENTS	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700	70	1066	NUTRIENTS	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	71	1120	NUTRIENTS	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
100	70	0042	NUTRIENT-LOSSES	STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
200	70	0226	NUTRIENT-LOSSES	A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
100	73	1128	NUTRIENT-REMOVAL	USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
200	71	0827	NUTRIENT-REMOVAL	A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM
200	71	0854	NUTRIENT-REMOVAL	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
200	71	0856	NUTRIENT-REMOVAL	GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTIL
300	70	0489	NUTRIENT-REMOVAL	WATER-QUALITY REQUIREMENTS AND RE-USE OF WASTEWATER EFFLUENTS KEYWORDS NUTRIENT-REMOV
100	70	0047	NUTRIENT-REQUIREME	PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
200	71	0764	NUTRIENT-REQUIREME	FUTURE PROSPECTS FOR ANIMAL AGRICULTURE KEYWORDS ECONOMICS INCOME FARM-WASTES NUTRIEN
200	71	0846	NUTRIENT-REQUIREME	NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL

200	71	0851	NUTRIENT-REQUIREME NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	71	0852	NUTRIENT-REQUIREME BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES THEIR NUTRITIONAL VALUE TO THE GROWING CH
200	71	0853	NUTRIENT-REQUIREME RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
200	73	1062	NUTRIENT-REQUIREME CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
300	71	1126	NUTRIENT-REQUIREME SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	65	1079	NUTRITION UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
200	71	0608	NUTRITION RECYCLING OF ANIMAL WASTES KEYWORDS REUSE FERTILIZATION NUTRITION PHOSPHORUS NITROGEN
200	71	0705	NUTRITION A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
200	72	1017	NUTRITION WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200	73	1093	NUTRITION DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
100	73	1190	NUTRITIONAL-INTERR NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
200	71	0847	NUTRITIONAL-REQUIR STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINA
200	71	0848	NUTRITIONAL-REQUIR DEHYDRATED POULTRY WASTE DPW AS A FEEDSTUFF IN POULTRY RATIONS KEYWORD RECYCLING NU
200	71	0849	NUTRITIONAL-REQUIR DRIED ANIMAL WASTE AS A PROTEIN SUPPLEMENT FOR RUMINANTS KEYWORD RECYCLING POULTRY NU
400	70	0029	NUTRITIONAL-VALUE DRIED POULTRY MANURE AS CATTLE FEED KEYWORDS DRYING NUTRITIONAL-VALUE
200	66	0145	NUTRITIVE-VALUE VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	69	0176	NUTRITIVE-VALUE THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
100	70	0578	N-IRELAND COLLECTION AND DISPOSAL OF FARM WASTES KEYWORDS N-IRELAND GASES SLURRY DISPOSAL
400	71	0295	N-IRELAND OXIDATION DITCH IN CAGE LAYER HOUSE KEYWORDS POULTRY BOD N-IRELAND ODOR OXIDATION-DI
100	70	0021	N-RECOVERY EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
100	68	0036	OBSERVATIONS OBSERVATIONS ON THE EFFECT OF THE REUSE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
100	65	0075	ODOR HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	65	0366	ODOR LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	65	0699	ODOR THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	65	1219	ODOR NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	66	0437	ODOR PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	67	0448	ODOR INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM KEYWORDS ODOR ANAEROBIC-DIGESTION METHAN
100	68	0044	ODOR THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	68	0106	ODOR OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
100	68	0337	ODOR A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	69	0096	ODOR IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0310	ODOR IMPROVEMENT IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION KEYW
100	70	0028	ODOR HOUSEFLY LARVAE BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS KEYWORDS
100	70	0084	ODOR FATTY ACID CONTENT AS A MEASURE OF THE ODOUR POTENTIAL OF STORED LIQUID POULTRY MANURE
100	70	0089	ODOR TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	70	0094	ODOR THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	70	0112	ODOR CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
100	70	0228	ODOR RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
100	70	0368	ODOR AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
100	70	0678	ODOR THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT KEYWORDS REUSE ODOR POLLUTION FUTURE MANAG
100	70	0684	ODOR CHANGING PRACTICES IN AGRICULTURE AND THEIR EFFECT ON THE ENVIRONMENT KEYWORDS ODOR P
100	71	0187	ODOR CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0266	ODOR CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0443	ODOR SULFUR BACTERIA IN RED LAGOONS KEYWORDS ODOR SULFUR-BACTERIA LAGOONS
100	71	0682	ODOR AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KE
100	71	0683	ODOR ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
100	71	0721	ODOR HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOF
100	71	0729	ODOR DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
100	71	1214	ODOR THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	72	1188	ODOR IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	70	1237	ODOR POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	66	0115	ODOR MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0122	ODOR METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	66	0129	ODOR WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
200	66	0130	ODOR DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
200	66	0132	ODOR REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
200	66	0137	ODOR PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	66	0150	ODOR PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	66	0587	ODOR HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO
200	69	0074	ODOR AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0078	ODOR OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
200	69	0163	ODOR DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	69	0164	ODOR SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
200	69	0167	ODOR AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
200	69	0176	ODOR DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
200	69	0188	ODOR PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
200	69	0192	ODOR POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200	69	0197	ODOR REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
200	69	0199	ODOR RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200	69	0202	ODOR ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
200	69	0203	ODOR WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT
200	69	0522	ODOR FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE
200	69	0528	ODOR THERES HOPE AHEAD KEYWORDS ODOR LAND-USE GOALS POPULATION
200	69	0534	ODOR COLUMBIA-COUNTY PROGRAM KEYWORDS POLLUTION-ABATEMENT ODOR ZONING NITRATES PROGRAM
200	69	0541	ODOR FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0546	ODOR THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0548	ODOR RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200	69	0756	ODOR SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
200	70	0114	ODOR SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0234	ODOR FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0239	ODOR FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI
200	70	0243	ODOR MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	70	0244	ODOR MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
200	70	0251	ODOR AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	70	0320	ODOR AGRICULTURAL-WASTES IN AN URBAN-ENVIRONMENT KEYWORDS ODOR LEGISLATION FUNDING RESEARC
200	70	0323	ODOR AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-
200	70	0326	ODOR AGRICULTURAL-WASTE RESEARCH-NEEDS KEYWORDS ENVIRONMENT ODOR WASTE-HANDLING SURVEYS RE
200	70	0715	ODOR OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	70	0716	ODOR BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	70	0728	ODOR ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	71	0483	ODOR HOW CAN PORK-PRODUCERS COMPLY WITH ENVIRONMENTAL QUALITY-STANDARDS KEYWORDS WATER-QUA
200	71	0594	ODOR IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200	71	0597	ODOR STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0662	ODOR WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME
200	71	0740	ODOR PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
200	71	0772	ODOR A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD
200	71	0777	ODOR FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0783	ODOR SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200	71	0787	ODOR IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOI
200	71	0790	ODOR IDENTIFICATION OF CARBONYL COMPOUNDS IN A SWINE-BUILDING ATMOSPHERE KEYWORDS ODOR ORG

200	71	0792	ODOR	CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200	71	0813	ODOR	THROUGH-CIRCULATION DRYING OF MANURE IN SUPERHEATED STEAM KEYWORDS MOISTURE-CONTENT OD
200	71	0814	ODOR	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
200	71	0815	ODOR	DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
200	71	0829	ODOR	WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
200	71	0840	ODOR	LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FA
200	71	0841	ODOR	SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRI
200	71	0842	ODOR	THE USE OF OXIDATION PONDS FOR POULTRY PROCESSING WASTE DISPOSAL KEYWORD INDUSTRIAL-W
200	71	1096	ODOR	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	72	1011	ODOR	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1013	ODOR	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1018	ODOR	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1019	ODOR	PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
200	72	1020	ODOR	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1024	ODOR	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1029	ODOR	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
300	49	1210	ODOR	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	64	1110	ODOR	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300	65	0757	ODOR	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	69	0001	ODOR	SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	0300	ODOR	WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	69	0631	ODOR	ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	0632	ODOR	QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
300	69	0633	ODOR	THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
300	69	0638	ODOR	ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
300	70	0009	ODOR	LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION
300	70	0073	ODOR	STOCKMEN S LIABILITY UNDER THE MISSOURI NUISANCE LAW KEYWORDS ODOR NOISE LAWSUITS DAMA
300	70	0204	ODOR	POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	70	0205	ODOR	INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DI
300	70	0455	ODOR	ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
300	71	0671	ODOR	REMOVAL OF WATER FROM ANIMAL MANURES, PART II EFFECTS OF VELOCITY ON AIR DRYING KEYWO
300	71	0621	ODOR	POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
300	71	0623	ODOR	ECONOMICS OF DRIED POULTRY WASTE DPW AS A FEED INGREDIENT OR A FERTILIZER KEYWORDS
300	71	0626	ODOR	DRYING OF POULTRY MANURE IN A CAGE-LAYER HOUSE KEYWORDS ODOR ENVIRONMENT AIR-VENTILATI
300	71	0675	ODOR	UNDER CAGE DRYING OF POULTRY MANURE KEYWORDS ODOR AIR-DRYING-MANURE CAGE
300	71	0700	ODOR	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
300	71	1008	ODOR	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
400	64	0379	ODOR	A REPORT ON THREE MANURE-COMPOSTING PLANTS KEYWORDS ODOR AEROBIC-DECOMPOSITION AMMON
400	67	0359	ODOR	WHIPPING THE MANURE PROBLEM KEYWORDS OXIDATION-DITCH ODOR AEROBIC-BACTERIA ROTOR PROB
400	69	0039	ODOR	LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
400	70	0022	ODOR	SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY
400	70	0046	ODOR	FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BU
400	70	0577	ODOR	BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
400	71	0262	ODOR	WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE-DISPOSAL CATTLE-WASTE STORAGE-WAS
400	71	0295	ODOR	OXIDATION DITCH IN CAGE LAYER HOUSE KEYWORDS POULTRY BOD N-IRELAND ODOR OXIDATION-DI
400	71	1143	ODOR	A LOVELY NEW SCENT FOR MANURE KEYWORDS AIR-POLLUTION SAGEBRUSH FARM-WASTES ODOR
400	72	1032	ODOR	NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
400	72	1173	ODOR	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
400	73	1178	ODOR	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
500	71	1072	ODOR	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	70	0469	ODOR	WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
600	72	1001	ODOR	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
600	72	1002	ODOR	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
600	72	1004	ODOR	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600	72	1031	ODOR	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1071	ODOR	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
700	69	1067	ODOR	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700	70	1109	ODOR	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
600	72	1004	ODORANTS	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
200	70	0728	ODORLESS	ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
300	69	0317	ODOROUS	AIR POLLUTION ASPECTS OF ODOROUS COMPOUNDS KEYWORDS AIR ODOROUS
400	70	0097	ODORPOULTRY	POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
100	65	0346	ODORS	LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	65	0470	ODORS	CONTROLLING ODORS FROM CATTLE FEEDLOTS AND MANURE DEHYDRATION OPERATIONS KEYWORDS LEG
100	68	0442	ODORS	CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE KEYWORDS LIME CHLORINE ODORS
100	69	0353	ODORS	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	69	0508	ODORS	AIR POLLUTION FROM ANIMAL WASTES,DETERMINATION OF MALODORS BY GAS CHROMATOGRAPHIC AND O
100	70	1227	ODORS	AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	71	0314	ODORS	GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDEN
100	71	0576	ODORS	CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS
100	71	0674	ODORS	CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS ODORS POULTRY WATER-CONTENT CONTR
200	69	0157	ODORS	ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0161	ODORS	THE CHALLENGE OF ANIMAL WASTE MANAGEMENT KEYWORDS ODORS WASTE-TREATMENT WASTE-MANAGEM
200	69	0162	ODORS	THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	69	0198	ODORS	LIVESTOCK PRODUCTION VS ENVIRONMENTAL QUALITY - AN IMPASSE KEYWORDS ECONOMIC-EFFICIEN
200	69	0525	ODORS	ENGINEERING-RESEARCH ON FARM-ANIMAL-MANURE KEYWORDS ODORS BIOLOGICAL-TREATMENT WASTE-
200	70	0225	ODORS	LEGAL-RESTRAINTS ON AGRICULTURAL-POLLUTION KEYWORDS ODORS WATER-POLLUTION PESTICIDES
200	70	0321	ODORS	WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	70	0670	ODORS	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	1114	ODORS	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	71	0583	ODORS	AIR POLLUTION FROM AGRICULTURE KEYWORDS DUST ALLERGENS ODORS PESTICIDES SMOKE
200	71	0595	ODORS	ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION E
200	71	0604	ODORS	STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71	0606	ODORS	POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY
200	71	0661	ODORS	ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71	0665	ODORS	WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
200	71	0762	ODORS	LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0763	ODORS	ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
200	71	0788	ODORS	LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200	71	0793	ODORS	CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AM
200	71	0798	ODORS	THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS
200	71	0802	ODORS	AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
200	71	0806	ODORS	COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
200	71	0837	ODORS	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
300	68	0749	ODORS	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	69	0006	ODORS	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	69	0007	ODORS	SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	69	0467	ODORS	IDENTIFICATION OF FEEDLOT ODORS KEYWORDS AMINES IDENTIFICATION ODORS
300	69	0637	ODORS	SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC-COMPOUNDS AMMONIA HYDROGEN-
300	70	0414	ODORS	THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW

300	71	0673	ODORS	OLFACTORY MEASUREMENT OF ANIMAL MANURE ODORS KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0704	ODORS	PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
400	70	0091	ODORS	MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
400	70	0579	ODORS	OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION KEYWORDS
400	71	0309	ODORS	CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POUL
400	71	0311	ODORS	WHY STIRRING MANURE REDUCES ODORS KEYWORDS AEROBIC ANAEROBIC STORAGE ODORS HANDLING
400	71	0350	ODORS	SCHEDULE MANURE REMOVAL TO AVOID FLY BREEDING KEYWORDS CALIFORNIA POULTRY ODORS FLY
400	71	0456	ODORS	TRY TO KEEP ODORS UNDER CONTROL KEYWORDS ODORS CONTROL
500	68	1259	ODORS	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
600	71	0494	ODORS	A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
100	69	0707	ODOR-CONTROL	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
200	72	1089	ODOR-CONTROL	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300	72	1264	ODOR-CONTROL	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
400	70	0415	ODOR-CONTROL	TURNING WASTES INTO PROFITS KEYWORDS WASTE-TREATMENT POULTRY DRYING ODOR-CONTROL WAST
300	72	1264	ODOR-INTENSITY	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
200	69	0189	ODOR-INTENSITY-IND	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
200	69	0190	ODOR-INTENSITY-IND	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
600	72	1004	ODOR-INTENSITY-IND	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
300	72	1264	ODOR-MEASUREMENTS	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
200	71	0791	ODOR-NUISANCE	METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS C
100	70	0019	ODOR-PANEL	CONTROL OF ODORS FROM ANIMAL WASTES KEYWORDS CHEMICALS COST ODOR-PANEL MASKING-AGENTS D
200	69	0190	ODOR-PANEL	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
300	69	0636	ODOR-PANEL	PARTICULATE MATTER KEYWORDS CIRCULATION GAS-CHROMATOGRAPHYFILTER-PADS POULTRY-DUST OD
100	65	1219	ODOR-PREVENTION	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
400	70	0111	ODOR-PROBLEMS	UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
300	72	1264	ODOR-QUALITY	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
200	69	0189	ODOR-STRENGTH	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
300	69	0635	ODOR-STRENGTH	GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE KEYWORDS ODOR-STRENGTH METHA
100	69	0105	ODOR-THRESHOLD	AMMONIA AND AMINES COMPONENTS OF SWINE-BUILDING ODOR KEYWORDS ODOR-THRESHOLD CHROMAT
200	69	0519	ODOR-THRESHOLD	AESTHETICS AND ODORS KEYWORDS HYDROGEN-SULFIDE ANAEROBIC-CONDITIONS ODOR-THRESHOLD AE
300	68	0741	OF	RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
100	71	1039	OHIO	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
300	26	1204	OHIO	OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	73	1009	OHIO	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400	72	1171	OHIO	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
300	70	1084	OIL	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71	1081	OIL	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	70	1050	OIL-INDUSTRY	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
300	69	1103	OIL-INDUSTRY	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	69	1060	OIL-WASTES	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	OIL-WASTES	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
200	71	0600	OKLAHOMA	STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
200	71	1234	OKLAHOMA	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
300	69	1103	OKLAHOMA	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	70	1192	OKLAHOMA	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1201	OKLAHOMA	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
400	71	1196	OKLAHOMA	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400	72	1173	OKLAHOMA	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
600	70	0469	OLFACTORY-MECHANIS	WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
200	69	0190	OLFACTORY-THRESHOL	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
300	69	0633	OLFACTORY-THRESHOL	THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
600	69	1160	ONSAGER-EQUATION	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
100	70	0083	ONTARIO	BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BE
400	73	1073	ONTARIO	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
100	64	1200	ONTOGENY	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
200	72	1108	ON-SITE-INVESTIGAT	EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300	69	1103	ON-SITE-INVESTIGAT	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	72	1052	ON-SITE-INVESTIGAT	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
400	71	1131	OPEN-LOT	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
400	71	1131	OPEN-SHED	FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
200	70	0687	OPERATING-COSTS	OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
400	72	1179	OPERATING-COSTS	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
100	68	0381	OPERATION	WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100	70	0458	OPERATION	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	71	0729	OPERATION	DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
300	65	0053	OPERATIONS	FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
200	64	1241	OPHRYOSCOLEX-CAUDA	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	71	0769	OPTIMIZATION	A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
100	71	1228	OPTIONS	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
400	70	0091	ORANIC-ACIDS	MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
200	69	0169	ORCHARD	INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
300	70	1247	OREGON	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
100	70	0418	ORGANIC	ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
100	70	0420	ORGANIC	SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGO
100	71	0509	ORGANIC	THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT
200	71	0783	ORGANIC	SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
400	65	0439	ORGANIC	THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC
100	69	0096	ORGANIC-ACIDS	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0508	ORGANIC-ACIDS	AIR POLLUTION FROM ANIMAL WASTES,DETERMINATION OF MALODORS BY GAS CHROMATOGRAPHIC AND O
200	71	0837	ORGANIC-ACIDS	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
700	70	1066	ORGANIC-CARBON	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
100	69	0693	ORGANIC-COMPOUNDS	IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
100	72	1222	ORGANIC-COMPOUNDS	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200	71	0790	ORGANIC-COMPOUNDS	IDENTIFICATION OF CARBONYL COMPOUNDS IN A SWINE-BUILDING ATMOSPHERE KEYWORDS ODOR ORG
300	69	0632	ORGANIC-COMPOUNDS	QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
300	69	0634	ORGANIC-COMPOUNDS	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
300	69	0637	ORGANIC-COMPOUNDS	SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC-COMPOUNDS AMMONIA HYDROGEN-
100	71	0576	ORGANIC-GASES	CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS KEYWORDS ODORS COD CONFINEMENT-PENS
200	69	1102	ORGANIC-LOADING	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	69	1116	ORGANIC-LOADING	MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	70	1114	ORGANIC-LOADING	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
100	65	0377	ORGANIC-MATTER	EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	69	0086	ORGANIC-MATTER	THE APPARENT-DIGESTIBILITY OF ENERGY AND PROTEIN IN TUPLAN DRIED-POULTRY-MANURE KEYWO
100	69	1198	ORGANIC-MATTER	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	72	1235	ORGANIC-MATTER	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
300	70	1084	ORGANIC-MATTER	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
400	66	0380	ORGANIC-MATTER	TWO BILLION TONS OF - WHAT KEYWORDS ORGANIC-WASTES VOLUME ORGANIC-MATTER GRASS-BELTS P
400	68	0032	ORGANIC-MATTER	NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
500	70	0388	ORGANIC-MATTER	CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORG
600	72	1156	ORGANIC-MATTER	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS

100	72	1199	ORGANIC-PESTICIDES	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
200	67	1243	ORGANIC-POLLUTION	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
600	72	1001	ORGANIC-REMOVAL	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
200	66	0120	ORGANIC-WASTE	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
100	70	1237	ORGANIC-WASTES	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	70	1115	ORGANIC-WASTES	CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	1252	ORGANIC-WASTES	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	53	1206	ORGANIC-WASTES	POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1043	ORGANIC-WASTES	WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	69	1061	ORGANIC-WASTES	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	69	1125	ORGANIC-WASTES	ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	70	1247	ORGANIC-WASTES	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	1245	ORGANIC-WASTES	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
400	66	0380	ORGANIC-WASTES	TWO BILLION TONS OF - WHAT KEYWORDS ORGANIC-WASTES VOLUME ORGANIC-MATTER GRASS-BELTS P
400	68	0032	ORGANIC-WASTES	NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
300	69	0632	ORGANOLEPTIC-TECHN	QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
100	66	0063	ORIGIN	SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
200	70	0235	ORIGINS	ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
600	72	1002	OSOMETER	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
300	69	0002	OUTLETS	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
100	71	1236	OUTWASH-GLACIAL	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100	71	1038	OVERLAND-FLOW	CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
200	69	0542	OVERVIEW	ANIMAL WASTE POLLUTION-OVERVIEW OF THE PROBLEM KEYWORDS RUNOFF GROUNDWATER FISH-KILL
100	70	0570	OVIPOSITION	MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
100	70	0342	OXIDANTS	IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES KEYWORDS DIGESTION FERMENTATION CO
100	66	0478	OXIDATION	LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
100	68	0106	OXIDATION	OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
100	70	1230	OXIDATION	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	0451	OXIDATION	REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
100	71	1221	OXIDATION	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	66	0133	OXIDATION	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	70	0114	OXIDATION	SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	71	1099	OXIDATION	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1013	OXIDATION	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1024	OXIDATION	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	73	1083	OXIDATION	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	68	0749	OXIDATION	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	68	1123	OXIDATION	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	72	1070	OXIDATION	PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
400	71	1136	OXIDATION	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
100	65	0344	OXIDATION-DITCH	THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
100	66	0347	OXIDATION-DITCH	AEROBIC-PURIFICATION OF FARM WASTE KEYWORDS BOD COD COSTS BIOLOGICAL-TREATMENT OXIDAT
100	68	0381	OXIDATION-DITCH	WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100	69	0361	OXIDATION-DITCH	NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
100	70	0050	OXIDATION-DITCHES	TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100	70	0089	OXIDATION-DITCH	TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	71	1228	OXIDATION-DITCH	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	66	0115	OXIDATION-DITCH	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST.
200	66	0133	OXIDATION-DITCH	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	66	0156	OXIDATION-DITCH	BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
200	69	0074	OXIDATION-DITCH	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0078	OXIDATION-DITCH	OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
200	69	0166	OXIDATION-DITCH	ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
200	69	0175	OXIDATION-DITCH	STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
200	69	0177	OXIDATION-DITCHES	FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0178	OXIDATION-DITCH	STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
200	69	0179	OXIDATION-DITCH	CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO
200	69	0180	OXIDATION-DITCH	FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
200	69	0187	OXIDATION-DITCHES	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	70	0218	OXIDATION-DITCH	REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DIT
200	70	0234	OXIDATION-DITCH	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0248	OXIDATION-DITCH	PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
200	70	0251	OXIDATION-DITCH	AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	71	0822	OXIDATION-DITCH	DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
200	71	0823	OXIDATION-DITCH	BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW KEYWORDS AERATION CATTLE BOD W
200	71	0836	OXIDATION-DITCH	SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
200	71	0861	OXIDATION-DITCH	CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
300	69	0001	OXIDATION-DITCH	SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	70	0008	OXIDATION-DITCH	AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION
300	70	0009	OXIDATION-DITCH	LIVESTOCK WASTE MANAGEMENT STUDIES - TERMINATION REPORT KEYWORDS BOD COD ODOR OXIDATION
300	71	0486	OXIDATION-DITCHES	FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
400	67	0359	OXIDATION-DITCH	WHIPPING THE MANURE PROBLEM KEYWORDS OXIDATION-DITCH ODOR AEROBIC-BACTERIA ROTOR PROB
400	70	0579	OXIDATION-DITCHES	OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION KEYWORDS
400	71	0295	OXIDATION-DITCH	OXIDATION DITCH IN CAGE LAYER HOUSE KEYWORDS POULTRY BOD N-IRELAND ODOR OXIDATION-DI
400	71	0339	OXIDATION-DITCH	FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
500	70	0401	OXIDATION-DITCH	MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER KEYWORDS DISPOSAL M
600	70	0098	OXIDATION-DITCH	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
700	68	0330	OXIDATION-DITCH	CONFINED SWINE MANURE DISPOSAL KEYWORDS OXIDATION-DITCH ROTOR-DESIGN OXYGEN-TRANSFER
100	65	0334	OXIDATION-LAGOONS	CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
100	70	1040	OXIDATION-LAGOONS	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	71	0266	OXIDATION-LAGOONS	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0574	OXIDATION-LAGOONS	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS CONFINEMENT-PENS BOD COD COSTS
100	71	1047	OXIDATION-LAGOONS	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS DX
200	69	1102	OXIDATION-LAGOONS	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	70	1113	OXIDATION-LAGOONS	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1114	OXIDATION-LAGOONS	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	71	0640	OXIDATION-LAGOONS	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
200	71	0666	OXIDATION-LAGOONS	PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
200	71	0780	OXIDATION-LAGOON	THE WASTE PATTERN OF BEEF CATTLE ON SLATTED FLOORS KEYWORDS FEED-LOTS CONFINEMENT-PEN
200	71	0808	OXIDATION-LAGOON	WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
200	71	0822	OXIDATION-LAGOONS	DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
200	71	1096	OXIDATION-LAGOONS	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	71	1234	OXIDATION-LAGOONS	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200	72	1018	OXIDATION-LAGOONS	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1089	OXIDATION-LAGOONS	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
200	72	1152	OXIDATION-LAGOONS	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
300	70	0008	OXIDATION-LAGOONS	AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION
300	70	1101	OXIDATION-LAGOONS	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
300	71	1106	OXIDATION-LAGOONS	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
400	71	1136	OXIDATION-LAGOONS	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA

400	71	1172	OXIDATION-LAGOONS	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400	73	1178	OXIDATION-LAGOONS	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	72	1071	OXIDATION-LAGOONS	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
700	70	1107	OXIDATION-LAGOONS	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
200	66	0152	OXIDATION-PITCH	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	66	0154	OXIDATION-PITCH	FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMI
200	70	0253	OXIDATION-PITCH	TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
600	71	0288	OXIDATION-POND	FIELD CROP IRRIGATION WITH OXIDATION POND EFFLUENT KEYWORDS MISSISSIPPI IRRIGATION OXI
200	70	0670	OXIDATION-PONDS	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0715	OXIDATION-PONDS	OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	71	0653	OXIDATION-PONDS	LIQUID WASTE TREATMENT II OXIDATION PONDS AND AERATED LAGOONS KEYWORDS AEROBIC-TREATM
200	66	0138	OXIDATION-REDUCTIO	DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	69	0176	OXIDATION-REDUCTIO	DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
200	70	0737	OXIDATION-REDUCTIO	REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	71	0837	OXIDATION-REDUCTIO	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
200	71	0802	OXIDATION-TREATMEN	AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
100	65	0263	OXYGEN	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	66	0437	OXYGEN	PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100	68	0106	OXYGEN	OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
100	71	0304	OXYGEN	STATE OF THE ART REVIEW TREATMENT AND DISPOSAL OF SWINE WASTES KEYWORDS CHEMICAL OXY
200	66	0134	OXYGEN	OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
200	69	0162	OXYGEN	THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	69	0166	OXYGEN	ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
200	71	0787	OXYGEN	IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOI
300	69	0006	OXYGEN	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	71	1119	OXYGEN	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
400	72	1173	OXYGEN	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
100	69	0355	OXYGENATION	FARM-WASTES KEYWORDS BOD COD HOLLAND AEROBIC-TREATMENT NUTRIENTS NITROGEN OXYGENATION
200	69	0074	OXYGENATION	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0166	OXYGENATION	ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
200	70	1114	OXYGENATION	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
100	69	1231	OXYGEN-DEMAND	POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	72	1235	OXYGEN-DEMAND	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
200	69	0177	OXYGEN-DEMAND	FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0194	OXYGEN-DEMAND	TYPICAL VARIATIONS ENCOUNTERED IN THE MEASUREMENT OF OXYGEN DEMAND OF ANIMAL WASTES KE
200	71	0641	OXYGEN-DEMAND	BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
200	71	0825	OXYGEN-DEMAND	MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE KEYWORDS OXYGEN-DEMAND SAL
700	68	0330	OXYGEN-TRANSFER	CONFINED SWINE MANURE DISPOSAL KEYWORDS OXIDATION-DITCH ROTOR-DESIGN OXYGEN-TRANSFER
100	72	1199	OXYTETRACYCLINE	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
300	70	1104	OYSTERS	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
400	71	0293	OYSTERS	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
100	65	0377	P	EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
100	68	0337	P	A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	69	0061	P	SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	70	0042	P	STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
200	70	0214	P	RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0226	P	A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
300	70	0475	P	LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
400	70	0070	P	SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
200	71	0779	PACIFIC-NORTHWEST	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
300	72	1003	PACIFIC-NORTHWEST-	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
400	68	0101	PACKAGING	MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
100	71	0751	PACKING-HOUSE	ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	70	1111	PAINTS	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100	69	1198	PALOUSE-RIVER-IDAH	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	72	1215	PANCREAS	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	70	1040	PANDORINA	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
200	69	0189	PANEL	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
200	71	0277	PANIC-POWER	THE FARMERS CONCERN KEYWORDS PESTICIDES WATER-POLLUTION PANIC-POWER MIS-USE RESISTA
600	69	1239	PANOCHE-SILTY-CLAY	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
100	69	0707	PARAFORMALDEHYDE	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
200	64	1241	PARAMECIUM	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	70	1237	PARASITES	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
100	63	1064	PARASITE-RESEARCH	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
200	68	1244	PARASITISM	SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
300	71	1106	PARASITISM	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
500	70	0395	PARATHION	CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
300	69	0631	PARTICULATE	ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	0636	PARTICULATE	PARTICULATE MATTER KEYWORDS CIRCULATION GAS-CHROMATOGRAPHYFILTER-PADS POULTRY-DUST OD
100	69	0363	PARTICULATE-MATTER	ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROM
300	70	1104	PASTEURELLA	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	69	0108	PASTURE	EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
100	69	0416	PASTURE	A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
200	70	0719	PASTURE	FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE P
100	69	0353	PASVEER	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
200	70	0253	PASVEER-DITCH	TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
100	67	0713	PATASSIUM	SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
200	71	0795	PATHOGEN	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
200	70	0238	PATHOGENIC	THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
100	67	1258	PATHOGENIC-BACTERI	RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
100	70	1051	PATHOGENIC-BACTERI	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	70	1217	PATHOGENIC-BACTERI	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	0484	PATHOGENIC-BACTERI	RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
100	71	1212	PATHOGENIC-BACTERI	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1213	PATHOGENIC-BACTERI	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	71	1232	PATHOGENIC-BACTERI	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	70	1237	PATHOGENIC-BACTERI	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	68	1242	PATHOGENIC-BACTERI	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	68	1244	PATHOGENIC-BACTERI	SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
200	69	1102	PATHOGENIC-BACTERI	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	71	0798	PATHOGENIC-BACTERI	THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS
200	71	0825	PATHOGENIC-BACTERI	MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE KEYWORDS OXYGEN-DEMAND SAL
200	71	0836	PATHOGENIC-BACTERI	SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
200	71	1099	PATHOGENIC-BACTERI	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	72	1016	PATHOGENIC-BACTERI	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1023	PATHOGENIC-BACTERI	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
300	70	1101	PATHOGENIC-BACTERI	BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS KEYWORDS ALGAE CULTURES ENTERIC-BACT
300	70	1104	PATHOGENIC-BACTERI	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
300	71	0515	PATHOGENIC-BACTERI	FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
400	66	0354	PATHOGENIC-BACTERI	SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS

500 71 1072 PATHOGENIC-BACTERI HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
200 66 0118 PATHOGENIC-ORGANIS HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
200 70 1053 PATHOGENIS-BACTERI BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
100 67 1218 PATHOGENS FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100 70 0018 PATHOGENS SALMONELLA SPP AND SEROTYPES OF ESCHERICHIA COLI ISOLATED FROM THE LESSER MEALWORM CO
200 71 0763 PATHOGENS ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
100 69 0265 PATHOLOGY PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
500 70 0402 PATHOLOGY DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATE
100 70 1111 PATH-OF-POLLUTANTS POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100 70 1217 PATH-OF-POLLUTANTS APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100 70 1251 PATH-OF-POLLUTANTS AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100 71 1039 PATH-OF-POLLUTANTS NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100 71 1236 PATH-OF-POLLUTANTS MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
300 71 1126 PATH-OF-POLLUTANTS SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
300 71 1246 PATH-OF-POLLUTANTS FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300 72 1052 PATH-OF-POLLUTANTS EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
100 70 0362 PATTERNS DISTRIBUTION OF BACTERIA IN FECES OF SWINE KEYWORDS MICROORGANISMS PATTERNS SWINE
200 72 1025 PAUNCH-MANURE OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
100 69 1042 PAWTUCKET-RHODE-IS THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
200 71 0669 PE ANIMAL AND HUMAN METABOLIC WASTES KEYWORDS BOD PE METABOLIC-WASTES
100 65 1079 PEANUT-HULLS UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
200 70 0727 PEAT EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
300 71 0584 PENALTY STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
300 71 0457 PENNSYLVANIA DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
200 66 0124 PENN-STATE ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
200 69 0562 PENS ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
100 72 1222 PEPSIN PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200 64 1241 PEPTOSTREPTOCOCCUS PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
600 70 0469 PERCEPTION WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
400 73 1073 PERCOLATES NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
300 67 0711 PERCOLATING-WATER THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
100 70 1195 PERCOLATION AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100 71 1197 PERCOLATION NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100 72 1224 PERCOLATION FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200 68 1242 PERCOLATION THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200 69 1185 PERCOLATION ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200 70 1114 PERCOLATION ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
300 67 1250 PERCOLATION DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300 69 1180 PERCOLATION CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300 72 1170 PERCOLATION POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
400 69 0016 PERCOLATION FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
400 72 1032 PERCOLATION NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
600 69 1239 PERCOLATION DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
600 71 0100 PERCOLATION ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT KEYWORDS LAND-APPLICATION RUNOFF PER
100 68 0011 PERFORMANCE THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
100 71 0461 PERFORMANCE FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100 70 0047 PERFORMANCE PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
100 71 0266 PERFORMANCE CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200 66 0137 PERFORMANCE PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
300 69 0003 PERFORMANCE CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
400 71 1131 PERFORMANCE FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
400 71 1144 PERFORMANCE CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
600 72 1074 PERFORMANCE SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
200 69 0171 PERFORMANCES CATTLE MANURE- REUSE THROUGH WASTELAGE FEEDING KEYWORDS FEEDS PERFORMANCES WASTELAGE
600 69 1239 PERMEABILITY DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
200 69 0544 PERMITS HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200 69 0546 PERMITS THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200 70 1175 PERMITS ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200 71 0594 PERMITS IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200 71 0597 PERMITS STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200 71 0598 PERMITS MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200 71 0599 PERMITS THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200 71 0600 PERMITS STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
300 67 1249 PERMITS AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300 69 1061 PERMITS RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300 71 0457 PERMITS DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
400 71 1196 PERMITS CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
200 71 0599 PERMIT-APPLICATION THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
300 71 1056 PERMIT-SYSTEM AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
100 70 1111 PERSISTENCE POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100 70 1195 PESTICICES AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
500 70 0396 PESTICIDE THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATION
100 62 1220 PESTICIDES WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100 66 0063 PESTICIDES SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100 68 1121 PESTICIDES WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100 69 0060 PESTICIDES RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTI
100 69 1231 PESTICIDES POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100 71 1038 PESTICIDES CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
200 69 0433 PESTICIDES EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200 70 0225 PESTICIDES LEGAL-RESTRAINTS ON AGRICULTURAL-POLLUTION KEYWORDS ODORS WATER-POLLUTION PESTICIDES
200 71 0274 PESTICIDES WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
200 71 0276 PESTICIDES THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOG
200 71 0277 PESTICIDES THE FARMERS CONCERN KEYWORDS PESTICIDES WATER-POLLUTION PANIC-POWER MIS-USE RESISTA
200 71 0280 PESTICIDES PESTICIDES KEYWORDS DDT HAZARDS BENEFICIAL-USE HEALTH PESTICIDES
200 71 0583 PESTICIDES AIR POLLUTION FROM AGRICULTURE KEYWORDS DUST ALLERGENS ODORS PESTICIDES SMOKE
200 71 0610 PESTICIDES WATER POLLUTION AND THE FARMER KEYWORDS RUNOFF COSTS PESTICIDES GOVERNMENT-FINANCE CO
200 71 0642 PESTICIDES AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
300 68 1043 PESTICIDES WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300 70 1036 PESTICIDES AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300 71 0591 PESTICIDES AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN KEYWORDS RUNOFF PESTICIDES EUTROPHICAT
300 71 1106 PESTICIDES MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300 71 1107 PESTICIDES WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300 72 1260 PESTICIDES NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400 69 1225 PESTICIDES CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400 71 1196 PESTICIDES CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
500 70 0398 PESTICIDES PESTICIDES AND PEST-MANAGEMENT FOR MAXIMUM-PRODUCTION AND MINIMUM POLLUTION KEYWORDS
500 70 0406 PESTICIDES EFFECTS OF AGRICULTURAL-POLLUTANTS ON RECREATIONAL-USES OF SURFACE-WATERS KEYWORDS R
500 70 0408 PESTICIDES LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
200 71 0650 PESTICIDE-DRIFT GUIDELINES FOR MINIMIZING PESTICIDE POLLUTION KEYWORDS PESTICIDE-DRIFT WATER-QUALITY P
100 67 1218 PESTICIDE-POLLUTIO FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE

KEYWORD INDEX

100 72 1199 PESTICIDE-RESIDUES IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100 70 1111 PESTICIDE-TOXICITY POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100 73 1165 PESTICIDE-TOXICITY FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
200 71 0645 PEST-CONTROL PESTICIDES AND PEST CONTROL IN THE FUTURE KEYWORDS PEST-CONTROL AGRICULTURAL-CHEMICAL
500 70 0398 PEST-CONTROL PESTICIDES AND PEST-MANAGEMENT FOR MAXIMUM-PRODUCTION AND MINIMUM POLLUTION KEYWORDS
500 70 0398 PEST-MANAGEMENT PESTICIDES AND PEST-MANAGEMENT FOR MAXIMUM-PRODUCTION AND MINIMUM POLLUTION KEYWORDS
100 63 0338 PH DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100 65 0503 PH THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100 66 0479 PH THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
100 69 0035 PH TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100 69 0096 PH IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100 70 0031 PH VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100 70 0110 PH ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
100 70 0369 PH ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUD
100 71 0476 PH THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER KEYWORDS FUNGUS PH BACTERIA MOLD POULTR
200 69 0157 PH ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200 69 0168 PH AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200 69 0180 PH FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
200 69 0193 PH CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
200 69 0430 PH CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
200 70 0252 PH ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
300 70 0207 PH THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMIC
600 69 1160 PH CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
600 70 0098 PH BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
600 72 1004 PH CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
200 66 0132 PHAGE REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
300 71 1100 PHINE-RIVER DETERMINATION OF MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
200 70 0221 PHOSPHATE LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
300 65 0757 PHOSPHATE AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
700 70 1104 PHOSPHATE AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100 69 1198 PHOSPHATED CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100 62 1220 PHOSPHATES WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100 68 1121 PHOSPHATES WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100 69 0037 PHOSPHATES WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
100 70 0417 PHOSPHATES ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100 70 1051 PHOSPHATES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100 70 1233 PHOSPHATES LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100 71 1038 PHOSPHATES CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100 71 1039 PHOSPHATES NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100 70 1237 PHOSPHATES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200 70 0727 PHOSPHATES EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200 70 1113 PHOSPHATES AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200 71 0785 PHOSPHATES A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200 71 0786 PHOSPHATES THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200 71 1099 PHOSPHATES SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200 72 1108 PHOSPHATES EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300 71 1055 PHOSPHATES ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300 72 1170 PHOSPHATES POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
400 73 1063 PHOSPHATES AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
500 70 0391 PHOSPHATES BEHAVIOR OF SOIL AND FERTILIZER-PHOSPHORUS IN RELATION TO WATER-POLLUTION KEYWORDS PH
700 70 1066 PHOSPHATES WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700 70 1256 PHOSPHATES MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
700 71 1120 PHOSPHATES SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
200 70 0670 PHOSPHOROUS ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
300 70 0414 PHOSPHOROUS THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS KEYWORD CONFINEMENT-PENS GROUNDW
500 70 0405 PHOSPHOROUS EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
100 67 0713 PHOSPHORUS SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100 68 0307 PHOSPHORUS EFFECT SOIL TEMPERATURE PHOSPHORUS MANURES
100 68 0502 PHOSPHORUS MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
100 69 0071 PHOSPHORUS ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100 70 0050 PHOSPHORUS TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS LAGOONS NUTRIENTS CONFINEMENT HOLDI
100 70 1195 PHOSPHORUS AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100 70 1233 PHOSPHORUS LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100 71 0688 PHOSPHORUS CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100 71 1197 PHOSPHORUS NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100 73 1069 PHOSPHORUS MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100 73 1162 PHOSPHORUS PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
100 73 1190 PHOSPHORUS NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
200 68 0724 PHOSPHORUS GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200 69 0165 PHOSPHORUS AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200 69 0183 PHOSPHORUS THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200 69 0200 PHOSPHORUS THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200 69 0482 PHOSPHORUS THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200 69 0521 PHOSPHORUS WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
200 69 0696 PHOSPHORUS QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200 69 1116 PHOSPHORUS MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200 70 0219 PHOSPHORUS THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME KEYWORD
200 70 0720 PHOSPHORUS PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200 71 0608 PHOSPHORUS RECYCLING OF ANIMAL WASTES KEYWORDS REUSE FERTILIZATION NUTRITION PHOSPHORUS NITROGEN
200 71 0774 PHOSPHORUS MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200 71 0775 PHOSPHORUS TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200 71 0778 PHOSPHORUS LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200 71 0781 PHOSPHORUS ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
200 71 0808 PHOSPHORUS WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
200 71 0815 PHOSPHORUS DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
200 71 0818 PHOSPHORUS THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
200 72 1016 PHOSPHORUS CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200 73 1189 PHOSPHORUS A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300 70 0592 PHOSPHORUS PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
300 71 0630 PHOSPHORUS A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWO
300 71 0700 PHOSPHORUS LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
300 71 1058 PHOSPHORUS DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300 71 1106 PHOSPHORUS MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300 72 1260 PHOSPHORUS NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400 67 1226 PHOSPHORUS PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
400 69 1045 PHOSPHORUS AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400 71 0293 PHOSPHORUS SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400 72 1166 PHOSPHORUS HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400 72 1173 PHOSPHORUS NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
500 70 0388 PHOSPHORUS CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORG

500	70	0390	PHOSPHORUS	SIGNIFICANCE OF PHOSPHORUS IN WATER-SUPPLIES KEYWORDS NUTRIENTS FERTILIZER DETERGENTS
500	70	0394	PHOSPHORUS	FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION
500	70	0407	PHOSPHORUS	EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
600	72	1177	PHOSPHORUS	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
700	72	1048	PHOSPHORUS	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
700	72	1049	PHOSPHORUS	ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
200	71	0646	PHOSPHORUS-	FARM LAND RUNOFF KEYWORDS NITROGEN-COMPOUNDS PHOSPHORUS- COMPOUNDS SOIL-EROSION RUNO
200	71	1099	PHOSPHORUS-COMPOUN	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300	68	1122	PHOSPHORUS-COMPOUN	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	70	1036	PHOSPHORUS-COMPOUN	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
200	71	0854	PHOSPHORUS-RADIOIS	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
100	70	1194	PHOSPHROUS	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1040	PHOTOSYNTHESIS	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
400	73	1063	PHOTOSYNTHESIS	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
500	71	1254	PHOTOSYNTHETIC-BAC	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	69	0040	PHYSICAL	PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
100	71	0681	PHYSICAL	EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
600	72	1076	PHYSICAL-CHANGES	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
300	69	0005	PHYSICAL-CHEMICAL-	SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
200	66	0132	PHYSICAL-ENVIRONME	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
100	68	0011	PHYSICAL-PROPERTIE	THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
100	70	1111	PHYSICAL-PROPERTIE	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	66	0121	PHYSICAL-PROPERTIE	PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200	70	0747	PHYSICAL-PROPERTIE	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	72	1016	PHYSICAL-PROPERTIE	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1021	PHYSICAL-PROPERTIE	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1023	PHYSICAL-PROPERTIE	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
500	71	1072	PHYSICAL-PROPERTIE	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	72	1004	PHYSICAL-PROPERTIE	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600	72	1031	PHYSICAL-PROPERTIE	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1156	PHYSICAL-PROPERTIE	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	73	1075	PHYSICAL-PROPERTIE	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
300	71	1238	PHYSICAL-TREATMENT	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
300	71	1055	PHYSICOCHEMICAL-PR	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
200	64	1240	PHYSIOCHEMICAL-PRO	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300	70	0385	PHYSIOLOGICAL-ECOL	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
200	64	1240	PHYSIOLOGY	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	64	1241	PHYSIOLOGY	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	71	1234	PHYTOPLANKTON	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
300	71	1245	PHYTOPLANKTON	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
200	71	0650	PHYTOTOXICITY	GUIDELINES FOR MINIMIZING PESTICIDE POLLUTION KEYWORDS PESTICIDE-DRIFT WATER-QUALITY P
200	72	1021	PHYTOTOXICITY	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
100	69	0052	PIEZOMETERS	NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-N
100	69	0316	PIG	EFFECTS OF ATMOSPHERIC AMMONIA ON THE PIG KEYWORDS EFFECTS ATMOSPHERIC-AMMONIA PIG
200	71	0859	PIG	THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY KEYWORD SIEVE-ANALYSIS SEDIMEN
100	71	0468	PIGGERY	EFFECT OF VENTILATION ON THE GAS CONCENTRATION IN A PART- SLATTED PIGGERY KEYWORDS EFF
200	71	1234	PIGMENTS	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
100	69	0707	PIGS	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	68	0381	PIG-PRODUCTION	WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100	70	1040	PILOT-PLANTS	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
200	70	1113	PILOT-PLANTS	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
100	68	0011	PINE-BARK	THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
100	73	1034	PIPETTING-DEVICE	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
400	71	0297	PIT	BROODER-GROW CAGES OVER DEEP PIT KEYWORDS POULTRY FARM-WASTES VENTILATION PIT STORAGE
100	71	0348	PITS	BIOLOGICAL FLY CONTROL IN DEEP PITS KEYWORDS POULTRY BIOLOGICAL FLY PITS
200	66	0133	PITS	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
100	70	0023	PIT-TRAPS	ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS KEYWORDS
400	73	1063	PLANKTON	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
100	70	0228	PLANNING	RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
100	70	0365	PLANNING	AGRICULTURE FACES NEW CHALLANGES IN CURRENT ENVIRONMENTAL CRISIS KEYWORDS WATER SALIN
200	69	0423	PLANNING	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	70	0235	PLANNING	ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
200	70	1118	PLANNING	WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
300	71	1055	PLANNING	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
200	66	0155	PLANT	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
200	64	1240	PLANTS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
300	67	1250	PLANTS	DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	71	1100	PLANTS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	70	1194	PLANT-GROWTH	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	73	1162	PLANT-NUTRITION	PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
600	72	1177	PLANT-POPULATION	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
200	66	0116	PLANT-RESPONSE	PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
600	73	1065	PLANT-TISSUES	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
500	71	1072	PLANT-YIELDS	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
100	70	0034	PLASMA	A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND
100	73	1190	PLASMA	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
100	70	1111	PLASTICS	POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	71	1099	PLASTICS	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
400	72	1171	PLASTICS	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
100	70	0110	PLATING-MEDIUM	ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
100	71	1038	PLAYAS	CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
400	73	1007	PLAYA-LAKES	FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
200	66	0130	PLOW	DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
100	70	1233	PLOWING	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	70	0215	PLOW-FURROW-COVER	MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-
400	65	0356	PLOW-FURROW-COVER	FURROW MANURE-DISPOSAL KEYWORDS POULTRY APPLICATION-RATES PLOW-FURROW-COVER DISPOSAL
500	70	0408	POINT-SOURCES	LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
200	69	0188	POISONOUS-GASES	PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
200	69	0184	POLISHING-UNIT	TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	71	0618	POLITICAL-ASPECTS	COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION KEYWORDS COMMUNICATION TECHNOLOGY POLIT
300	71	1055	POLITICAL-ASPECTS	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	64	1200	POLLEN	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	71	1228	POLLUTANT	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100	66	0063	POLLUTANTS	SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100	70	0065	POLLUTANTS	AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
100	70	0228	POLLUTANTS	RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
100	70	0417	POLLUTANTS	ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100	71	0507	POLLUTANTS	ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLL
200	64	1240	POLLUTANTS	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69	0428	POLLUTANTS	DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-R

KEYWORD INDEX

200	70	0054	POLLUTANTS POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
200	72	1022	POLLUTANTS RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200	72	1024	POLLUTANTS WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
300		1077	POLLUTANTS SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	68	1202	POLLUTANTS OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	69	1125	POLLUTANTS ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	70	0385	POLLUTANTS AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	70	1201	POLLUTANTS OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300	70	1247	POLLUTANTS DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0512	POLLUTANTS FECAL-RESIDUES FROM FEED ADDITIVES POULTRY KEYWORDS POLLUTANTS DIETS ANTIBIOTICS NITR
300	71	1246	POLLUTANTS FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300	72	1085	POLLUTANTS CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
400	70	0069	POLLUTANTS CONNECTICUT REQUIREMENTS FOR LIQUID MANURE DISPOSAL KEYWORDS REGULATIONS POLLUTANTS C
400	71	1196	POLLUTANTS CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
500	70	0399	POLLUTANTS LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
600	73	1147	POLLUTANTS SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
700	71	1120	POLLUTANTS SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
700	72	1049	POLLUTANTS ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100	70	1217	POLLUTANT-IDENTIFI APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	1213	POLLUTANT-IDENTIFI A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	71	1221	POLLUTANT-IDENTIFI DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	72	1199	POLLUTANT-IDENTIFI IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1215	POLLUTANT-IDENTIFI AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	72	1224	POLLUTANT-IDENTIFI FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
100	72	1235	POLLUTANT-IDENTIFI BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
200	69	0423	POLLUTANT-IDENTIFI 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0424	POLLUTANT-IDENTIFI ANIMAL WASTE RUNOFF-A MAJOR WATER QUALITY CHALLENGE KEYWORDS RUNOFF BOD POLLUTANT-IDE
200	70	1053	POLLUTANT-IDENTIFI BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
300	70	0384	POLLUTANT-IDENTIFI THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	0385	POLLUTANT-IDENTIFI AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	71	1100	POLLUTANT-IDENTIFI DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	69	0259	POLLUTION ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
100	69	0707	POLLUTION A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	70	0031	POLLUTION VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100	70	0420	POLLUTION SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGO
100	70	0678	POLLUTION THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT KEYWORDS REUSE ODOR POLLUTION FUTURE MANAS
100	70	0684	POLLUTION CHANGING PRACTICES IN AGRICULTURE AND THEIR EFFECT ON THE ENVIRONMENT KEYWORDS ODOR P
100	71	0681	POLLUTION EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
200	66	0115	POLLUTION MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	69	0482	POLLUTION THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	69	0520	POLLUTION DEAD-ANIMALS AND HOW THEY CONTRIBUTE TO POLLUTION OF THE ENVIRONMENT KEYWORDS DEAD-AN
200	69	0541	POLLUTION FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0562	POLLUTION ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
200	69	1167	POLLUTION AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
200	69	1185	POLLUTION ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0226	POLLUTION A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
200	70	0232	POLLUTION CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORDS RUNOFF IRRIGATI
200	70	0240	POLLUTION WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
300	68	0741	POLLUTION RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	72	1157	POLLUTION CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1260	POLLUTION NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	71	1135	POLLUTION ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
100	71	1228	POLLUTIONAL-CHARAC ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100	70	0228	POLLUTION-ABATEMEN RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
100	71	0507	POLLUTION-ABATEMEN ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLL
200	69	0431	POLLUTION-ABATEMEN MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	69	0532	POLLUTION-ABATEMEN COST-SHARING UNDER THE AGRICULTURAL-CONSERVATION-PROGRAM KEYWORDS POLLUTION-ABATEMENT
200	69	0533	POLLUTION-ABATEMEN THE REGULATORY ROLE OF THE DEPARTMENT OF NATURAL-RESOURCES KEYWORDS LEGISLATION POLLU
200	69	0534	POLLUTION-ABATEMEN COLUMBIA-COUNTY PROGRAM KEYWORDS POLLUTION-ABATEMENT ODOR ZONING NITRATES PROGRAM
200	69	0540	POLLUTION-ABATEMEN INDUSTRY AND THE ENVIRONMENT-FEEDLOT WASTE MANAGEMENT KEYWORDS REGULATION CATTLE ECOS
200	69	0550	POLLUTION-ABATEMEN HOW TO GAIN PUBLIC SUPPORT KEYWORDS RUNOFF POLLUTION-ABATEMENT CATTLE
200	69	0553	POLLUTION-ABATEMEN STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0554	POLLUTION-ABATEMEN MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRA
200	69	0564	POLLUTION-ABATEMEN RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL KEYWORDS BYPRODUCTS POLLUTION-ABATEMENT
200	69	0566	POLLUTION-ABATEMEN DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM KEYWORDS REGULATIONS LEGISLATION
200	70	1050	POLLUTION-ABATEMEN THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0643	POLLUTION-ABATEMEN AGRICULTURE S RESPONSIBILITIES IN A CLEAN ENVIRONMENT KEYWORDS POLLUTION-ABATEMENT ECO
200	73	1082	POLLUTION-ABATEMEN COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300		1105	POLLUTION-ABATEMEN RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	26	1204	POLLUTION-ABATEMEN OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	53	1206	POLLUTION-ABATEMEN POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1209	POLLUTION-ABATEMEN ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	1103	POLLUTION-ABATEMEN ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	70	1192	POLLUTION-ABATEMEN IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1247	POLLUTION-ABATEMEN DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
400	71	1196	POLLUTION-ABATEMEN CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
600	72	1149	POLLUTION-ABATEMEN MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
100	71	0758	POLLUTION-ASPECTS HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
100	73	1162	POLLUTION-CONTROL PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
200	69	0174	POLLUTION-CONTROL THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
200	69	1116	POLLUTION-CONTROL MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	71	0483	POLLUTION-CONTROL HOW CAN PORK-PRODUCERS COMPLY WITH ENVIRONMENTAL QUALITY-STANDARDS KEYWORDS WATER-QUA
200	71	0789	POLLUTION-CONTROL ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
300	71	1257	POLLUTION-CONTROL EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
400	66	0380	POLLUTION-CONTROL TWO BILLION TONS OF - WHAT KEYWORDS ORGANIC-WASTES VOLUME ORGANIC-MATTER GRASS-BELTS P
300	70	0383	POLLUTION-LAW PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION
200	69	0175	POLLUTION-POTENTIA STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
200	72	1016	POLLUTION-POTENTIA CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
300	70	0384	POLLUTION-POTENTIA THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
100	64	1200	POLYPHEMIDAE PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
400	68	0015	POND CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION KEYWORDS LAGOON POND FUR
100	70	1230	PONDS LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	73	1184	PONDS ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	69	1102	PONDS MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
300	68	1202	PONDS OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	69	1180	PONDS CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
400	68	0038	PONDS PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
500	68	1259	PONDS WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
500	68	1259	POND-APPEARANCE-AN WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
500	68	1259	POND-LOADING-RATES WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO

200	69	0517	POPULATION — QUANTITIES AND CHARACTERISTICS OF FARM ANIMAL-WASTES KEYWORDS WATER-POLLUTION POPULAT
200	69	0523	POPULATION — WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN W
200	69	0528	POPULATION — THERES HOPE AHEAD KEYWORDS ODOR LAND-USE GOALS POPULATION
100	69	0259	POPULATION-EQUIVAL — ANIMAL-WASTES - A NATIONAL PROBLEM KEYWORDS POLLUTION BOD COD NUTRIENTS ANAEROBIC-DIG
100	70	0112	POPULATION-EQUIVAL — CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
200	69	0175	POPULATION-EQUIVAL — STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVI
200	69	0187	POPULATION-EQUIVAL — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	70	0054	POPULATION-EQUIVAL — POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
200	70	0234	POPULATION-EQUIVAL — FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0241	POPULATION-EQUIVAL — SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
300	69	0093	POPULATION-EQUIVAL — HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
400	70	0092	POPULATION-EQUIVAL — SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
200	70	0728	PORK — ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
300	70	0383	PORK — PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION
200	71	0440	PORK-PRODUCTION — LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
600	73	1075	POROSITY — THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100	67	0713	PORPERTIES — SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY CATTLE MANUREKEYWORDS D COD CATTLE NITRO
100	71	0681	PORPERTIES — EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
100	67	1258	POTABLE-WATER — RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
300	68	1123	POTABLE-WATER — A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
200	69	0186	POTASH — MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
200	69	0200	POTASH — THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
300	69	0005	POTASH — SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
100	71	0688	POTASSIUM — CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100	71	1039	POTASSIUM — NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1197	POTASSIUM — NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
100	73	1069	POTASSIUM — MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
200	68	0724	POTASSIUM — GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	69	0482	POTASSIUM — THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	69	1116	POTASSIUM — MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	70	0720	POTASSIUM — PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0785	POTASSIUM — A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200	71	0801	POTASSIUM — PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
200	71	0815	POTASSIUM — DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
300	71	0269	POTASSIUM — INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
300	71	0700	POTASSIUM — LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
400	72	1166	POTASSIUM — HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400	72	1173	POTASSIUM — NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
600	72	1177	POTASSIUM — DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
100	71	1221	POTASSIUM-PERMANGA — DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	73	1069	POTATOES — MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100	70	0065	POTENTIAL — AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
100	60	1078	POULTRY — EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
100	63	0338	POULTRY — DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100	63	0436	POULTRY — POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100	65	0346	POULTRY — LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	65	0503	POULTRY — THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	65	0699	POULTRY — THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	65	1091	POULTRY — TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
100	66	0290	POULTRY — CORYNEFORM BACTERIA POULTRY DEEP LITTER KEYWORDS CORYNEFORM BACTERIA POULTRY LITTER
100	66	0422	POULTRY — PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
100	66	0479	POULTRY — THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
100	68	0011	POULTRY — THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
100	68	0044	POULTRY — THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	71	0461	POULTRY — FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	69	0040	POULTRY — PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
100	69	0364	POULTRY — LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
100	69	0690	POULTRY — AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM T
100	69	0707	POULTRY — A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	69	0736	POULTRY — SALMONELLA IN WASTES PRODUCED AT COMMERCIAL POULTRY FARMS KEYWORDS SALMONELLA-ISOLATION
100	69	1231	POULTRY — POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	0018	POULTRY — SALMONELLA SPP AND SEROTYPES OF ESCHERICHIA COLI ISOLATED FROM THE LESSER MEALWORM CO
100	70	0024	POULTRY — PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
100	70	0026	POULTRY — A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
100	70	0065	POULTRY — AGRICULTURE POSES WASTE PROBLEMS KEYWORDS POLLUTANTS IDENTIFICATION GOVERNMENT-ACTION
100	70	0094	POULTRY — THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	70	0107	POULTRY — DRYING POULTRY MANURE INSIDE THE POULTRY HOUSE KEYWORDS DRYING POULTRY MANURE
100	70	0340	POULTRY — FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE KEYWORDS POULTRY CROP-RESPONSE
100	70	0368	POULTRY — AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
100	70	0570	POULTRY — MANURE MITES AND THEIR ROLE IN FLY CONTROL KEYWORDS INSECT-CONTROL CATTLE POULTRY OVI
100	70	0585	POULTRY — BOD POSES PROBLEMS FOR POULTRY GROWERS AND PROCESSORS KEYWORDS BOD PROBLEMS POULTRY GR
100	70	1111	POULTRY — POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100	70	1227	POULTRY — AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	70	1230	POULTRY — LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	0187	POULTRY — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0266	POULTRY — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0314	POULTRY — GASES AND ODORS FROM POULTRY MANURE A SELECTED BIBLIOGRAPHY KEYWORDS LITERATURE IDEN
100	71	0348	POULTRY — BIOLOGICAL FLY CONTROL IN DEEP PITS KEYWORDS POULTRY BIOLOGICAL FLY PITS
100	71	0509	POULTRY — THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT
100	71	0674	POULTRY — CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS ODORS POULTRY WATER-CONTENT CONTR
100	71	0682	POULTRY — AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KE
100	71	0695	POULTRY — CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS KEYWORD CONFI
100	71	0729	POULTRY — DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
100	71	0751	POULTRY — ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	71	1092	POULTRY — EFFECT OF BACILLUS THURINGIENSIS IN CATTLE MANURE ON HOUSE FLY LARVAE KEYWORDS
100	71	1223	POULTRY — EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS KEYWORDS POULTRY BLOOD DURSBAN CHOLIN
100	72	0746	POULTRY — RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
100	72	1199	POULTRY — IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1222	POULTRY — PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
100	73	1034	POULTRY — TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
100	73	1086	POULTRY — THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
100	73	1164	POULTRY — SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
100	73	1165	POULTRY — FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN O-O DIETHYL O-3 5 6-TRICHLORO-2-P
200	64	0750	POULTRY — LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
200	66	0115	POULTRY — MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0117	POULTRY — DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
200	66	0121	POULTRY — PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200	66	0122	POULTRY — METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	66	0129	POULTRY — WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL KEYWORDS POULTRY ODOR CLAYS CO
200	66	0130	POULTRY — DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L

200	66	0136	POULTRY ON-SITE COMPOSTING OF POULTRY MANURE KEYWORDS LITTERLIFE FECAL-MATERIAL HEAT-OF-COMP
200	66	0140	POULTRY DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
200	66	0141	POULTRY REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
200	66	0142	POULTRY REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING E
200	66	0143	POULTRY DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUEL
200	66	0144	POULTRY TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200	66	0145	POULTRY VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	66	0147	POULTRY COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	66	0148	POULTRY ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
200	68	0724	POULTRY GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	68	1186	POULTRY TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	69	0163	POULTRY DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	69	0172	POULTRY SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD
200	69	0173	POULTRY USE OF POULTRY MANURE FOR CORRECTION OF ZN AND FE DEFICIENCIES IN PLANTS KEYWORDS FER
200	69	0179	POULTRY CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO
200	69	0186	POULTRY MANURE CONSERVATION KEYWORDS POULTRY FERTILIZER POTASH AIR-CONDITIONING GROSS-PROFIT
200	69	0189	POULTRY MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
200	69	0192	POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200	69	0197	POULTRY REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
200	69	0200	POULTRY THE ECONOMICS OF POULTRY MANURE DISPOSAL KEYWORDS FERTILIZERS NITROGEN PHOSPHORUS POT
200	69	0203	POULTRY WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT
200	69	0516	POULTRY PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200	70	0215	POULTRY MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-
200	70	0243	POULTRY MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	70	0321	POULTRY WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	70	0323	POULTRY AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-
200	70	0670	POULTRY ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0715	POULTRY OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	70	0716	POULTRY BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	70	0717	POULTRY PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT KEYWORDS BOD SEW
200	70	0718	POULTRY WATER UTILIZATION IN PROCESSING PLANTS KEYWORDS BOD POULTRY BACTERIA INDUSTRIAL-WASTE
200	70	0719	POULTRY FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES KEYWORDS FESCUE P
200	70	0720	POULTRY PROGRESS REPORT PASTURE FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200	71	0606	POULTRY POULTRY WASTE MANAGEMENT KEYWORDS EUTROPHICATION ODORS DRYING FIELD-SPREADING POULTRY
200	71	0617	POULTRY THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRAT
200	71	0661	POULTRY ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71	0762	POULTRY LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0768	POULTRY SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0783	POULTRY SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200	71	0786	POULTRY THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200	71	0788	POULTRY LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200	71	0793	POULTRY CONTROL OF ODORS FROM POULTRY HOUSES KEYWORDS ODORS DUST POULTRY FILTERING-SYSTEM AM
200	71	0794	POULTRY AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN MICROF
200	71	0797	POULTRY GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA KEYWORDS FEED MICRO
200	71	0805	POULTRY HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
200	71	0814	POULTRY PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
200	71	0815	POULTRY DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
200	71	0817	POULTRY MARKETING CONVERTED POULTRY MANURE KEYWORDS FERTILIZERS NUTRIENTS POULTRY MARKET-VALU
200	71	0821	POULTRY AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE
200	71	0824	POULTRY AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71	0831	POULTRY EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYW
200	71	0835	POULTRY AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILAT
200	71	0842	POULTRY THE USE OF OXIDATION PONDS FOR POULTRY PROCESSING WASTE DISPOSAL KEYWORD INDUSTRIAL-W
200	71	0846	POULTRY NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0849	POULTRY DRIED ANIMAL WASTE AS A PROTEIN SUPPLEMENT FOR RUMINANTS KEYWORD RECYCLING POULTRY NU
200	71	0860	POULTRY DEWATERING POULTRY MANURE BY CENTRIFUGATION KEYWORD CENTRIFUGATION DEWATERING POULTRY
300		1105	POULTRY RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	46	1208	POULTRY GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	69	0631	POULTRY ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	69	0634	POULTRY ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
300	69	0637	POULTRY SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC-COMPOUNDS AMMONIA HYDROGEN-
300	69	0638	POULTRY ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
300	69	1061	POULTRY RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	70	0204	POULTRY POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	70	0206	POULTRY POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
300	70	0208	POULTRY DRYING ANIMAL WASTE KEYWORDS POULTRY CATTLE HOGS MOISTURE-CONTENT NUTRIENTS DENSITY CO
300	70	0210	POULTRY THE RESULT OF FEEDING DRIED-POULTRY-WASTE TO LAYING HENS ON EGG-PRODUCTION AND FEED-CON
300	70	0213	POULTRY ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-
300	70	0384	POULTRY THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	1247	POULTRY DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	70	1248	POULTRY LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0671	POULTRY REMOVAL OF WATER FROM ANIMAL MANURES, PART II EFFECTS OF VELOCITY ON AIR DRYING KEYWO
300	1	0412	POULTRY POULTRY
300	71	0477	POULTRY BIOLOGICAL CONVERSION OF ANIMAL WASTES TO NUTRIENTS KEYWORDS POULTRY FLY-PUPAE NUTRIENT
300	71	0515	POULTRY FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
300	71	0621	POULTRY POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
300	71	0623	POULTRY ECONOMICS OF DRIED POULTRY WASTE DPW AS A FEED INGREDIENT OR A FERTILIZER KEYWORDS
300	71	0626	POULTRY DRYING OF POULTRY MANURE IN A CAGE-LAYER HOUSE KEYWORDS ODOR ENVIRONMENT AIR-VENTILATI
300	71	0628	POULTRY THE METABOLIZEABLE ENERGY VALUE OF DRIED POULTRY WASTE KEYWORDS NUTRIENT DEHYDRATION
300	71	0629	POULTRY THE EFFECTS OF CONTINUALLY RECYCLING DEHYDRATED POULTRY WASTES DPW ON THE PERFORMANCE
300	71	0630	POULTRY A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWO
300	71	0673	POULTRY OLFACTORY MEASUREMENT OF ANIMAL MANURE ODURS KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0674	POULTRY CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS DRYING POULTRY AIR-DRYING-MANURE
300	71	0677	POULTRY THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	1098	POULTRY BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
300	71	1126	POULTRY SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
300	72	1052	POULTRY EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
300	72	1182	POULTRY BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
300	72	1264	POULTRY PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
400	65	0356	POULTRY FURROW MANURE-DISPOSAL KEYWORDS POULTRY APPLICATION-RATES PLOW-FURROW-COVER DISPOSAL
400	66	0088	POULTRY POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
400	68	0449	POULTRY WASTES FROM THE POULTRY INDUSTRY KEYWORDS ENGLAND POULTRY
400	69	0419	POULTRY DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400	70	0022	POULTRY SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY
400	70	0068	POULTRY POSSIBLE DEFENSES AGAINST NUISANCE COMPLAINTS KEYWORDS LEGAL-ASPECTS POULTRY NUISANCE
400	70	0091	POULTRY MOISTURE INCREASES MANURE ODORS KEYWORDS POULTRY AMMONIA HYDROGEN-SULFIDE CHROMATOGR
400	70	0109	POULTRY SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS
400	70	0111	POULTRY UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
400	70	0308	POULTRY DEEP PIT SLAT-FLOOR BREEDING HOUSE KEYWORDS POULTRY FARM-WASTES SLOTTED-FLOOR VENTILA
400	70	0415	POULTRY TURNING WASTES INTO PROFITS KEYWORDS WASTE-TREATMENT POULTRY DRYING ODOR-CONTROL WAST

400	70	0577	POULTRY	BLOCK DRYING OF CHICKEN MANURE KEYWORDS DRYING POULTRY MOISTURE CONTENT ODOR NITROGEN
400	71	0293	POULTRY	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	0294	POULTRY	MANURE MITES IN INTEGRATED FLY CONTROL KEYWORDS POULTRY CALIFORNIA FLY-CONTROL
400	71	0295	POULTRY	OXIDATION DITCH IN CAGE LAYER HOUSE KEYWORDS POULTRY BOD N-IRELAND ODOR OXIDATION-DI
400	71	0297	POULTRY	BROODER-GROW CAGES OVER DEEP PIT KEYWORDS POULTRY FARM-WASTES VENTILATION PIT STORAGE
400	71	0309	POULTRY	CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POUL
400	71	0327	POULTRY	RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
400	71	0329	POULTRY	DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HA
400	71	0349	POULTRY	MAXI-MIXING FOR MANURE DISPOSAL KEYWORDS POULTRY COMPOSTING MIXING DISPOSAL
400	71	0350	POULTRY	SCHEDULE MANURE REMOVAL TO AVOID FLY BREEDING KEYWORDS CALIFORNIA POULTRY ODORS FLY
400	71	0463	POULTRY	CHEMICAL COMPOSITION OF POULTRY MANURE KEYWORDS CHEMICAL POULTRY CHARACTERISTICS
400	71	0465	POULTRY	FEED ADDITIVE RESIDUES IN POULTRY MANURE KEYWORDS ADDITIVE-RESIDUES POULTRY
400	71	0575	POULTRY	POULTRY WASTE HANDLING SYSTEMS KEYWORDS POULTRY HANDLING-SYSTEMS
400	72	1130	POULTRY	THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
400	73	1073	POULTRY	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
500	71	1254	POULTRY	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
600	68	0471	POULTRY	ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION KEYWORDS
600	72	1031	POULTRY	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1076	POULTRY	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
700	70	1046	POULTRY	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
100	69	0374	POULTRY-CROPPINGS	ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CAL
100	69	0373	POULTRY-DROPPINGS	ARTHROPOD-PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY-DROPPINGS IN NORTHERN CAL
300	69	0636	POULTRY-DUST	PARTICULATE MATTER KEYWORDS CIRCULATION GAS-CHROMATOGRAPHYFILTER-PADS POULTRY-DUST OD
100	69	0363	POULTRY-HOUSES	ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROM
100	69	0360	POULTRY-LAGOON	THE BACTERIAL-POPULATION OF AN INDOOR POULTRY-LAGOON KEYWORDS E-COLI BOD MICROORGANISM
100	65	1079	POULTRY-LITTER	UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	68	0502	POULTRY-LITTER	MANURE-PRODUCTION BY BROILERS KEYWORDS POULTRY-LITTER MOISTURE-CONTENT CRUDE-PROTEIN
100	69	0081	POULTRY-LITTER	DISTRIBUTION OF ARSENIC FROM POULTRY-LITTER IN BROILER-CHICKENS, SOIL, AND CROPS KEYWO
100	69	0376	POULTRY-LITTER	EVALUATION OF SEVERAL METHODS OF ISOLATING SALMONELLA FROM POULTRY-LITTER AND ANIMAL-F
100	70	0110	POULTRY-LITTER	ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
100	71	0476	POULTRY-LITTER	THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER KEYWORDS FUNGUS PH BACTERIA MOLD POULTR
100	71	0572	POULTRY-LITTER	AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
200	70	0217	POULTRY-LITTER	POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200	71	0609	POULTRY-LITTER	REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
400	65	0439	POULTRY-LITTER	THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER KEYWORDS DECOMPOSING ORGANIC
400	65	0485	POULTRY-LITTER	POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-
100	64	0333	POULTRY-MANURE	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	70	0691	POULTRY-MANURE	THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS
200	66	0153	POULTRY-MANURE	POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
300	72	1052	POULTRY-MANURE	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
400	70	0029	POULTRY-MANURE	DRIED POULTRY MANURE AS CATTLE FEED KEYWORDS DRYING NUTRITIONAL-VALUE
100	67	0501	POULTRY-MANURES	INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
100	70	0013	POULTRY-MANURE-REM	INFLUENCE OF POULTRY-MANURE-REMOVAL SCHEDULES ON VARIOUS DIPTERA LARVAE AND SELECTED AN
200	73	1093	POULTRY-MANURE-SUP	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
100	71	0748	POULTRY-ODOR	THE ELIMINATION OF ODOR FROM THE EFFLUENT GASES OF CHICKEN MANURE DRYING PLANT KEYWORD
200	69	0170	POULTRY-WASTE	THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
300	70	0209	POULTRY-WASTE	THE UTILIZATION OF POULTRY-WASTE AS A FEEDSTUFF FOR GROWING CHICKS KEYWORDS DEHYDRATI
300	71	0624	POULTRY-WASTE	FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITR
300	71	0625	POULTRY-WASTE	THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE K
300	71	0627	POULTRY-WASTE	DRIED POULTRY WASTE AS A PROTEIN SOURCE FOR FEEDLOT CATTLE KEYWORDS FEED-EFFECIENCY R
100	68	0337	POULTRY-WASTE-DISP	A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	70	0047	PRACTICES	PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
200	69	0188	PRACTICES	PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
100	69	0071	PRECIP	ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	66	1080	PRECIPITATION	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	70	0042	PRECIPITATION	STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
200	70	0214	PRECIPITATION	RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
300	69	1180	PRECIPITATION	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
600	69	1005	PRECIPITATION	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
200	71	1252	PRECIPITATION-ATMO	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	71	1058	PRECIPITATION-ATMO	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300	71	1106	PRECIPITATION-ATMO	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
100	71	1221	PRECISION	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
400	73	1191	PRECONDITIONING	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
300	71	1106	PREDATION	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
100	70	0013	PREDATORS	INFLUENCE OF POULTRY-MANURE-REMOVAL SCHEDULES ON VARIOUS DIPTERA LARVAE AND SELECTED AN
100	68	0090	PREDICTION-EQUATIO	WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS
300	46	1208	PRESCRIPTIVE-RIGHT	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
600	72	1076	PRESSURE	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
100	64	0333	PRESSURE-BLOWER	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	66	0341	PREVENTION	AGRICULTURE AND THE PREVENTION OF RIVER-POLLUTION, AS EXPERIENCED IN THE WEST-OF-SCOTLA
100	69	0265	PREVENTION	PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
200	70	0687	PRE-TREATMENT	OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER KEYWORD OPERATING-COSTS EFF
200	71	0274	PRICING	WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
600	72	1002	PRIMARY-ODOR-LIST	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
100	71	1232	PRIMATES	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	70	0047	PRINCIPLES	PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
100	65	0067	PROBLEM	EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
200	66	0124	PROBLEM	ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
200	66	0150	PROBLEM	PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
200	69	0174	PROBLEM	THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE KEYWORDS GROUNDWATER NITRA
200	69	0203	PROBLEM	WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT
200	69	0425	PROBLEM	ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	69	0561	PROBLEM	INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUN
200	69	0562	PROBLEM	ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
200	70	0237	PROBLEM	THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	70	0238	PROBLEM	THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	70	0245	PROBLEM	MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
200	71	0703	PROBLEM	FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0783	PROBLEM	SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
300	70	0455	PROBLEM	ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
400	67	0359	PROBLEM	WHIPPING THE MANURE PROBLEM KEYWORDS OXIDATION-DITCH ODOR AEROBIC-BACTERIA ROTOR PROB
400	71	0435	PROBLEM	THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION KEYWORDS WASTE-DISPOSAL AIR-POLLUTIO
100	70	0585	PROBLEMS	BOD POSES PROBLEMS FOR POULTRY GROWERS AND PROCESSORS KEYWORDS BOD PROBLEMS POULTRY GR
100	71	0572	PROBLEMS	AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
200	69	0188	PROBLEMS	PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
200	69	0521	PROBLEMS	WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
200	69	0529	PROBLEMS	INTRODUCTION TO FEDERAL STATE AND LOCAL ACTION-PROGRAMS TO SOLVE ANIMAL-WASTE-DISPOSAL
200	69	0535	PROBLEMS	WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POL
200	70	0239	PROBLEMS	FARM WASTES PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM KEYWORDS ODOR LEGISLATI

KEYWORD INDEX

200	70	0243	PROBLEMS — MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	70	0715	PROBLEMS — OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	71	0599	PROBLEMS — THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0647	PROBLEMS — ENVIRONMENTAL PROBLEMS IN THE FOOD PROCESSING INDUSTRY KEYWORDS LIQUID-WASTES INDUSTRI
200	71	0765	PROBLEMS — ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWO
300	70	0204	PROBLEMS — POULTRY POLLUTION PROBLEMS AND SOLUTIONS KEYWORDS EGGS DEHYDRATION FEED DIET ODOR CO
300	71	0511	PROBLEMS — ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
100	70	0367	PROCEDURE — NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND D
200	69	0430	PROCEDURE — CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
200	69	0563	PROCEDURE — A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION KEYWORDS CATTLE RUN
100	71	0682	PROCESS — AERATION OF LIQUID POULTRY MANURE A STABILIZATION PROCESS OR ODOUR CONTROL MEASURE KE
100	71	0680	PROCESSING — ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE KEYWORDS TRANSPORTATION PROCES
200	66	0153	PROCESSING — POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
200	69	0055	PROCESSING — MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
300	70	1084	PROCESSING — CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
200	66	0117	PROCESSING-PLANTS — DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
400	68	0101	PROCESSING-PLANT — MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
200	69	0431	PROCESSING-PROBLEM — MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
100	67	0448	PRODUCTION — INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM KEYWORDS ODOR ANAEROBIC-DIGESTION METHAN
200	66	0115	PRODUCTION — MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0119	PRODUCTION — BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES KEYWORDS FILTH-FLIES CONFINEMENT
200	66	0121	PRODUCTION — PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200	69	0055	PRODUCTION — MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	71	0281	PRODUCTION — LIVESTOCK-WASTE KEYWORDS COPROLOGY BYPRODUCTS PRODUCTION
200	71	0807	PRODUCTION — QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
300	70	0211	PRODUCTION — THE EFFECT OF FEEDING DEHYDRATED-POULTRY-WASTE ON PRODUCTION, FEED-EFFICIENCY, BODY-WEI
300	72	1157	PRODUCTION — CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
100	64	1200	PRODUCTIVITY — PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
200	72	1152	PRODUCTIVITY — PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
300	70	1192	PRODUCTIVITY — IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION
400	69	1045	PRODUCTIVITY — AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400	71	1139	PRODUCTIVITY — HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
400	72	1166	PRODUCTIVITY — HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
300	70	1192	PROFIT — IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION
400	68	0101	PROFIT — MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR
100	70	0047	PROFITS — PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS KEYWORDS DISEASES COSTS PROFITS NUTR
200	69	0534	PROGRAM — COLUMBIA-COUNTY PROGRAM KEYWORDS POLLUTION-ABATEMENT ODOR ZONING NITRATES PROGRAM
200	69	0546	PROGRAM — THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
200	69	0551	PROGRAM — MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULAT
200	69	0552	PROGRAM — STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	69	0553	PROGRAM — STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0555	PROGRAM — STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS
200	69	0556	PROGRAM — STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF A
200	69	0557	PROGRAM — STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0558	PROGRAM — COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
200	69	0566	PROGRAM — DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM KEYWORDS REGULATIONS LEGISLATION
200	71	0709	PROGRAM — BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
100	71	1213	PROGRAMMING-LANGUA — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	71	0611	PROGRAMS — U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENC
200	71	0614	PROGRAMS — SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO
300		1105	PROGRAMS — RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
200	72	1027	PROGRAM-PLANNING-R — REGIONAL ADMINISTRATORS SUMMARY KEYWORDS PROGRAM-PLANNING-REVIEW
300	69	1125	PROJECTED-LIVESTOC — ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300	71	1055	PROJECTS — ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	64	0474	PROPERTIES — PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
200	66	0115	PROPERTIES — MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0116	PROPERTIES — PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES BOVINE ANIMALS KEYWOR
200	66	0121	PROPERTIES — PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
200	70	0243	PROPERTIES — MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	71	0831	PROPERTIES — EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYW
300	71	0486	PROPERTIES — FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
600	70	0080	PROPERTIES — FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
100	65	1079	PROTEIN — UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	66	0422	PROTEIN — PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS KEYWORDS FEE
100	71	0751	PROTEIN — ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
100	72	1222	PROTEIN — PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
200	66	0148	PROTEIN — ROLE OF THE RENDERER IN THE USE AND DISPOSAL ANIMAL WASTES KEYWORDS POULTRY CATTLE EC
200	70	0716	PROTEIN — BIODEGRADATION OF POULTRY MANURE FROM CAGED LAYERS KEYWORDS ODOR POULTRY DRYING LARVA
200	71	0815	PROTEIN — DRYING POULTRY WASTE KEYWORDS ODOR DRYING PROTEIN POTASSIUM PHOSPHORUS POULTRY
300	70	0213	PROTEIN — ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-
300	71	0624	PROTEIN — FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS KEYWORDS CATTLE DRYING AMINO-ACIDS NITR
300	71	0625	PROTEIN — THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE K
300	71	0630	PROTEIN — A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR E J BENNE KEYWO
100	66	1080	PROTEINS — NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	70	0340	PROTEINS — FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE KEYWORDS POULTRY CROP-RESPONSE
100	70	1037	PROTEINS — NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	73	1263	PROTEINS — CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
200	64	1241	PROTEINS — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	66	0145	PROTEINS — VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	71	0785	PROTEINS — A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
200	71	0861	PROTEINS — CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
200	71	1096	PROTEINS — ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	72	1025	PROTEINS — OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1030	PROTEINS — RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
200	72	1089	PROTEINS — A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300	72	1070	PROTEINS — PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
300	72	1146	PROTEINS — FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS KEYWORDS FARM-WASTES SHEEP FEED-LOTS PROT
400	71	0293	PROTEINS — SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
400	71	1134	PROTEINS — FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
400	71	1136	PROTEINS — FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	71	1172	PROTEINS — OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
600	72	1163	PROTEINS — ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
100	73	1088	PROTEIN-INTAKE — OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
200	71	0849	PROTEIN-SUPPLEMENT — DRIED ANIMAL WASTE AS A PROTEIN SUPPLEMENT FOR RUMINANTS KEYWORD RECYCLING POULTRY NU
100	71	1213	PROTEUS-VULGARIS — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	64	1241	PROTOZOA — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	71	1099	PROTOZOA — SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
500	71	1254	PROTOZOA — ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	71	1213	PSEUDOMONAS — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	66	0587	PSEUDOMONAS — HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO

[illegible]	70	1104	PSEUDOMONAS	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	71	1213	PSEUDOMONAS-AERUGI	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
600	72	1001	PSYCHODA-FLY-LARVA	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
400	71	0505	PSYCHROMETRICS	CONFINEMENT-REARING OF TURKEYS KEYWORDS VENTILATION MANAGEMENT PSYCHROMETRICS CONTROL
500	70	0403	PUBLIC-AGENCIES	LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
[illegible]	65	1080	PUBLIC-HEALTH	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
[illegible]	67	1218	PUBLIC-HEALTH	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
200	66	0112	PUBLIC-HEALTH	HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
200	71	0656	PUBLIC-HEALTH	CHLORINATION OF WASTEWATER EFFLUENTS KEYWORDS DISINFECTION WATER-TREATMENT PUBLIC-HEA
200	71	1099	PUBLIC-HEALTH	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300	46	1207	PUBLIC-HEALTH	FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
300	53	1206	PUBLIC-HEALTH	POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	67	1249	PUBLIC-HEALTH	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69	1044	PUBLIC-HEALTH	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1060	PUBLIC-HEALTH	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1124	PUBLIC-HEALTH	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	70	0592	PUBLIC-HEALTH	PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL KEYWORDS ENVIRONMENTAL-EFFECTS PUBLIC-HEALT
200	71	0664	PUBLIC-HEALTH-AGEN	ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
300	69	1203	PUBLIC-HEALTH-ADMI	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
200	71	0795	PUBLIC-HEALTH-HAZA	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
200	70	0320	PUBLIC-RELATIONS	AGRICULTURAL-WASTES IN AN URBAN-ENVIRONMENT KEYWORDS ODOR LEGISLATION FUNDING RESEARC
100	69	1198	PULP-WASTES	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
400	68	0015	PUMP	CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION KEYWORDS LAGOON POND FUR
400	73	1168	PUMP	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
100	64	0474	PUMPING	PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
100	65	0067	PUMPING	EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
100	72	0746	PUMPING	RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
200	71	0286	PUMPING	AGRICULTURAL-BENEFITS FROM URBAN POLLUTION-CONTROL KEYWORDS SEWAGE-TREATMENT TREATMEN
300	67	0711	PUMPING	THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
600	72	1071	PUMPING	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100	58	0580	PUMPS	ENGINEERING PRINCIPLES IN HANDLING LIQUID MATERIALS KEYWORDS PUMPS ENGINEERING LIQUID
200	66	0122	PUMPS	METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	66	0123	PUMPS	PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELEC
200	71	0799	PUMPS	AGITATION IN LIQUID MANURE TANKS KEYWORDS LIQUID-WASTES PUMPS SLURRIES MODEL-STUDIES
400	65	0332	PUMPS	HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
200	71	0800	PUMP-TESTING	MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE KEYWORDS L
200	71	0440	PUNITIVE-DAMAGES	LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
300	70	0491	PYRAMID-LAKE-NEV	WATER-QUALITY CONTROL PROBLEMS IN INLAND-SINKS KEYWORDS SALINITY EUTROPHICATION PYRAMI
200	71	0814	PYROLYSIS	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
200	73	1082	PYROLYSIS	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	PYROLYSIS	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
400	72	1171	PYROLYSIS	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
200	70	0240	QUALITY	WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
200	71	0807	QUALITY	QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
600	70	0469	QUALITY	WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
600	72	1002	QUALITY	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
100	72	1222	QUALITY-CONTROL	PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS KEYWORDS DIGESTION FILTRATION ANALYTICA
300	71	0538	QUALITY-CONTROL	CHARACTERISTICS OF WASTES FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORD RUNOFF QUALITY-CO
500	70	0409	QUALITY-LEVELS	ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
200	69	0198	QUALITY-STANDARDS	LIVESTOCK PRODUCTION VS ENVIRONMENTAL QUALITY - AN IMPASSE KEYWORDS ECONOMIC-EFFICIEN
200	69	0517	QUANTITES	QUANTITIES AND CHARACTERISTICS OF FARM ANIMAL-WASTES KEYWORDS WATER-POLLUTION POPULAT
100	70	1217	QUATIC-BACTERIA	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	72	1215	QUENCHING	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
700	70	1256	RACIOACTIVE-TRACER	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
100	66	0063	RADIOACTIVE	SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100	71	0303	RADIOACTIVITY	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
300	71	1106	RADIOACTIVITY	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	71	1126	RADIOACTIVITY-EFFE	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
300	71	1126	RADIOECOLOGY	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	67	0104	RAIN	MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
300	68	1202	RAIN	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
400	71	1139	RAIN	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
100	69	1198	RAINFALL	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	70	0372	RAINFALL	DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GRO
100	70	1233	RAINFALL	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	71	0318	RAINFALL	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
100	73	1087	RAINFALL	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
200	66	0120	RAINFALL	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	68	0726	RAINFALL	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES
200	69	0184	RAINFALL	TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	71	0709	RAINFALL	BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
200	71	0778	RAINFALL	LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
300	67	0701	RAINFALL	WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300	68	0702	RAINFALL	BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
300	68	1202	RAINFALL	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	73	1009	RAINFALL	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
200	68	0434	RAINFALL-CONTROL	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS CONFINEME
200	66	1112	RAINFALL-INTENSITY	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
600	70	0255	RAINFALL-INTENSITY	EFFECTS OF MANURE-DEPTHS ON RUNOFF FROM SOUTHWESTERN CATTLE-FEEDLOTS KEYWORDS RAINFAL
200	69	0423	RAINFALL-RUNOFF	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0428	RAINFALL-RUNOFF	DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS KEYWORDS RAINFALL-R
200	69	0430	RAINFALL-RUNOFF	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
300	70	0010	RAINFALL-RUNOFF	THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WAST
300	72	1085	RAINFALL-RUNOFF-RE	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
600	70	0255	RAINFALL-RUNOFF	EFFECTS OF MANURE-DEPTHS ON RUNOFF FROM SOUTHWESTERN CATTLE-FEEDLOTS KEYWORDS RAINFAL
200	69	0182	RAINFALL-SIMULATOR	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
200	69	0189	RANKING	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
200	66	0144	RAPPAHANNOCK-RIVER	TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200	69	0056	RATE	PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
100	70	0458	RATES	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
300	68	0256	RATES	USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENE
600	71	0271	RATES	GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS KEYWORDS DISPOSAL CR
100	70	0021	RATES-OF-APPLICATI	EFFECT OF MANURE APPLICATION, AERATION, AND SOIL PH ON SOIL NITROGEN TRANSFORMATIONS AN
300	72	1052	RATES-OF-APPLICATI	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
600	72	1177	RATES-OF-APPLICATI	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
300	71	0466	RATE-OF-CONCENTRAT	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
300	69	0006	RATE-OF-FLOW	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
400	65	0485	RATE-OF-GAIN	POULTRY LITTER AS CATTLE FEED KEYWORDS LEGAL-ASPECTS HAZARDS BLOAT EFFICIENCIES RATE-
100	64	0333	RATIO	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	64	0072	RATION	A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT

200	69	0183	RATION — THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	73	1062	RATION — CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
400	70	0109	RATION — SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS
600	73	1075	RATION — THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
200	69	0170	RATIONS — THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS KEYWORD
100	69	0071	RATION-COMPOSITION — ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	69	0361	RATS — NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
200	72	1089	RATS — A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
100	70	1217	REACREATION — APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	65	0334	REACTIONS — CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE KEYWORDS OXIDATION-LAG
200	69	0191	REACTION-TEMPERATU — CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
100	71	1221	REAGENTS — DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	71	0616	REAP — THE LAKE MENDOTA WATERSHED PROJECT KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPOR
200	71	0620	REAP — RECOMMENDATIONS OF NATIONAL MILK PRODUCERS FEDERATION KEYWORDS ADMINISTRATIVE-AGENCIE
300	30	1205	REASONABLE-USE — SUMNER V OBELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	49	1210	REASONABLE-USE — MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
200	70	0242	RECIRCULATED — MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
400	71	0339	RECIRCULATED — FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
100	65	0331	RECIRCULATED-WATER — DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
100	69	0058	RECIRCULATED-WATER — REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES KEYWORDS RECIRCULATED-WATER STORA
200	66	0135	RECIRCULATED-WATER — TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200	70	0248	RECIRCULATED-WATER — PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
400	70	0097	RECIRCULATED-WATER — POULTRY MANURE LAGOON DESIGN KEYWORDS RECIRCULATED-WATER AERATION EQUIPMENT COSTS FL
400	73	1181	RECIRCULATED-WATER — SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND
200	68	1244	RECLAIMED-WATER — SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
300	70	0668	RECLAMATION — PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTE KEYWORDS ALGAE RECL
100	71	0571	RECOVERY — EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES
100	72	1199	RECOVERY — IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	72	1215	RECOVERY — AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	69	1231	RECREATION — POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	0051	RECREATION — IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
100	71	1212	RECREATION — EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
200	69	0426	RECREATION — REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
300	49	1210	RECREATION — MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	68	0702	RECREATION — BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
300	70	0406	RECREATION — EFFECTS OF AGRICULTURAL-POLLUTANTS ON RECREATIONAL-USES OF SURFACE-WATERS KEYWORDS R
300	64	1110	RECREATIONAL-USE — LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
200	69	1117	RECREATION-WASTES — WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
600	69	1006	RECTAL-TEMPERATURE — HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
300	69	0093	RECURRENCE-INTERVA — HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
200	68	0725	RECYCLE — POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAG
200	71	0785	RECYCLE — A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES KEYWORDS LIQUID-WASTES PHOSPHAT
300	71	1238	RECYCLE — CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
200	71	0844	RECYCLED — REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORD ADMINISTRATIVE AG
400	71	0327	RECYCLED — RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
300	71	1238	RECYCLED-WASHWATER — CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
100	65	0366	RECYCLING — LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	65	1079	RECYCLING — UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	72	0746	RECYCLING — RECYCLING SYSTEM FOR POULTRY WASTES KEYWORD NITROGEN LAGOON PUMPING AEROBIC BIOCHEMIC
100	73	1086	RECYCLING — THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
100	73	1184	RECYCLING — ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	70	0325	RECYCLING — RECYCLING AND UTILIZATION OF BIODEGRADABLE-WASTES IN THE SOIL KEYWORDS BIOLOGICAL-SYST
200	71	0802	RECYCLING — AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
200	71	0845	RECYCLING — CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS NE
200	71	0846	RECYCLING — NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE KEYWORDS FARM-WASTES RECYCLING CATTLE POUL
200	71	0847	RECYCLING — STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINA
200	71	0848	RECYCLING — DEHYDRATED POULTRY WASTE DPW AS A FEEDSTUFF IN POULTRY RATIONS KEYWORD RECYCLING NU
200	71	0849	RECYCLING — DRIED ANIMAL WASTE AS A PROTEIN SUPPLEMENT FOR RUMINANTS KEYWORD RECYCLING POULTRY NU
200	71	0850	RECYCLING — THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYC
200	71	0851	RECYCLING — NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	71	0852	RECYCLING — BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES THEIR NUTRITIONAL VALUE TO THE GROWING CH
200	71	0853	RECYCLING — RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE O
200	71	0858	RECYCLING — RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANU
200	71	0861	RECYCLING — CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED LIQUOR KEYWORD RECYC
200	72	1011	RECYCLING — NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1012	RECYCLING — REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1021	RECYCLING — APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1024	RECYCLING — WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1025	RECYCLING — OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1030	RECYCLING — RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
200	72	1089	RECYCLING — A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
200	73	1062	RECYCLING — CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
200	73	1082	RECYCLING — COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	RECYCLING — CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
200	73	1093	RECYCLING — DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
300	70	1084	RECYCLING — CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71	0623	RECYCLING — ECONOMICS OF DRIED POULTRY WASTE DPW AS A FEED INGREDIENT OR A FERTILIZER KEYWORDS
300	71	0627	RECYCLING — DRIED POULTRY WASTE AS A PROTEIN SOURCE FOR FEEDLOT CATTLE KEYWORDS FEED-EFFECIENCY R
300	71	1081	RECYCLING — CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
300	72	1070	RECYCLING — PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
300	72	1182	RECYCLING — BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES KEYWORDS
400	70	1132	RECYCLING — THE GREAT MANURE DILEMMA KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT RECYCLING FARM-WASTES
400	70	1133	RECYCLING — POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	71	1134	RECYCLING — FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
400	71	1172	RECYCLING — OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400	72	1130	RECYCLING — THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
400	72	1171	RECYCLING — MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
400	73	1068	RECYCLING — NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
400	73	1145	RECYCLING — FEED RECYCLING SHOWING PROMISE KEYWORDS FEED-LOTS FARM-WASTES RECYCLING FEEDS EQUIPMENT
400	73	1168	RECYCLING — CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
600	72	1031	RECYCLING — ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1076	RECYCLING — HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
600	72	1163	RECYCLING — ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
200	69	0179	REDOX-POTENTIAL — CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO
200	69	0193	REDOX-POTENTIAL — CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
700	69	0712	REDOX-POTENTIAL — CATTLE FEEDLOT WASTE CHARACTERISTICS KEYWORDS FEEDLOTS BOD HYDROGEN-ION-CONCENTRATION
100	71	0261	REDUCTION — ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUD
100	71	1221	REDUCTION-CHEMICAL — DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
200	69	0553	REDULATIONS — STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
300	70	0475	REED-CANARY-GRASS — LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI

200	70	0324	REFEEDING	DISPOSAL OF SOLID AGRICULTURAL-WASTES - CONCEPTS AND PRINCIPLES KEYWORDS RESEARCH-NEE
200	71	0609	REFEEDING	REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
400	73	1066	REFEEDING	NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED KEYWORDS RECYCLING FARM-WASTES CATTLE
300	69	1060	REFUSE	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	REFUSE	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	71	1261	REGIONAL-PRODUCTIO	INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
300	71	0515	REGISTRATION	FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE KEYWORDS PATHOGENIC-BACTERIA BORON
400	71	1137	REGISTRATION	REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEED
300	70	0410	REGISTRATION	ALLIANCE FOR ACTION KEYWORDS WATER-POLLUTION FEEDLOTS REGISTRATION INVENTORY WASTE-MA
100	68	0087	REGRESSION-ANALYSI	AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
100	69	0095	REGRESSION-ANAL	BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
100	70	1041	REGRESSION-ANALYSI	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
200	69	0181	REGULATION	FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200	69	0535	REGULATION	WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POL
200	69	0540	REGULATION	INDUSTRY AND THE ENVIRONMENT-FEEDLOT WASTE MANAGEMENT KEYWORDS REGULATION CATTLE ECOS
200	69	0551	REGULATION	MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM-STATUS REPORT KEYWORDS LEGISLATION REGULAT
200	69	0552	REGULATION	STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	69	0554	REGULATION	MISSOURI S ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION POLLUTION-ABATEMENT ADMINISTRA
200	69	0555	REGULATION	STATUS REPORT-KANSAS FEEDLOT POLLUTION CONTROL PROGRAM-EXTEMPORANEOUS REMARKS KEYWORDS
200	69	0556	REGULATION	STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF A
200	69	0559	REGULATION	FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
200	69	0560	REGULATION	ANIMAL WASTE MANAGEMENT-QUESTIONS AND ANSWERS KEYWORDS RUNOFF CONFINEMENT-PENS REGULAT
200	69	0563	REGULATION	A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION KEYWORDS CATTLE RUN
200	70	1175	REGULATION	ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200	71	0595	REGULATION	ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION E
200	71	0596	REGULATION	SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
200	71	0598	REGULATION	MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200	71	0599	REGULATION	THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0600	REGULATION	STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
200	71	0601	REGULATION	PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULA
200	71	0609	REGULATION	REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
200	71	0765	REGULATION	ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWO
200	71	0819	REGULATION	ECONOMIC INPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING
200	71	1094	REGULATION	AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
300		1105	REGULATION	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	67	1249	REGULATION	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	68	1202	REGULATION	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	69	1061	REGULATION	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	70	0383	REGULATION	PORK PRODUCERS AND POLLUTION LEGAL ASPECTS KEYWORDS LAW LEGAL-PROCEDURE REGULATION
300	70	1247	REGULATION	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71	0301	REGULATION	STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDE
300	71	0704	REGULATION	PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
300	71	1246	REGULATION	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
400	70	1133	REGULATION	POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	72	1166	REGULATION	HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
600	72	1002	REGULATION	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
200	69	0557	REGULATIONS	STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0558	REGULATIONS	COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
200	69	0566	REGULATIONS	DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM KEYWORDS REGULATIONS LEGISLATION
200	71	0594	REGULATIONS	IMPROVED CONTROL OF ANIMAL WASTES KEYWORDS LAWS PERMITS ODOR LOCAL-GOVERNMENTS REGULA
200	71	0597	REGULATIONS	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0664	REGULATIONS	ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
200	71	0709	REGULATIONS	BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
300	71	0744	REGULATIONS	ANIMAL SLAUGHTERING AND PROCESSING KEYWORDS REGULATIONS BY-PRODUCTS SOLID-WASTES INDU
300	72	1157	REGULATIONS	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	70	0069	REGULATIONS	CONNECTICUT REQUIREMENTS FOR LIQUID MANURE DISPOSAL KEYWORDS REGULATIONS POLLUTANTS C
200	69	0533	REGULATORY	THE REGULATORY ROLE OF THE DEPARTMENT OF NATURAL-RESOURCES KEYWORDS LEGISLATION POLLU
200	71	0844	REGULATORY	REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORD ADMINISTRATIVE AG
200	69	0203	REGULATORY-MECHANI	WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT
200	72	1018	REGULATORY-WASTE-C	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1018	REGULATORY-WASTE-C	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
300	69	0004	REINFORCED-CONCRET	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
100	69	0060	RELATION	RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTI
300	30	1205	RELATIVE-RIGHTS	SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
200	66	0150	RELOCATION	PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT KEYWORDS
400	73	1191	RELOCATION	MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
200	70	1050	REMEDIES	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
300	30	1205	REMEDIES	SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	68	1202	REMEDIES	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	68	1209	REMEDIES	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
100	65	0263	REMOVAL	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
200	66	0141	REMOVAL	REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 1 KEYWORDS DEWATERING E
200	66	0142	REMOVAL	REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS PART 2 KEYWORDS DEWATERING E
200	69	0191	REMOVAL	CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
200	69	0192	REMOVAL	POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL KEYWORDS FILTERS FOAM-PAD-FILTE
200	69	0197	REMOVAL	REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
200	71	0658	REMOVAL	MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION RE
200	71	0857	REMOVAL	NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
300	71	0099	REMOVAL	REMOVAL OF NITRATE BY AN ALGAL SYSTEM KEYWORDS REMOVAL NITRATE ALGAL-SYSTEM
200	69	0191	REMOVAL-MECHANISM	CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
300	71	0745	RENDERING	ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING
400	71	0568	RENDERING	DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DIS
200	69	0520	RENDERING-PLANTS	DEAD-ANIMALS AND HOW THEY CONTRIBUTE TO POLLUTION OF THE ENVIRONMENT KEYWORDS DEAD-AN
200	70	0321	RENDERING-PLANT	WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	64	1241	REPRODUCTION	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	66	0132	REQUIREMENTS	REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES KEYWORDS LAGOONS ODOR BIOD
200	68	0724	REQUIREMENTS	GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
300	69	0003	REQUIREMENTS	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
100	70	0368	RESEARCH	AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY DISPOSAL ODOR COSTS DRYING EQUIPMEN
200	69	0181	RESEARCH	FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200	69	0432	RESEARCH	AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
200	69	0525	RESEARCH	ENGINEERING-RESEARCH ON FARM-ANIMAL-MANURE KEYWORDS ODORS BIOLOGICAL-TREATMENT WASTE-
200	69	0526	RESEARCH	NATION-WIDE RESEARCH ON ANIMAL-WASTE-DISPOSAL KEYWORDS GRANTS ALGAE FWPCA NUTRIENTS RE
200	69	0527	RESEARCH	WATER-RESOURCES-CENTER RESEARCH ON ANIMAL-WASTES AND WATER-QUALITY KEYWORDS EUTROPHIC
200	69	0548	RESEARCH	RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200	69	0564	RESEARCH	RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL KEYWORDS BYPRODUCTS POLLUTION-ABATEMENT
200	69	0565	RESEARCH	RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT KEYWORDS WASTE-TREATMENT CAT
200	70	0322	RESEARCH	FUNDING FOR AGRICULTURAL-WASTE RESEARCH KEYWORDS GRANTS USDA RESEARCH-FUNDS ENVIRONME
200	70	0323	RESEARCH	AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-
200	71	0604	RESEARCH	STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR

200	72	1026	RESEARCH — REGIONAL ADMINISTRATORS SUMMARY KEYWORDS FARM-WASTES RESEARCH
300	71	0621	RESEARCH — POULTRY POLLUTION RESEARCH RESULTS KEYWORDS ODOR NUTRIENTS DIET AIR-VENTILATION FEED
200	69	0549	RESEARCH-AND-DEVEL — THE UNIVERSITIES ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS RUNOFF CATTLE RESEARCH-A
200	72	1012	RESEARCH-AND-DEVEL — REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	70	0322	RESEARCH-FUNDS — FUNDING FOR AGRICULTURAL-WASTE RESEARCH KEYWORDS GRANTS USDA RESEARCH-FUNDS ENVIRONME
200	70	0320	RESEARCH-NEEDS — AGRICULTURAL-WASTES IN AN URBAN-ENVIRONMENT KEYWORDS ODOR LEGISLATION FUNDING RESEARC
200	70	0324	RESEARCH-NEEDS — DISPOSAL OF SOLID AGRICULTURAL-WASTES - CONCEPTS AND PRINCIPLES KEYWORDS RESEARCH-NEE
200	70	0326	RESEARCH-NEEDS — AGRICULTURAL-WASTE RESEARCH-NEEDS KEYWORDS ENVIRONMENT ODOR WASTE-HANDLING SURVEYS RE
300	70	0455	RESEARCH-NEEDS — ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM KEYWORDS ODOR GASES LAGOONS RE
100	70	1194	RESEARCH-POLICY — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1194	RESEARCH-STRATEGY — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
300	71	1245	RESERVOIR — EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	70	1194	RESERVOIRS — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
300	71	1126	RESERVOIRS — SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	69	0361	RESIDUE — NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
200	69	0195	RESIDUES — ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE KEYW
500	70	0397	RESIDUES — HERBICIDE RESIDUES IN AGRICULTURAL WATER FROM CONTROL OF AQUATIC AND BANK WEEDS KEYWOR
300	71	0511	RESIDUESREUSE — ANIMAL WASTE REUSE NUTRITIVE-VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES A REVIEW
100	70	1111	RESINS — POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
100	69	0265	RESISTANCE — PENICILLIN BY THE POUND KEYWORDS ANIMAL PATHOLOGY DISEASE RESISTANCE ANTIBIOTICS DISE
200	71	0277	RESISTANCE — THE FARMERS CONCERN KEYWORDS PESTICIDES WATER-POLLUTION PANIC-POWER MIS-USE RESISTA
200	71	0278	RESOURCES — POPULATION GROWTH-RATE SHOULDNT GET ALL THE BLAME KEYWORDS FERTILITY CITIES RESOURCES
200	70	1050	RESOURCE-ALLOCATIO — THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
100	66	0479	RESPIRATION — THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS KEYWORDS POULTRY DI
600	69	1006	RESPIRATION-RATE — HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
600	72	1074	RESPIRATORY-RATE — SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
200	71	0850	RESPONSE — THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS KEYWORD RECYC
200	71	0856	RESPONSE — GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTIL
300	71	0412	RESPONSE — THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP
200	69	0425	RETENTION — ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	70	0755	RETENTION — FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
400	73	1191	RETENTION-POND — MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER KEYWORDS
400	73	1007	RETENTION-PONDS — FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
200	73	1082	RETORT — COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
300	68	0256	RETURNS — USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENE
400	71	1196	RETURN-FLOW — CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
300	70	1192	RETURN-MONETARY — IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
100	71	0461	REUSE — FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	68	0481	REUSE — RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE W
100	69	0035	REUSE — TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100	70	0260	REUSE — GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS
100	70	0678	REUSE — THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT KEYWORDS REUSE ODOR POLLUTION FUTURE MANAG
100	70	0723	REUSE — FEEDING VALUE OF CATTLE MANURE FOR CATTLE KEYWORDS REUSE UTILIZATION
200	71	0608	REUSE — RECYCLING OF ANIMAL WASTES KEYWORDS REUSE FERTILIZATION NUTRITION PHOSPHORUS NITROGEN
200	71	0609	REUSE — REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES KEYWORDS REUSE REGULATION
200	71	0651	REUSE — ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMEN
300	71	0622	REUSE — EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THEUSE OF CHICKEN MANURE KEYW
400	71	0753	REUSE — MANURE CAN BE PROCESSED AND SOLD AT A PROFIT KEYWORD FEEDLOT CATTLE MARKET-VALUE WAST
200	70	0242	REVERSE-OSMOSIS — MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
100	68	0337	REVIEW — A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT
100	68	0036	RE-USE — OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
200	71	0617	RE-USE — THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRAT
300	70	0489	RE-USE — WATER-QUALITY REQUIREMENTS AND RE-USE OF WASTEWATER EFFLUENTS KEYWORDS NUTRIENT-REMOV
100	73	1155	RHAMNOSE — THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
400	73	1181	RHODE-ISLAND — SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND
100	63	1064	RHODIA-RP-9895 — TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
300	26	1204	RIPARIAN-LAND — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	26	1204	RIPARIAN-RIGHT — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	30	1205	RIPARIAN-RIGHTS — SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
200	70	0240	RIPARIAN-WATER — WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
300	26	1204	RIPARIAN-WATER — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	46	1208	RIPARIAN-WATER — GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
100	70	1194	RIVERS — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	71	1197	RIVERS — NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
200	71	1099	RIVERS — SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300		1105	RIVERS — RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	69	0093	RIVERS — HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
300	69	1060	RIVERS — FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	RIVERS — FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	71	1055	RIVERS — ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
200	70	0236	RIVER-AUTHORITIES — ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK
300	71	1246	RIVER-BASINS — FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
100	66	0341	RIVER-POLLUTION — AGRICULTURE AND THE PREVENTION OF RIVER-POLLUTION, AS EXPERIENCED IN THE WEST-OF-SCOTLA
100	66	1080	ROCKS — NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	70	0024	RODENTS — PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
300	71	1126	RODENTS — SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	69	0536	ROLE — ROLE OF UNIVERSITY-EXTENSION KEYWORDS ENVIRONMENT EDUCATION UNIVERSITIES WATER-POLLUT
100	70	1194	ROOTED-AQUATIC-PLA — REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	71	0784	ROTATION — A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINE
200	69	0201	ROTATIONS — ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
200	70	0227	ROTATIONS — RATES OF WATER-INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY-MANURE KEYWORDS ROT
600	72	1071	ROTATION-BIOLOGICA — A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
300	69	0006	ROTOR — SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
400	67	0359	ROTOR — WHIPPING THE MANURE PROBLEM KEYWORDS OXIDATION-DITCH ODOR AEROBIC-BACTERIA ROTOR PROB
100	68	0106	ROTORS — OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
200	69	0177	ROTORS — FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0178	ROTORS — STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
200	69	0179	ROTORS — CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO
200	70	0218	ROTORS — REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DIT
200	70	0728	ROTORS — ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
600	70	0098	ROTORS — BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
200	69	0166	ROTOR-AERATION — ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
300	68	0749	ROTOR-AERATION — ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
700	68	0330	ROTOR-DESIGN — CONFINED SWINE MANURE DISPOSAL KEYWORDS OXIDATION-DITCH ROTOR-DESIGN OXYGEN-TRANSFER
100	70	1111	RUBBER — POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300	68	0741	RULES — RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
100	55	0328	RUMEN — EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
200	64	1241	RUMEN — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	73	1155	RUMEN-LIQUOR — THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	71	0273	RUMEN-MICROFIORA — ROLE OF EXCRETED CHLORTETRACYCLINE IN MODIFYING THE DECOMPOSITION PROCESS IN FEEDLOT WA

100	73	1034	RUMEN-SAMPLING	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
200	64	1241	RUMINANTS	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
300	71	1098	RUMINANTS	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
500	71	1254	RUMINANTS	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	62	0292	RUNOFF	AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAIN
100	66	0506	RUNOFF	CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE
100	67	0079	RUNOFF	SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	67	0302	RUNOFF	SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF KEYWORDS SALMONELLA INFANTIS FEEDLOT RUNO
100	68	0090	RUNOFF	WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS
100	68	1121	RUNOFF	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	0071	RUNOFF	ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	69	1198	RUNOFF	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	70	0042	RUNOFF	STREAM ENRICHMENT FROM FARM OPERATIONS KEYWORDS FERTILIZER N P K NUTRIENT-LOSSES PREC
100	70	0083	RUNOFF	BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BE
100	70	0372	RUNOFF	DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GRO
100	70	0417	RUNOFF	ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100	70	0458	RUNOFF	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	70	0738	RUNOFF	MODELING FEEDLOT POLLUTION I ANALOG SIMULATION KEYWORDS RUNOFF MODELING FEEDLOT
100	70	1194	RUNOFF	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1195	RUNOFF	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	71	0318	RUNOFF	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
100	71	0444	RUNOFF	PROLONGED SALMONELLA CONTAMINATION OF A RECREATIONAL LAKE BY RUNOFF WATERS KEYWORDS SA
100	71	0571	RUNOFF	EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES
100	71	0573	RUNOFF	METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS
100	71	0721	RUNOFF	HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOF
100	71	0722	RUNOFF	THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
100	71	0729	RUNOFF	DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
100	71	1038	RUNOFF	CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100	71	1039	RUNOFF	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1228	RUNOFF	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100	72	1129	RUNOFF	BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
200	64	0759	RUNOFF	STREAM POLLUTION FROM FEEDLOT RUNOFF KEYWORD KANSAS BIOCHEMICAL-OXYGEN-DEMAND CHEMICA
200	66	0115	RUNOFF	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0120	RUNOFF	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0139	RUNOFF	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	67	0734	RUNOFF	CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	67	1243	RUNOFF	THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200	68	0434	RUNOFF	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS CONFINEME
200	68	0694	RUNOFF	THE MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLU
200	68	0726	RUNOFF	ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS KEYWORDS FARM-WASTES
200	68	1186	RUNOFF	TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	69	0182	RUNOFF	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
200	69	0183	RUNOFF	THE EFFECT OF FEED, DESIGN, AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE
200	69	0423	RUNOFF	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0424	RUNOFF	ANIMAL WASTE RUNOFF-A MAJOR WATER QUALITY CHALLENGE KEYWORDS RUNOFF BOD POLLUTANT-IDE
200	69	0425	RUNOFF	ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	69	0426	RUNOFF	REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
200	69	0433	RUNOFF	EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	69	0541	RUNOFF	FEEDLOT POLLUTION SLIDE SHOW KEYWORDS RUNOFF FISH-KILL IRRIGATION FARM LAGOONS ODOR C
200	69	0542	RUNOFF	ANIMAL WASTE POLLUTION-OVERVIEW OF THE PROBLEM KEYWORDS RUNOFF GROUNDWATER FISH-KILL
200	69	0543	RUNOFF	INDUSTRY S ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS CATTLE FISH-KILL KANSAS ECONOMI
200	69	0544	RUNOFF	HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION MI
200	69	0545	RUNOFF	HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200	69	0547	RUNOFF	CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	69	0548	RUNOFF	RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOT
200	69	0549	RUNOFF	THE UNIVERSITIES ROLE IN FEEDLOT POLLUTION CONTROL KEYWORDS RUNOFF CATTLE RESEARCH-A
200	69	0550	RUNOFF	HOW TO GAIN PUBLIC SUPPORT KEYWORDS RUNOFF POLLUTION-ABATEMENT CATTLE
200	69	0556	RUNOFF	STATUS REPORT-NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM KEYWORDS REGULATION RUNOFF A
200	69	0557	RUNOFF	STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
200	69	0560	RUNOFF	ANIMAL WASTE MANAGEMENT-QUESTIONS AND ANSWERS KEYWORDS RUNOFF CONFINEMENT-PENS REGULAT
200	69	0561	RUNOFF	INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES KEYWORDS RUN
200	69	0562	RUNOFF	ASSESSING THE PROBLEM OF FEEDLOT POLLUTION KEYWORDS RUNOFF CATTLE LEGISLATION CONFIN
200	69	0563	RUNOFF	A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION KEYWORDS CATTLE RUN
200	69	0676	RUNOFF	CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS KEYWORDS RUNOFF GR
200	69	0708	RUNOFF	TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
200	69	1185	RUNOFF	ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0054	RUNOFF	POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
200	70	0214	RUNOFF	RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200	70	0224	RUNOFF	HYDROLOGIC-STUDIES FOR EVALUATION OF THE POLLUTION-POTENTIAL OF FEEDLOTS IN EASTERN NEB
200	70	0232	RUNOFF	CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORDS RUNOFF IRRIGATI
200	70	0240	RUNOFF	WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
200	70	0498	RUNOFF	WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	70	0670	RUNOFF	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0715	RUNOFF	OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE KEYWORDS DEHYDRATION FORC
200	70	0727	RUNOFF	EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
200	70	0747	RUNOFF	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	71	0586	RUNOFF	CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT KEYWORDS LIVESTOCK-WASTES WATER
200	71	0596	RUNOFF	SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
200	71	0597	RUNOFF	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0602	RUNOFF	STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS RUNOFF LAWS FEEDLOT V
200	71	0604	RUNOFF	STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71	0605	RUNOFF	CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
200	71	0607	RUNOFF	SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEME
200	71	0610	RUNOFF	WATER POLLUTION AND THE FARMER KEYWORDS RUNOFF COSTS PESTICIDES GOVERNMENT-FINANCE CO
200	71	0640	RUNOFF	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
200	71	0646	RUNOFF	FARM LAND RUNOFF KEYWORDS NITROGEN-COMPOUNDS PHOSPHORUS- COMPOUNDS SOIL-EROSION RUNO
200	71	0703	RUNOFF	FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0733	RUNOFF	ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0762	RUNOFF	LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0770	RUNOFF	LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN KEYWORDS GOVERNMENTS GROUNDWATER
200	71	0773	RUNOFF	MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
200	71	0773	RUNOFF	MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS KEYWORDS FEED
200	71	0775	RUNOFF	TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200	71	0778	RUNOFF	LAND DISPOSAL OF CATTLE FEEDLOT WASTES KEYWORDS RUNOFF LAGOON RAINFALL CORN IRRIGATIO
200	71	0779	RUNOFF	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200	71	0789	RUNOFF	ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
200	71	0796	RUNOFF	DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	1095	RUNOFF	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1234	RUNOFF	SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200	72	1010	RUNOFF	PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES

200	72	1011	RUNOFF
200	72	1014	RUNOFF
200	72	1015	RUNOFF
200	72	1016	RUNOFF
200	72	1019	RUNOFF
200	72	1020	RUNOFF
200	72	1021	RUNOFF
200	72	1022	RUNOFF
200	72	1023	RUNOFF
200	72	1025	RUNOFF
300	67	0701	RUNOFF
300	67	0710	RUNOFF
300	68	0702	RUNOFF
300	68	1122	RUNOFF
300	69	0067	RUNOFF
300	69	0300	RUNOFF
300	69	1180	RUNOFF
300	70	0384	RUNOFF
300	70	0743	RUNOFF
300	71	0269	RUNOFF
300	71	0466	RUNOFF
300	71	0486	RUNOFF
300	71	0538	RUNOFF
300	71	0591	RUNOFF
300	71	0677	RUNOFF
300	71	0689	RUNOFF
300	71	0697	RUNOFF
300	71	0700	RUNOFF
300	71	0752	RUNOFF
300	71	1008	RUNOFF
300	71	1106	RUNOFF
300	71	1107	RUNOFF
300	71	1245	RUNOFF
300	72	1003	RUNOFF
300	72	1260	RUNOFF
300	73	1009	RUNOFF
400	68	0038	RUNOFF
400	69	1045	RUNOFF
400	71	0731	RUNOFF
400	71	1131	RUNOFF
400	71	1139	RUNOFF
400	71	1144	RUNOFF
400	72	1179	RUNOFF
400	73	1158	RUNOFF
500	70	0396	RUNOFF
500	70	0399	RUNOFF
500	70	0405	RUNOFF
500	70	0407	RUNOFF
600	69	1005	RUNOFF
600	71	0100	RUNOFF
600	71	0493	RUNOFF
600	72	1149	RUNOFF
600	72	1177	RUNOFF
700	70	1066	RUNOFF
200	72	1015	RUNOFF-CONTROL-SYS
200	68	1186	RUNOFF-FORECASTING
100	69	0061	RUNOFF-SAMPLER
200	69	0999	RUN-OFF
200	71	0666	RUN-OFF
200	71	0709	RUN-OFF
300	72	1260	RURAL
200	66	0131	RURAL-AREAS
400	73	1158	RURAL-ENVIRONMENTA
100	69	0375	RURAL-RUNOFF
200	71	0795	R-FACTORS
100	68	0036	S
200	69	0553	S
200	69	0557	S
200	69	0558	S
200	71	0664	SAFETY
400	71	1143	SAGEBRUSH
100	71	0681	SALINE-SOILS
300	70	1036	SALINE-SOILS
300	69	1103	SALINE-WATER-INTRU
100	70	0051	SALINITY
100	70	0365	SALINITY
100	70	1041	SALINITY
200	70	1118	SALINITY
200	71	0831	SALINITY
200	71	0832	SALINITY
300	70	0491	SALINITY
300	70	1036	SALINITY
300	71	1106	SALINITY
400	71	1196	SALINITY
600	72	1169	SALINITY
600	72	1177	SALINITY
300	71	1100	SALMON
400	73	1181	SALMON
100	64	0343	SALMONELLA
100	64	0345	SALMONELLA
100	67	0302	SALMONELLA
100	67	1258	SALMONELLA
100	69	0376	SALMONELLA
100	69	0714	SALMONELLA
100	70	0026	SALMONELLA
100	70	0094	SALMONELLA
100	70	1217	SALMONELLA
100	71	0451	SALMONELLA
100	71	0572	SALMONELLA
100	71	1212	SALMONELLA

NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
FARM ANIMAL WASTE DISPOSAL KEYWORDS CONFINEMENT-PENS BOD COD RUNOFF FERTILIZER ECONO
BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS KEYWORDS CATTLE ECONOMICS IRR
INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
FARM ANIMAL-WASTE MANAGEMENT KEYWORDS DISPOSAL DESIGN-CRITERIA DISEASES OXIDATION-DIT
CHARACTERISTICS OF WASTES FROM SOUTHWESTERN CATTLE FEEDLOTS KEYWORD RUNOFF QUALITY-CO
AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN KEYWORDS RUNOFF PESTICIDES EUTROPHICAT
THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
WASTE MANAGEMENT FOR FEEDLOTS KEYWORD NEBRASKA LIVESTOCK RUNOFF FEDERAL-GOVERNMENT MA
ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES
ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
DISPOSING OF ANIMAL WASTES KEYWORDS FARM-WASTES DAIRY LAGOONS RUNOFF FERTILIZER DISPO
FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATION
LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS KEYWORDS POLLU
EFFECTS OF AGRICULTURAL-POLLUTION ON EUTROPHICATION KEYWORDS NITROGEN PHOSPHOROUS NITRA
EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT KEYWORDS LAND-APPLICATION RUNOFF PER
NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
FEEDLOT POLLUTION CONTROL IN IOWA KEYWORDS REGULATION RUN-OFF ADMINISTRATIVE-AGENCIES
PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK S
STATUS REPORT OF MONTANA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
STATUS OF NORTH DAKOTA S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS KEYWORDS
COLORADO S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION C
ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
A LOVELY NEW SCENT FOR MANURE KEYWORDS AIR-POLLUTION SAGEBRUSH FARM-WASTES ODOR
EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES KEYWORDS BOD COD DISPOSAL IRRIGATION L
AGRICULTURE FACES NEW CHALLENGES IN CURRENT ENVIRONMENTAL CRISIS KEYWORDS WATER SALIN
STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES KEYW
GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SA
WATER-QUALITY CONTROL PROBLEMS IN INLAND-SINKS KEYWORDS SALINITY EUTROPHICATION PYRAMI
AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND
BOVINE-SALMONELLOSIS IN A FEEDLOT OPERATION KEYWORDS MUC ANTIBIOTICS STAGNANT-WATER
BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF KEYWORDS SALMONELLA INFANTIS FEEDLOT RUNO
RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
EVALUATION OF SEVERAL METHODS OF ISOLATING SALMONELLA FROM POULTRY-LITTER AND ANIMAL-F
EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
REDUCTION OF SALMONELLA IN COMPOST IN A HOG FATTENING FARM OXIDATION VAT KEYWORDS AE
AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO A
EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN

100	71	1213	SALMONELLA	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	73	1164	SALMONELLA	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200	66	0144	SALMONELLA	TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200	71	0641	SALMONELLA	BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
200	71	0795	SALMONELLA	ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAG
200	71	0825	SALMONELLA	MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE KEYWORDS OXYGEN-DEMAND SAL
300	70	1104	SALMONELLA	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
400	67	0336	SALMONELLA	DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND
100	70	0110	SALMONELLAE	ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRIC
100	70	0024	SALMONELLAI	PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
100	71	0444	SALMONELLA-CONTAMI	PROLONGED SALMONELLA CONTAMINATION OF A RECREATIONAL LAKE BY RUNOFF WATERS KEYWORDS SA
100	69	0736	SALMONELLA-ISOLATI	SALMONELLA IN WASTES PRODUCED AT COMMERCIAL POULTRY FARMS KEYWORDS SALMONELLA-ISOLATION
100	71	1213	SALMONELLA-TYPHOSA	A COMPUTER PROGRAM FOR IBENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	66	0118	SALMONELLOSIS	HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
400	66	0354	SALMONELLOSIS	SALMONELLOSIS IN CATTLE KEYWORDS PATHOGENIC-BACTERIA CARRIERS ENGLAND CLINICAL-SIGNS
100	70	1051	SALMONIDS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
110	70	1237	SALMONIDS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
300		1077	SALT	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
400	70	0109	SALT	SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS
300	70	0491	SALTON-SEA-CAL	WATER-QUALITY CONTROL PROBLEMS IN INLAND-SINKS KEYWORDS SALINITY EUTROPHICATION PYRAMI
200	69	0431	SALTS	MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
200	70	0217	SALTS	POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200	71	0830	SALTS	FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES KEYWORDS
300	68	0256	SALTS	USE ANIMAL MANURE EFFECTIVELY KEYWORDS FERTILIZERS SALTS COMPOSTING RATES RETURNS BENE
300	71	1107	SALTS	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
400	73	1168	SALTS	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
600	73	1065	SALTS	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
300	70	0490	SALT-BALANCE	SALINITY-CONTROL IN RETURN-FLOW FROM IRRIGATED AREAS A DEMONSTRATION-PROJECT KEYWORDS
300	70	1036	SALT-TOLERANCE	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
100	68	0090	SAMPLER	WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS
100	65	1079	SAMPLES	UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	72	1097	SAMPLES	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
100	71	0441	SAMPLE-PREPARATION	METHODS OF SAMPLE PREPARATION FOR CHEMICAL DETERMINATION OF CHROMIC OXIDE IN BOVINE FEC
100	71	1221	SAMPLE-PREPARATION	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	72	1215	SAMPLE-PREPARATION	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	65	0075	SAMPLING	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	69	0375	SAMPLING	RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
100	69	0690	SAMPLING	AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM T
100	70	0013	SAMPLING	INFLUENCE OF POULTRY-MANURE-REMOVAL SCHEDULES ON VARIOUS DIPTERA LARVAE AND SELECTED AN
100	71	0484	SAMPLING	RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
100	71	0722	SAMPLING	THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
100	71	1212	SAMPLING	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1232	SAMPLING	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	73	1087	SAMPLING	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
200	71	0703	SAMPLING	FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0832	SAMPLING	GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SA
300	71	0697	SAMPLING	ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
300	71	1057	SAMPLING	EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
700	70	1066	SAMPLING	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1109	SAMPLING	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	72	1224	SANDS	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
700	72	1048	SANDS	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
700	70	1256	SANDY-LOAM-LAND-DI	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
200	64	1240	SANITARY-ENGINEERI	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	60	0059	SANITATION	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
200	66	0127	SANITATION	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
100	70	1237	SAN-JOAQUIN-RIVER-	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
600	69	1239	SAN-JOAQUIN-VALLEY	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
100	71	1213	SARCINA-LUTEA	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
700	70	1256	SATURATED-SOILS	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
200	71	0805	SAWDUST	HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST KEYWORDS AEROBIC-TREATMENT COMPOSTIN
700	69	1067	SCHEDULING-MODEL	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700	70	1256	SCINTILLATOR	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
300	65	0053	SCRAPERS	FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
200	71	0858	SCREENS	RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANU
200	69	0531	SCS	TECHNICAL-ASSISTANCE AVAILABLE FROM THE SOIL-CONSERVATION SERVICE KEYWORDS SCS SURFAC
200	71	0282	SCS	SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHED
200	71	0611	SCS	U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENC
200	71	0615	SCS	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
200	71	0616	SCS	THE LAKE MENDOTA WATERSHED PROJECT KEYWORDS ADMINISTRATIVE-AGENCIES GOVERNMENT-SUPPOR
400	68	0038	SCS	PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
400	68	0229	SCS	THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTIO
100	70	0089	SEA	TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	71	0567	SEAGULL	BACTERIAL AND FUNGAL FLORA OF SEAGULL DROPPINGS IN JERSEY KEYWORDS BACTERIAL FLORA SEA
600	72	1148	SEALING	DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
300	71	1100	SEALS-ANIMALS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
100	68	0011	SEARCH	THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
300	69	0003	SEASON	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	72	1070	SEASONAL-GROWTH	PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
100	68	0381	SECONDARY-DITCH	WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100	70	1195	SEDIMENT	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
200	69	0423	SEDIMENT	2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0432	SEDIMENT	AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
300	72	1260	SEDIMENT	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	68	0229	SEDIMENT	THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTIO
500	70	0388	SEDIMENT	CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORG
200	66	0134	SEDIMENTATION	OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
200	66	0135	SEDIMENTATION	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200	69	0433	SEDIMENTATION	EFFECT OF AGRICULTURE ON WATER QUALITY KEYWORDS EROSION SEDIMENTATION NUTRIENTS RUNOF
200	71	0282	SEDIMENTATION	SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHED
200	71	0859	SEDIMENTATION	THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY KEYWORD SIEVE-ANALYSIS SEDIMEN
200	71	1095	SEDIMENTATION	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	70	1036	SEDIMENTATION	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
200	71	1008	SEDIMENTATION	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
200	70	1109	SEDIMENTATION	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
200	69	0168	SEDIMENTATION-TANK	AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200	70	0365	SEDIMENTCHALLANGES	AGRICULTURE FACES NEW CHALLANGES IN CURRENT ENVIRONMENTAL CRISIS KEYWORDS WATER SALIN
100	64	1200	SEDIMENTS	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	68	1121	SEDIMENTS	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	1190	SEDIMENTS	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS

300	69	1103	SEDIMENTS	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	71	1100	SEDIMENTS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300	71	1106	SEDIMENTS	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
500	71	1254	SEDIMENTS	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
700	72	1049	SEDIMENTS	ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
300	70	1036	SEDIMENT-CONTROL	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
400	71	1196	SEDIMENT-DISCHARGE	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
300	68	1043	SEDIMENT-LOAD	WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
200	71	0804	SEDIMENT-TRANSPORT	IMPROVING WATER UTILIZATION EFFICIENCY IN AUTOMATIC HYDRAULIC WASTE REMOVAL KEYWORDS
500	70	0387	SEDIMENT-TRANSPORT	POLLUTION BY SEDIMENT SOURCES AND THE DETACHMENT AND TRANSPORT-PROCESSES KEYWORDS SE
100	70	1217	SEDIMENT-WATER-INT	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	0484	SEDIMENT-WATER-INT	RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
100	68	1121	SEDIMENT-YIELD	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
500	70	0389	SEDIMENT-YIELD	LAND AND WATER-MANAGEMENT FOR MINIMIZING SEDIMENT KEYWORDS SOIL-EROSION SEDIMENT-YIELD
100	72	1224	SEEPAGE	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	71	1252	SEEPAGE	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
300	46	1207	SEEPAGE	FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
600	72	1156	SEEPAGE	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
100	73	1164	SEFTENBERG	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200	66	0123	SELECTION-CRITERIA	PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELEC
100	69	0714	SELENITE	EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
200	71	0640	SEPARATION	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
100	70	0270	SEPARATION-TECHNIQ	RAPID CONCENTRATION OF STRONGYLE EGGS FROM EQUINE FECES FOR IN VITRO STUDIES KEYWORDS
300	71	1100	SEPARATION-TECHNIQ	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
200	71	0859	SEPERATION	THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY KEYWORD SIEVE-ANALYSIS SEDIMEN
100	65	0331	SEPTIC-TANK	DISPOSAL OF DAIRY-MANURE KEYWORDS SEPTIC-TANK AESTHETICS EFFICIENCIES RECIRCULATED-W
100	69	0035	SEPTIC-TANK	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
200	71	0665	SEPTIC-TANK	WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
100	65	0075	SEPTIC-TANKS	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
100	65	0366	SEPTIC-TANKS	LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
200	66	0128	SEPTIC-TANKS	MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPM
200	66	0131	SEPTIC-TANKS	DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
200	69	1117	SEPTIC-TANKS	WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
300	68	0352	SEPTIC-TANKS	DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SE
300	71	0457	SEPTIC-TANKS	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
100	64	1200	SERGENTIA	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	71	1213	SERRATIA	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	71	1213	SERRATIA-MARCESENS	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
100	69	1198	SESTON	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	70	1237	SETTLEABLE-SOLIDS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	71	0640	SETTLING	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
100	71	0573	SETTLING-BASIN	METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF KEYWORDS
200	71	0703	SETTLING-BASIN	FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
200	71	0803	SETTLING-BASIN	MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
300	69	0735	SETTLING-BASIN	SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-
300	71	0700	SETTLING-BASIN	LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL KEYWORD FEED-LOTS CATTLE RUNOFF
200	71	0666	SETTLING-BASINS	PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
300	67	1253	SETTLING-BASINS	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
400	71	1174	SETTLING-BASINS	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	72	1179	SETTLING-BASINS	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
100	69	0035	SETTLING-TANK	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100	64	0345	SEWAGE	BOVINE-SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK-WATER AND HUMAN-INFECTION KEYW
100	66	0063	SEWAGE	SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100	70	1037	SEWAGE	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
200	66	0140	SEWAGE	DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
200	70	0241	SEWAGE	SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
200	70	0321	SEWAGE	WASTE-DISPOSAL AND POLLUTION, POULTRY-PROCESSING KEYWORDS RENDERING-PLANT ODORS SEWAG
200	71	0811	SEWAGE	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
200	71	1099	SEWAGE	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300	53	1206	SEWAGE	POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	69	1103	SEWAGE	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	72	1070	SEWAGE	PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
500	70	0390	SEWAGE	SIGNIFICANCE OF PHOSPHORUS IN WATER-SUPPLIES KEYWORDS NUTRIENTS FERTILIZER DETERGENTS
500	71	1072	SEWAGE	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
700	70	1046	SEWAGE-ASSESSMENTS	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
100	70	1217	SEWAGE-BACTERIA	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
200	70	1053	SEWAGE-BACTERIA	BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
200	71	0857	SEWAGE-DISPOSAL	NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
300	69	1060	SEWAGE-DISPOSAL	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	SEWAGE-DISPOSAL	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
400	68	0033	SEWAGE-DISPOSAL	IRRIGATING WITH ANIMAL WASTE KEYWORDS SPRINKLER-IRRIGATION SEWAGE-DISPOSAL EFFLUENT H
700	71	1120	SEWAGE-DISPOSAL	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
700	70	1046	SEWAGE-DISTRICTS	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
100	71	0722	SEWAGE-EFFLUENTS	THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
100	72	1193	SEWAGE-EFFLUENTS	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
300	46	1208	SEWAGE-EFFLUENTS	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	69	1060	SEWAGE-EFFLUENTS	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	SEWAGE-EFFLUENTS	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
400	67	1226	SEWAGE-EFFLUENTS	PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE
100	62	1220	SEWAGE-LAGOONS	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
600	72	1148	SEWAGE-PONDS	DAIRY WASTE PONDS EFFECTIVELY SELF SEALING KEYWORDS GROUNDWATER-POLLUTION FARM-WASTES I
300	46	1208	SEWAGE-SLUDGE	GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300	70	1084	SEWAGE-SLUDGE	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71	1081	SEWAGE-SLUDGE	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
600	72	1163	SEWAGE-SLUDGE-TREA	ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
100	68	1229	SEWAGE-TREATMENT	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	70	1230	SEWAGE-TREATMENT	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
200	71	0286	SEWAGE-TREATMENT	AGRICULTURAL-BENEFITS FROM URBAN POLLUTION-CONTROL KEYWORDS SEWAGE-TREATMENT TREATMEN
200	72	1054	SEWAGE-TREATMENT	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
300	67	1253	SEWAGE-TREATMENT	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	71	1058	SEWAGE-TREATMENT	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300	71	1098	SEWAGE-TREATMENT	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
400	70	1176	SEWAGE-TREATMENT	ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
200	70	0717	SEWER	PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT KEYWORDS BOD SEW
100	71	1214	SEWERS	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	66	0131	SEWERS	DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
200	70	0236	SEWERS	ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK
300	69	0002	SHAPE	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
600	70	0080	SHEAR-DIAGRAMS	FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
600	70	0080	SHEAR-STRENGTH	FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA

200	66	0127	SHEDS	CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST KEYWORDS CATTLE LOADING
100	64	1200	SHEEP	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
100	65	1079	SHEEP	UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
100	69	0045	SHEEP	THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES KEYWORDS INCUBATION GRA
100	69	0693	SHEEP	IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
100	72	1215	SHEEP	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	73	1088	SHEEP	OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
100	73	1155	SHEEP	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	73	1190	SHEEP	NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCUIM PHOSPHORUS AND MAGNESUIM IN SHEEP KEY
200	64	1240	SHEEP	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	66	0145	SHEEP	VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
200	66	0147	SHEEP	COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	69	1116	SHEEP	MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200	71	0796	SHEEP	DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0851	SHEEP	NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	72	1024	SHEEP	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	73	1093	SHEEP	DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
300	67	1249	SHEEP	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69	1060	SHEEP	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	SHEEP	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	0213	SHEEP	ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP KEYWORDS ANIMAL-
300	70	0384	SHEEP	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	70	1248	SHEEP	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0677	SHEEP	THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	72	1146	SHEEP	FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS KEYWORDS FARM-WASTES SHEEP FEED-LOTS PROT
400	71	0504	SHELF-LIFE	COST OF DEHYDRATING POULTRY MANURE KEYWORDS SHELF-LIFE FERTILIZERS EQUIPMENT COST DEH
100	70	0020	SHELL-EGGS	EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
400	71	1139	SHELTER	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
600	72	1154	SHELTERS	WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
100	71	1212	SHIGELLA	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
200	71	0641	SHIGELLA	BACTERIAL COUNTS OF A SECTION OF THE RED RIVER-SUMMER 1970 KEYWORDS COLIFORMS BACTERI
300	70	1104	SHIGELLA	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	65	0075	SHOCK-LOADING	HOG-WASTE-DISPOSAL BY LAGOONING KEYWORDS ODOR BOD COD E-COLI SAMPLING SEPTIC-TANKS ALGA
600	73	1075	SHRINKAGE	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
200	70	0323	SHUD	AGRICULTURE-WASTE RESEARCH-NEEDS KEYWORDS POULTRY ODOR LIQUID-HANDLING SHUD MOISTURE-
100	64	1200	SIDIDAE	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
200	71	0859	SIEVE-ANALYSIS	THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY KEYWORD SIEVE-ANALYSIS SEDIMEN
600	73	1075	SIEVE-ANALYSIS	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100	66	0341	SILAGE	AGRICULTURE AND THE PREVENTION OF RIVER-POLLUTION, AS EXPERIENCED IN THE WEST-OF-SCOTLA
100	68	0077	SILAGE	FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
100	69	0108	SILAGE	EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
200	66	0146	SILAGE	UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
200	68	0725	SILAGE	POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH THE USE OF MANURE AS FEED KEYWORDS SILAG
200	71	0806	SILAGE	COMPOSTING DAIRY COW WASTES KEYWORDS AEROBIC-BACTERIA CATTLE HAY SILAGE GRAIN ODORS C
200	73	1189	SILAGE	A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
100	65	1219	SILAGE-GAS	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
500	70	0408	SILTING	LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
100	70	1051	SILTS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	73	1069	SILTS	MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
200	69	0518	SILT-LOAM-SOIL	HEALTH-PROBLEMS KEYWORDS BACTERIA COLIFORMS ENTEROCOCCI ADSORPTION SILT-LOAM-SOIL HEA
200	69	0430	SIMULATION	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS RAINFALL-RUNOFF BOD PH SIMULATION LIQ
200	71	0705	SIMULATION-ANALYSI	A MATHEMATICAL SIMULATION OF BEEF ANIMALS-A REALITY WITH POTENTIAL KEYWORDS MATHEMATI
100	62	0499	SITE-SELECTION	MANURE LAGOONS DESIGN CRITERIA AND MANAGEMENT KEYWORDS FARM-LAGOONS DESIGN-CRITERIA SI
300	72	1003	SITE-SELECTION	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
600	72	1262	SITE-SELECTION	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
100	69	0040	SIZE	PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS-ABSTRACT KEYWORDS POULTRY
300	69	0002	SIZE	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	69	0003	SIZE	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	71	1261	SIZE	INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
100	69	0508	SKATOLE	AIR POLLUTION FROM ANIMAL WASTES,DETERMINATION OF MALODORS BY GAS CHROMATOGRAPHIC AND O
600	72	1150	SLATTED-ALLEYS	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
100	69	0035	SLATTED-FLOOR	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
200	69	0178	SLATTED-FLOOR	STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMAT
100	65	0344	SLATTED-FLOORS	THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK KEYWORDS DAIRY-CATTLE SLATTED-FLOORS OX
200	66	0125	SLATTED-FLOORS	SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS KEYWORDS DISPOSAL CONFINEMENT SLATTED-FLOORS
200	69	0188	SLATTED-FLOORS	PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
200	70	0114	SLATTED-FLOORS	SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0246	SLATTED-FLOORS	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
300	53	1206	SLAUGHTER-HOUSES	POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
600	72	1071	SLIME	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100	69	0071	SLOPE	ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	69	0353	SLOTTED-FLOOR	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	70	0012	SLOTTED-FLOOR	CONTROL OF HOUSE FLIES IN SWINE FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL K
200	66	0133	SLOTTED-FLOOR	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	68	0760	SLOTTED-FLOOR	HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
400	70	0308	SLOTTED-FLOOR	DEEP PIT SLAT-FLOOR BREEDING HOUSE KEYWORDS POULTRY FARM-WASTES SLOTTED-FLOOR VENTILA
200	70	1159	SLOTTED-FLOORS	METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	72	1152	SLOTTED-FLOORS	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
300	70	1000	SLOTTED-FLOORS	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
100	65	0263	SLUDGE	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	65	0366	SLUDGE	LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	68	0106	SLUDGE	OXIDATION DITCHES FOR WASTE DISPOSAL KEYWORDS HOGS BOD ROTORS FOAMING SLUDGE ODOR OXY
100	68	0306	SLUDGE	ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
100	68	1229	SLUDGE	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
100	69	0353	SLUDGE	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	70	0112	SLUDGE	CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
100	70	0369	SLUDGE	ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUD
100	71	0261	SLUDGE	ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUD
200	66	0135	SLUDGE	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200	66	0137	SLUDGE	PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	66	0140	SLUDGE	DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
200	70	0243	SLUDGE	MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	70	0252	SLUDGE	ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
200	70	0253	SLUDGE	TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	71	0803	SLUDGE	MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
300	69	0002	SLUDGE	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	69	0006	SLUDGE	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	70	0206	SLUDGE	POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
300	70	0475	SLUDGE	LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
500	68	1259	SLUDGE	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO

100	63	0338	SLUDGE-DIGESTION DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
200	71	0812	SLUDGE-DIGESTION PORCINE ENTEROVIRUS SURVIVAL AND ANAEROBIC SLUDGE DIGESTION KEYWORDS VIRUSES SWINE SLU
500	68	1259	SLUDGE-DIGESTION WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
300	67	1253	SLUDGE-DISPOSAL WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
500	68	1259	SLUDGE-DISPOSAL WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
200	71	1099	SLUDGE-TREATMENT SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	66	0120	SLUGGING STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
100	64	0371	SLURRIED-MANURES THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
100	65	0067	SLURRIES EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
100	68	0077	SLURRIES FARM-WASTE-DISPOSAL IN RELATION TO CATTLE KEYWORDS SILAGE EFFLUENTS SLURRIES IRRIGATI
100	69	0353	SLURRIES OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	70	0085	SLURRIES DANGEROUS GASES IN AGRICULTURE KEYWORDS SLURRIES STORAGE GASES
100	70	0089	SLURRIES TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE KEYWORDS AERATION ODOR
100	70	0112	SLURRIES CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
100	71	0266	SLURRIES CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	1214	SLURRIES THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	66	0115	SLURRIES MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0123	SLURRIES PUMPING MANURE SLURRIES KEYWORDS PUMPS SLURRIES CAPACITY EFFICIENCIES HANDLING SELEC
200	66	0128	SLURRIES MACERATION FOR DISPOSAL OF DEAD POULTRY KEYWORDS DISPOSAL LAGOONS SEPTIC-TANKS EQUIPM
200	66	0130	SLURRIES DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER KEYWORDS ODOR SLURRIES FURROWS FLIES L
200	68	1187	SLURRIES THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
200	69	0163	SLURRIES DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION
200	69	0172	SLURRIES SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD
200	69	0706	SLURRIES HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	70	0234	SLURRIES FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0237	SLURRIES THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	70	0238	SLURRIES THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	70	0244	SLURRIES MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
200	70	0245	SLURRIES MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
200	70	0247	SLURRIES BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
200	70	0248	SLURRIES PIGGERY CLEANING USING RENOVATED WASTES KEYWORDS DISPOSAL EQUIPMENT OXIDATION-DITCH F
200	70	0250	SLURRIES LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
200	70	0251	SLURRIES AEROBIC TREATMENT OF FARM WASTES. KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	70	0252	SLURRIES ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
200	70	0253	SLURRIES TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	71	0794	SLURRIES AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES KEYWORDS NITROGEN MICROF
200	71	0799	SLURRIES AGITATION IN LIQUID MANURE TANKS KEYWORDS LIQUID-WASTES PUMPS SLURRIES MODEL-STUDIES
200	71	0801	SLURRIES PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
400	64	0335	SLURRIES EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRI
400	67	0336	SLURRIES DISPOSAL OF FARM EFFLUENT KEYWORDS SALMONELLA SLURRIES DISEASE-HAZARD ANTHRAX ENGLAND
400	73	1073	SLURRIES NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
600	70	0080	SLURRIES FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
600	72	1149	SLURRIES MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
700	70	1109	SLURRIES AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	70	0578	SLURRY COLLECTION AND DISPOSAL OF FARM WASTES KEYWORDS N-IRELAND GASES SLURRY DISPOSAL
200	71	0839	SLURRY AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE KEYWORD DENITRIFICATION ACTIVATED-SLUDGE C
200	71	0840	SLURRY LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FA
200	71	0856	SLURRY GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTES KEYWORD FERTIL
200	71	0858	SLURRY RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANU
400	65	0332	SLURRY HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
400	71	0264	SLURRY HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE-DISPOSAL WASTE-DUMPS FAR
200	71	0614	SMALL-BUSINESS-ADM SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO
400	70	0579	SMART-PORK-FARM OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION KEYWORDS
200	71	0583	SMOKE AIR POLLUTION FROM AGRICULTURE KEYWORDS DUST ALLERGENS ODORS PESTICIDES SMOKE
300	70	0385	SMOKE AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	71	1126	SNAKES SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	69	0061	SNOW SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	69	1198	SNOWMELT CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
300	71	1058	SNOWMELT DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
100	71	0454	SOCIAL SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION KEYWORDS ECOLOGY SOCIAL CHANGE LEGISLATION
200	69	0516	SOCIAL-ASPECTS PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
300	70	1192	SOCIAL-ASPECTS IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	71	1107	SOCIAL-ASPECTS WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	71	0269	SODIUM INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
400	71	0293	SODIUM SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
600	72	1177	SODIUM DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
100	71	0257	SODIUM-CHLORIDE DRINKING OF SULFATE-WATER BY CATTLE KEYWORDS GROWTH-RATES SODIUM-CHLORIDE TOXICITY CA
200	71	0801	SODIUM-CHLORIDE PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES K
200	73	1082	SODIUM-CHLORIDE COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	69	0169	SODIUM-PEROXIDE INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
100	66	0063	SOIL SOIL POLLUTANTS THEIR ORIGIN AND BEHAVIOR KEYWORDS PESTICIDES SEWAGE DEGRADATION RAD
100	67	0041	SOIL THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
100	68	0307	SOIL EFFECT SOIL TEMPERATURE PHOSPHORUS MANURES
100	70	0031	SOIL VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100	70	0049	SOIL USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND AP
100	70	0417	SOIL ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100	70	0421	SOIL EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNE
100	70	0458	SOIL USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
200	70	0223	SOIL NITROGEN-TRANSFORMATIONS AND PLANT-GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATT
200	70	0237	SOIL THE PROBLEM OF DISPOSAL OF FARM WASTES WITH PARTICULAR REFERENCE TO MAINTAINING SOIL F
200	71	0787	SOIL IMPACT OF FARM ANIMAL PRODUCTION AND PROCESSING ON THE TOTAL ENVIRONMENT KEYWORDS SOI
200	72	1012	SOIL REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
300	71	0412	SOIL THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP
300	71	0466	SOIL INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
400	68	0038	SOIL PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
100	69	0061	SOILS SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	70	1233	SOILS LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	64	1240	SOILS THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69	0157	SOILS ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0523	SOILS WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN W
200	71	1095	SOILS BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1252	SOILS NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200	72	1029	SOILS CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
300	71	1058	SOILS DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
400	73	1063	SOILS AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400	73	1073	SOILS NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
500	70	0393	SOILS CHEMISTRY OF NITROGEN IN SOILS KEYWORDS NITRATES AMMONIUM FIXATION NITRITES LEACHING
500	70	0394	SOILS FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION
500	70	0400	SOILS MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOILS KEYWORDS DISPOSAL FERTIL
500	71	1254	SOILS ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS

700	70	1066	SOILS	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700	70	1256	SOILS	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
700	72	1048	SOILS	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
400	72	1032	SOIL-ANALYSIS	NEBRASKA IS NO ONE KEYWORDS FEED-LOTS CATTLE FARM-WASTES ODOR IRRIGATION LABORATORIES
200	66	0587	SOIL-BACTERIA	HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO
500	71	1254	SOIL-BACTERIA	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	69	0416	SOIL-BORNE	A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
200	66	0131	SOIL-CLOGGING	DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL KEYWORDS SEWERS SEPTIC-TANKS ABSORPTION SOI
300	69	0637	SOIL-COLUMNS	SOIL FILTRATION TO REMOVE ODORS KEYWORDS POULTRY ORGANIC-COMPOUNDS AMMONIA HYDROGEN-
400	64	0379	SOIL-CONDITIONER	A REPORT ON THREE MANURE-COMPOSTING PLANTS KEYWORDS ODOR AEROBIC-DECOMPOSITION AMMON
300		1077	SOIL-CONDITIONS	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
100	70	1195	SOIL-CONSERVATION	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
200	71	0284	SOIL-CONSERVATION	CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONS
200	72	1022	SOIL-CONSERVATION-	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
300	70	1036	SOIL-CONSERVATION	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	72	1260	SOIL-CONSERVATION-	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	69	1225	SOIL-CONSERVATION	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400	73	1158	SOIL-CONSERVATION-	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
100	66	1080	SOIL-CONTAMINATION	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
200	68	1242	SOIL-CONTAMINATION	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	69	0157	SOIL-CONTAMINATION	ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200	69	0516	SOIL-CONTAMINATION	PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200	71	1095	SOIL-CONTAMINATION	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1096	SOIL-CONTAMINATION	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200	72	1010	SOIL-CONTAMINATION	PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1011	SOIL-CONTAMINATION	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1013	SOIL-CONTAMINATION	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1020	SOIL-CONTAMINATION	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
300		1077	SOIL-CONTAMINATION	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	70	0205	SOIL-CONTAMINATION	INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DI
300	71	1008	SOIL-CONTAMINATION	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
400	69	0016	SOIL-CONTAMINATION	FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
500	71	1072	SOIL-CONTAMINATION	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	73	1065	SOIL-CONTAMINATION	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	70	1256	SOIL-CONTAMINATION	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
100	71	0318	SOIL-CORES	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
300	68	0352	SOIL-DISPOSAL	DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SE
100	70	0299	SOIL-DISPOSAL-FIEL	HYDROLOGY OF SPRAY-RUNOFF WASTEWATER TREATMENT KEYWORDS HYDROLOGY WASTE-WATER-TREATME
200	68	1242	SOIL-DISPOSAL-FIEL	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	70	0670	SOIL-DISPOSAL-FIEL	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	71	0603	SOIL-DISPOSAL-FIEL	EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
200	71	0665	SOIL-DISPOSAL-FIEL	WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
300	67	1253	SOIL-DISPOSAL-FIEL	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	70	1036	SOIL-DISPOSAL-FIEL	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
100	69	0375	SOIL-EROSION	RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
100	71	1197	SOIL-EROSION	NUTRIENT LOSSES FROM AGRICULTURAL LAND KEYWORDS EUTROPHICATION AGRICULTURAL-RUNOFF FERT
200	71	0284	SOIL-EROSION	CURRENT CONSERVANCY-LEGISLATION KEYWORDS SOIL-CONSERVATION DRAINAGE SOIL-EROSION CONS
200	71	0646	SOIL-EROSION	FARM LAND RUNOFF KEYWORDS NITROGEN-COMPOUNDS PHOSPHORUS- COMPOUNDS SOIL-EROSION RUNO
300	68	1122	SOIL-EROSION	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
400	69	1225	SOIL-EROSION	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
500	70	0387	SOIL-EROSION	POLLUTION BY SEDIMENT SOURCES AND THE DETACHMENT AND TRANSPORT-PROCESSES KEYWORDS SE
500	70	0389	SOIL-EROSION	LAND AND WATER-MANAGEMENT FOR MINIMIZING SEDIMENT KEYWORDS SOIL-EROSION SEDIMENT-YIELD
500	70	0394	SOIL-EROSION	FERTILIZER-MANAGEMENT FOR POLLUTION-CONTROL KEYWORDS NITROGEN PHOSPHORUS SOIL-EROSION
200	69	0191	SOIL-FILTER	CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
200	71	0857	SOIL-FILTER	NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL KEYWORD FARM-WASTES SOIL-FILTE
200	71	0661	SOIL-FILTRATION	ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71	0855	SOIL-FILTRATION	TREATMENT OF LIVESTOCK-LAGOON EFFLUENT BY SOIL FILTRATION KEYWORD ANAEROBIC-LAGOON-EF
300	71	0639	SOIL-FILTRATION	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
200	71	0661	SOIL-INJECTION	ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
300	69	1044	SOIL-LEACHING	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	SOIL-LEACHING	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
200	72	1021	SOIL-MANAGEMENT	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
100	70	1037	SOIL-MICROORGANISM	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
500	71	1254	SOIL-MICROORGANISM	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	71	1236	SOIL-MOISTURE	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
200	69	0191	SOIL-MOISTURE	CHEMICAL ASPECTS OF ODOR REMOVAL IN SOME SOIL SYSTEMS KEYWORDS HYDROGEN-SULFIDE SOIL-
300	69	1044	SOIL-NITROGEN	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	SOIL-NITROGEN	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
200	71	0810	SOIL-OXYGEN-DEMAND	WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD
300	69	1044	SOIL-PHOSPHORUS	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	SOIL-PHOSPHORUS	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
200	68	1242	SOIL-PHYSICAL-PROP	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
300	68	1122	SOIL-POROSITY	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL.
100	73	1069	SOIL-PROFILES	MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
200	72	1013	SOIL-PROFILES	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
300		1077	SOIL-PROFILES	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	69	1044	SOIL-PROFILES	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	SOIL-PROFILES	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
500	71	1072	SOIL-PROFILES	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
200	71	0605	SOIL-PROPERTIES	CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
300	72	1052	SOIL-PROPERTIES	EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
400	70	0070	SOIL-PROPERTIES	SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
600	72	1177	SOIL-PROPERTIES	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
400	69	1225	SOIL-RUNOFF	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
100	65	0377	SOIL-STRUCTURE	EFFECTS OF ORGANIC-MANURES ON SOILS AND CROPS KEYWORDS ORGANIC-MATTER FERTILIZERS SOI
400	70	0070	SOIL-SURVEYS	SOIL AS AN ANIMAL-WASTE DISPOSAL-MEDIUM KEYWORDS N P K SOIL-PROPERTIES SOIL-SURVEYS F
200	70	0217	SOIL-TESTS	POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200	71	0826	SOIL-TESTS	CROP PRODUCTION AND SOIL ANALYSIS AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE
300	70	0207	SOIL-TESTS	THE EFFECT OF APPLICATION-RATE OF CHICKEN MANURE ON THE YIELD OF CORN KEYWORDS CHEMIC
300	71	0732	SOIL-TREATMENT	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
200	66	0587	SOIL-TYPES	HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO
200	69	0201	SOIL-TYPES	ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE KEYWORDS F
200	70	0215	SOIL-WATER	MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL KEYWORDS SOIL-WATER LYSIMETER PLOW-
200	71	1252	SOIL-WATER	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
100	71	1236	SOIL-WATER-MOVEMEN	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100	72	1224	SOIL-WATER-MOVEMEN	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
300	71	1126	SOIL-WATER-PLANT-R	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	71	0824	SOLID	AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
100	64	0474	SOLIDS	PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
100	65	0066	SOLIDS	THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR

100	68	0500	SOLIDS ANAEROBIC LAGOONS CONSIDERATIONS IN DESIGN AND APPLICATION KEYWORDS FARM-LAGOONS ANAER
100	70	1195	SOLIDS AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	71	0261	SOLIDS ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUD
200	66	0134	SOLIDS OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
300	69	0002	SOLIDS SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	72	1085	SOLIDS CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
600	73	1075	SOLIDS THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
200	69	0180	SOLIDSDISPOSAL FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
300	71	1245	SOLIDS-CONCENTRATI EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
100	64	0371	SOLIDS-PERCENT THIN-SPREADING OF SLURRIED-MANURES KEYWORDS DRYING LAYERS MOISTURE-CONTENT SOLIDS-PER
100	72	1129	SOLIDS-REMOVAL-SYS BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
600	72	1150	SOLID-ALLEYS OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
200	70	1159	SOLID-FLOORS-WITH- METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200	66	0143	SOLID-FUELS DESTRUCTION OF CHICKEN MANURE BY INCINERATION KEYWORDS POULTRY HEAT-BALANCE SOLID-FUEL
400	68	0038	SOLID-WASTE PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
100	70	1051	SOLID-WASTES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	71	0688	SOLID-WASTES CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE KEYWORD FEED BIOCHEMICAL
100	70	1237	SOLID-WASTES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	68	1186	SOLID-WASTES TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200	71	0657	SOLID-WASTES SOLIDS DESTRUCTION OR SEVERE TREATMENT KEYWORDS INCINERATION SOLID-WASTES CHEMICAL-DE
200	71	0733	SOLID-WASTES ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0786	SOLID-WASTES THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCI
200	71	1099	SOLID-WASTES SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200	73	1082	SOLID-WASTES COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	SOLID-WASTES CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	68	1123	SOLID-WASTES A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	70	0010	SOLID-WASTES THE EFFECT OF ANIMAL-DENSITY AND SURFACE-SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID-WAST
300	70	1247	SOLID-WASTES DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	70	1248	SOLID-WASTES LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0457	SOLID-WASTES DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300	71	0732	SOLID-WASTES CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
300	71	0744	SOLID-WASTES ANIMAL SLAUGHTERING AND PROCESSING KEYWORDS REGULATIONS BY-PRODUCTS SOLID-WASTES INDU
300	71	1081	SOLID-WASTES CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
600	72	1156	SOLID-WASTES SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	73	1147	SOLID-WASTES SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
100	70	1233	SOLUBILITY LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	72	1188	SOLUBILITY IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
100	73	1155	SOLUBLE-MUCINS THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
100	70	1040	SOLUBLE-ORGANIC-SO STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	71	1038	SOLUTES CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100	71	1236	SOLUTES MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
700	70	1256	SOLUTIONS MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
300	71	1081	SOLVENTS CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
100	72	1215	SOLVENT-EXTRACTION AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
700	71	1120	SOMERSET-COUNTY SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
100	70	1111	SONBIRDS POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300	70	0475	SORGHUM LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS KEYWORDS IRRIGATI
100	64	0072	SORGUUM A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
200	68	1242	SORPTION THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	71	1252	SORPTION NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200	69	0432	SOURCE AGRICULTURE AS A SOURCE OF WATER POLLUTION KEYWORDS LEGISLATION SEDIMENT CHEMICALS LI
100	67	0079	SOURCES SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES KEYWORDS DISTRIBUTION FERTILIZERS
100	67	1218	SOURCES FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100	68	0011	SOURCES THE SEARCH FOR NEW POULTRY LITTER MATERIALS-AN EXAMPLE OF COOPERATION BETWEEN EXTENSION
100	69	1042	SOURCES THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
100	69	1231	SOURCES POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	0024	SOURCES PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM KEYWORDS INVESTIGATIONS ANIMALS RODEN
100	70	0417	SOURCES ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
100	70	1051	SOURCES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	70	1237	SOURCES POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	69	1117	SOURCES WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200	70	0240	SOURCES WATER POLLUTION PREVENTION,REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
200	70	1118	SOURCES WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
300		1105	SOURCES RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	30	1205	SOURCES SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	53	1206	SOURCES POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1043	SOURCES WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300	68	1122	SOURCES NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS-WASTES FERTIL
300	68	1202	SOURCES OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	69	1060	SOURCES FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1061	SOURCES RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	69	1203	SOURCES FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	1036	SOURCES AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	70	1201	SOURCES OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
500	70	0396	SOURCES THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATION
200	69	0552	SOUTH STATUS,PLANS,& NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DA
200	70	0054	SOUTH POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA KEYWORDS LAGOONS
300	71	1126	SOUTHEAST-US SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	71	0779	SOUTHERN-HIGH-PLAI EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200	71	0779	SOUTHWEST EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
600	70	0255	SOUTHWESTERN EFFECTS OF MANURE-DEPTHS ON RUNOFF FROM SOUTHWESTERN CATTLE-FEEDLUTS KEYWORDS RAINFAL
200	64	0750	SOUTH-DAKOTA LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA KEYWORD ANAEROBIC AEROBIC POULTRY CONFI
400	70	0092	SOUTH-DAKOTA SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
300	67	1250	SOUTH-PLATTE-VALLE DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300	70	1000	SOW-CONFINEMENT EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
100	65	1079	SOYBEAN-PROTEIN UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP KEYWORDS
200	73	1093	SOYGEAN-OIL-MEAL DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP KEYWORDS
100	70	0014	SPACE INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GA
300	69	0001	SPACE-REQUIREMENTS SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	0004	SPACING CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
200	69	0523	SPATIAL-DISTRIBUTI WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN W
200	69	0756	SPECIFICATIONS SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
400	70	0357	SPECIFICATIONS FROM THE ALS MECHANICAL-CLEANING OF COWSHEDS KEYWORDS DAIRY-CATTLE AGE COSTS SPECIFIC
100	70	1111	SPECTROPHOTOMETRY POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
200	72	1013	SPECTROSCOPY POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
500	71	1254	SPHAEROPHORUS ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
500	71	1254	SPIROCHAETES ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	72	1215	SPLEEN AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
200	64	1240	SPORES THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	69	1231	SPORT-FISHING POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS

200	68	1187	SPRAYING	THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE KEYWORDS FARM-WASTES MANAGEMENT FARM-MANAGE
400	70	0022	SPRAY-AERATION	SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY
100	71	0721	SPREADERS	HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN KEYWORD FERTILIZER ODOR RUNOF
300	65	0053	SPREADERS	FARMYARD MANURE HANDLING KEYWORDS DISPOSAL EQUIPMENT OPERATIONS MACHINERY LOADERS SCR
200	70	0220	SPREADING	THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
300	30	1205	SPRINGS	SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	69	1044	SPRING-THAWS	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	SPRING-THAWS	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	30	1205	SPRING-WATERS	SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
100	65	0067	SPRINKLER-IRRIGATI	EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM KEYWORDS SLURRIES SPRINKLER-IRRIGATION PUMPI
100	68	0730	SPRINKLER-IRRIGATI	AGRICULTURE S EFFECT ON NITRATE POLLUTION OF GROUNDWATER KEYWORD FERTILIZER FEED-LOTS
200	67	0734	SPRINKLER-IRRIGATI	CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200	69	0176	SPRINKLER-IRRIGATI	DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION KEYWORDS BOD COD OX
200	70	0221	SPRINKLER-IRRIGATI	LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
200	70	0498	SPRINKLER-IRRIGATI	WATER POLLUTION CONTROL IN CATTLE FEEDLOTS KEYWORD RUNOFF ECONOMICS FERTILIZER NUTRIE
200	70	0755	SPRINKLER-IRRIGATI	FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	70	1114	SPRINKLER-IRRIGATI	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	71	0774	SPRINKLER-IRRIGATI	MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200	71	0777	SPRINKLER-IRRIGATI	FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE KEYWORDS ODOR DUST NITROGEN LAGOON EVAP
200	71	0782	SPRINKLER-IRRIGATI	MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE KEYWORDS SPRINKLER-IRRIGAT
200	71	0784	MPRINKLER-IRRIGATI	A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM KEYWORDS CATTLE SPRINKLER-IRRIGATION CONFINE
200	71	0841	SPRINKLER-IRRIGATI	SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRI
200	71	0854	SPRINKLER-IRRIGATI	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORD FERTILIZERS NUTRIENT-REMO
300	69	0300	SPRINKLER-IRRIGATI	WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE KEYWOR
300	71	0457	SPRINKLER-IRRIGATI	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
400	64	0335	SPRINKLER-IRRIGATI	EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRI
400	68	0032	SPRINKLER-IRRIGATI	NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
400	68	0033	SPRINKLER-IRRIGATI	IRRIGATING WITH ANIMAL WASTE KEYWORDS SPRINKLER-IRRIGATION SEWAGE-DISPOSAL EFFLUENT H
400	69	0039	SPRINKLER-IRRIGATI	LABOR FREE MANURE DISPOSAL KEYWORDS FLOATING-AERATOR ODOR LAGOON AEROBIC-BACTERIA SPRI
700	72	1048	SPRINKLER-IRRIGATI	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200	66	0124	SPRINKLING	ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER KEYWORDS SPRINKLING DI
600	72	1074	SPRINKLING	SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
100	63	0338	STABILIZATION	DIGESTION-TESTS OF LIVESTOCK-WASTES KEYWORDS BOD COD CATTLE POULTRY SLUDGE-DIGESTION
100	65	0263	STABILIZATION	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	66	0478	STABILIZATION	LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
100	67	0233	STABILIZATION	EFFLUENT-QUALITY FROM ANAEROBIC-LAGOONS TREATING FEEDLOT-WASTES KEYWORDS KANSAS LAGOO
100	68	0044	STABILIZATION	THE DIGESTION OF POULTRY FECES UNDER CAGES-ABSTRACT KEYWORDS ODOR AEROBIC-CONDITIONS
100	70	1040	STABILIZATION	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
200	69	0708	STABILIZATION	TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
300	70	1192	STABILIZATION	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
500	68	1259	STABILIZATION	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
400	70	0268	STACKING	MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL UTIMATE-DISPOSAL WASTE-STORAGE F
600	72	1150	STACKING-SYSTEM	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
100	64	0343	STAGNANT-WATER	BOVINE-SALMONELLOSIS IN A FEEDLOT OPERATION KEYWORDS MUD ANTIBIOTICS STAGNANT-WATER
600	72	1150	STALL-BARN	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
100	67	1218	STANDARDS	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
200	69	0160	STANDARDS	EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES
200	71	0274	STANDARDS	WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
200	71	0283	STANDARDS	ECONOMICS OF POLLUTION-CONTROL KEYWORDS STANDARDS GOALS ENVIRONMENTAL-QUALITY COSTS B
200	71	0483	STANDARDS	HOW CAN PORK-PRODUCERS COMPLY WITH ENVIRONMENTAL QUALITY-STANDARDS KEYWORDS WATER-QUA
200	71	0598	STANDARDS	MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL KEYWORDS LEGAL-ASPECTS STANDARDS REGULATI
200	71	0789	STANDARDS	ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS
300		1105	STANDARDS	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	67	1249	STANDARDS	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69	1103	STANDARDS	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	71	0752	STANDARDS	ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES
500	70	0404	STANDARDS	MOVEMENT OF AGRICULTURAL-POLLUTANTS WITH GROUNDWATER KEYWORDS WATER-POLLUTION ZONE-OF-
500	70	0411	STANDARDS	ACCOMPLISHMENTS AND GOALS KEYWORDS WATER-POLLUTION WATER-QUALITY FWPCA STANDARDS ENVI
100	71	1221	STANNOUS-CHLORIDE	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	71	1213	STAPHYLOCOCCUS	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
300	70	1104	STAPHYLOCOCCUS	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	71	1213	STAPHYLOCOCCUS-AUR	A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	64	1241	STARCH	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
300	71	0584	STATES-OF-UNITED-S	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
200	70	1050	STATE-GOVERNMENTS	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200	71	0765	STATE-GOVERNMENTS	ROLE OF STATE DEPARTMENTS OF AGRICULTURAL IN PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWO
200	71	0767	STATE-GOVERNMENTS	PUTTING IT ALL TOGETHER KEYWORDS FEDERAL-GOVERNMENTS STATE-GOVERNMENTS BUDGETING DESI
300	67	1249	STATE-GOVERNMENTS	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69	1061	STATE-GOVERNMENTS	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	71	0301	STATE-GOVERNMENT	STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS KEYWORDS REGULATION FEDE
300	67	1249	STATE-JURISDICTION	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
200	71	0593	STATE-LEGISLATION	ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL
200	71	0596	STATE-OFFICIAL	SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
100	70	1041	STATISTICAL-METHOD	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	71	1039	STATISTICAL-METHOD	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
200	64	1240	STATISTICAL-METHOD	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	71	0593	STATUTES	ANIMAL WASTE MANAGEMENT KEYWORDS STATUTES LAWS LEGISLATION CATTLE LAGOON STATE-LEGISL
200	71	0595	STATUTES	ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT KEYWORDS ODORS STATUTES LAWS REGULATION E
200	71	0597	STATUTES	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN ANDMANAGEMENT KEYWORDS RUNOF
200	71	0599	STATUTES	THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0600	STATUTES	STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS REGULATION STATUTES
200	71	0601	STATUTES	PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA KEYWORDS REGULA
300	71	0584	STATUTES	STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT DECEMBER 1970 K
100	63	1064	STAUFFER-R-1504	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
300	70	1084	STEAM	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
600	72	1156	STEAM-DISTILLATION	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
100	69	0108	STEER	EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA KEYWORDS SI
100	71	0462	STEERS	NUTRIENT DIGESTIBILITY USING FECAL COLLECTION APPARATUS AND INDICATOR METHOD FOR STEERS
200	66	0146	STEERS	UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS KEYWORDS CATTLE SILAGE NUTRIENTS MAN
200	70	0242	STERILIZATION	MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
600	72	1076	STERILIZATION	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
100	67	0104	STIRRED-TANK-INJEC	MODELING FEEDLOT RUNOFF POLLUTION KEYWORDS COD DISCHARGE HYDROGRAPHS CONCENTRATION S
400	70	0111	STIRRING	UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS KEYWORDS POULTRY COSTS ECONOMICS
100	70	0031	STOCKING-RATECATTL	VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
300	68	1123	STOCK-WATER	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	68	1209	STOCK-WATER	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
100	60	0059	STORAGE	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
100	65	0366	STORAGE	LIQUID HANDLING OF POULTRY MANURE KEYWORDS SLUDGE ODOR DISPOSAL DESIGN-CRITERIA RECYC
100	68	0287	STORAGE	METHODS FOR DISPOSAL OF POULTRY MANURE KEYWORDS NEW ZEALAND IRRIGATION DRYING STORAGE
100	68	0337	STORAGE	A REVIEW OF POULTRY-WASTE-DISPOSAL POSSIBILITIES KEYWORDS BOD N P K MOISTURE-CONTENT

100	70	0020	STORAGE — EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DU
100	70	0083	STORAGE — BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BE
100	70	0085	STORAGE — DANGEROUS GASES IN AGRICULTURE KEYWORDS SLURRIES STORAGE GASES
100	70	0458	STORAGE — USE OF SOIL TO TREAT ANAERCBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
100	71	0472	STORAGE — A YEAR IN THE LIFE OF A SLURRY COMPOUND KEYWORDS STORAGE BRITAIN
100	71	0683	STORAGE — ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
200	66	0115	STORAGE — MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0120	STORAGE — STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA
200	66	0152	STORAGE — ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	69	0167	STORAGE — AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
200	69	0185	STORAGE — WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
200	69	0187	STORAGE — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	69	0188	STORAGE — PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN NORTHERN EUROPE KEYWORDS
200	69	0423	STORAGE — 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200	69	0706	STORAGE — HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	70	0246	STORAGE — BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
200	70	0247	STORAGE — BUILDING DESIGN AND MANURE DISPOSAL KEYWORDS STORAGE SLURRIES DISPOSAL DESIGN-CRITERI
200	70	0249	STORAGE — LAND DISPOSAL AND STORAGE CF FARM WASTES 1 PLANNING AND CHOICE OF SYSTEM KEYWORDS EF
200	70	0250	STORAGE — LAND DISPOSAL AND STORAGE OF FARM WASTES 2 HANDLING AND DISTRIBUTION KEYWORDS EQUIPM
200	71	0769	STORAGE — A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
200	71	0835	STORAGE — AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILAT
300	69	0006	STORAGE — SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	69	0062	STORAGE — MANAGEMENT OF CATTLE FEEDLOT WASTES KEYWORDS CONFINEMENT-PENS DISPOSAL LAGOONS RUNOFF
400	71	0297	STORAGE — BROODER-GROW CAGES OVER DEEP PIT KEYWORDS POULTRY FARM-WASTES VENTILATION PIT STORAGE
400	71	0311	STORAGE — WHY STIRRING MANURE REDUCES ODORS KEYWORDS AEROBIC ANAEROBIC STORAGE ODORS HANDLING
500	70	0403	STORAGE — ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
600	73	1147	STORAGE — SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
100	69	0030	STORAGE-CAPACITY — TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
200	66	0151	STORAGE-CAPACITY — ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	70	0114	STORAGE-CAPACITY — SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200	70	0220	STORAGE-CAPACITY — THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
300	69	0007	STORAGE-PIT — SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
100	70	0685	STORAGE-PITS — GASES AND ODORS FROM STORED SWINE WASTES AMMONIA MANURE METHANE CARBON-DIOXIDE HYDROGEN
100	69	0058	STORAGE-TANKS — REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES KEYWORDS RECIRCULATED-WATER STORA
100	71	0266	STORAGE-TANKS — CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
200	69	0524	STORAGE-TANKS — CONSIDERATIONS IN SELECTING DAIRY MANURE-DISPOSAL SYSTEMS KEYWORDS LABOR ANNUAL-COST I
200	69	0706	STORAGE-TANKS — HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	70	0220	STORAGE-TANKS — THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
400	64	0335	STORAGE-TANKS — EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS KEYWORDS SLURRIES STORAGE-TANKS SPRI
400	65	0332	STORAGE-TANKS — HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
400	71	0262	STORAGE-WASTE — WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE-DISPOSAL CATTLE-WASTE STORAGE-WAS
100	70	0026	STRAINS — A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULT
400	70	0109	STRAINS — SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS
100	62	0292	STREAM — AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION KEYWORDS RUNOFF BOD DISEASE LAND DRAIN
300	69	0093	STREAM — HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
100	69	1231	STREAMFLOW — POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
300	71	1058	STREAMFLOW — DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
100	69	1198	STREAMS — CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	71	1212	STREAMS — EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
300		1105	STREAMS — RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	26	1204	STREAMS — OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	30	1205	STREAMS — SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	53	1206	STREAMS — POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1202	STREAMS — OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	69	1060	STREAMS — FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300	69	1203	STREAMS — FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	1192	STREAMS — IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	71	1126	STREAMS — SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
700	70	1066	STREAMS — WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
100	69	1198	STREAM-CONCOURSE — CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	67	1218	STREAM-CONDITIONS — FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100	69	0375	STREAM-POLLUTION — RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
200	71	0807	STREAM-POLLUTION — QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
300	68	0352	STREAM-POLLUTION — DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SE
100	70	1217	STREPTOCOCCUS — APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	71	0484	STREPTOCOCCUS — RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
100	71	1213	STREPTOCOCCUS — A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS KEYWORDS PATHOGENIC-BACTERIA ENTERIC-
200	64	1241	STREPTOCOCCUS — PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
200	66	1112	STREPTOCOCCUS — CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	71	0796	STREPTOCOCCUS — DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE O
200	71	0825	STREPTOCOCCUS — MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE KEYWORDS OXYGEN-DEMAND SAL
300	67	0701	STREPTOCOCCUS — WATER POLLUTION AND AGRICULTURE KEYWORDS RUNOFF RAINFALL BACTERIA BOD COLIFORM FISHK
300	68	0702	STREPTOCOCCUS — BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
300	72	1085	STREPTOCOCCUS — CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
700	70	0231	STREPTOCOCCUS — THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
200	70	1053	STREPTOCOCCUS-BOVI — BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
200	70	1053	STREPTOCOCCUS-FAEC — BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
100	70	0027	STRESS — EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID
200	71	0840	STROAGE — LOW-VOLUME, SURFACE-LAYER, AERATION-CONDITIONED MANURE STORAGE KEYWORD ODOR CATTLE FA
200	69	0706	STRUCTURAL-DESIGN — HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	69	0166	STUDIES — ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS KEYWORDS EQUATION
100	69	0416	STUDY — A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
600	68	0471	SUBLIMATION — ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION KEYWORDS
200	69	1167	SUBSIDY — AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
100	70	1233	SUBSOIL — LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
200	70	0755	SUBSURFACE-DRAINS — FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
100	72	1224	SUBSURFACE-WATERS — FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
500	68	1259	SUBSURFACE-WATERS — WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
100	73	1184	SUBTROPICAL-ENVIRO — ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
100	72	1224	SUB-SURFACE-DRAINA — FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
300	71	1081	SUCROSE — CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	69	0431	SUGAR-BEETS — MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES KEYWORDS EROSION
300	69	0735	SULFATE — SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-
300	72	1170	SULFATES — POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
200	66	0587	SULFER-BACTERIA — HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS KEYWORDS DEGRADATIO
100	69	0310	SULFIDE — IMPROVEMENT IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION KEYW
300	69	0632	SULFIDE — QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE KEYWORDS GAS-CHROMATO
100	69	0096	SULFIDES — IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
200	71	0792	SULFUR — CHROMATOGRAPHIC IDENTIFICATION OF MALODORS FROM DAIRY ANIMAL WASTE KEYWORDS CHROMATOG
200	71	0810	SULFUR — WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD

300	70	1084	SULFUR	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
100	71	1221	SULFURIC-ACID	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	71	0443	SULFUR-BACTERIA	SULFUR BACTERIA IN RED LAGOONS KEYWORDS ODOR SULFUR-BACTERIA LAGOONS
200	69	0190	SULFUR-BACTERIA	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
500	71	1254	SULFUR-BACTERIA	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	69	0508	SULFUR-COMPOUNDS	AIR POLLUTION FROM ANIMAL WASTES,DETERMINATION OF MALODORS BY GAS CHROMATOGRAPHIC AND O
300	69	0634	SULFUR-DIOXIDE	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
400	73	1158	SUMPS	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
600	69	1239	SUMPS	DRAIN INSTALLATION FOR NITRATE REDUCTION KEYWORDS CALIFORNIA DRAINS INSTALLATION NITRAT
200	69	0482	SUPPLEMENTAL-IRRIG	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
300	70	1201	SURFACE	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
100	69	0071	SURFACES	ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION KEYWORDS RUNOFF PRECI
100	70	0372	SURFACE-DRAINAGE	DRAINAGE AND POLLUTION FROM BEEF CATTLE-FEEDLOTS KEYWORDS RUNOFF SURFACE-DRAINAGE GRO
100	69	1198	SURFACE-RUNOFF	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	72	1224	SURFACE-RUNOFF	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
200	66	1112	SURFACE-RUNOFF	CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200	69	0531	SURFACE-RUNOFF	TECHNICAL-ASSISTANCE AVAILABLE FROM THE SOIL-CONSERVATION SERVICE KEYWORDS SCS SURFAC
200	71	0642	SURFACE-RUNOFF	AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
200	71	0649	SURFACE-RUNOFF	LAND DISPOSAL OF MANURE IN RELATION TO WATER QUALITY KEYWORDS FERTILIZATION SURFACE-R
340	68	1209	SURFACE-RUNOFF	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	1044	SURFACE-RUNOFF	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	SURFACE-RUNOFF	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	70	1201	SURFACE-RUNOFF	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
600	69	1160	SURFACE-RUNOFF	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
700	71	1120	SURFACE-RUNOFF	SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
200	69	0182	SURFACE-STORAGE	CATTLE FEEDLOT WATER QUALITY HYDROLOGY KEYWORDS HYDROGRAPHS RAINFALL-SIMULATORS INTEN
100	69	0103	SURFACE-WATER	NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE F
400	64	0358	SURFACE-WATER	TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
500	70	0392	SURFACE-WATER	SOURCES-OF-NITROGEN IN WATER-SUPPLIES KEYWORDS NITRATES GROUNDWATER SURFACE-WATER INF
100	69	1198	SURFACE-WATERS	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
200	69	0696	SURFACE-WATERS	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	70	1118	SURFACE-WATERS	WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200	71	1094	SURFACE-WATERS	AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1095	SURFACE-WATERS	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200	71	1252	SURFACE-WATERS	NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200	72	1013	SURFACE-WATERS	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1019	SURFACE-WATERS	PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT KEYWORDS
300	69	1103	SURFACE-WATERS	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	70	1201	SURFACE-WATERS	OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
400	71	1196	SURFACE-WATERS	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
700	70	1066	SURFACE-WATERS	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
100	69	0690	SURGICAL-MODIFICAT	AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE FECES AND EXPIRATORY GASES FROM T
400	70	0357	SURVEY	FROM THE ALS MECHANICAL-CLEANING OF COWSHEDS KEYWORDS DAIRY-CATTLE AGE COSTS SPECIFIC
100	70	1041	SURVEYS	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
200	70	0326	SURVEYS	AGRICULTURAL-WASTE RESEARCH-NEEDS KEYWORDS ENVIRONMENT ODOR WASTE-HANDLING SURVEYS RE
100	70	1233	SUSPENDED-LOAD	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	70	1237	SUSPENDED-LOAD	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
400	71	0686	SUSPENDED-SOLIDS	NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF KEYWORDS CATTLE WASTE-TREATMENT SUSPEN
100	72	1215	SUSPENSION	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
300	49	1210	SWIMMING	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
100	60	1078	SWINE	EXCRETION STUDIES IN SWINE FED ARSANILIC ACID KEYWORDS ARSENIC FARM-WASTES SWINE DIETS
100	65	0346	SWINE	LAGOONS FOR LIVESTOCK MANURE KEYWORDS POULTRY DAIRY SWINE BOD ANAEROBIC-DIGESTION INF
100	66	0478	SWINE	LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
100	69	0096	SWINE	IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE KEYWORDS ODOR ORGA
100	69	0361	SWINE	NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE KEYWORDS FEED-VALUE SWINE AEROBIC-TREATMENT
100	70	0027	SWINE	EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID
100	70	0064	SWINE	URINARY CREATININE AS AN INDEX COMPOUND FOR ESTIMATING RATE OF STEROIDS IN THE DOMESTIC
100	70	0362	SWINE	DISTRIBUTION OF BACTERIA IN FECES OF SWINE KEYWORDS MICROORGANISMS PATTERNS SWINE
100	70	0369	SWINE	ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT KEYWORDS LABORATORY-TESTS,TEMPERATURE SLUD
100	71	0683	SWINE	ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
100	71	0751	SWINE	ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
200	66	0115	SWINE	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0133	SWINE	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	66	0137	SWINE	PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	66	0138	SWINE	DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	66	0147	SWINE	COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS KEYWORDS POULTRY CATTLE CATFISH
200	66	0151	SWINE	ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS KEYWOR
200	66	0155	SWINE	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
200	66	0156	SWINE	BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
200	69	0074	SWINE	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0164	SWINE	SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION KEYWORDS ANAEROBIC-DIGESTION B
200	69	0177	SWINE	FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0425	SWINE	ANIMAL WASTES - A MAJOR POLLUTION PROBLEM KEYWORDS BOD COD HOGS SWINE DISPOSAL RUNOFF
200	69	0696	SWINE	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	69	0708	SWINE	TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
200	70	0244	SWINE	MINIMIZING THE WASTE PROBLEM WITH PIGS KEYWORDS SLURRIES SWINE ODOR CONFINEMENT-PENS
200	70	0251	SWINE	AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	70	0670	SWINE	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200	70	0737	SWINE	REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICA
200	71	0607	SWINE	SWINE WASTE MANAGEMENT KEYWORDS RUNOFF IRRIGATION-PRACTICES FIELD-SPREADING CONFINEME
200	71	0762	SWINE	LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT KEYWORDS ODORS ECONOMICS DRYING RU
200	71	0768	SWINE	SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0788	SWINE	LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200	71	0790	SWINE	IDENTIFICATION OF CARBONYL COMPOUNDS IN A SWINE-BUILDING ATMOSPHERE KEYWORDS ODOR ORG
200	71	0803	SWINE	MANURE MANAGEMENT IN A 700 HEAD SWINE FINISHING BUILDING TWO APPROACHES USING RENOVATE
200	71	0804	SWINE	IMPROVING WATER UTILIZATION EFFICIENCY IN AUTOMATIC HYDRAULIC WASTE REMOVAL KEYWORDS
200	71	0811	SWINE	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
200	71	0812	SWINE	PORCINE ENTEROVIRUS SURVIVAL AND ANAEROBIC SLUDGE DIGESTION KEYWORDS VIRUSES SWINE SLU
200	71	0814	SWINE	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
200	71	0818	SWINE	THE ECONOMICS OF SWINE WASTE DISPOSAL KEYWORDS COSTS ECONOMIC-FEASIBILITY AEROBIC-TRE
200	71	0825	SWINE	MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE KEYWORDS OXYGEN-DEMAND SAL
200	71	0837	SWINE	AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS K
200	72	1089	SWINE	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300	65	0757	SWINE	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	68	0352	SWINE	DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION KEYWORDS SE
300	68	0749	SWINE	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	69	0001	SWINE	SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW KEYWORDS CONFINEMENT-PENS AEROBI
300	69	0002	SWINE	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	69	0003	SWINE	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	69	0004	SWINE	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C

KEYWORD INDEX

300	69	0005	SWINE WASTE MANAGEMENT-PROPERTIES OF SWINE WASTES-FACT SHEET KEYWORDS PHYSICAL-CHEMIC
300	69	0006	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
300	69	0007	SWINE WASTE MANAGEMENT-GASES FROM STORED SWINE WASTES-FACT SHEET KEYWORDS ODORS CARBO
300	70	0384	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	71	0677	THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	0692	EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS KEYWORDS CATTLE FEEDLOTS M
300	71	1098	BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
600	71	0494	A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
700	68	0330	CONFINED SWINE MANURE DISPOSAL KEYWORDS OXIDATION-DITCH ROTOR-DESIGN OXYGEN-TRANSFER
700	70	0231	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
700	70	1066	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
100	70	0685	GASES AND ODORS FROM STORED SWINE WASTES AMMONIA MANURE METHANE CARBON-DIOXIDE HYDROGEN
100	69	0095	BIO-OXIDATION OF SWINE-WASTE BY THE ACTIVATED-SLUDGE PROCESS KEYWORDS MODEL-STUDIES AN
400	65	1142	WASTE CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS KEYWORDS VENTILATION SWINE-
700	72	1048	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
100	70	0418	ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
600	72	1002	USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS KEYWORDS AIR-POLLUTION ODOR REGULA
100	69	0416	A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
100	70	0458	USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT DESIGN AND OPERATION OF A FIELD DISPOSA
200	71	0663	INTEGRATION OF COMPONENTS INTO A SYSTEM KEYWORDS WATER-QUALITY-ACT FERTILIZERS DISPOS
200	71	0772	A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD
400	70	0022	SIMPLE SYSTEM FOR AERATING MANURE LAGOONS KEYWORDS POULTRY AEROBIC-TREATMENT ODOR SPRAY
100	71	0683	ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
100	71	0758	HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE KEYWORDS CHARACTERISTICS LAND ANAEROBIC
200	66	0115	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	71	0612	PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTE
200	71	0615	FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OFIRRIGATION SYSTEMS KEYWORD
200	71	0768	SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES A TECHNICAL AND ECONOMICAL REVIEW KEY
200	71	0833	EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING KEYWORDS FERTILIZATION CRO
300	69	0631	ODORS, GASES, AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS TH
300	71	0704	PLANNING ANIMAL WASTE DISPOSAL SYSTEMS KEYWORDS REGULATION ECONOMICS GOVERNMENT-AGENC
300	71	0732	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
100	71	1228	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
600	72	1153	MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS KEYWORDS
400	65	0332	HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
100	64	1200	PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE
1 0	70	1237	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	71	0274	WHAT DO WE MEAN BY POLLUTION KEYWORDS ENVIRONMENT-QUALITY STANDARDS TAXATION PRICING
200	70	1050	THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
400	71	1196	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
700	70	1046	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
200	64	1240	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
100	73	1155	THE FATE OF SOLUBLE MUCIN IN THE GASTRO INTESTINAL TRACT OF SHEEP KEYWORDS
200	66	0145	VALUE OF BROILER LITTER AS FEED FOR RUMINANTS KEYWORDS SHEEP CATTLE FEEDS NUTRITIVE-VA
300	71	1246	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
200	66	0153	POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
200	69	0199	RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
200	69	0203	WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS KEYWORDS TECHNOLOGY ODOR GOVT COMMUNICAT
200	69	0537	WHERE DO WE GO FROM HERE KEYWORDS ENVIRONMENT TECHNOLOGY EDUCATION
200	71	0618	COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION KEYWORDS COMMUNICATION TECHNOLOGY POLIT
200	71	0766	RESPONSIBILITIES OF A PROFESSIONAL SOCIETY TOWARD URGENT SOCIAL PROBLEMS KEYWORDS TEC
200	71	1094	AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200	71	1096	ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
100	65	0503	THE MICROBIOLOGY OF BUILT UP POULTRY MANURE KEYWORDS PH BACTERIA ALKALINITY LABORATOR
100	65	0699	THE MICROBIOLOGY OF BUILT UP POULTRY LITTER KEYWORDS MICROBIOLOGY BACTERIA FARM-WASTES
100	67	0501	INVESTIGATIONS ON FLY-CONTROL BY COMPOSTING POULTRY-MANURES KEYWORDS TEMPERATURE DEGRA
100	68	0307	EFFECT SOIL TEMPERATURE PHOSPHORUS MANURES
100	69	0364	LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA KEYWORDS FREEZE-DRYING TEMPER
100	70	0094	THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES
100	70	1230	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	0695	CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS KEYWORD CONFI
100	73	1087	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	70	1237	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	66	0138	DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
200	68	0760	HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
200	69	0165	AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS KEYWORDS MOISTURE-CONTENT
200	69	0167	AEROBIC STORAGE OF DAIRY CATTLE MANURE KEYWORDS AERATION TEMPERATURE ODOR COD LOADIN
200	71	0740	PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
200	73	1083	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	69	0002	SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS-FACT SHEET KEYWORDS SIZE LOCATION SHAPE DEPT
300	69	0003	CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS-FACTSHEET KEYWORDS SIZE TEMPERATURE SEA
300	69	0634	ANALYSIS OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE KEYWORDS ORGANIC-COMPOUNDS
300	70	1084	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71	1081	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
300	72	1264	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
600	70	0080	FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
600	70	0098	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
600	72	1074	SPRINKLING CATTLE FOR RELIEF FROM HEAT STRESS KEYWORDS CATTLE SPRINKLING FEED-LOTS AIR-
600	72	1076	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
600	72	1262	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
600	69	1006	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
200	72	1108	EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300	30	1205	SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300	71	0745	ANIMAL WASTES KEYWORDS INDUSTRIAL-WASTES FLOW-CONTROL TERRACES BY-PRODUCTS RENDERING
300	71	1008	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
400	72	1179	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
400	70	0092	SEEK DATA IN FEEDLOT RESEARCH KEYWORDS SOUTH-DAKOTA FEEDLOT DESIGN-CRITERIA BOD CATTL
200	72	1015	DESIGN AND MANAGEMENT OF RUNOFF CONTROL SYSTEMS KEYWORDS FARM-WASTES FEED-LOTS CATTLE R
100	70	1230	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
200	71	0656	CHLORINATION OF WASTEWATER EFFLUENTS KEYWORDS DISINFECTION WATER-TREATMENT PUBLIC-HEA
300	71	0732	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
500	70	0407	EFFECTS OF SURFACE-RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE-TREATMENT KEY
200	66	0135	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
100	55	0328	EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS KEYWORDS FERMENTA
100	70	0034	A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND
100	71	0303	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
300	71	0412	THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAPBEANS, AND TOMATOES KEYWORDS CROP
100	71	0722	THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
200	69	0708	TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
600	71	0272	A DOSING-SIPHON FOR DISCHARGING CLEANING-WATER INTO FLUSHING-GUTTERS KEYWORDS DESIGN

100	73	1034	TEST-TUBES	TECHNIQUES FOR SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTE
100	69	0714	TETRATHIONATE	EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLA FROM FECES KEYWORDS
100	71	1038	TEXAS	CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
200	73	1083	TEXAS	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300	68	0702	TEXAS	BUFFALO LAKE PROJECT RANDALL COUNTY,TEXAS KEYWORDS RUNOFF RAINFALL BACTERIA COLIFORMS
300	69	1180	TEXAS	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	70	1192	TEXAS	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1248	TEXAS	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
400	71	1134	TEXAS	FEED EM TRASH, CUT POLLUTION KEYWORDS CELLULOSE BRUSH-CONTROL FARM-WASTES RECYCLING PR
400	71	1196	TEXAS	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400	73	1007	TEXAS	FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
600	72	1169	TEXAS	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
300	71	0466	TEXAS-HIGH-PLAINS	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
100	70	1194	THAMES-RIVER-ENGLA	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
200	69	0078	THEORETICAL-ANALYS	OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS K
600	70	0469	THEORIES	WHY DOES IT SMELL SO BAD KEYWORDS ODOR LITERATURE INSTRUMENTATION PERCEPTION THEORIES
200	71	0814	THERMAL-CAPACITY	PYROLYSIS OF LIVESTOCK WASTES KEYWORDS CHEMICAL-TREATMENT ANAEROBIC CHEMICAL-ANALYSIS
600	72	1076	THERMAL-DESTRUCTIO	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
600	69	1006	THERMAL-ENVIRONMEN	HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE KEYWORDS CATTLE TEMPERATURE-CONTROL HUMID
300	71	1126	THERMAL-POLLUTION	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
200	72	1016	THERMAL-PROPERTIES	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
100	72	1215	THIOCARBAMATE-PEST	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	73	1164	THOMPSON	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
100	70	0417	THRESHOLD-LEVEL	ACCUMULATION OF PHOSPHATES IN WATER KEYWORDS RUNOFF FERTILIZERS SOURCES POLLUTANTS SO
400	65	1142	THRESHOLD-LEVELS	WASTE CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS KEYWORDS VENTILATION SWINE-
200	69	0189	THRESHOLD-ODOR-NUM	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
200	69	0190	THRESHOLD-ODOR-NUM	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
400	72	1171	TILES	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
600	73	1065	TILE-DRAINED-GRASS	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
200	71	0843	TIME-CONSTANT	ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS KEYWORD ACTIVATED-SLUDGE AN
100	72	1215	TISSUE	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	72	1199	TISSUES	IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK MILK PRODUCTS CHIC
100	73	1164	TISSUES	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
200	71	1095	TOBACCO-INDUSTRY	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
600	71	0493	TOC	NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS KEYWORDS MANAGEMENT COLIFORMS RUN
400	65	1142	TOLERANCE-LEVELS	WASTE CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS KEYWORDS VENTILATION SWINE-
100	67	1218	TOTAL-MANAGEMENT	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
200	71	0807	TOTAL-ORGANIC-CARB	QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES KEYWORDS STREAM-POLLUTION COLIF
300	72	1085	TOTAL-ORGANIS-CARB	CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
100	66	0473	TOTAL-SOLID	BOD OF CAPTIVE WILD ANIMAL WASTES KEYWORDS ZOO TOTAL-SOLID BOD WASTES
100	69	0030	TOTAL-SOLIDS	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
200	69	0074	TOTAL-SOLIDS	AEROBIC DIGESTION OF SWINE WASTE KEYWORDS OXYGENATION AERATION LAGOON OXIDATION-DITCH
200	69	0177	TOTAL-SOLIDS	FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS KEYWORDS ROTORS OXYGE
200	69	0180	TOTAL,VOLATILE	FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEER OXIDATION DITCH, SETTLIN
500	70	0395	TOXAPHENE	CHEMISTRY AND METABOLISM OF INSECTICIDES KEYWORDS ALDRIN DDT DIELDRIN INSECT-CONTROL
100	63	1064	TOXICITY	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100	65	1091	TOXICITY	TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
100	65	1219	TOXICITY	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	69	0057	TOXICITY	THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS KEYWORDS EFFECTS CARBON-DIOXIDE METHANE AM
100	70	0418	TOXICITY	ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
100	71	0257	TOXICITY	DRINKING OF SULFATE-WATER BY CATTLE KEYWORDS GROWTH-RATES SODIUM-CHLORIDE TOXICITY CA
100	73	1087	TOXICITY	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
200	69	0696	TOXICITY	QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS KEYWORD SURFACE-WATERS DISCHARGE LAGO
200	69	0708	TOXICITY	TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
200	70	0234	TOXICITY	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70	0238	TOXICITY	THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	71	0276	TOXICITY	THE SPORTSMANS VIEW KEYWORDS PESTICIDES DDT BIOCONTROL BENEFICIAL-USE TOXICITY BIOLOG
200	71	0279	TOXICITY	POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS KEYWORDS NITRATE EUTROPHICATI
200	71	1095	TOXICITY	BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
300	64	1110	TOXICITY	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300	68	1122	TOXICITY	NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300	70	0385	TOXICITY	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS: - A LITERATURE REVIEW KEYW
300	71	1100	TOXICITY	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
400	72	1166	TOXICITY	HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400	73	1178	TOXICITY	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
500	71	1072	TOXICITY	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL SERIO
600	73	1065	TOXICITY	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
300	64	1110	TOXIC-ALGAE	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
400	73	1181	TOXIC-WASTES	SALMON THAT NEED NEVER SEE THE SEA KEYWORDS RECIRCULATED-WATER SALMON RHODE-ISLAND
300	69	1103	TOXINS	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
200	64	1241	TRACERS	PHYSIOLOGY OF THE RUMEN PROTOZOA KEYWORDS RUMINANTS PROTOZOA BACTERIA CATTLE REPRODUCTI
100	70	0048	TRACE-ELEMENTS	SOIL FERTILITY UNDER CONTINUOUS CULTIVATION IN NORTHERN NIGERIA I THE ROLE OF ORGANIC
200	71	0740	TRAINING	PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT KEYWORD ANIMAL-BE
100	72	1097	TRANSMISSIVITY	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
200	71	0775	TRANSPORT	TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY,
200	71	0858	TRANSPORT	RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANU
100	71	0680	TRANSPORTATION	ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE KEYWORDS TRANSPORTATION PROCES
200	69	0055	TRANSPORTATION	MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	72	1024	TRANSPORTATION	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
300	71	1261	TRANSPORTATION-RAT	INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOM
200	71	0808	TREAT	WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT KEYWORDS AEROBIC-LAGOON OX
100	63	0289	TREATMENT	TREATMENT OF LONG-ISLAND DUCK FARM WASTES KEYWORDS CHLORINATION COLIFORMS TREATMENT DU
100	65	0263	TREATMENT	REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100	69	0030	TREATMENT	TREATMENT OF DAIRY MANURE BY LAGOONING KEYWORDS BIODEGRADATION ALGAE BOD ANAEROBIC-DI
100	69	0035	TREATMENT	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
100	69	0353	TREATMENT	OXIDATION-DITCH TREATMENT OF SWINE WASTES KEYWORDS SLURRIES BOD COD ODORS EQUIPMENT L
100	69	0707	TREATMENT	A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS KEYWORDS
100	70	0083	TREATMENT	BEEF-FEEDLOT OPERATIONS IN ONTARIO KEYWORDS RUNOFF STORAGE TREATMENT LAND-DISPOSAL BE
100	70	0421	TREATMENT	EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNE
100	71	0507	TREATMENT	ANIMAL-WASTES KEYWORDS MANAGEMENT POLLUTION-ABATEMENT DISPOSAL TREATMENT LAGOONS POLL
100	71	1228	TREATMENT	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
200	66	0115	TREATMENT	MANAGEMENT OF FARM ANIMAL WASTES KEYWORDS ECONOMICS BOD COD SLURRIES DISPOSAL ODOR ST
200	66	0133	TREATMENT	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS SLOTTED-FLOOR AERATION BOD COD COLLECTION P
200	66	0137	TREATMENT	PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING KEYWORDS BACTERIA SLUDGE ODOR GAS LAGOO
200	66	0139	TREATMENT	CATTLE MANURE TREATMENT TECHNIQUES KEYWORDS LAGOONS COD BOD ACTIVATED-SLUDGE RUNOFF A
200	66	0144	TREATMENT	TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200	66	0152	TREATMENT	ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK KEYWORDS COD BOD COST NUTR
200	66	0156	TREATMENT	BIOLOGICAL TREATMENT OF ANIMAL WASTES KEYWORDS SWINE COST BOD NITROGEN NITROGEN-BALAN
200	66	0438	TREATMENT	SOIL CHEMICAL CHANGES AND INFILTRATION RATE REDUCTION UNDER SEWAGE SPREADING KEYWORDS
200	68	1186	TREATMENT	TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS

200	69 0056	TREATMENT	PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES KEYWORDS
200	69 0162	TREATMENT	THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200	69 0184	TREATMENT	TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS-FIELD RESULTS KEYWORDS ANAEROBIC-CONDIT
200	69 0706	TREATMENT	HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
200	69 0756	TREATMENT	SWINE-WASTE MANAGEMENT KEYWORDS LEGAL-ASPECTS DESIGN-CRITERIA HOGS ODOR TREATMENT FAC
200	70 0234	TREATMENT	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	70 0242	TREATMENT	MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	70 0251	TREATMENT	AEROBIC TREATMENT OF FARM WASTES KEYWORDS ODOR SLURRIES AERATION LAGOONS BOD COD OXID
200	70 0252	TREATMENT	ANAEROBIC TREATMENT OF FARM WASTES KEYWORDS BACTERIA SLUDGE SLURRIES DESIGN-DATA METH
200	70 0253	TREATMENT	TREATMENT OF FARM WASTES KEYWORDS DISPOSAL LAGOON AERATION ACTIVATED SLUDGE SLURRIES
200	71 0603	TREATMENT	EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
200	71 0604	TREATMENT	STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH KEYWORDS DAIRY-INDUSTR
200	71 0640	TREATMENT	HANDLING LIVESTOCK WASTE KEYWORDS TREATMENT OXIDATION-LAGOONS DISPOSAL DRYING SEPARAT
200	71 0652	TREATMENT	LIQUID WASTE TREATMENT I FUNDAMENTALS KEYWORDS AEROBIC-TREATMENT ANAEROBIC-BIODEGRADAT
200	71 0653	TREATMENT	LIQUID WASTE TREATMENT II OXIDATION PONDS AND AERATED LAGOONS KEYWORDS AEROBIC-TREATM
200	71 0654	TREATMENT	LIQUID WASTE TREATMENT III THE OXIDATION DITCH KEYWORDS AEROBIC-TREATMENT DISSOLVED-OX
200	71 0655	TREATMENT	ANAEROBIC BIOLOGICAL WASTE TREATMENT SYSTEMS KEYWORDS METHANE-BACTERIA FARM-LAGOONS AN
200	71 0661	TREATMENT	ODORS AND THEIR CONTROL KEYWORDS POULTRY CHEMICAL TREATMENT AIR-CIRCULATION DRYING SO
200	71 0666	TREATMENT	PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES KEYWORDS DUCK OXIDATION-LAGOONS S
200	71 0667	TREATMENT	FOOD PROCESSING WASTEWATER TREATMENT KEYWORDS ANAEROBIC-LAGOON ACTIVATED-SLUDGE IRRIG
200	71 0781	TREATMENT	ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
200	71 0791	TREATMENT	METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES KEYWORDS C
200	71 0824	TREATMENT	AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE KEYWORDS BIODEGRADATION NITRIFIC
200	71 0855	TREATMENT	TREATMENT OF LIVESTOCK-LAGOON EFFLUENT BY SOIL FILTRATION KEYWORD ANAEROBIC-LAGOON-EF
300	65 0757	TREATMENT	AEROBIC TREATMENT OF SWINE WASTE KEYWORDS CONFINEMENT-PENS AERATION BOD COD AMMONIA N
300	68 0749	TREATMENT	ROTOR AERATION OF SWINE WASTES KEYWORD OXIDATION TREATMENT GASES ODORS CONFINEMENT-PE
300	69 0638	TREATMENT	ODOR CONTROLS BY CHEMICAL TREATMENT KEYWORDS POULTRY AMMONIA-HYDROGEN-SULFIDE CARBON-
300	70 0008	TREATMENT	AEROBIC TREATMENT OF LIVESTOCK WASTES KEYWORDS OXIDATION-LAGOONS AERATION BOD OXIDATION
400	64 0358	TREATMENT	TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400	69 0419	TREATMENT	DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400	71 0329	TREATMENT	DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HA
500	70 0403	TREATMENT	ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
200	69 0169	TREATMENTS	INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES KEYWORDS CATTLE
300	69 0735	TREATMENTS	SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND KEYWORD SETTLING-
600	71 0271	TREATMENTS	GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS KEYWORDS DISPOSAL CR
200	71 0286	TREATMENT-CELLS	AGRICULTURAL-BENEFITS FROM URBAN POLLUTION-CONTROL KEYWORDS SEWAGE-TREATMENT TREATMEN
300	71 0639	TREATMENT-DISPOSAL	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
100	71 1232	TREATMENT-FACILITI	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	69 0706	TREATMENT-FACILITI	HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS K
300	67 1249	TREATMENT-FACILITI	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69 1061	TREATMENT-FACILITI	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	71 0457	TREATMENT-FACILITI	DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILK HOUSES KEYWORD AEROBIC-TREATMENT SPRI
300	71 1058	TREATMENT-FACILITI	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
100	69 0037	TREATMENT-PROCESSE	WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
300	49 1210	TREES	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	71 1106	TREES	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
100	69 1198	TREE-BARK	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
200	71 0828	TRENCHES	DISPOSAL OF BEEF MANURE BY DEEP PLOWING KEYWORDS DEEP-TILLAGE COST-COMPARISONS CROP-P
200	66 0154	TRENDS	FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE KEYWORDS DISPOSAL OXIDATION-PITCH FAMI
200	66 0135	TRICKLING-FILTERS	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
300	71 0732	TRICKLING-FILTERS	CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT KEYWORD ENVIRONMENTAL-EFFECTS DAIRY-INDUST
600	72 1001	TRICKLING-FILTERS	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
100	72 1215	TRITIUM	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	62 0480	TS	CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
600	70 0098	TS	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
100	73 1069	TUBER-BLACKENING	MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100	70 1237	TUBIFICIDS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
300	71 1055	TUBIFICIDS	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
100	69 0035	TURBIDITY	TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE KEYWORDS BOD COD PH SEPTIC-TAN
200	70 0755	TURBIDITY	FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	72 1021	TURKEYS	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
400	71 0505	TURKEYS	CONFINEMENT-REARING OF TURKEYS KEYWORDS VENTILATION MANAGEMENT PSYCHROMETRICS CONTROL
300	71 1126	TURTLES	SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
100	62 0480	TVS	CAGE AND KENNEL WASTEWATER KEYWORDS LABORATORY-ANIMALS BOD TS TVS CHARACTERISTICS CAG
600	70 0098	TVS	BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH KEYWORDS COD BOD TS TVS PH DO TEMPERATURE
100	73 1164	TYPHIMURIUM	SALMONELLA IN THE LAYING HEN I SALMONELLA RECOVERY FROM VISCERA FECES AND EGGS FOLLOWIN
400	70 0268	UITIMATE-DISPOSAL	MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL UITIMATE-DISPOSAL WASTE-STORAGE F
100	70 0112	UK	CURRENT TRENDS IN FARM WASTE DISPOSAL KEYWORDS NUTRIENTS EXCRETION UK ODOR POPULATION
200	70 0235	UK	ORIGINS AND NATURE OF FARM WASTES KEYWORDS DISPOSAL COSTS LEGAL-ASPECTS ECONOMICS UK
200	70 0236	UK	ORIGINS AND NATURE OF FARM WASTES DISCUSSION KEYWORDS DISPOSAL LEGISLATION SEWERS UK
200	70 0238	UK	THE PROBLEM ON THE FARM ANIMAL HEALTH KEYWORDS DISEASE UK PATHOGENIC LAGOONS SLURRIE
200	70 0240	UK	WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL KEYWORDS L
200	70 0241	UK	SEWERS AND SEWAGE TREATMENT KEYWORDS LEGISLATION DESIGN-CRITERIA ACTIVATED-SLUDGE CAP
200	70 0243	UK	MINIMIZING POULTRY WASTE PROBLEMS KEYWORDS COSTS DISPOSAL ODOR BOD UK FERTILIZERS SLU
200	70 0245	UK	MINIMIZING THE WASTE PROBLEM WITH CATTLE KEYWORDS SLURRIES DISPOSAL COSTS CONFINEMENT
200	70 0246	UK	BUILDING DESIGN KEYWORDS MANAGEMENT COSTS DESIGN GASES DISPOSAL LAGOONS BUILDINGS STO
100	72 1235	ULTIMATE-BOD	BOD DETERMINATIONS ON FEEDLOT RUNOFF KEYWORDS ANALYTICAL-TECHNIQUES BIOCHEMICAL-OXYGEN-
200	69 0199	ULTIMATE-DISPOSAL	RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES KEYWORD
300	71 1238	ULTIMATE-DISPOSAL	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
300	71 1257	ULTIMATE-DISPOSAL	EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
600	73 1147	ULTIMATE-DISPOSAL	SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
200	71 0651	UNITED	ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMEN
100	70 1194	UNITED-KINGDOM	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70 1233	UNITED-KINGDOM	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	71 1214	UNITED-KINGDOM	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
200	70 0234	UNITED-KINGDOM	FARM WASTES KEYWORDS DISPOSAL UNITED-KINGDOM SLURRIES BOD COD DO ODOR COSTS EQUIPMENT
200	64 1240	UNITED-STATES	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	69 0536	UNIVERSITIES	ROLE OF UNIVERSITY-EXTENSION KEYWORDS ENVIRONMENT EDUCATION UNIVERSITIES WATER-POLLUT
200	72 1022	UNIVERSITY-OF-NEBR	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
300	70 1247	UNLIMATE-DISPOSAL	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	71 1057	UPPER-NEOSHO-RIVER	EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
100	70 1041	URBANIZATION	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	70 0228	URBAN-FRINGE	RAISING LIVESTOCK IN THE URBAN FRINGE KEYWORDS ODOR LEGAL-ASPECTS PLANNING MANAGEMENT
300	70 1084	URBAN-REFUSE	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71 1081	URBAN-REFUSE	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	69 1167	URBAN-RURAL-INTERF	AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
200	70 0222	UREA	THE NITROGEN-CYCLE OF A DAIRY FARM KEYWORDS NUTRIENTS FERTILIZATION FOLIAR-APPLICATION
200	71 1033	UREA	NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
100	70 1037	UREAS	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS
100	70 0260	URIC	GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS

200	69	0190	URIC-ACID	MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AN
600	72	1076	URIC-ACID	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
100	71	0303	URINARY	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
100	73	1088	URINARY-NITROGEN	OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION O
100	69	0693	URINE	IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE K
100	70	0027	URINE	EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON, VANILMANDELIC ACID
100	70	1251	URINE	AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0303	URINE	METABOLIC FATE OF UBIQUINONE-7 KEYWORDS RADIOACTIVITY URINE LABORATORY TESTS CHEMICAL
100	71	1221	URINE	DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION & FLAMELESS
100	71	1232	URINE	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
200	66	0155	URINE	PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES KEYWORDS LIQUID-W
300	68	1123	URINE	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
200	70	0322	USDA	FUNDING FOR AGRICULTURAL-WASTE RESEARCH KEYWORDS GRANTS USDA RESEARCH-FUNDS ENVIRONME
200	71	0596	USDA	SUMMARY OF EXISTING STATE LAWS KEYWORDS RUNOFF REGULATION FEEDLOTS STATE-OFFICIAL EPA
200	71	0599	USDA	THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS--PROBLEMS KEYWORDS REG
200	71	0620	USDA	RECOMMENDATIONS OF NATIONAL MILK PRODUCERS FEDERATION KEYWORDS ADMINISTRATIVE-AGENCIE
400	71	1172	USDA	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
200	72	1012	US-DEPARTMENT-OF-A	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1028	US-MEAT-ANIMAL-RES	AREA DIRECTORS SUMMARY KEYWORDS FARM-WASTES MANAGEMENT FEED-LOTS US-MEAT-ANIMAL-RESEARC
100	64	0072	UTILIZATION	A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
100	70	0028	UTILIZATION	HOUSEFLY LARVAE BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS KEYWORDS
100	70	0723	UTILIZATION	FEEDING VALUE OF CATTLE MANURE FOR CATTLE KEYWORDS REUSE UTILIZATION
100	71	0680	UTILIZATION	ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE KEYWORDS TRANSPORTATION PROCES
200	69	0055	UTILIZATION	MISSION IMPOSSIBLE DISPOSAL ANIMAL WASTES KEYWORDS PRODUCTION TRANSPORTATION MANAGEM
200	69	0172	UTILIZATION	SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD
400	71	0262	UTILIZATION	WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE-DISPOSAL CATTLE-WASTE STORAGE-WAS
500	70	0403	UTILIZATION	ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION KEYWORDS COLLECTION STORAGE TREATMENT UT
100	63	1064	U-S-DEPARTMENT-OF-	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
700	70	1066	VACTERIA	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
200	66	0140	VACUUM	DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
100	60	0059	VALUE	THE MANAGEMENT OF LIVESTOCK MANURE KEYWORDS DISPOSAL VALUE STORAGE CN-RATIO COMPOSTIN
100	69	0086	VALUE	THE APPARENT-DIGESTIBILITY OF ENERGY AND PROTEIN IN TOPLAN DRIED-POULTRY-MANURE KEYWO
100	70	0413	VALUE	VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
100	71	0318	VALUE	RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS KEYWORDS COD BOD DO SOIL-C
200	66	0153	VALUE	POULTRY MANURE MARKETING KEYWORDS FERTILIZER BAGGING PROCESSING TECHNIQUES VALUE ANAL
200	69	0202	VALUE	ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS KEYWORDS COST
200	70	0220	VALUE	THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEE
200	71	0282	VALUE	SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHED
200	71	0847	VALUE	STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINA
300	49	1210	VALUE	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
400	66	0088	VALUE	POULTRY-MANURE DISPOSAL - IS THERE A PROBLEM KEYWORDS COSTS NUTRIENTS VALUE FERTILIZER
100	70	0027	VANILMANDELIC-ACID	EFFECT OF STRESS ON SWINE HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID
600	69	1160	VANT-HOFF-ARRHENUI	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
200	69	0189	VAPOR-DILUTION	MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES KEYWORDS POULTRY ODOR-STRENGTH VAPO
100	66	0506	VARIATION	CATTLE FEEDLOT RUNOFF IT S NATURE AND VARIATION KEYWORDS BOD COD FEEDLOT RUNOFF NATURE
200	66	0118	VECTOR	HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
300	70	1104	VECTROS-BIOLOGY	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
200	71	0804	VELOCITY	IMPROVING WATER UTILIZATION EFFICIENCY IN AUTOMATIC HYDRAULIC WASTE REMOVAL KEYWORDS
600	72	1151	VELOMETER-TEST	IMPROVED BEEF CONFINEMENT FACILITIES THROUGH PIT VENTILATION AND TEMPERED AIR INTAKES K
100	71	0683	VENTILATION	ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE KEYWORDS SYSTEM
100	71	0695	VENTILATION	CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS KEYWORD CONFI
200	68	0760	VENTILATION	HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE KEYWORD CONFINEMENT-PENS VENT
200	69	0196	VENTILATION	THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION KEYWORDS NITROGEN CARB
200	72	1018	VENTILATION	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
300	70	0206	VENTILATION	POULTRY MANURE HANDLING BY INDOOR SEPTIC-TANKS KEYWORDS SLUDGE DIGESTION VENTILATION A
400	65	1142	VENTILATION	WASTE CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS KEYWORDS VENTILATION SWINE-
400	70	0308	VENTILATION	DEEP PIT SLAT-FLOOR BREEDING HOUSE KEYWORDS POULTRY FARM-WASTES SLOTTED-FLOOR VENTILA
400	71	0297	VENTILATION	BROODER-GROW CAGES OVER DEEP PIT KEYWORDS POULTRY FARM-WASTES VENTILATION PIT STORAGE
400	71	0505	VENTILATION	CONFINEMENT-REARING OF TURKEYS KEYWORDS VENTILATION MANAGEMENT PSYCHROMETRICS CONTROL
400	73	1178	VENTILATION	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	71	0494	VENTILATION	A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
600	72	1151	VENTILATION	IMPROVED BEEF CONFINEMENT FACILITIES THROUGH PIT VENTILATION AND TEMPERED AIR INTAKES K
600	71	0494	VENTILATION-SYSTEM	A MODEL STUDY TO DETERMINE THE EFFCTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN
300	70	0385	VETERINARY-DIAGONO	AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW KEYW
300	71	1238	VIBRATING-SCREEN	CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK KEYWORDS VIBRATING-SCREEN HYDRAULIC-TRANSP
200	69	1102	VIRAL-REMOVAL	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	71	0602	VIRGINIA	STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT KEYWORDS RUNOFF LAWS FEEDLOT V
200	71	0617	VIRGINIA	THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA KEYWORDS POULTRY ADMINISTRAT
100	71	0307	VIRUS	ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS-ARMIGERA AND ITS PERISTENCE IN AVIAN FECES
500	70	0402	VIRUS	DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATE
100	71	0742	VIRUSES	INFECTIONS PANCREATIC NECROSIS VIRUS COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES A
200	68	1242	VIRUSES	THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
200	68	1244	VIRUSES	SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
200	69	1102	VIRUSES	MICROBIOLOGY OF A WASTE STABILIZATION POND KEYWORDS BIOLOGICAL-TREATMENT MICROBIOLOGY O
200	71	0812	VIRUSES	PORCINE ENTEROVIRUS SURVIVAL AND ANAEROBIC SLUDGE DIGESTION KEYWORDS VIRUSES SWINE SLU
600	72	1151	VIRUS-PNEUMONIA-IN	IMPROVED BEEF CONFINEMENT FACILITIES THROUGH PIT VENTILATION AND TEMPERED AIR INTAKES K
600	70	0080	VISCOMETERS	FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
600	70	0080	VISCOSITY	FLOW PROPERTIES OF ANIMAL WASTE SLURRIES KEYWORDS VISCOSITY FLOW-CHARACTERISTICS SHEA
100	71	0261	VOLATILE	ANAEROBIC DIGESTION OF FARM ANIMAL WASTES DAIRY BULL, SWINE,AND POULTRY KEYWORDS SLUD
200	66	0134	VOLATILE	OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS KEYW
200	66	0138	VOLATILE	DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL KEYWORDS COD BOD TEMP
100	69	0363	VOLATILEODOR-TRANS	ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROM
600	72	1004	VOLATILE-ORGANIC-A	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
200	66	0135	VOLATILE-SOLIDS	TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT KEYWORDS BOD LABORATORY TE
200	69	0168	VOLATILE-SOLIDS	AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS-TEMPORARY EXPEDIENT OR LON
200	69	0193	VOLATILE-SOLIDS	CHARACTERISTICS OF AQUEOUS SOLUTION OF CATTLE MANURE KEYWORDS BOD PH REDOX-POTENTIAL
600	69	1160	VOLATILE-SOLIDS	CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF KEYWORDS FEED-LOTS SURFACE-RUNOFF DISS
100	69	0103	VOLATILITY	NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE F
400	73	1178	VOLATILITY	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	72	1156	VOLATILITY	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	73	1075	VOLATILITY	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
100	70	1211	VOLTAGE	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
100	65	0066	VOLUME	THE EFFECTS OF VOLUME AND SURFACE-AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR
100	69	0363	VOLUME	ODOR-TRANSPORT BY PARTICULATE-MATTER IN HIGH DENSITY POULTRY-HOUSES KEYWORDS GAS-CHROM
200	69	0197	VOLUME	REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
300	69	0006	VOLUME	SWINE WASTE MANAGEMENT-OXIDATION DITCH FOR TREATING HOG WASTES-FACT SHEET KEYWORDS DE
400	64	0358	VOLUME	TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
400	65	0332	VOLUME	HOW WE HANDLE LIQUID-MANURE KEYWORDS DAIRY-CATTLE SLURRY STORAGE-TANKS AGITATION VOL
400	66	0380	VOLUME	TWO BILLION TONS OF - WHAT KEYWORDS ORGANIC-WASTES VOLUME ORGANIC-MATTER GRASS-BELTS P
400	68	0101	VOLUME	MANURE MANAGEMENT - COSTS AND PRODUCT FORMS KEYWORDS CATTLE MARKETING VOLUME PROFIT PR

KEYWORD INDEX

600 73 1075 VOLUMETRIC-ANALYSI THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
200 72 1018 VOLUNTARY-WASTE-CO EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
100 68 0087 VS AEROBIC-DIGESTION OF CATTLE-WASTE KEYWORDS BOD COD VS FS AERATION LOADING-RATES REGRES
200 66 0121 VS PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING KEYWORDS PHYSICAL-PROP
700 70 0231 VS THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
100 63 1064 V-C-13 TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100 70 1111 WADING-BIRDS POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300 71 1119 WALDORF-AERATOR TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
200 69 0194 WARBURG TYPICAL VARIATIONS ENCOUNTERED IN THE MEASUREMENT OF OXYGEN DEMAND OF ANIMAL WASTES KE
400 71 1131 WARM-BARN FIVE FEEDING SYSTEMS COMPARED KEYWORDS FEED-LOTS PERFORMANCE RUNOFF FARM-WASTES CATTLE
200 72 1017 WARM-SLOT-HOUSING WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200 71 0860 WASHING DEWATERING POULTRY MANURE BY CENTRIFUGATION KEYWORD CENTRIFUGATION DEWATERING POULTRY
100 71 1236 WASHINGTON MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100 70 1237 WASHINGTON POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
100 65 0263 WASTE REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE KEYWORDS WASTE
100 66 0478 WASTE LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE KEYWORDS FARMWASTES WASTE
100 68 0481 WASTE RETURNING WASTES TO THE LAND. A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE W
100 69 0416 WASTE A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
100 70 0260 WASTE GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS
100 70 0420 WASTE SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS KEYWORDS LAGO
100 70 1195 WASTE AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
200 66 0438 WASTE SOIL CHEMICAL CHANGES AND INFILTRATION RATE REDUCTION UNDER SEWAGE SPREADING KEYWORDS
300 69 0633 WASTE THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE KEYWORDS WASTE
400 69 0419 WASTE DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400 69 0419 WASTE DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400 70 0268 WASTE MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL UITIMATE-DISPOSAL WASTE-STORAGE F
400 71 0267 WASTE WASTE MANAGEMENT WHAT DOES IT COST KEYWORDS WASTE DISPOSAL COSTS COST ANALYSIS COST F
400 71 0327 WASTE RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
400 71 0329 WASTE DISPOSAL OF HATCHERY WASTES KEYWORDS POULTRY INCINERATION WASTE TREATMENT DISPOSAL HA
400 71 0435 WASTE THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION KEYWORDS WASTE-DISPOSAL AIR-POLLUTIO
100 71 0751 WASTELAGE ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION KEYWORDS POULTRY SWINE CATTLE PA
200 69 0171 WASTELAGE CATTLE MANURE- REUSE THROUGH WASTELAGE FEEDING KEYWORDS FEEDS PERFORMANCES WASTELAGE
200 71 0845 WASTELAGE CATTLE MANURE AS FEED FOR CATTLE KEYWORD RECYCLING ANIMAL-PATHOLOGY MICROORGANISMS NE
100 63 0436 WASTES POULTRY DUST ORIGIN AND COMPOSITION KEYWORDS FARM WASTES POULTRY ENVIRONMENTAL EFFEC
100 64 0474 WASTES PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES KEYWORDS SOLIDS N DIAPHRAGM-PUMP
100 65 1219 WASTES NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100 66 0437 WASTES PROPERTIES OF FARM ANIMAL EXCRETA KEYWORDS LIVESTOCK GASES BIODEGRADATION BIOCHEMICAL
100 66 0473 WASTES BOD OF CAPTIVE WILD ANIMAL WASTES KEYWORDS ZOO TOTAL-SOLID BOD WASTES
100 68 0306 WASTES ANAEROBIC DIGESTION FAILURES KEYWORDS DIGESTION SLUDGE DISPOSAL AMMONIUM ALKALINE BUIL
100 68 0381 WASTES WASTES FROM PIG-PRODUCTION UNITS KEYWORDS OXIDATION-DITCH EFFLUENT BOD LININGS SECOND
100 70 0413 WASTES VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
100 70 0418 WASTES ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION KEYWORDS FARM WASTES T
100 71 0569 WASTES ENZYMATIC EVALUATION OF PROCESSES FOR IMPROVING AGRICULTURAL WASTES FOR RUMINANT FEEDS
200 66 0140 WASTES DEWATERING CHICKEN MANURES BY VACUUM FILTRATION KEYWORDS DEWATERING VACUUM SEWAGE SLUD
200 67 1243 WASTES THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200 70 1118 WASTES WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200 71 0665 WASTES WASTE MANAGEMENT ON A MODERN DAIRY FARM KEYWORDS CATTLE SOIL-DISPOSAL-FIELDS SEPTIC-T
200 71 1099 WASTES SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
300 53 1206 WASTES POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300 68 1122 WASTES NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300 69 1060 WASTES FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300 69 1125 WASTES ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300 69 1203 WASTES FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300 70 1248 WASTES LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
400 69 0419 WASTES DIGESTION OF POULTRY MANURE BY DIPTERA KEYWORDS WASTE TREATMENT WASTE DISPOSAL FARM W
400 71 1135 WASTES ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
300 72 1085 WASTES-CHARACTERIS CHARACTERISTICS OF RAINFALL RUNOFF FROM A BEEF CATTLE FEEDLOT KEYWORDS
100 72 1188 WASTES-GASES IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS KEYWORDS AIR-POLLUTION ODOR CATTLE FEED-LOT
300 69 1125 WASTES-MANAGEMENT ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300 71 0744 WASTEWATER ANIMAL SLAUGHTERING AND PROCESSING KEYWORDS REGULATIONS BY-PRODUCTS SOLID-WASTES INDU
200 70 0747 WASTEWATER-DISPOSA ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
700 72 1048 WASTEWATER-DISPOSA SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200 70 0670 WASTEWATER-TREATME ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES CON
200 70 0747 WASTEWATER-TREATME ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
300 70 0489 WASTEWATER-TREATME WATER-QUALITY REQUIREMENTS AND RE-USE OF WASTEWATER EFFLUENTS KEYWORDS NUTRIENT-REMOV
700 72 1048 WASTEWATER-TREATME SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200 71 0835 WASTE-ASSIMILATIVE AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILAT
300 70 1036 WASTE-ASSIMILATIVE AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
200 71 0660 WASTE-BYPRODUCTS UTILIZATION OF AGRICULTURAL WASTES KEYWORDS WASTE-BYPRODUCTS AGRICULTURE WATER-POLLUTIO
100 68 1229 WASTE-CHARACTERIST ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS
200 71 0709 WASTE-DILUTION BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM KEYWORDS RUN-OFF CATTLE WASTE-DILUTION R
300 70 1192 WASTE-DILUTIONS IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
100 62 1220 WASTE-DISPOSAL WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100 71 0266 WASTE-DISPOSAL CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100 71 1214 WASTE-DISPOSAL THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100 71 1228 WASTE-DISPOSAL ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100 73 1069 WASTE-DISPOSAL MANURING OF POTATOES ON PEN SILT SOILS IN HOLLAND LINCOLNSHIRE KEYWORDS
100 73 1162 WASTE-DISPOSAL PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL KEYWORDS
100 73 1184 WASTE-DISPOSAL ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200 67 1243 WASTE-DISPOSAL THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200 69 0159 WASTE-DISPOSAL ENVIRONMENTAL POLLUTION--NOW AND IN THE YEARS AHEAD KEYWORDS LEGAL-ASPECTS DESIGN-STA
200 69 0522 WASTE-DISPOSAL FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE
200 69 1116 WASTE-DISPOSAL MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200 69 1167 WASTE-DISPOSAL AGRICULTURAL WASTES A MANAGEMENT PROBLEM KEYWORDS POLLUTION WASTE-DISPOSAL AGRICULTURA
200 69 1185 WASTE-DISPOSAL ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200 70 0720 WASTE-DISPOSAL PROGRESS REPORT PASTURE-FERTILIZATION USING POULTRY LITTER KEYWORDS FARM-WASTE WASTE-
200 70 0755 WASTE-DISPOSAL FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200 70 1159 WASTE-DISPOSAL METHODS OF SWINE MANURE DISPOSAL KEYWORDS FARM-WASTES MANAGEMENT WASTE-DISPOSAL HOGS LA
200 70 1175 WASTE-DISPOSAL ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200 71 0660 WASTE-DISPOSAL UTILIZATION OF AGRICULTURAL WASTES KEYWORDS WASTE-BYPRODUCTS ARTIFICAL-USE WASTE-DISP
200 71 0664 WASTE-DISPOSAL ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION KEYWORDS RE
200 71 0733 WASTE-DISPOSAL ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200 71 0763 WASTE-DISPOSAL ANIMAL WASTES AND AMERICA THE BEAUTIFUL KEYWORDS FARM-WASTES CONFINEMENT-PENS ODORS NUT
200 71 0769 WASTE-DISPOSAL A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
200 71 0779 WASTE-DISPOSAL EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200 71 0834 WASTE-DISPOSAL SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
200 71 1094 WASTE-DISPOSAL AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200 71 1096 WASTE-DISPOSAL ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200 72 1010 WASTE-DISPOSAL PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200 72 1011 WASTE-DISPOSAL NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R

200	72	1012	WASTE-DISPOSAL	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1014	WASTE-DISPOSAL	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1016	WASTE-DISPOSAL	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1018	WASTE-DISPOSAL	EDUCATION ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT KEYWORDS
200	72	1020	WASTE-DISPOSAL	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1021	WASTE-DISPOSAL	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200	72	1022	WASTE-DISPOSAL	RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF-CONTROL SYSTEMS KEY
200	72	1023	WASTE-DISPOSAL	CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF KEYWORDS FARM-WASTES PHYSICAL-PROPERTIES
200	72	1024	WASTE-DISPOSAL	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
200	72	1025	WASTE-DISPOSAL	OTHER RESEARCH NEEDS KEYWORDS FARM-WASTES PROTEINS RUNOFF FEED-LOTS WASTE-DISPOSAL
200	72	1029	WASTE-DISPOSAL	CONCLUDING COMMENTS KEYWORDS FARM-WASTES CROP-PRODUCTION LIVESTOCK SOILS MARKETING WAS
200	72	1030	WASTE-DISPOSAL	RECOVERY OF ANIMAL FEED FROM CATTLE MANURE KEYWORDS RECYCLING FARM-WASTES CATTLE FEED-L
200	73	1062	WASTE-DISPOSAL	CONTINUED RECYCLING OF CATTLE MANURE KEYWORDS CATTLE FARM-WASTES RECYCLING NITROGEN CAL
200	73	1082	WASTE-DISPOSAL	COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES KEYWORDS SOLID-WASTES COSTS
200	73	1083	WASTE-DISPOSAL	CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
200	73	1189	WASTE-DISPOSAL	A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL KEYWORDS FARM-WASTES WASTE-DISPOSAL FEED-LOTS F
300		1077	WASTE-DISPOSAL	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300		1105	WASTE-DISPOSAL	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300	26	1204	WASTE-DISPOSAL	OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300	62	0754	WASTE-DISPOSAL	NOTES ON WATER POLLUTION WASTE WATERS FROM FARMS KEYWORDS FARM-WASTES IRRIGATION BOD
300	67	1249	WASTE-DISPOSAL	AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300	69	1061	WASTE-DISPOSAL	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	69	1103	WASTE-DISPOSAL	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	69	1180	WASTE-DISPOSAL	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	69	1203	WASTE-DISPOSAL	FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300	70	1000	WASTE-DISPOSAL	EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL KEYWORDS
300	70	1036	WASTE-DISPOSAL	AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300	70	1192	WASTE-DISPOSAL	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1247	WASTE-DISPOSAL	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300	70	1248	WASTE-DISPOSAL	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0697	WASTE-DISPOSAL	ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
300	71	1008	WASTE-DISPOSAL	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300	71	1106	WASTE-DISPOSAL	MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300	71	1107	WASTE-DISPOSAL	WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300	72	1003	WASTE-DISPOSAL	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
300	72	1157	WASTE-DISPOSAL	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1170	WASTE-DISPOSAL	POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES KEYWORDS
300	72	1260	WASTE-DISPOSAL	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
300	72	1264	WASTE-DISPOSAL	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
300	73	1009	WASTE-DISPOSAL	STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400	70	0268	WASTE-DISPOSAL	MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL UITIMATE-DISPOSAL WASTE-STORAGE F
400	70	1132	WASTE-DISPOSAL	THE GREAT MANURE DILEMMA KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT RECYCLING FARM-WASTES.
400	70	1133	WASTE-DISPOSAL	POLLUTION CRACKDOWN KEYWORDS FEED-LOTS REGULATION WASTE-DISPOSAL RECYCLING
400	70	1176	WASTE-DISPOSAL	ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
400	71	0262	WASTE-DISPOSAL	WASTE HANDLING WHAT ARE THE CHOICES KEYWORDS WASTE-DISPOSAL CATTLE-WASTE STORAGE-WAS
400	71	0264	WASTE-DISPOSAL	HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE-DISPOSAL WASTE-DUMPS FAR
400	71	0327	WASTE-DISPOSAL	RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
400	71	0435	WASTE-DISPOSAL	THE MOUNTING PROBLEM OF GATTLE FEEDLOT POLLUTION KEYWORDS WASTE-DISPOSAL AIR-POLLUTIO
400	71	0435	WASTE-DISPOSAL	THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION KEYWORDS WASTE-DISPOSAL AIR-POLLUTIO
400	71	0568	WASTE-DISPOSAL	DEAD BIRD DISPOSAL BY RENDERING KEYWORDS CHICKENS BY-PRODUCTS ARTIFICAL-USE WASTE-DIS
400	71	0753	WASTE-DISPOSAL	MANURE CAN BE PROCESSED AND SOLD AT A PROFIT KEYWORD FEEDLOT CATTLE MARKET-VALUE WAST
400	71	1137	WASTE-DISPOSAL	REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEED
400	71	1174	WASTE-DISPOSAL	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	71	1196	WASTE-DISPOSAL	CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400	72	1138	WASTE-DISPOSAL	HOUSED CONFINEMENT AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA KEYWORDS
400	72	1166	WASTE-DISPOSAL	HOW MUCH MANURE PER ACRE KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL HOGS CATTLE
400	72	1171	WASTE-DISPOSAL	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
400	72	1173	WASTE-DISPOSAL	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
400	72	1179	WASTE-DISPOSAL	THE PRICE TAG TO STOP FEEDLOT RUN OFF KEYWORDS FARM-WASTE WASTE-DISPOSAL FEED-LOTS SETT
400	73	1007	WASTE-DISPOSAL	FEEDERS SCOLDED FOR FAILING TO LEARN THEIR MANURE ECONOMICS KEYWORDS FARM-WASTES ECONOM
400	73	1073	WASTE-DISPOSAL	NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS KEYWORDS NITRATES FARM-WASTES LYS
400	73	1158	WASTE-DISPOSAL	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
400	73	1183	WASTE-DISPOSAL	CONFINEMENT IN ARIZONA KEYWORDS FARM-MANAGEMENT FARM-WASTES CONFINEMENT-PENS FEED-LOTS
500	71	1072	WASTE-DISPOSAL	HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
600	69	1005	WASTE-DISPOSAL	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	72	1031	WASTE-DISPOSAL	ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE KEYWORDS POULTRY ODOR NUTRIENTS RECYCLING FAR
600	72	1149	WASTE-DISPOSAL	MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF KEYWORDS POLLUTION-ABATEMENT RUNOF
600	72	1150	WASTE-DISPOSAL	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
600	72	1156	WASTE-DISPOSAL	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	72	1169	WASTE-DISPOSAL	CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS KEYWORDS APPLICATION-METHODS
600	72	1177	WASTE-DISPOSAL	DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND KEYWORDS FARM-WASTES WASTE-DISPOSAL CATTL
600	72	1262	WASTE-DISPOSAL	CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM KEYWORDS CLIMATES FEED-LOTS
600	73	1065	WASTE-DISPOSAL	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	69	1067	WASTE-DISPOSAL	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
700	70	1066	WASTE-DISPOSAL	WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
300	72	1070	WASTE-DISPOSAL-LAG	PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
400	71	0264	WASTE-DUMPS	HANDLING METHODS FOR LIQUID MANURE ARE TESTED KEYWORDS WASTE-DISPOSAL WASTE-DUMPS FAR
200	70	0326	WASTE-HANDLING	AGRICULTURAL-WASTE RESEARCH-NEEDS KEYWORDS ENVIRONMENT ODOR WASTE-HANDLING SURVEYS RE
300	71	1257	WASTE-HANDLING-ALT	EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
300	71	1257	WASTE-HANDLING-COS	EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
100	72	1193	WASTE-IDENTIFICATI	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
200	66	0117	WASTE-LOADS	DUCK-PROCESSING WASTE KEYWORDS POULTRY DUCKS BOD COLIFORMS LONG-ISLAND PROCESSING-PLA
200	69	0161	WASTE-MANAGEMENT	THE CHALLENGE OF ANIMAL WASTE MANAGEMENT KEYWORDS ODORS WASTE-TREATMENT WASTE-MANAGEM
200	69	0525	WASTE-MANAGEMENT	ENGINEERING-RESEARCH ON FARM-ANIMAL-MANURE KEYWORDS ODORS BIOLOGICAL-TREATMENT WASTE-
200	72	1016	WASTE-MANAGEMENT	CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200	72	1089	WASTE-MANAGEMENT	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300	72	1003	WASTE-MANAGEMENT	CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
400	71	0298	WASTE-MANAGEMENT	MANAGING SWINE WASTES TO PREVENT POLLUTION KEYWORDS FARM-WASTES HOGS WASTE-WATER-DISP
500	70	0410	WASTE-MANAGEMENT	ALLIANCE FOR ACTION KEYWORDS WATER-POLLUTION FEEDLOTS REGISTRATION INVENTORY WASTE-MA
600	69	1005	WASTE-MANAGEMENT-F	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	72	1071	WASTE-MANAGEMENT-S	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
500	70	0386	WASTE-PRODUCTION	INTRODUCTION ISSUES IN FOOD-PRODUCTION AND CLEAN WATER KEYWORDS ENVIRONMENT FEEDLOTS
300	71	1081	WASTE-PRODUCTS	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
600	73	1065	WASTE-QUALITY	EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700	72	1048	WASTE-REUSE	SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONC
200	71	0802	WASTE-SLUDGE	AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT
200	66	0122	WASTE-STORAGE	METHODS OF HANDLING POULTRY-WASTE MATERIAL KEYWORDS ODOR POULTRY WASTE-STORAGE DISPO
200	68	0724	WASTE-STORAGE	GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE KEYWORDS POULTRY CONFIN
200	69	0547	WASTE-STORAGE	CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	71	0658	WASTE-STORAGE	MOISTURE REMOVAL KEYWORDS DRYING DEHYDRATION ABSORPTION WASTE-STORAGE INCINERATION RE

200	71	0662	WASTE-STORAGE	WASTE HANDLING ALTERNATIVES KEYWORDS LIQUID-WASTES ODOR WASTE-STORAGE AEROBIC-TREATME
200	71	0733	WASTE-STORAGE	ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS KEYWORD RUNOFF SOLID-WASTES
200	71	0769	WASTE-STORAGE	A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES KEYWORDS COMPUTER-MOD
200	71	0821	WASTE-STORAGE	AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES KEYWORDS FARM-WASTE
200	71	0822	WASTE-STORAGE	DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE
200	71	0823	WASTE-STORAGE	BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW KEYWORDS AERATION CATTLE BOD W
200	71	0834	WASTE-STORAGE	SUBSURFACE DISPOSAL OF LIQUID MANURE KEYWORD WASTE-DISPOSAL FERTILIZATION WASTE-STORA
200	71	0835	WASTE-STORAGE	AEROBIC STORAGE OF POULTRY MANURE KEYWORD AERATION AEROBIC-CONDITIONS WASTE-ASSIMILAT
200	71	0836	WASTE-STORAGE	SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE KEYWORD PATHOGENI
200	71	0841	WASTE-STORAGE	SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION KEYWORD ODOR SPRINKLER-IRRI
200	72	1010	WASTE-STORAGE	PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1012	WASTE-STORAGE	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1020	WASTE-STORAGE	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
300	67	1253	WASTE-STORAGE	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	69	1180	WASTE-STORAGE	CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300	71	0671	WASTE-STORAGE	REMOVAL OF WATER FROM ANIMAL MANURES, PART II EFFECTS OF VELOCITY ON AIR DRYING KEYWO
300	72	1157	WASTE-STORAGE	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
400	70	0268	WASTE-STORAGE	MANURE STACKING KEYWORDS WASTE DUMPS WASTE-DISPOSAL ULTIMATE-DISPOSAL WASTE-STORAGE F
400	70	0415	WASTE-STORAGE	TURNING WASTES INTO PROFITS KEYWORDS WASTE-TREATMENT POULTRY DRYING ODOR-CONTROL WAST
400	71	1136	WASTE-STORAGE	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
400	73	1158	WASTE-STORAGE	DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
400	73	1178	WASTE-STORAGE	ODOR CONTROL MAY BE A BIG CONCERN KEYWORDS ODOR LIVESTOCK FARM-WASTES DAIRY-INDUSTRY CO
600	69	1005	WASTE-STORAGE	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	72	1004	WASTE-STORAGE	CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY MANURE KEYWORDS
600	72	1150	WASTE-STORAGE	OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS KEYWORDS WASTE-DISPOSAL WASTE-STORAGE STA
600	72	1156	WASTE-STORAGE	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
600	73	1075	WASTE-STORAGE	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
700	69	1067	WASTE-STORAGE	ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS KEYWORDS FARM-WASTES ODOR W
300	68	1123	WASTE-STORAGES	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
600	72	1071	WASTE-TRANSPORT	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100	65	1219	WASTE-TREATMENT	NITRATES IN THE ENVIROMENT KEYWORDS NITROGEN ATMOSPHERE BIOSPHERE FERTILIZATION NITROG
100	70	0413	WASTE-TREATMENT	VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS KEYWORDS WASTE-TREATMENT DIG
100	71	0266	WASTE-TREATMENT	CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS
100	71	0729	WASTE-TREATMENT	DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE KEYWORD ODOR WAST
100	73	1184	WASTE-TREATMENT	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	68	1244	WASTE-TREATMENT	SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
200	69	0161	WASTE-TREATMENT	THE CHALLENGE OF ANIMAL WASTE MANAGEMENT KEYWORDS ODORS WASTE-TREATMENT WASTE-MANAGEM
200	69	0547	WASTE-TREATMENT	CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF KEYWORDS CATTLE FARM LAGOONS IRRIGATION WAS
200	69	0565	WASTE-TREATMENT	RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT KEYWORDS WASTE-TREATMENT CAT
200	69	1185	WASTE-TREATMENT	ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200	70	0728	WASTE-TREATMENT	ODORLESS PORK PRODUCTION FROM CONCEPTION TO MARKET KEYWORD AEROBIC-TREATMENT WASTE-T
200	70	0747	WASTE-TREATMENT	ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT KEYWORD WASTE-TREATMENT DESIGN-CRITER
200	70	0755	WASTE-TREATMENT	FEEDLOT WASTE IN FLORIDA KEYWORD WASTE-TREATMENT BIOLOGICAL-TREATMENT WASTE-DISPOSAL
200	70	1115	WASTE-TREATMENT	CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	70	1175	WASTE-TREATMENT	ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200	71	0642	WASTE-TREATMENT	AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
200	71	0651	WASTE-TREATMENT	ANIMAL WASTE HANDLING IN THE UNITED KINGDOM KEYWORDS REUSE DEHYDRATION WASTE-TREATMEN
200	71	0779	WASTE-TREATMENT	EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS FARM-WASTES WASTE-TRE
200	71	0810	WASTE-TREATMENT	WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES KEYWORDS SULFUR CARBON NITROGEN BOD
200	71	1033	WASTE-TREATMENT	NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200	72	1010	WASTE-TREATMENT	PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200	72	1011	WASTE-TREATMENT	NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200	72	1012	WASTE-TREATMENT	REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200	72	1014	WASTE-TREATMENT	APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE KEYWORDS WASTE-DISPOSAL WASTE-T
200	72	1017	WASTE-TREATMENT	WASTE MANAGEMENT AND ANIMAL PERFORMANCE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT
200	72	1020	WASTE-TREATMENT	POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200	72	1024	WASTE-TREATMENT	WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK KEYWORDS LIVESTOCK SHEEP CATTLE HOGS NEBRASK
300	67	1253	WASTE-TREATMENT	WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT KEYWORDS FARM-WASTES WASTE-TREATM
300	69	1103	WASTE-TREATMENT	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	70	1192	WASTE-TREATMENT	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	70	1248	WASTE-TREATMENT	LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300	71	0677	WASTE-TREATMENT	THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY KEYWORDS FARM-WASTES
300	71	1257	WASTE-TREATMENT-AL	EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES KEYWORDS
300	72	1157	WASTE-TREATMENT	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
300	72	1260	WASTE-TREATMENT	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
300	72	1264	WASTE-TREATMENT	PRINCIPLES OF FEEDLOT ODOR CONTROL KEYWORDS AIR-POLLUTION FEED-LOTS FARM-WASTES AEROBIC
400	70	0415	WASTE-TREATMENT	TURNING WASTES INTO PROFITS KEYWORDS WASTE-TREATMENT POULTRY DRYING ODOR-CONTROL WAST
400	70	1132	WASTE-TREATMENT	THE GREAT MANURE DILEMMA KEYWORDS WASTE-DISPOSAL WASTE-TREATMENT RECYCLING FARM-WASTES
400	71	0327	WASTE-TREATMENT	RECYCLED POULTRY NUTRIENTS KEYWORDS FARM-WASTES POULTRY WASTE-DISPOSAL DRIED-POULTRY
400	71	0686	WASTE-TREATMENT	NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF KEYWORDS CATTLE WASTE-TREATMENT SUSPEN
400	71	1172	WASTE-TREATMENT	OXIDATION DITCH IS CATTLE FEED SOURCE KEYWORDS OXIDATION-LAGOONS FEEDS EFFLUENT CATTLE
400	71	1174	WASTE-TREATMENT	LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400	72	1130	WASTE-TREATMENT	THE OPCCO DRYER KEYWORDS RECYCLING DRYING FERTILIZERS FARM-WASTES WASTE-TREATMENT
400	72	1171	WASTE-TREATMENT	MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC KEYWORDS FEED-LOTS PLASTICS TILES
400	72	1173	WASTE-TREATMENT	NEW ODOR CONTROL PRODUCT KEYWORDS ODOR WASTE-DISPOSAL FEED-LOTS LAGOONS OXYGEN NITROGEN
400	73	1140	WASTE-TREATMENT	ANOTHER POSSIBLE PROCESS FOR MANURE KEYWORDS FEED-LOTS FARM-WASTES WASTE-TREATMENT FERT
500	68	1259	WASTE-TREATMENT	WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES KEYWORDS WASTE-TREATMENT STABILIZATIO
600	69	1005	WASTE-TREATMENT	FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600	72	1001	WASTE-TREATMENT	INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE KEYWORDS WASTE-TREATMENT AEROBIC-TREATM
600	72	1071	WASTE-TREATMENT	A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
600	72	1076	WASTE-TREATMENT	HIGH-TEMPERATURE HIGH-PRESSURE EXTRUSION OF CHICKEN EXCRETA KEYWORDS FARM-WASTES POULTR
600	72	1163	WASTE-TREATMENT	ACTIVATED SLUDGE AS A SOURCE OF PROTEIN KEYWORDS BACTERIA PROTEINS AMINO-ACIDS NITROGEN
600	73	1075	WASTE-TREATMENT	THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE KEYWORDS
700	70	1109	WASTE-TREATMENT	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	69	0060	WASTE-WATER	RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION A REVIEW KEYWORDS FERTILIZERS PESTI
200	71	0829	WASTE-WATER	WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
300	72	1070	WASTE-WATER	PERIOCIDITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOS
400	64	0358	WASTE-WATER	TREATMENT OF FARM-EFFLUENTS KEYWORDS DAIRY HOGS BOD VOLUME WASTE-WATER SURFACE-WATER
100	67	1218	WASTE-WATER-DISPOS	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100	69	1231	WASTE-WATER-DISPOS	POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
300	69	1061	WASTE-WATER-DISPOS	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	70	1247	WASTE-WATER-DISPOS	DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
400	68	0032	WASTE-WATER-DISPOS	NATURAL FILTERS FOR AGRICULTURAL WASTES KEYWORDS SPRINKLER-IRRIGATION EFFLUENTS ORGAN
400	71	0298	WASTE-WATER-DISPOS	MANAGING SWINE WASTES TO PREVENT POLLUTION KEYWORDS FARM-WASTES HOGS WASTE-WATER-DISP
200	68	1244	WASTE-WATER-IRRIGA	SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS KEYWORDS HAZARDS IRRIGATION-WATER REC
400	73	1168	WASTE-WATER-IRRIGA	CALIFORNIA WASTE PONDS ARE PASSING THE TEST KEYWORDS IRRIGATION-STORAGE-PONDS LEACHING
300	68	1209	WASTE-WATER-POLLUT	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
700	70	1046	WASTE-WATER-POLLUT	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
700	70	1256	WASTE-WATER-POLLUT	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
100	68	1229	WASTE-WATER-TREATM	ANAEROBIC LAGOON TREATMENT OF MILKING PARLOR WASTES KEYWORDS ANAEROBIC-CONDITIONS INDUS

100	70	0299	WASTE-WATER-TREATM	HYDROLOGY OF SPRAY-RUNOFF WASTEWATER TREATMENT KEYWORDS HYDROLOGY WASTE-WATER-TREATME
100	70	1040	WASTE-WATER-TREATM	STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS KEYWORDS
100	70	1227	WASTE-WATER-TREATM	AGRICULTURAL LIVESTOCK WASTES LITERATURE REVIEW KEYWORDS AGRICULTURE INDUSTRIAL-WASTES
100	70	1230	WASTE-WATER-TREATM	LAGOONS AND OXIDATION PONDS LITERATURE REVIEW KEYWORDS WASTE-WATER-TREATMENT LAGOONS PO
100	71	1047	WASTE-WATER-TREATM	OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING KEYWORDS FARM-WASTES CONFINEMENT-PENS OX
100	71	1228	WASTE-WATER-TREATM	ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES KEYWORDS FARM-WASTES DISP
100	71	1232	WASTE-WATER-TREATM	WASTE WATER FROM SIMIAN PRIMATE FACILITIES KEYWORDS LABORATORY-ANIMALS WASTE-WATER-TREA
100	72	1129	WASTE-WATER-TREATM	BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS KEYWORDS
100	73	1128	WASTE-WATER-TREATM	USE OF DUCKWEED FOR WASTE TREATMENT AND ANIMAL FEED KEYWORDS FARM-WASTES WASTE-WATER-TR
100	73	1184	WASTE-WATER-TREATM	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
200	70	1113	WASTE-WATER-TREATM	AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES KEYWORDS OXIDATION-LAGOONS FARM-WAS
200	70	1114	WASTE-WATER-TREATM	ANIMAL MANURE LAGOONS A QUESTIONABLE TREATMENT SYSTEM KEYWORDS FARM-WASTES OXIDATION-LA
200	72	1054	WASTE-WATER-TREATM	APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF KEYWORDS
200	72	1152	WASTE-WATER-TREATM	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
300	68	1123	WASTE-WATER-TREATM	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	69	1061	WASTE-WATER-TREATM	RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300	71	0639	WASTE-WATER-TREATM	USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUNDW
300	71	1119	WASTE-WATER-TREATM	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
400	71	1136	WASTE-WATER-TREATM	FEEDERS HEAR WOES OF CONFINEMENT START KEYWORDS AMMONIA FEED-LOTS WASTE-STORAGE FARM-WA
600	73	1147	WASTE-WATER-TREATM	SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS KEYWORDS SOLID-WASTES STORAGE ULTIMATE-DISPO
700	70	1046	WASTE-WATER-TREATM	AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
700	70	1109	WASTE-WATER-TREATM	AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
100	66	1080	WATER	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	68	0481	WATER	RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE W
100	68	0481	WATER	RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE KEYWORDS WATER REUSE WASTE W
100	69	0416	WATER	A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING C
100	69	0679	WATER	NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS KEYWORDS EUTROPHICATION AMMONIA NITR
100	70	0031	WATER	VOLITILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEEDLOT
100	70	0365	WATER	AGRICULTURE FACES NEW CHALLANGES IN CURRENT ENVIRONMENTAL CRISIS KEYWORDS WATER SALIN
200	64	1240	WATER	THE PHYSIOLOGY OF THE COLIFORM GROUP KEYWORDS BACTERIA COLIFORMS POLLUTANTS SANITARY-E
200	66	0438	WATER	SOIL CHEMICAL CHANGES AND INFILTRATION RATE REDUCTION UNDER SEWAGE SPREADING KEYWORDS
200	70	0242	WATER	MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING KEYWORDS COD BOD REVERS
200	72	1089	WATER	A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES KEYWORDS
300		1077	WATER	SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300	68	0741	WATER	RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROMLIVESTOCK CONFINEMENT FACIL
300	70	1084	WATER	CONVERSION OF URBAN REFUSE TO OIL KEYWORDS RECYCLING TEMPERATURE SEWAGE-SLUDGE OIL WATE
300	71	1081	WATER	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
300	72	1260	WATER	NONPOINT RURAL SOURCES OF WATER POLLUTION KEYWORDS WATER POLLUTION RURAL AREAS FERTILIZ
400	71	0339	WATER	FLUSHING AWAY MANURE PROBLEMS KEYWORDS RECIRCULATED WATER HOGS OXIDATION-DITCH FLUSHI
400	71	1135	WATER	ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES KEYWORDS
300	69	1103	WATERCOURSES-LEGAL	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
100	69	0061	WATERSHEDS	SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
100	71	1212	WATERSHEDS	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
200	71	0282	WATERSHEDS	SEDIMENT EVERYBODY S POLLUTION-PROBLEM KEYWORDS EROSION SEDIMENTATION SCS WATERSHED
300	71	1058	WATERSHEDS-BASINS	DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
100	71	1212	WATERSHED-MANAGEME	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
300	71	1056	WATER-ALLOCATION-P	AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
300	71	0466	WATER-ANALYSIS	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS TEXAS HIGH PLAINS KE
300	71	1100	WATER-ANALYSIS	DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300	64	1110	WATER-BLOOM	LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
400	69	1225	WATER-CONSERVATION	CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
100	70	1211	WATER-CONSUMPTION	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
200	71	0781	WATER-CONSUMPTION	ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS KEYWORDS MODEL PHOSPHORUS BOD DUCK AERA
400	70	0109	WATER-CONSUMPTION	SOME CAUSES OF WET POULTRY MANURE KEYWORDS MOISTURE-CONTENT WATER-CONSUMPTION STRAINS
100	71	0674	WATER-CONTENT	CONTROL OF ODORS THROUGH MANURE MANAGEMENT KEYWORDS ODORS POULTRY WATER-CONTENT CONTR
100	70	1194	WATER-DEMAND	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
300		1105	WATER-FOWL	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
200	70	1175	WATER-LAW	ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL.
300	71	1246	WATER-LAW	FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
100	68	0090	WATER-LEVEL	WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS
200	70	0727	WATER-MANAGEMENT	EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES KEYWORD DRAINAGE-EFFECTS DE
300	70	1192	WATER-MANAGEMENT-A	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
700	72	1049	WATER-MANAGEMENT-A	ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
300	70	0384	WATER-MEASUREMENT	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300		1105	WATER-POLICY	RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
100	67	0076	WATER-POLLUTANTS	NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS KEYWORDS. NITRATES WATER-
100	62	1220	WATER-POLLUTION-SO	WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES KEYWORDS WATER-POLLUTION-SOURCES
100	66	1080	WATER-POLLUTION	NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100	67	0076	WATER-POLLUTION-SO	NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS KEYWORDS NITRATES WATER-
100	67	1218	WATER-POLLUTION	FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100	68	1121	WATER-POLLUTION	WATER POLLUTION FROM LAND RUNOFF KEYWORDS RUNOFF WATER-POLLUTION INFILTRATION SEDIMENTS
100	69	1042	WATER-POLLUTION-TR	THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT KEYWORDS SOURCES ANIMAL-WASTES
100	69	1198	WATER-POLLUTION-SO	CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER IDAHO RUNOFF FLOWARE KEYWORDS
100	69	1231	WATER-POLLUTION-EF	POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY LONG ISLAND, NEW YORK KEYWORDS
100	70	0102	WATER-POLLUTION	POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
100	70	1037	WATER-POLLUTION-EF	NITROGEN IN AGRICULTURE THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT KEYWORDS.
100	70	1041	WATER-POLLUTION-SO	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
100	70	1051	WATER-POLLUTION-CO	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS FISH-HATCHERIES SALMONIDS SOUR
100	70	1194	WATER-POLLUTION-SO	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1195	WATER-POLLUTION	AGRICULTURAL POLLUTION OF WATER BODIES KEYWORDS WATER-POLLUTION FARMS LIVESTOCK PHOSPHO
100	70	1217	WATER-POLLUTION	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	70	1217	WATER-POLLUTION-SO	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100	70	1233	WATER-POLLUTION-SO	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
100	70	1251	WATER-POLLUTION-SO	AIRBORNE AMMONIA EUTROPHIES LAKES KEYWORDS AMMONIA EUTROPHICATION NITROGEN ALGAE WATER-
100	71	0722	WATER-POLLUTION	THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
100	71	1038	WATER-POLLUTION-SO	CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100	71	1039	WATER-POLLUTION-SO	NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100	71	1212	WATER-POLLUTION-SO	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100	71	1214	WATER-POLLUTION	THE DISPOSAL OF AGRICULTURAL WASTE KEYWORDS WASTE-DISPOSAL FARM-WASTES WATER-POLLUTION
100	71	1223	WATER-POLLUTION-EF	EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS KEYWORDS POULTRY BLOOD DURSBAN CHOLIN
100	71	1236	WATER-POLLUTION-SO	MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT KEYWORDS PATH-OF-POLLUTANTS GL
100	72	1097	WATER-POLLUTION	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
100	72	1193	WATER-POLLUTION-SO	CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS KEYWOR
100	72	1215	WATER-POLLUTION-SO	AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES KE
100	72	1224	WATER-POLLUTION-SO	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
100	73	1087	WATER-POLLUTION	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	73	1184	WATER-POLLUTION	ANIMAL WASTE MANAGEMENT IN HAWAII KEYWORDS FARM-WASTES LIVESTOCK WASTE-DISPOSAL WASTE-T
100	70	1237	WATER-POLLUTION-CO	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	66	0118	WATER-POLLUTION	HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES KEYWORDS PUBLIC-HEALT
200	66	0120	WATER-POLLUTION	STORMWATER RUNOFF FROM CATTLE FEEDLOTS KEYWORDS STORAGE NITROGEN ORGANIC-WASTE RAINFA

200 66 1112 WATER-POLLUTION-SO CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR KEYWORDS WATER-POLLUTION-SOURCES SURFACE-RUNO
200 67 0734 WATER-POLLUTION CATTLE FEEDLOT WASTE PROBLEMS KEYWORDS FARM-WASTES FEEDLOTS RUNOFF SPRINKLER-IRRIGATION
200 67 1243 WATER-POLLUTION-SO THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200 67 1243 WATER-POLLUTION-EF THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES KEYWORDS ANIMAL-WASTES WASTES
200 68 1186 WATER-POLLUTION TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES KEYWORDS
200 69 0157 WATER-POLLUTION ANIMAL WASTE MANAGEMENT KEYWORDS BOD COD DO PH WATER-POLLUTION AIR-POLLUTION SOIL-CON
200 69 0162 WATER-POLLUTION THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES KE
200 69 0181 WATER-POLLUTION FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200 69 0185 WATER-POLLUTION WASTE DISPOSAL MANAGEMENT KEYWORDS NITROGEN WATER-POLLUTION INCINERATION STORAGE MORT
200 69 0516 WATER-POLLUTION PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE KEYWORDS FARM-
200 69 0517 WATER-POLLUTION QUANTITIES AND CHARACTERISTICS OF FARM ANIMAL-WASTES KEYWORDS WATER-POLLUTION POPULAT
200 69 0521 WATER-POLLUTION WATER-QUALITY PROBLEMS KEYWORDS WATER-POLLUTION NITROGEN PHOSPHORUS NITRATES BASE-FL
200 69 0535 WATER-POLLUTION WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POL
200 69 0536 WATER-POLLUTION ROLE OF UNIVERSITY-EXTENSION KEYWORDS ENVIRONMENT EDUCATION UNIVERSITIES WATER-POLLUT
200 69 0539 WATER-POLLUTION PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE KEYWORDS CATTLE WATER-POLLUTION FEEDL
200 69 1116 WATER-POLLUTION-SO MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200 69 1117 WATER-POLLUTION-CO WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200 69 1185 WATER-POLLUTION ECONOMICS OF WATER POLLUTION CONTROL KEYWORDS POLLUTION WATER-POLLUTION ECONOMICS HERBI
200 70 0114 WATER-POLLUTION SWINE MANURE - LIABILITY OR ASSET KEYWORDS WATER-POLLUTION AIR-POLLUTION ECONOMICS CO
200 70 0214 WATER-POLLUTION RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION KEYWORDS BOD COD FERTILIZERS
200 70 0217 WATER-POLLUTION POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY-LITTER MANURE APPLICATION IN ARKA
200 70 0221 WATER-POLLUTION LAND-DISPOSAL OF DAIRY-FARM-WASTE KEYWORDS EFFLUENT NITRATE PHOSPHATE GROUNDWATER WATE
200 70 0225 WATER-POLLUTION LEGAL-RESTRAINTS ON AGRICULTURAL-POLLUTION KEYWORDS ODORS WATER-POLLUTION PESTICIDES
200 70 1050 WATER-POLLUTION THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200 70 1050 WATER-POLLUTION-CO THE LEGAL FUTURE NEW THEORIES OF ENVIRONMENTAL PROTECTION KEYWORDS ENVIRONMENTAL-SANI
200 70 1053 WATER-POLLUTION-SO BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION KEYWORD
200 70 1118 WATER-POLLUTION-CO WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200 70 1175 WATER-POLLUTION-CO ANIMAL WASTE DISPOSAL KEYWORDS WATER-LAW REGULATION PERMITS FEED-LOTS WASTE-DISPOSAL
200 71 0277 WATER-POLLUTION THE FARMERS CONCERN KEYWORDS PESTICIDES WATER-POLLUTION PANIC-POWER MIS-USE RESISTA
200 71 0440 WATER-POLLUTION LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
200 71 0586 WATER-POLLUTION-SO CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT KEYWORDS LIVESTOCK-WASTES WATER
200 71 0644 WATER-POLLUTION ENVIRONMENTAL QUALITY AND PRODUCTIVITY KEYWORDS WATER-QUALITY WATER-POLLUTION
200 71 0647 WATER-POLLUTION ENVIRONMENTAL PROBLEMS IN THE FOOD PROCESSING INDUSTRY KEYWORDS LIQUID-WASTES INDUSTRI
200 71 0783 WATER-POLLUTION SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION KEYWORDS ODOR DRY
200 71 0788 WATER-POLLUTION LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS KEYWORDS ODORS LEGAL-A
200 71 0832 WATER-POLLUTION GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS KEYWORDS WATER-POLLUTION SA
200 71 1033 WATER-POLLUTION NITROGEN IN INDUSTRY KEYWORDS NITROGEN INDUSTRY FERTILIZERS WATER-POLLUTION AMMONIA FAR
200 71 1094 WATER-POLLUTION AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
200 71 1095 WATER-POLLUTION BIOLOGICAL ASPECTS OF AGRICULTURES EFFECTS ON ENVIRONMENTAL QUALITY KEYWORDS
200 71 1096 WATER-POLLUTION ENGINEERING AGRICULTURAL WASTES KEYWORDS DEHYDRATION LAND-USE PROTEINS EROSION TECHNOLO
200 71 1099 WATER-POLLUTION-CO SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
200 71 1234 WATER-POLLUTION-EF SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES KEYWORDS
200 71 1252 WATER-POLLUTION-SO NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200 72 1010 WATER-POLLUTION PROCEEDINGS LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW KEYWORDS LIVESTOCK FARM-WASTES
200 72 1011 WATER-POLLUTION NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS FARM-WASTE FEED-LOTS GROUNDWATER R
200 72 1012 WATER-POLLUTION REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM KEYWORDS RESEARCH-AND-DEVELOPMENT LIVESTOCK
200 72 1013 WATER-POLLUTION POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200 72 1016 WATER-POLLUTION CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF KEYWORDS CONDUCTIVITY FARM-WASTES RUNOFF TH
200 72 1020 WATER-POLLUTION POLLUTION OF AIR WATER AND SOIL BY LIVESTOCK KEYWORDS AIR-POLLUTION WATER-POLLUTION SOI
200 72 1021 WATER-POLLUTION APPLICATION UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES KEYWORDS FARM-WASTES FEED-LOTS
200 72 1108 WATER-POLLUTION-SO EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
200 73 1083 WATER-POLLUTION CONTINUOUS SOLID WASTE RETORT-FEASIBILITY STUDY KEYWORDS CATTLE FARM-WASTES WASTE-DISPO
300 1077 WATER-POLLUTION SOIL CONDITIONS UNDER FEEDLOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES
300 1105 WATER-POLLUTION-CO RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS KEYWORDS NEBRASKA WATER-POLLUTION-
300 26 1204 WATER-POLLUTION OHIO STOCK FOOD COMPANY V GINTLING STREAM POLLUTION BY UPPER RIPARIAN HOG FARM KEYWORDS
300 30 1205 WATER-POLLUTION SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300 46 1207 WATER-POLLUTION FAIRES V DUPREE WATER POLLUTION FROM ANIMAL WASTES KEYWORDS ARKANSAS HOGS ANIMAL-WASTES
300 46 1208 WATER-POLLUTION GREEN V MCCLOUD ACTION TO ENJOIN SEWAGE FLOW KEYWORDS KENTUCKY DOMESTIC-WASTES WATER-PO
300 49 1210 WATER-POLLUTION MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300 53 1206 WATER-POLLUTION POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300 64 1110 WATER-POLLUTION-EF LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300 67 1249 WATER-POLLUTION AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300 67 1249 WATER-POLLUTION-SO AGRICULTURAL AND RELATED WASTES CONTROL KEYWORDS WASTE-DISPOSAL KANSAS DOMESTIC-ANIMALS
300 67 1250 WATER-POLLUTION-SO DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MID
300 68 1043 WATER-POLLUTION-EF WASTES IN RELATION TO AGRICULTURE AND FORESTRY KEYWORDS SOURCES WATER-POLLUTION-EFFECTS
300 68 1122 WATER-POLLUTION NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS KEYWORDS DOMESTIC-ANIMALS WASTES FERTIL
300 68 1123 WATER-POLLUTION A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300 68 1202 WATER-POLLUTION OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300 68 1209 WATER-POLLUTION-SO ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300 69 1060 WATER-POLLUTION-CO FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300 69 1061 WATER-POLLUTION RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300 69 1061 WATER-POLLUTION-CO RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL KEYWORDS IOWA FARM-WASTES L
300 69 1103 WATER-POLLUTION-SO ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300 69 1125 WATER-POLLUTION-SO ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA KEYWORDS LIVESTOCK WASTES FARM-W
300 69 1180 WATER-POLLUTION CATTLE FEEDLOT POLLUTION STUDY KEYWORDS CATTLE FEED-LOTS FARM-WASTES WASTE-DISPOSAL RUN
300 69 1203 WATER-POLLUTION-CO FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300 70 0205 WATER-POLLUTION INTRODUCTION KEYWORDS ODOR WATER-POLLUTION AIR-POLLUTION SOIL-CONTAMINATION INSECTS DI
300 70 0384 WATER-POLLUTION THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300 70 1036 WATER-POLLUTION AGRICULTURE THE UNSEEN FOE IN THE WAR ON POLLUTION KEYWORDS AGRICULTURE WATER-POLLUTIO
300 70 1059 WATER-POLLUTION-SO NITRATE ACCUMULATION IN KANSAS GROUNDWATER KEYWORDS NITRATES GROUNDWATER FERTILIZATION
300 70 1192 WATER-POLLUTION-EF IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300 70 1201 WATER-POLLUTION OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
300 70 1247 WATER-POLLUTION DISPOSAL OF INDUSTRIAL WASTES KEYWORDS OREGON INDUSTRIAL-WASTES WASTE-DISPOSAL POLLUTIO
300 71 0697 WATER-POLLUTION ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF KEYWORD WATER-POLLUTION FARM-LAGOON
300 71 1008 WATER-POLLUTION ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
300 71 1055 WATER-POLLUTION-CO ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300 71 1057 WATER-POLLUTION-EF EFFECTS OF POLLUTION ESPECIALLY FROM FEEDLOTS ON FISHES IN THE UPPER NEOSHO RIVER BASI
300 71 1058 WATER-POLLUTION-SO DEVELOPMENT OF A MATHEMETICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWA
300 71 1098 WATER-POLLUTION-CO BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS KEYWORDS AQUATIC-PLANTS FISH PO
300 71 1100 WATER-POLLUTION-SO DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT KEYWORDS MERCURY NEUTRO
300 71 1106 WATER-POLLUTION-CO MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO
300 71 1107 WATER-POLLUTION-SO WATER POLLUTION CONTROL LEGISLATION AGRICULTURAL RUNOFF PART 6 KEYWORDS AGRICULTURAL-C
300 71 1126 WATER-POLLUTION-EF SAVANNAH RIVER ECOLOGY LABORATORY ANNUAL REPORT 1971 KEYWORDS BORON NUTRIENT-REQUIREMEN
300 71 1246 WATER-POLLUTION-CO FEEDLOT WASTE MANAGEMENT KEYWORDS WATER-POLLUTION-CONTROL CONFINEMENT-PENS CATTLE POLLU
300 72 1003 WATER-POLLUTION CATTLE FEEDLOTS AND THE ENVIRONMENT KEYWORDS FEED-LOTS DESIGN-CRITERIA AIR-POLLUTION WA
300 72 1052 WATER-POLLUTION-SO EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUNDWATER SYSTEMS KEYWORDS
300 73 1009 WATER-POLLUTION STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
400 65 1127 WATER-POLLUTION-SO WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400 65 1141 WATER-POLLUTION-SO NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
400 67 1226 WATER-POLLUTION-SO PHOSPHORUS & WATER POLLUTION KEYWORDS PHOSPHORUS GROUNDWATER WATER-POLLUTION-SOURCES SE

400 68 0229 WATER-POLLUTION THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTIO
400 69 1045 WATER-POLLUTION-SO AGRICULTURES CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE KEYWORDS EUTROPHICATION NU
400 69 1225 WATER-POLLUTION CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
400 70 0046 WATER-POLLUTION FARM WASTE DISPOSAL - AMENITY AND GOOD NEIGHBOURLINESS KEYWORDS ODOR WATER-POLLUTION BU
400 70 1176 WATER-POLLUTION ANIMAL WASTE DISPOSAL KEYWORDS ANIMAL-WASTES WASTE-DISPOSAL WATER-POLLUTION NITRATES
400 71 1137 WATER-POLLUTION-CO REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEED
400 71 1143 WATER-POLLUTION-CO A LOVELY NEW SCENT FOR MANURE KEYWORDS AIR-POLLUTION SAGEBRUSH FARM-WASTES ODOR
400 71 1144 WATER-POLLUTION CONFINEMENT FEEDING PROS, CONS, AND TIPS KEYWORDS RUNOFF WATER-POLLUTION AIR-POLLUTION
400 71 1174 WATER-POLLUTION-CO LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER KEYWORDS AQUIFER CATTLE FARM-WASTES FEED-L
400 71 1196 WATER-POLLUTION-CO CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
400 73 1063 WATER-POLLUTION AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
400 73 1158 WATER-POLLUTION-CO DO YOU HAVE TO MOVE EM OR CAN YOU LEAVE EM KEYWORDS FEED-LOTS RUNOFF WASTE-STORAGE WAST
500 70 0388 WATER-POLLUTION CHEMISTRY OF SEDIMENT IN WATER KEYWORDS NITROGEN PHOSPHORUS WATER-POLLUTION CLAYS ORG
500 70 0396 WATER-POLLUTION THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE KEYWORDS DDT SOURCES CONCENTRATION
500 70 0404 WATER-POLLUTION MOVEMENT OF AGRICULTURAL-POLLUTANTS WITH GROUNDWATER KEYWORDS WATER-POLLUTION ZONE-OF-
500 70 0408 WATER-POLLUTION LEGAL-ASPECTS KEYWORDS WATER-POLLUTION PESTICIDES SILTING FERTILIZERS POINT-SOURCES N
500 70 0410 WATER-POLLUTION ALLIANCE FOR ACTION KEYWORDS WATER-POLLUTION FEEDLOTS REGISTRATION INVENTORY WASTE-MA
500 70 0411 WATER-POLLUTION ACCOMPLISHMENTS AND GOALS KEYWORDS WATER-POLLUTION WATER-QUALITY FWPCA STANDARDS ENVI
500 71 1072 WATER-POLLUTION HUMAN AND ANIMAL WASTES AS FERTILIZERS KEYWORDS FARM-WASTES SEWAGE WASTE-DISPOSAL IRRIG
500 71 1255 WATER-POLLUTION-SO DISEASES OF FEEDLOT CATTLE KEYWORDS ANIMAL-DISEASES CATTLE FEED-LOTS FARM-WASTES WATER-
600 69 1005 WATER-POLLUTION-CO FACILITY DESIGN KEYWORDS FEED-LOTS RUNOFF WATER-POLLUTION-CONTROL DESIGN FARM-WASTES
600 73 1065 WATER-POLLUTION EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE KEYWORDS
700 70 1046 WATER-POLLUTION-SO AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNIC
700 70 1066 WATER-POLLUTION WATER POLLUTION BY SWINE PRODUCTION OPERATIONS KEYWORDS EFFLUENT WASTE-DISPOSAL HYDROGR
700 70 1109 WATER-POLLUTION-SO AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES KEYWORDS FARM-WASTES HOGS A
700 71 1120 WATER-POLLUTION-SO SOURCES OF PHOSPHATE AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STR
700 72 1049 WATER-POLLUTION-SO ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100 70 1111 WATER-POLYCHLORINA POLYCHLORINATED BIPHENYLS KEYWORDS CHLORINATED-HYDROCARBON-PESTICIDES FOOD-CHAINS PESTI
300 68 1123 WATER-PURIFICATION A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
100 66 1080 WATER-QUALITY NITROGEN COMPOUNDS IN NATURAL WATER--A REVIEW KEYWORDS NITROGEN WATER FARM-WASTES GROUN
100 67 1218 WATER-QUALITY FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
100 67 1258 WATER-QUALITY RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
100 69 0375 WATER-QUALITY RURAL-RUNOFF AS A FACTOR IN STREAM-POLLUTION KEYWORDS WATER-QUALITY SOIL-EROSION COLIF
100 70 1217 WATER-QUALITY APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
100 71 0453 WATER-QUALITY PLANT NUTRIENTS AND WATER QUALITY KEYWORDS NUTRIENTS WATER-QUALITY
100 71 0484 WATER-QUALITY RELATIONSHIPS OF SALMONELLA TO FECAL COLIFORMS IN BOTTOM SEDIMENTS KEYWORD INDICATORS
100 71 0681 WATER-QUALITY EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS KEYWO
100 71 0722 WATER-QUALITY THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS A
100 71 1038 WATER-QUALITY CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF KEYWORDS LAKES WATER-QUALITY TEXAS
100 71 1039 WATER-QUALITY NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON OHIO KEYWORDS
100 71 1212 WATER-QUALITY EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
100 72 1097 WATER-QUALITY NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
200 66 0144 WATER-QUALITY TREATMENT OF DUCK WASTES AND THEIR EFFECTS ON WATER QUALITY KEYWORDS COLIFORMS BOD POU
200 69 0158 WATER-QUALITY REFLECTIONS ON POLLUTION CONTROL KEYWORDS WATER-QUALITY COST-BENEFIT-RATIO ENVIRONMEN
200 69 0423 WATER-QUALITY 2 ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT KEYWORDS RAINFALL-RUNOFF EQUIPMENT DESIGN-D
200 69 0426 WATER-QUALITY REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT KEYWORDS LEGISLATION RUNOFF WATER-QUAL
200 69 0523 WATER-QUALITY WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN W
200 69 0708 WATER-QUALITY TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS KEYWORDS BOD COD TEST-PR
200 69 1116 WATER-QUALITY MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION KEYWORDS POLLUTION-CONTROL ORGANIC-LOADI
200 69 1117 WATER-QUALITY WATER POLLUTION BY NUTRIENTS--SOURCES EFFECTS AND CONTROL PAPERS PRESENTED AT 1966 ANNU
200 70 0226 WATER-QUALITY A BALANCE-SHEET-METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL-WASTES TO SURFAC
200 70 1118 WATER-QUALITY WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS KEYWORDS CONFERENCES WATER-QUALITY SO
200 71 0483 WATER-QUALITY HOW CAN PORK-PRODUCERS COMPLY WITH ENVIRONMENTAL QUALITY-STANDARDS KEYWORDS WATER-QUA
200 71 0642 WATER-QUALITY AGRICULTURAL WASTES PRINCIPLES AND GUIDELINES FOR PRACTICALSOLUTIONS KEYWORDS WATER-
200 71 0644 WATER-QUALITY ENVIRONMENTAL QUALITY AND PRODUCTIVITY KEYWORDS WATER-QUALITY WATER-POLLUTION
200 71 0650 WATER-QUALITY GUIDELINES FOR MINIMIZING PESTICIDE POLLUTION KEYWORDS PESTICIDE-DRIFT WATER-QUALITY P
200 71 0774 WATER-QUALITY MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY KEYWORDS SPRINKLER-I
200 71 0829 WATER-QUALITY WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND DRY DAIRY
200 71 1252 WATER-QUALITY NITRATE POLLUTION OF WATER KEYWORDS WATER-POLLUTION-SOURCES GROUNDWATER SURFACE-WATERS
200 72 1108 WATER-QUALITY EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF KEYWORDS
300 30 1205 WATER-QUALITY SUMNER V ODELL INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE KEYWORDS
300 53 1206 WATER-QUALITY POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300 64 1110 WATER-QUALITY LAKE TERMINOLOGY WATER BLOOM KEYWORDS EUTROPHICATION ALGAE DUCKS COLOR FISHKILL LAKES
300 69 0093 WATER-QUALITY HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL KEYWORDS BOD DO RIVERS WATER-QUALITY STREAM
300 69 1060 WATER-QUALITY FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300 69 1103 WATER-QUALITY ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300 69 1203 WATER-QUALITY FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300 70 1248 WATER-QUALITY LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY REPORT NUMBER ONE KEYWORDS
300 71 1055 WATER-QUALITY ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300 71 1056 WATER-QUALITY AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
300 73 1009 WATER-QUALITY STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF KEYWORDS WATER-POLLUTION CATTLE FARM-WASTES
500 70 0409 WATER-QUALITY ECONOMIC-ASPECTS KEYWORDS WATER-QUALITY COSTS BENEFITS QUALITY-LEVELS EXTERNALITIES M
500 70 0411 WATER-QUALITY ACCOMPLISHMENTS AND GOALS KEYWORDS WATER-POLLUTION WATER-QUALITY FWPCA STANDARDS ENVI
600 72 1071 WATER-QUALITY A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE KEYWORDS
100 69 0037 WATER-QUALITY-ACT WATER POLLUTION CONTROL LEGISLATION-CONDENSATION KEYWORDS WATER-QUALITY-ACT BOD PHOSP
200 69 0181 WATER-QUALITY-ACT FEEDLOT POLLUTION CONTROL-A PROFILE FOR ACTION KEYWORDS WATER-POLLUTION LEGISLATION G
200 69 0545 WATER-QUALITY-ACT HOW TO CONDUCT A STATE INVENTORY KEYWORDS CATTLE INVESTIGATIONS RUNOFF LEGISLATION CO
200 71 0663 WATER-QUALITY-ACT INTEGRATION OF COMPONENTS INTO A SYSTEM KEYWORDS WATER-QUALITY-ACT FERTILIZERS DISPOS
300 70 1192 WATER-QUALITY-ACT IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
400 68 0038 WATER-QUALITY-ACT PONDS STOP POLLUTION FROM FEEDLOTS KEYWORDS PONDS KANSAS WATER-QUALITY-ACT DAMS RUNO
200 69 0546 WATER-QUALITY-CONT THE KANSAS ANIMAL WASTE CONTROL PROGRAM KEYWORDS LEGISLATION CATTLE INVESTIGATIONS WA
300 53 1206 WATER-QUALITY-CONT POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300 69 1060 WATER-QUALITY-CONT FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION-CONTROL
300 69 1203 WATER-QUALITY-CONT FOULING OF WATERS A MISDEMEANOR KEYWORDS NORTH-DAKOTA SOURCES WATER-POLLUTION
300 70 1201 WATER-QUALITY-CONT OKLAHOMA FEED YARDS ACT KEYWORDS OKLAHOMA WATER-POLLUTION CONTROL SURFACE
400 71 1196 WATER-QUALITY-CONT CATTLE FEEDERS MUST COMPLY WITH ANTI POLLUTION LAWS KEYWORDS LEGAL-ASPECTS POLLUTION-AB
700 72 1049 WATER-QUALITY-CONT ECONOMICS OF WATER QUALITY MANAGEMENT EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTU
100 67 1218 WATER-QUALITY-MANA FUTURE WATER QUALITY DESIGN KEYWORDS WATER-QUALITY WATER-POLLUTION WATER-QUALITY-MANAGE
200 69 0530 WATER-QUALITY-STAN THE ROLE OF THE FEDERAL WATER-POLLUTION CONTROL ADMINISTRATION IN FARM-ANIMAL-WASTE AND
400 70 1237 WATER-REQUIREMENTS POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200 71 0611 WATER-RESOURCES-DE U S D A TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS KEYWORDS ADMINISTRATIVE-AGENC
200 71 0613 WATER-RESOURCES-DE TECHNICAL AND FINANCIAL ASSISTANCE FOR THE CONTROL OF ANIMAL WASTES KEYWORDS ADMINIST
300 71 1055 WATER-RESOURCES ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300 71 1056 WATER-RESOURCE-INV AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION KEYWO
400 69 1225 WATER-RESOURCE-DEV CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT KEYWORDS WATER-RESOURCE-DEV
100 73 1263 WATER-RESTRICTION CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRIC
200 68 1242 WATER-REUSE THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS KEYWORDS WATER-REUSE PATHOGEN
300 68 1123 WATER-REUSE A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300 69 1103 WATER-REUSE ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300 71 1106 WATER-REUSE MANAGING OUR ENVIRONMENT KEYWORDS MANAGEMENT ENVIRONMENT AGRICULTURE WATER-POLLUTION-CO

KEYWORD INDEX

400	68	0229	WATER-SHED-PROTECT	THE FARM ROLE IN WATER-QUALITY MANAGEMENT KEYWORDS SEDIMENT FERTILIZERS WATER-POLLUTIO
300	69	1103	WATER-SOURCES	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
400	71	0309	WATER-SPRAY	CONTROL OF POULTRY HOUSE EXHAUST ODORS KEYWORDS FILTERS DUST WATER-SPRAY CONTROL POUL
200	71	0279	WATER-SUPPLIES	POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS KEYWORDS NITRATE EUTROPHICATI
100	70	1194	WATER-SUPPLY	REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS KEYWORDS EUTROPHICATION
100	70	1211	WATER-SUPPLY	ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES KEYWORDS WATER-SUPPLY AGRICULTURAL-ENGI
100	71	1212	WATER-SUPPLY	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
300	53	1206	WATER-SUPPLY	POLLUTION OF STREAMS KEYWORDS DELAWARE WATER-POLLUTION STREAMS SOURCES
300	68	1209	WATER-SUPPLY	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
300	69	1103	WATER-SUPPLY	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
400	65	1127	WATER-SUPPLY	WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
100	69	0052	WATER-TABLE	NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES KEYWORDS PIEZOMETERS FLOW-N
300	69	1044	WATER-TABLE	IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN KEYWORDS NITRIFICATION SOIL-NI
300	69	1124	WATER-TABLE	EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANS
300	71	1008	WATER-TABLE	ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF KEYWORDS FEED-LOTS WASTE-DISPOSAL R
400	69	0016	WATER-TABLE	FERTILIZERS AND FEEDLOTS - WHAT ROLE IN GROUNDWATER POLLUTION KEYWORDS FERTILIZERS SO
500	70	0404	WATER-TABLE	MOVEMENT OF AGRICULTURAL-POLLUTANTS WITH GROUNDWATER KEYWORDS WATER-POLLUTION ZONE-OF-
500	70	0402	WATER-TRANSFER	DISEASE TRANSMISSION OF WATER-BORN ORGANISMS OF ANIMAL ORIGIN KEYWORDS PATHOLOGY WATE
200	70	1115	WATER-TREATMENT	CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS KEYWORDS FARM-WASTES NITROGEN-COMPOUNDS WA
200	71	0656	WATER-TREATMENT	CHLORINATION OF WASTEWATER EFFLUENTS KEYWORDS DISINFECTION WATER-TREATMENT PUBLIC-HEA
200	71	1094	WATER-TREATMENT	AGRICULTURE AND POLLUTION--SOCIO-ECONOMIC ASPECTS KEYWORDS WATER-POLLUTION ECONOMICS SU
300	68	1123	WATER-TREATMENT	A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER K
300	70	1192	WATER-TREATMENT	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
300	69	1103	WATER-USERS	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
300	71	1055	WATER-USERS	ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971 KEYWORDS WATER-RESOURCES WATER-USER
300	70	0384	WATER-USES	THE ECONOMICS OF CLEAN WATER VOLUME TWO ANIMAL WASTES PROFILE KEYWORDS COSTS WATER-PO
300	49	1210	WATER-UTILIZATION	MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM KEYWORDS JUDICIAL-DECISIONS D
300	70	1192	WATER-UTILIZATION	IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY KEYWORDS CONTROL POLLUTION-
100	70	1041	WATER-WELLS	STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AG
300	68	1202	WATER-WELLS	OWENS V UNITED STATES LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICI
300	68	1209	WATER-WELLS	ATKINSON V HERINGTON CATTLE COMPANY FEED LOT OPERATORS AND CATTLE OWNERS JOINT LIABILI
400	65	1127	WATER-WELLS	WHY NITRATES IN WATER SUPPLIES KEYWORDS NITRATES FEED-LOTS FERTILIZERS FARM-WASTES MISS
400	65	1141	WATER-WELLS	NITRATES DANGER FOR HUMANS, TOO KEYWORDS FEED-LOTS WATER-WELLS NITRATES FARM-WASTES MIS
100	70	1217	WATER-ZONING	APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY KEYWORDS REACREATION
700	70	1256	WAVES	MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS KEYWORDS PHOSPHATES SOIL-CONTAMINAT
400	71	1139	WEATHER	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
100	70	1237	WEEDS	POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES KEYWORDS SOURCES FISH-HATCHERIES SALMON
200	69	0197	WEIGHT	REMOVAL OF WATER FROM ANIMAL MANURES KEYWORDS POULTRY ODOR MOISTURE-CONTENT WEIGHT VO
100	70	0014	WEIGHT-GAIN	INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE KEYWORDS CONFINEMENT-PENS WEIGHT-GA
200	72	1152	WEIGHT-GAIN	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
100	71	0461	WEIGHT-GAINS	FUMIGATION AND REUSE OF BROILER LITTER KEYWORDS POULTRY PERFORMANCE MORTALITY WEIGHT-G
100	68	0090	WEIRS	WILSCHWITZ RUNOFF SAMPLER KEYWORDS NUTRIENTS WATER-LEVEL PREDICTION-EQUATIONS WEIRS
100	69	0061	WEIRS	SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS KEYWORDS FERTILIZERS N P K
200	71	0703	WEIRS	FEEDLOT WASTE MANAGEMENT SOME SOLUTIONS TO THE PROBLEM KEYWORDS MOISTURE-CONTENT SAM
100	72	1224	WEIR-GAUGES	FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA BACTERIA IN LAND DRAINAGE WATER
300	67	0711	WELL	THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
100	72	1097	WELLS	NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS
200	69	0482	WELLS	THE EFFECTS OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS KEYWORD GROUNDWATER NUT
200	69	0542	WELLS	ANIMAL WASTE POLLUTION-OVERVIEW OF THE PROBLEM KEYWORDS RUNOFF GROUNDWATER FISH-KILL
300	71	0269	WELLS	INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS
400	73	1063	WELLS	AGRICULTURE AND ENVIRONMENT KEYWORDS PHOTOSYNTHESIS WATER-POLLUTION NITRATES PHOSPHATES
300	67	0711	WELL-REGULATIONS	THE NITRATE HAZARD IN WELL WATER KEYWORDS WELL DATA FEED-LOTS WELL-REGULATIONS PERCOL
100	66	0341	WEST-OF-SCOTLAND	AGRICULTURE AND THE PREVENTION OF RIVER-POLLUTION, AS EXPERIENCED IN THE WEST-OF-SCOTLA
100	64	0072	WHEAT	A NOTE ON THE UTILIZATION BY CHICKENS OF ENERGY FROM FAECES KEYWORDS WHEAT SORGUUM NIT
400	71	0293	WHEAT	SODIUM EGG-SHELLS EFF-QUALITY EGG-PRODUCTION ALBUMEN SOUTHERN WORKERS REPORT RESEARCH K
300	71	1119	WHEY	TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PROD
100	65	1091	WHITE-LEGHORN-HENS	TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE KEYWORDS
300	70	1104	WHITE-PERCH	FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES KEYWORDS DISEASES VECTROS-BIOLOGY
100	71	1212	WILDLIFE	EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH MOUNTAIN WATERSHEDS BACTERIOLOGICAL IN
300	69	1103	WILDLIFE-CONSERVAT	ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA KEYWORDS OKLAHOMA WATER-POLLUTION-SOURC
100	67	1258	WILD-LIFE	RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER KEYWORDS
100	67	0041	WILTING-POINT	THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL KEYW
400	71	1139	WIND	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
200	72	1152	WINDBREAKS	PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIROMENT DURING A FAL
600	72	1154	WINDBREAKS	WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA KEYWORDS FEED-LOTS FARM-WASTES L
100	64	0333	WINDROW-METHOD	AEROBIC-DIGESTION, COMPOSTING OF POULTRY-MANURE KEYWORDS AERATION WINDROW-METHOD PRE
100	73	1087	WINDS	ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUNDS VOLATILIZED FROM A LARGE DAIRY ARE
100	70	1233	WIND-EROSION	LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND KEYWORDS WATER-POLLUTION-SOURC
400	71	1139	WINTER	HOW WEATHER AFFECTS FEEDLOT PERFORMANCE KEYWORDS MUD RAIN WIND FEED-LOTS FARM-WASTES WE
600	68	0471	WINTER	ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION KEYWORDS
100	70	0025	WIRE-FLOOR	BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY KEYW
200	69	0522	WISCONSIN	FUTURE-TRENDS IN LIVESTOCK-PRODUCTION KEYWORDS WISCONSIN WASTE-DISPOSAL DAIRY CATTLE
200	69	0523	WISCONSIN	WHAT AND WHERE ARE THE CRITICAL-SITUATIONS WITH FARM ANIMAL-WASTES AND BY-PRODUCTS IN W
200	69	0527	WISCONSIN	WATER-RESOURCES-CENTER RESEARCH ON ANIMAL-WASTES AND WATER-QUALITY KEYWORDS EUTROPHIC
200	69	0532	WISCONSIN	COST-SHARING UNDER THE AGRICULTURAL-CONSERVATION-PROGRAM KEYWORDS POLLUTION-ABATEMENT
200	69	0533	WISCONSIN	THE REGULATORY ROLE OF THE DEPARTMENT OF NATURAL-RESOURCES KEYWORDS LEGISLATION POLLU
200	71	1099	WISCONSIN	SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY KEYWORDS MICROORGANISMS WATER-POL
600	72	1156	WISCONSIN	SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE KEYWORDS
300	69	0004	WOOD	CONFINEMENT SWINE HOUSING - SLOTTED FLOORS-FACT SHEET KEYWORDS MATERIALS REINFORCED-C
300	71	1081	WOOD	CONVERTING ORGANIC WASTES TO OIL KEYWORDS RECYCLING SEWAGE-SLUDGE FARM-WASTES AGRICULTU
200	71	0851	WOOD-WASTES	NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES KEYWORDS
200	69	0171	YEAST-FERMENTATION	CATTLE MANURE- REUSE THROUGH WASTELAGE FEEDING KEYWORDS FEEDS PERFORMANCES WASTELAGE
100	73	1086	YOLK-PIGMENTATIONS	THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF E
100	68	0287	ZEALAND	METHODS FOR DISPOSAL OF POULTRY MANURE KEYWORDS NEW ZEALAND IRRIGATION DRYING STORAGE
200	71	0603	ZERO-DISCHARGE	EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY KEYWORDS TREATME
200	71	0811	ZINC	BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES KEYWORDS COPPER ZINC ANTIBI
700	70	0231	ZINC	THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WAS
500	70	0404	ZONE-OF-SATURATION	MOVEMENT OF AGRICULTURAL-POLLUTANTS WITH GROUNDWATER KEYWORDS WATER-POLLUTION ZONE-OF-
100	70	0102	ZONING	POLLUTION CONTROL-FEEDLOT OPERATIONS KEYWORDS HOGS CONFINEMENT LABOR WATER-POLLUTION
200	69	0534	ZONING	COLUMBIA-COUNTY PROGRAM KEYWORDS POLLUTION-ABATEMENT ODOR ZONING NITRATES PROGRAM
200	69	0535	ZONING	WHAT ARE THE PROBLEMS IN WALWORTH-COUNTY KEYWORDS ZONING LAND-USE REGULATION WATER-POL
200	71	0440	ZONING	LEGAL-ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK-PRODUCTION KEYWORDS NUI
200	71	0605	ZONING	CATTLE FEEDLOT POLLUTION KEYWORDS CONFINEMENT-PENS RUNOFF GROUNDWATER-FERTILITY SOIL-
300	72	1157	ZONING	CANADA ANIMAL WASTE MANAGEMENT GUIDE KEYWORDS FARM-WASTES LIVESTOCK PRODUCTION DESIGN M
100	66	0473	ZOO	BOD OF CAPTIVE WILD ANIMAL WASTES KEYWORDS ZOO TOTAL-SOLID BOD WASTES
300	71	1245	ZOOPLANKTON	EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS KEYWORDS RESERVOIR FISHFILL
500	71	1254	ZYMOMONAS-ANAEROBI	ISOLATION OF ANAEROBES KEYWORDS ISOLATION CULTURES SOIL-BACTERIA PROTOZOA FUNGI PHOTOS
100	63	1064	22408	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
500	70	0397	2-4-D	HERBICIDE RESIDUES IN AGRICULTURAL WATER FROM CONTROL OF AQUATIC AND BANK WEEDS KEYWOR
100	63	1064	37341	TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS

KEYWORD INDEX

100 63 1064 37342 TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE KEYWORDS
100 72 1097 3-DAY-PUMPING-STUD NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT KEYWORDS

SECTION G

ANIMAL INFORMATION CATEGORY INDEX

CATEGORIES OF ANIMAL INFORMATION

Interest Area	Topic Area
A. Environmental Effects	1. General
	2. Surface Runoff from Animal Production Unit Operation
	3. Surface Runoff from Agricultural Watersheds
	4. Groundwater
	5. Odor
	6. Air
	7. Biocides
	8. Vectors
	9. Health
	10. Aesthetics
B. Management of Animal Production and Confinement Operations	1. General
	2. Liquid Systems
	3. Solid Systems
C. Characteristics of Animal Wastes	1. General
	2. Physical
	3. Chemical
	4, Biological
	5. Management's Impact On
D. Treatment Processes	1. General
	2. Physical
	3. Chemical
	4. Biological
E. Utilization and Disposal	1. General
	2. Land
	3. Reuse
	4. By-Product Recovery
F. General	1. Economics
	2. Legalities
	3. Institutional and Policy Needs
	4. Overviews, Trends and Projections
	5. Related Atricultural Operations

A1

0034
0083
0102
0114
0199
0230
0239
0259
0278
0281
0286
0300
0365
0384
0414
0435
0454
0465
0488
0520
0523
0527
0532
0534
0548
0595
0606
0607
0611
0612
0613
0617
0677
0725
0744
0777
0787
1003
1008
1010
1011
1013
1019
1020
1032
1037
1043
1050
1063
1095
1106
1117
1118
1133
1147
1166
1167
1169
1185
1246
1247

A2

0010
0037
0038
0062
0071
0093
0104
0120
0144
0160
0174
0182
0183
0218
0224
0232
0233
0255
0298
0302
0318
0343
0352
0372
0375
0387
0399
0417
0424
0425
0426
0428
0429
0430
0433
0434
0443
0445
0482

0493
0498
0506
0538
0539
0586
0591
0610
0640
0666
0669
0684
0694
0696
0697
0698
0700
0701
0709
0726
0727
0733
0741
0759
0773
0774
0775
0788
0795
0796
0807
0810
0820
1005
1009
1014
1021
1022
1051
1054
1055
1057
1058
1059
1060
1077
1085
1105
1107
1108
1112
1124
1137
1149
1156
1158
1160
1168
1177
1179
1180
1181
1192
1193
1194
1195
1196
1197
1201
1203
1204
1205
1206
1207
1209
1210
1214
1217
1218
1219
1223
1225
1226
1233
1234
1235
1237
1243
1248
1250
1251
1252
1255
1257

A3

0042
0051
0061
0063
0076
0079

A3

0090
0100
0193
0217
0225
0226
0240
0275
0276
0279
0282
0292
0341
0345
0387
0390
0391
0392
0394
0398
0399
0402
0405
0406
0407
0408
0416
0429
0433
0450
0453
0484
0487
0490
0491
0495
0518
0521
0531
0534
0535
0547
0571
0591
0592
0605
0610
0616
0641
0643
0644
0645
0646
0648
0649
0679
0689
0697
0701
0702
0721
0734
0738
0754
0789
0801
0829
0834
1015
1016
1033
1038
1039
1042
1044
1045
1049
1052
1059
1066
1080
1103
1107
1108
1110
1111
1120
1121
1122
1125
1129
1135
1195
1198
1200
1201
1202
1203
1208
1210
1212
1214
1217

A3

1218
1219
1220
1224
1225
1231
1250
1258
1260

A4

0016
0052
0060
0076
0100
0174
0216
0217
0222
0233
0279
0318
0372
0392
0404
0424
0426
0429
0450
0452
0466
0482
0537
0605
0610
0639
0640
0676
0701
0711
0730
0739
0782
0832
1041
1052
1055
1058
1059
1077
1097
1103
1107
1108
1122
1124
1127
1141
1148
1168
1170
1197
1201
1203
1214
1218
1219
1220
1224
1226
1233
1236
1239
1248
1250
1252
1256

A5

0007
0009
0019
0022
0035
0046
0057
0084
0091
0096
0105
0111
0167
0187
0169
0190
0191
0192
0202
0206
0228

A5

0262
0266
0304
0309
0311
0314
0316
0317
0321
0350
0363
0415
0442
0456
0467
0469
0470
0472
0491
0500
0508
0519
0473
0575
0576
0579
0583
0587
0626
0631
0632
0633
0635
0636
0637
0638
0661
0671
0673
0674
0682
0684
0685
0695
0707
0721
0728
0729
0748
0749
0783
0786
0790
0791
0792
0794
0802
0813
0834
0837
0840
0841
1001
1002
1004
1022
1067
1110
1143
1168
1173
1178
1188
1191
1250
1264

A6

0007
0057
0063
0085
0096
0103
0188
0192
0310
0314
0316
0317
0336
0385
0436
0479
0494
0508
0576
0582
0583
0589
0626
0631

A6

0634
0635
0636
0672
0685
0748
0783
0790
0791
0792
0794
1087
1142
1151
1251
1264

A7

0063
0118
0276
0277
0280
0315
0395
0396
0397
0398
0570
0645
1064
1090
1091
1111
1165
1199
1202
1220
1223

A8

0012
0013
0028
0119
0270
0294
0348
0350
0373
0374
0419
0468
0501
0515
0570
0716
1001
1064
1090
1091
1092
1165
1191

A9

0024
0025
0036
0063
0118
0216
0217
0238
0239
0279
0292
0302
0316
0317
0336
0343
0345
0354
0402
0416
0451
0518
0567
0572
0592
0656
0698
0719
0720
0736
0739
0742
0795
0845

A9

0853
1104
1110
1111
1121
1126
1141
1142
1151
1161
1164
1197
1218
1219
1220
1223
1242
1244
1252
1255
1258

A10

0046
0519

B1

0003
0004
0007
0010
0014
0015
0025
0035
0038
0050
0057
0062
0067
0068
0071
0075
0077
0081
0092
0100
0102
0133
0114
0122
0125
0127
0147
0150
0160
0161
0183
0188
0190
0199
0223
0230
0243
0244
0247
0279
0262
0265
0287
0296
0298
0300
0301
0308
0309
0323
0331
0337
0349
0350
0352
0355
0357
0368
0384
0389
0403
0426
0429
0433
0434
0438
0456
0468
0471
0474
0479
0483
0486
0493

B1

0434
0498
0505
0520
0523
0524
0530
0531
0538
0539
0547
0560
0565
0568
0571
0575
0278
0582
0585
0586
0590
0597
0603
0604
0611
0612
0613
0614
0615
0616
0617
0618
0626
0629
0633
0638
0648
0649
0650
0651
0661
0662
0663
0666
0669
0670
0674
0677
0680
0683
0685
0689
0690
0692
0694
0695
0697
0700
0703
0704
0705
0706
0710
0719
0728
0729
0731
0733
0738
0740
0741
0743
0747
0752
0754
0755
0756
0759
0760
0769
0770
0771
0775
0776
0780
0784
0788
0791
0802
0807
0816
0817
0819
0820
0832
0833
0834
1000
1003
1005
1006
1007
1008

b1

1014
1015
1017
1018
1019
1021
1024
1025
1035
1043
1052
.054
1061
1067
1068
1074
1075
1085
1106
1116
1123
1127
1131
1133
1135
1139
1142
1143
1144
1147
1150
1151
1152
1153
1154
1157
1159
1167
1170
1178
1180
1183
1184
1185
1187
1188
1191
1192
1196
1206
1207
1211
1224
1228
1230
1234
1237
1238
1239
1245
1246
1249
1253
1255
1257
1261
1262
1263
1264

B2

0058
0066
0069
0084
0085
0093
0097
0123
0124
0134
0137
0138
0151
0152
0155
0168
0177
0180
0187
0202
0206
0219
0220
0250
0264
0266
0295
0332
0335
0336
0339

B2

0344
0351
0356
0359
0366
0371
0442
0457
0459
0472
0496
0502
0580
0639
0665
0687
0727
0726
0749
0757
0758
0772
0774
0779
0799
0800
0801
0804
0821
0622
0827
0831
0837
0841
0858
1022
1048
1051
1071
1109
1119
1129
1136
1137
1148
1149
1158
1171
1179
1259

B3

0011
0013
0028
0040
0044
0053
0101
0107
0109
0126
0165
0215
0250
0255
0268
0297
0313
0344
0348
0460
0691
0720
0725
0777
0798
1091
1146
1189

C1

0001
0010
0023
0041
0086
0089
0098
0100
0117
0122
0135
0137
0138
0144
0164
0233
0251
0259
0281

C1

0323
0353
0355
0372
0400
0430
0436
0437
0462
0464
0472
0470
0499
0510
0511
0517
0538
0673
0674
0690
0692
0696
0697
0698
0701
0717
0759
0767
0774
0776
0778
0807
0847
0851
1001
1002
1009
1023
1079
1085
1108
1155
1200
1237
1257
1264

C2

0005
0017
0031
0066
0080
0093
0103
0105
0116
0120
0121
0123
0124
0125
0129
0182
0193
0227
0358
0363
0387
0388
0416
0422
0436
0474
0506
0630
0668
0671
0681
0688
0691
0712
0713
0735
0773
0800
0801
1016
1066
1129
1160
1193
1198
1222
1232
1234
1253

C3

0005
0031

C3

0034
0052
0075
0076
0079
0081
0084
0091
0096
0105
0116
0120
0166
0167
0168
0169
0173
0174
0179
0182
0184
0189
0190
0193
0196
0216
0222
0223
0226
0232
0273
0305
0314
0318
0358
0363
0367
0370
0392
0393
0404
0417
0422
0429
0441
0450
0452
0463
0465
0467
0469
0474
0493
0496
0502
0508
0509
0513
0514
0521
0569
0576
0583
0589
0592
0622
0625
0628
0630
0631
0632
0633
0634
0635
0636
0637
0646
0661
0672
0676
0679
0668
0708
0712
0713
0730
0735
0737
0739
0748
0773
0775
0790
0792
0794
0795
0801
0810
0811
0829
0830
0832
0837
0838

C3

1004
1016
1030
1037
1038
1039
1041
1047
1058
1059
1066
1073
1075
1087
1093
1097
1100
1112
1115
1122
1141
1143
1160
1162
1170
1188
1189
1190
1193
1197
1198
1199
1215
1216
1221
1222
1226
1232
1233
1234
1241
1250
1252
1253
1256

C4

0005
0018
0024
0026
0082
0108
0110
0116
0118
0120
0132
0168
0182
0184
0190
0193
0194
0260
0270
0290
0291
0294
0302
0303
0307
0312
0314
0330
0360
0362
0376
0382
0416
0420
0439
0443
0443
0451
0466
0476
0477
0484
0503
0567
0570
0572
0585
0641
0676
0688
0702
0712
0713
0714
0722

C4

0735
0736
0742
0773
0796
0797
0801
0810
0811
0812
0825
0829
0832
0836
0837
1053
1066
1076
1099
1101
1102
1104
1112
1160
1182
1193
1199
1212
1213
1217
1222
1224
1232
1234
1235
1236
1240
1241
1242
1244
1253
1254
1258

C5

0005
0020
0027
0045
0064
0071
0081
0091
0108
0109
0155
0165
0183
0195
0231
0232
0257
0265
0266
0273
0316
0328
0342
0350
0367
0385
0418
0419
0425
0462
0465
0474
0482
0505
0511
0512
0513
0514
0515
0538
0622
0639
0647
0659
0676
0688
0693
0696
0731
0734
0757
0773
0776
0780
0787
0795
0798

C5

0807
0825
0842
1005
1006
1009
1015
1016
1017
1042
1051
1064
1066
1071
1072
1074
1075
1075
1088
1090
1091
1092
1112
1131
1138
1142
1144
1146
1150
1153
1154
1156
1160
1178
1180
1181
1182
1183
1211
1212
1214
1224
1229
1251
1263

D1

0001
0019
0035
0062
0067
0122
0127
0139
0144
0151
0152
0160
0162
0175
0188
0230
0259
0261
0304
0314
0317
0337
0358
0372
0497
0510
0547
0569
0575
0278
0587
0590
0631
0638
0667
0670
0677
0684
0685
0698
0703
0710
0733
0734
0754
0758
0777
0781
0818
0824
0847
0857
1018
1033
1096

D1

1116
1147
1150
1157
1159
1173
1180
1186
1228
1262
1264

D2

0107
0111
0140
0141
0142
0143
0186
0192
0197
0199
0208
0309
0313
0323
0329
0364
0415
0434
0470
0471
0492
0504
0473
0577
0621
0625
0626
0637
0657
0658
0671
0675
0682
0768
0783
0813
0815
0855
0858
0859
0860
0861
1031
1068
1076
1082
1083
1084
1085
1123
1129
1130
1140
1163
1171
1179
1182
1238
1257

D3

0169
0191
0289
0310
0379
0583
0638
0656
0657
0661
0707
0729
0794
0814
1068
1081
1134
1163

D4

0002
0006
0008
0009
0022
0030
0039

D4

0044
0049
0056
0066
0074
0075
0078
0087
0094
0095
0097
0098
0099
0106
0132
0133
0134
0135
0136
0137
0138
0149
0156
0163
0164
0165
0166
0167
0168
0176
0177
0178
0179
0180
0184
0187
0193
0195
0199
0206
0218
0219
0233
0248
0251
0252
0253
0254
0261
0263
0295
0306
0311
0319
0321
0330
0331
0333
0334
0338
0346
0347
0353
0355
0339
0360
0366
0369
0378
0401
0401
0419
0439
0443
0448
0451
0457
0458
0477
0476
0487
0496
0499
0500
0501
0525
0574
0579
0588
0632
0653
0654
0655
0657
0659
0668
0681
0687
0713
0716
0728
0732
0735
0737

D4

0746
0748
0749
0750
0755
0757
0782
0798
0802
0803
0805
0806
0808
0809
0812
0821
0822
0823
0825
0827
0835
0837
0838
0839
0840
0842
0843
0858
1001
1040
1047
1048
1054
1070
1071
1089
1101
1102
1109
1113
1114
1115
1119
1123
1128
1136
1148
1152
1172
1181
1184
1187
1191
1229
1230
1238
1239
1253
1259

E1

0001
0089
0127
0128
0151
0152
0243
0247
0256
0281
C267
0299
0304
0319
0323
0324
0335
0337
0352
0368
0372
0394
0446
0455
0507
0510
0538
0569
0575
0278
0579
0590
0608
0638
0661
0670
0677
0684
0697
0710
0730
0733
0736

E1

0754
0758
0777
0779
0807
0818
1000
1003
1005
1014
1018
1021
1023
1025
1096
1116
1121
1147
1156
1157
1159
1176
1186
1228
1257
1262

E2

0015
0021
0030
0032
0033
0038
0041
0042
0048
0049
0069
0070
0081
0100
0130
0131
0155
0172
0174
0176
0200
0201
0215
0217
0223
0227
0233
0237
0279
0250
0272
0330
0349
0356
0366
0371
0377
0380
0390
0391
0392
0393
0400
0416
0427
0434
0457
0458
0459
0481
0581
0639
0649
0660
0681
0721
0727
0732
0755
0769
0778
0826
0828
0829
0830
0831
0832
0833
0834
0841
0854
1015
1019
1020

E2

1031
1042
1044
1048
1052
1058
1065
1067
1069
1072
1073
1077
1124
1138
1149
1158
1162
1166
1168
1169
1170
1171
1177
1179
1183
1189
1191
1233
1242
1256

E3

0020
0021
0029
0035
0036
0043
0044
0058
0072
0086
0101
0145
0147
0148
0153
0168
0170
0171
0173
0186
0196
0200
0207
0209
0210
0211
0212
0213
0221
0232
0248
0254
0260
0271
0272
0288
0325
0327
0340
0361
0370
0379
0412
0413
0418
0419
0421
0422
0463
0475
0481
0485
0489
0492
0511
0571
0572
0621
0622
0623
0624
0627
0629
0630
0660
0686
0719
0720
0723
0725

E3

0731
0746
0751
0753
0785
0797
0602
0603
0826
0844
0845
0846
0847
0848
0849
0850
0851
0852
0853
0856
0858
0861
1030
1034
1062
1066
1070
1076
1079
1081
1082
1086
1089
1093
1115
1128
1130
1134
1140
1145
1146
1163
1164
1171
1172
1181
1182
1184
1187
1238
1242

E4

0028
0082
0143
0258
0338
0448
0477
0852
1098
1255

F1

0075
0088
0114
0123
0150
0151
0152
0160
0186
0199
0200
0201
0202
0219
0220
0225
0241
0243
0247
0253
0256
0267
0283
0284
0322
0337
0340
0344
0355
0359
0409
0432
0442
0449
0492
0498

F1

0504
0532
0544
0582
0593
0610
0612
0613
0614
0615
0621
0623
0704
0726
0743
0746
0752
0753
0783
0816
0817
0818
0819
0820
0828
0846
0850
1007
1017
1018
1031
1047
1049
1056
1074
1114
1138
1147
1149
1150
1171
1179
1180
1183
1185
1189
1205
1210
1261
1262

F2

0001
0037
0068
0069
0073
0102
0203
0240
0301
0333
0426
0426
0432
0440
0454
0485
0495
0530
0533
0539
0545
0546
0551
0552
0556
0563
0572
0584
0596
0597
0598
0599
0600
0602
0609
0640
0663
0666
0682
0700
0704
0741
0788
0842
0844
1002
1018
1019
1050
1060

F2

1061
1105
1133
1137
1150
1157
1166
1168
1172
1175
1186
1192
1196
1201
1202
1203
1204
1206
1207
1208
1209
1210
1245
1246
1247
1249

F3

0046
0060
0158
0161
0203
0228
0236
0275
0285
0289
0320
0322
0410
0424
0446
0453
0454
0529
0530
0543
0544
0550
0551
0552
0553
0554
0556
0557
0558
0559
0561
0562
0563
0566
0592
0594
0595
0598
0601
0605
0609
0616
0618
0620
0628
0640
0643
0644
0664
0680
0709
0744
0756
0758
0763
0764
0765
0767
0786
0817
0819
1002
1011
1012
1020
1022
1025
1026
1027
1028
1094
1103
1106
1107
1167

F3

1194
1214
1225

F4

0001
0047
0050
0054
0055
0059
0065
0077
0083
0112
0114
0115
0124
0157
0159
0162
0181
0185
0198
0204
0205
0214
0229
0230
0234
0235
0245
0252
0259
0274
0281
0286
0293
0300
0326
0365
0384
0386
0411
0414
0423
0428
0431
0435
0445
0447
0449
0455
0483
0489
0507
0516
0522
0523
0526
0528
0540
0541
0542
0548
0549
0555
0560
0564
0565
0276
0591
0593
0603
0604
0606
0607
0611
0617
0619
0642
0645
0662
0670
0677
0678
0680
0683
0689
0706
0709
0715
0745
0751
0762
0763
0766
0771
0787
0823
1008
1010
1011

F4

1012
1013
1016
1021
1024
1029
1032
1035
1036
1046
1080
1095
1096
1107
1117
1118
1125
1132
1157
1166
1192
1194
1218
1219
1220
1227
1230
1231
1243
1248
1252
1260

F5

0011
0117
0242
0296
0299
0306
0321
0329
0397
0473
0470
0481
0488
0490
0568
0647
0648
0667
0686
0687
0717
0718
0727
0744
0842
1033
1040
1046
1084
1098
1163
1232
1242
1244
1247

SECTION VII

ABSTRACTS OF BIBLIOGRAPHY ENTRIES

0001 - C1, D1, E1, F2, F4

SWINE HOUSING AND WASTE MANAGEMENT - A RESEARCH REVIEW,

National Pork Producers Council; Illinois Univ., Urbana. Coll. of Agriculture.
Arthur J. Muehling.
Department of Agricultural Engineering, College of Agriculture, University of Illinois at Urbana-Champaign, August 1969. 91 p, 232 ref. A. Eng.-873.

Descriptors: *Farm wastes, *Hogs, *Confinement pens, *Aerobic treatment, *Anerobic digestion, Odor, Economics.
Identifiers: *Oxidation ditch, *Housing, Space requirements, Slotted floors, Methods of disposal, Legal implications.

Current and past research in swine housing and waste management is reviewed and summarized. The author utilized 77 references in Part I of the report on swine housing studies. Research on production units, space requirements, slotted floors, and economics of swine housing systems is presented in summary form. Recommendations for future swine housing research are made. 155 references were utilized in Part II of the report on waste management studies. Properties of swine wastes, treatment and return of swine wastes to the land, other methods of disposal, gases and odors, and legal implications of waste handling are summarized. Recommendations for future research in waste management are made. Six fact sheets available from the National Pork Producers Council, Des Moines, supplement the research review. (White-Iowa State)

0002 - D4

SWINE WASTE MANAGEMENT-ANAEROBIC LAGOONS,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Cooperative Extension Service, University of Illinois at Urbana-Champaign, August 1969. 2 p. AENG-877.

Descriptors: *Hogs, *Farm wastes, *Anaerobic conditions, *Lagoons, Size, Sites, Construction, Shape, Depth, Odors, Sludge, Water pollution, Temperature, Intakes, Outlets, Grading, Management, Mixing, Organic matter, Stabilization.
Identifiers: *Loading rates, *Location, Solids, Wind action, Gas bubbling, Volatile solids.

Anaerobic lagoons were first adapted for the storage and treatment of hog wastes because of their low initial cost, ease of operation, and lack of serious alternatives. They have not always been successful, for sometimes they release objectional odors, they can pollute surface and underground water, they sometimes do not decompose the manure adequately, and in time they are apt to fill up with sludge. This fact sheet gives advice as to loading rates, size and location of anaerobic lagoons. Attention is given to the construction shape, depth, inlets and outlets, fencing, and grading of banks. Management practices include an adequate supply of water, correct start-up, continuous loading rates, restriction of solids, and adequate mixing. (White-Iowa State)

0003 - B1

CONFINEMENT SWINE HOUSING - SPACE REQUIREMENTS,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Cooperative Extension Service, University of Illinois at Urbana-Champaign, August 1969. 2 p. AEng-874.

Descriptors: *Size, *Seasonal, *Temperature, *Ventilation, Farm wastes, Hogs, Confinement pens, Management, Performance, Economics.
Identifiers: *Space requirements, Method of feeding, Number of pigs per pen, Heat stress.

As confinement housing has changed to include total enclosure of feeding and sleeping area under roof, the minimum space requirements recommended for pigs in confinement have been reduced. These recommendations indicate the minimum amount of floor space per pig necessary to prevent a significant reduction in pig performance and to maintain a reasonable degree of cleanliness in the pen. The fact sheet lists space requirements for different weight ranges of hogs. These recommendations are based on research that has considered the more important factors affecting space needs. The factors discussed in the fact sheet include size of animal, season (as related to temperature), ventilation, method of feeding, level of management, and number of pigs per pen. (White-Iowa State)

0004 - B1

CONFINEMENT SWINE HOUSING - SLOTTED FLOORS,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Cooperative Extension Service, University of Illinois at Urbana-Champaign, August 1969. 2 p. AEng-875.

Descriptors: *Construction materials, *Reinforced concrete, *Metals, Farm wastes, Dimensions, Corrosion, Failure, Durability, Depth, Height, Length, Reinforcement, Hog.
Identifiers: *Slotted floors, *Wood, *Spacing, Expanded metal, Farrowing, Feed wastage.

This fact sheet lists wood, concrete and metal as being effective for slotted floors. Advantages and disadvantages of each type are given, as well as dimensions that should be used. Expanded metal and steel straps are both discussed as to their effectiveness for slotted floors. The amount and kind of reinforcing to use in concrete slats is given. Recommended spacing and advice for farrowing on slotted floors is also given. Pens with totally slotted floors remain consistently cleaner than those partially slotted. In general, the larger the pig the wider the slat that can be used without sacrificing cleaning efficiency. (White-Iowa State)

0005 - C2, C3, C4, C5

SWINE WASTE MANAGEMENT - PROPERTIES OF SWINE WASTES,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Cooperative Extension Service, University of Illinois at Urbana-Champaign, August 1969. 2 p. AEng-876.

Descriptors: *Farm wastes, *Physical properties, *Chemical properties, *Biological properties, Hogs, Antibiotics, Nitrogen, Potash, Biochemical oxygen demand, Chemical oxygen demand, Nutrients, Animal physiology, Biological treatment.
Identifiers: *Daily production, *Fertilizer value, Phosphoric acid, Population equivalent, Feed ration, Solids.

An understanding of the properties of swine wastes is necessary to develop an adequate system of waste management. The properties of swine wastes as classified by this fact sheet are physical, chemical, and biological. The physical and chemical properties may be affected by the physiology of the animal, the feed ration, and the environment. The quality of feed influences the amount the hogs will eat and the chemical composition of the wastes. The physical properties of daily production and amount of solids are listed by this fact sheet. The fertilizer value of swine manure is shown and the amounts required to obtain certain pounds per acre of nitrogen, potash, and phosphoric acid are told. Average values for BOD, COD and population equivalent are listed as biological properties of swine manure. (White-Iowa State)

0006 - D4

SWINE WASTE MANAGEMENT - OXIDATION DITCH FOR TREATING HOG WASTES,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Cooperative Extension Service, University of Illinois at Urbana-Champaign, August 1969. 2 p. AEng-878.

Descriptors: *Costs, *Farm wastes, *Hogs, *Design, *Rotors, Effluent, Volume, Storage, Oxygen, Biochemical oxygen demand, Aerobic bacteria, Organic matter, Calibrations, Foaming, Microorganisms, Odors, Dissolved oxygen, Color, Anaerobic bacteria, Sludge.
Identifiers: *Oxidation ditch, Rotor capacity, Rotor immersion, Rate of flow, Configuration, Detention time.

There has been considerable interest in aerobically treating hog wastes in an oxidation ditch because of the need for a low-odor method of manure storage and treatment. This fact sheet gives guidelines as to design shape, capacity and loading, rotor capacity and immersion, liquid depth and rate of flow. Operational procedures are given as well as a discussion of problems that may arise. Solutions to the problem of foaming include vegetable or petroleum oil, commercial products or a water spray. Sludge buildup and final disposal are given some attention. Rotor costs are about $250 per foot and operation costs are estimated to between 1/2 and 1 cent per day per hog. (White-Iowa State)

0007 - A5, A6, B1

SWINE WASTE MANAGEMENT - CASES FROM STORED SWINE WASTES,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Cooperative Extension Service, University of Illinois at Urbana-Champaign, August 1969. 2 p. AEng-879.

Descriptors: *Farm wastes, *Hogs, *Gases, Odors, Carbon dioxide, Ammonia, Hydrogen sulfide, Methane, Lagoons.
Identifiers: *Threshold limit values (TLV), Air quality, Irritation, Lethal situations, Storage pit, Concentrations, Asphyxiation, Symptoms.

This fact sheet concerns itself about the quality of the air inside confinement swine buildings with slotted floors since the wastes may be held in the building long enough to produce gases and odors. Noxious gases and odors formed from stored wastes can be irritating to both the hogs and operator and have been the cause of numerous complaints and even lawsuits by neighbors. The most important gases generated from stored manure, and those discussed by the fact sheet are carbon dioxide, ammonia, hydrogen sulfide, and methane. The potentially lethal situations of ventilation breakdown, agitation of storage pit, and entering a storage pit are discussed and warnings given. (White-Iowa State)

0008 - D4

AEROBIC TREATMENT OF LIVESTOCK WASTES,

Illinois Univ., Urbana. Agricultural Experiment Station.
D. D. Jones, D. L. Day, and A. C. Dale.
University of Illinois Agricultural Experiment Station Bulletin 737, 1970. 55 p, 26 fig, 4 tab, 45 ref. HEW Grants EC-00245 and EC-00244.

Descriptors: *Oxidation lagoons, *Aeration, *Farm wastes, *Biochemical oxygen demand, Organic matter, Sludge disposal, Oxygenation, Hogs, Cattle.
Identifiers: *Oxidation ditch, *Aerobic lagoon, Livestock waste properties, Biochemical properties, Aerobic treatment, Irrigation system.

This report emphasizes the aerobic method of storage and treatment of livestock wastes primarily becuase of the low level of odors associated with aerobic treatment. An introduction to the theory of aerobic treatment is presented along with several laboratory experiments on swine, dairy cattle, and poultry wastes. These laboratory experiments verified the use of the aerobic method for livestock wastes. Two methods of aerobic treatment were studied and the results summarized. These were (A) the in-the-building oxidation ditch and (B) the aerobic lagoon (oxidation pond and aerated lagoon). Recommendations are made as to operator convenience, capacity, and design of the different systems. (White-Iowa State)

0009 - A5, D4
LIVESTOCK WASTE MANAGEMENT STUDIES-TERMINATION REPORT,
Illinois Univ., Urbana Agricultural Experiment Station.
D. L. Day, D. D. Jones, and J. C. Converse.
HEW Project No EC-245. July 1970. 97 p, 75 fig, 14 tab, 7 ref.

Descriptors: *Farm wastes, *Biochemical oxygen demand, *Chemical oxygen demand, *Odor, Hogs.
Identifiers: *Livestock oxidation ditch, Loading rates, Ditch mixed liquor, Optimum aerobic degradation, Aeration rotors, Operating cost, Feeding value of oxidation ditch solids.

This report deals mainly with results from laboratory tests and field trials of oxidation diches. Different loading rates were studied, and solutions to the problem of foaming were discussed. Most of the work was done with swine although laboratory tests were made with beef and dairy animals. Some research was done to determine the feeding value of oxidation ditch solids. The oxygenation capacity of rotors was discussed. A laboratory study of the minimum aeration for odor control was made using set design criteria. (White-Iowa State)

0010 - A2, B1, C1
THE EFFECT OF ANIMAL DENSITY AND SURFACE SLOPE ON CHARACTERISTICS OF RUNOFF, SOLID WASTES AND NITRATE MOVEMENT ON UNPAVED BEEF FEEDLOTS,
Nebraska Univ., Lincoln. Agricultural Experiment Station.
C. B. Gilbertson, T. M. McCalla, J. R. Ellis, O. E. Cross, and W. R. Woods.
Publication SB508, June 1970. 23 p, 5 fig, 7 tab, 23 ref.

Descriptors: *Rainfall-runoff relationships, *Chemical analysis, *Farm wastes, Chemical oxygen demand, Biochemical oxygen demand, Cattle, Laboratory tests, Detention reservoirs, Nitrates, Phosphorus.
Identifiers: *Dry matter removed (DMR), *Dry matter feces (DMF), Volatile solids, Feedlot slope, Cattle densities, Soil core samples, Feedlots.

The objectives of this study were to determine the effect of feedlot slope and cattle densities on: (1) The quantity and quality of runoff resulting from rainstorms and snowmelt, (2) Downward movement of pollutants into the soil profile on unpaved feedlots, and, (3) Amount of solids accumulation on the feedlot surface. Pairs of feedlots with 3, 6, and 9% slopes were installed. Ten and twenty cattle were placed in each pair of feedlots, which allowed 200 and 100 sq. ft. of area per animal. Volumetric measurement of runoff resulting from rainfall and snowmelt were made and samples of each runoff occurrence were taken to the laboratory for analysis. Laboratory analyses included pH, electric conductivity, total solids, non-volatile solids, total nitrogen, ammonium, nitrate, total phosphorus, COD and BOD. Soil cores were taken to depths of 14 ft. below the feedlot surface and adjacent buffer strips to determine downward movement of contaminants into the soil profile. Solids accumulations on the lot surface were removed twice. Weights of material removed were recorded and composite samples were taken to the laboratory for analyses. (Christenbury-Iowa State)

0011 - B3, F5
THE SEARCH FOR NEW POULTRY LITTER MATERIAL - AN EXAMPLE OF COOPERATION BETWEEN EXTENSION, RESEARCH AND INDUSTRY,
Georgia Univ., Athens. Dept. of Poultry Science.
Milton Y. Dendy, M. J. Reed, and M. G. McCartney.
Poultry Science, Vol 45, p 1666, 1968.

Descriptors: *Farm wastes, *Poultry, Physical properties, Performance, Agricultural engineering, Waste treatment, Pollutants.
Identifiers: *Litter materials, Pine bark, Pine bark and chips, Pine stump chips, Rice hulls, Poultry industry, Extension Poultrymen.

In the fall of 1966 a litter shortage was brought to the attention of the Extension Poultrymen during an industry meeting. The Extension Poultrymen took the problem to the research people in the Department of Poultry Science and the Department of Agricultural Engineering at the University of Georgia, and a project was started to test (1) the physical properties and performance characteristics of materials usable as litter in poultry houses, and (2) bird performance on several materials available in Georgia were tested, including pine shavings and pine sawdust, the two materials most commonly used. Results obtained indicate that some of the materials such as pine bark, pine bark and chips, pine stump chips and rice hulls are about as suitable for poultry litter as pine shavings or pine sawdust. (White-Iowa State)

0012 - A8
CONTROL OF HOUSE FLIES IN SWINE-FINISHING UNITS BY IMPROVED METHODS OF WASTE DISPOSAL,
Purdue Univ., Lafayette, Ind. Dept. of Entomology.
R. C. Dobson, and F. W. Kutz.
Journal of Economic Entomology, Vol 63, No 1, February 1970. 6 fig, 3 ref.

Descriptors: *Farm wastes, *Hogs, Disposal, Lagoons, *Insect control, Vectors, Entomology.
Identifiers: *Control of house flies, *Waste disposal systems, Collection pit, Slotted floor.

Four swine-finishing units were equipped with different waste disposal systems to determine their effectiveness in preventing development of the house fly, Musca domestica L. Each unit was completely screened to prevent contamination from outside sources. No insecticides were used. One of the 4 was a standard shed-type house used as a control. The other 3 units were equipped with new and improved waste disposal systems. Results from 2 years of study indicate that house fly production in and around swine-finishing units can be greatly reduced by using 1 of the 3 improved methods of waste disposal described. (Miner-Iowa State)

0013 - A8, B3
INFLUENCE OF POULTRY-MANURE-REMOVAL SCHEDULES ON VARIOUS DIPTERA LARVAE AND SELECTED ANTHROPOD PREDATORS,
California Univ., Berkeley. Dept. of Entomology and Parasitology.
John H. Peck, and John R. Anderson.
Journal of Economic Entomology, Vol 63, No 1, February 1970, p 82-90. 11 fig, 7 ref.

Descriptors: *Farm wastes, *Poultry, *Larvae, *Insect control, *Entomology, Vectors.
Identifiers: *Manure removal, *Diptera larvae, *Arthropod predators, Sampling, Control of flies.

The effects of weekly manure removal, monthly removal, and no removal on populations of fly larvae and slected predators (Acarina: Machrocheles muscaedomesticae Scopoli, Fuscuropods sp. (undescribed), Parasitidae; Coleoptera: Staphylinidae, Histeridaw, Hydrophilidae; Diptera: Ophyra leucostoma (Wiedemann) were studied for a full fly season at each of 2 northern California ranches. Third-instar larvae of the house fly, Musca domestica L., the false stable fly, Muscina stabulans (Fallen), and Calliphoridae were most abundant in 1-week-old manure; those of the little house fly, Fannia canicularis (L.), the coastal fly, Fannia femoralis Stein, and the black garbage fly, O. leucostoma, reached greatest numbers in 2- to 3-week-old manure. Unremoved manure had the least numbers of dipterous larvae, with the exception of the stable fly, Stomoxys calcitrans (L.). All predators studied were most abundant in unremoved manure. Abstention from manure removal favored the predators; monthly or biweekly removal favored the dipterous larvae. (Miner-Iowa State)

0014 - B1
INFLUENCE OF SPACE ON PERFORMANCE OF FEEDLOT CATTLE,
California Univ., Davis; and Agricultural Research Service, Davis, Calif.
S. R. Morrison, V. E. Mendel, and T. E. Bond.
Transactions of the ASAE, Vol 13, No 1, January 1970, p 145-147. 2 fig, 2 tab, 9 ref.

Descriptors: *Farm wastes, *Cattle, *Performance, *Confinement pens.
Identifiers: *Space, *Influence, *Weight gain, Feed efficiency.

Two tests in the Imperial Valley of California involving 74 heifers indicate that space allotments below 40 sq. ft. per head are likely to reduce the body weight gains and feed efficiency of feedlot cattle, and hot weather may accentuate the decrease. There is evidence suggesting that animal performance may be less even at 40 sq. ft. than at 60 sq. ft. per head. Tests with larger pens and more animals are desirable to establish the relation between gain and feed efficiency and pen space per animal. The range of space tested should be great enough to provide sufficient data to aid in designing feed lots for maximum profit. (White-Iowa State)

0015 - B1, E2
CATTLE FEEDERS AVOID POLLUTION BY USING WASTES IN IRRIGATION.
Soil Conservation Service, Washington, D.C.

Soil Conservation, Vol 34, No 4, November 1968, p 84-86. 3 fig.

Descriptors: *Farm wastes, *Cattle, *Ponds, *Furrow irrigation, Lagoon, Water pollution, Nebraska, Water Quality Act, Costs, Loess.
Identifiers: *Tractor driven pump, Soil Conservation Service, Feedlots.

Two brothers in Franklin county Nebraska have implemented a system that avoids pollution while fertilizing and irrigating their land. Solid wastes are hauled to the field from their 5 feedlots covering four acres. The rest washes down with every rain and is caught in a farm pond in a natural draw. In the bottom of the pond a lagoon-type pit was dug so

there will always be some water available to keep wastes in suspension. From here the suspension is pumped to nearby fields by a tractor driven pump. If it doesn't rain they pump water from their irrigation wall into the pond and out again onto the land. (White-Iowa State)

0016 - A4

FERTILIZERS AND FEEDLOTS --- WHAT ROLE IN GROUNDWATER POLLUTION.

Agricultural Research, Vol 18, No 6, December 1969, p 14-15.

Descriptors: *Farm wastes, *Soil contamination, *Fertilizers, *Nitrates, Water pollution, Nitrogen, Nitrites, Aquifers, Colorado, Denitrification, Water table, Percolation.
Identifiers: *Feedlots, South Platte River Valley.

No significant contamination of the water table with nitrate from farm fertilizers or extensive cattle feeding operations was found in preliminary ARS studies in northeastern Colorado. But studies indicated that substantial amounts of nitrate could eventually reach the water table under heavily fertilized irrigated fields and under feedlots. ARS soil scientists measured nitrates in 129 soil cores drilled to bedrock or the water table and in 75 samples of groundwater taken with the cores in Colorado's South Platte River Valley. The investigators found that, on the average, the kind of land use did not effect the nitrate concentration of water entering the bottom of the holes where the cores were taken. The surface may contain more pollutants than water deeper in the aquifer. (White-Iowa State)

0017 - C2

AN IMPROVED METHOD FOR PREPARATION OF FECES FOR BOMB CALORIMETRY,
School of Aerospace Medicine, Brooks AFB, Tex.
Hubert G. Lovelady, and Emmett J. Stork.
Clinical Chemistry, Vol 16, No 3, 1970, p 253-254. 1 tab, 2 ref.

Descriptors: *Laboratory tests, Energy, Odor, *Farm wastes, Drying.
Identifiers: *Bomb calorimetry, Lyophilize.

As a preliminary to bomb calorimetry, weighed, homogenized fecal slurries are prefrozen and lyophilized. Advantages of this method over the method of drying in a vacuum oven include: more moisture is removed from the sample initially, drying time is reduced from 48h to 16 h, grinding is eliminated and objectionable odors are eliminated during sample processing. (Christenbury-Iowa State)

0018 - C4

SALMONELLA Spp. AND SEROTYPES OF ESCHERICHIA COLI ISOLATED FROM THE LESSER MEALWORM COLLECTED IN POULTRY BROODER HOUSES,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
Philip K. Harein, Ernesto De LasCasa, B. S. Pomeroy, and Mabel D. York.
Journal of Economic Entomology, Vol 63, No 1, February 1970, p 80-82. 3 tab, 20 ref.

Descriptors: *Farm wastes, *Poultry, *Salmonella, *E. coli, Cultures.
Identifiers: *Isolated, *Brooder houses, Litter, Mealworms, Pathogens.

Adult Alphitobius diaperinus (Panzer) were collected from the litter of poultry brooder houses in 1967 and 1968. One thousand of the lesser mealworms were individually surface disinfected, mascerated, and cultured in thioglycolate enrichment broth at 37 degrees C and streaked on cosin methylene blue agar or brilliant green agar plates for detection of Escherichia coli (Migula) Castelani and Chalmers and Salmonella spp., respectively. Five species of Salmonella found within the lesser mealworms were identified as S. heidelberg Kauffman, S. worthington Edwards and Bruner, S. saint paul Kauffman, S. typhimurium var copenhagen Kauffman, and S. chester Kauffman and Tesdal. Forty-eight serotypes of E. coli were recovered from within 251 lesser mealworms. Twenty-six of these serotypes are known pathogens for man or animals. (Miner-Iowa State)

0019 - A5, D1

CONTROL OF ODORS FROM ANIMAL WASTES,
W. E. Burnett, and N. C. Dondero.
Transaction of the ASAE, Vol 13, No 2, p 221-224, 231, March 1970. 3 fig, 5 tab, 15 ref.

Descriptors: *Farm wastes, *Poultry, *Odor, *Chemicals, Costs.
Identifiers: *Odor panel, *Masking agents, *Counteractants, Deodorants, Digestive deodorants, D-indices.

A matching-standard method was successfully used for the evaluation of the ability of commercial odor-control chemicals to mask or eliminate the offensive odor of poultry manure when added directly to the waste in both loboratory and field tests. The method enables one to find the most effective chemicals in a systematic and relatively time-saving manner. The method provides information on the lowest concentration of chemical necessary to obtain a desired effect. Masking agents and counteractants were found to be the most effective odor-control products, deodorants were moderately effective, and digestive deodorants were least effective. The cost in some field trials was estimated to be 63 cents per 450 gal. of liquid manure. Further research is needed on the effect of repeated applications of odor-control products on soil, so as not to harm the soil for other purposes. (White-Iowa State)

0020 - C5, E3

EFFECT OF DIETS CONTAINING DEHYDRATED POULTRY WASTE ON QUALITY CHANGES IN SHELL EGGS DURING STORAGE,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
L. R. York, C. J. Flegal, H. C. Zindel, and T. H. Coleman.
Poultry Science, Vol 49, No 2, p 590-591, March 1970. 1 tab, 3 ref.

Descriptors: *Farm wastes, *Poultry, *Dehydration, *Diets, Eggs.
Identifiers: *Haugh unit, *Qaulity changes, Color and odor observations, Waste feeding, Manure utilization, Dried poultry wastes.

Eggs from 32 Leghorn-type hens on each of four diets were used. All the birds were 10 months of age and had been on the experimental diet for three months. The diets used were (1) control, (2) control with 10% DPW, (3) control with 20% DPW, and (4) control with 30% DPW. One-day-old eggs were stored at room environment to accelerate the changes that occur during storage. Room temperature varied from 22 degrees C to 25 degrees C and relative humidity varied from 50% to 68%. Eggs were gathered on five consecutive days and held for storage periods of 10, 20, 30, 40 or 50 days. Physical and microbiological examinations were made at the beginning of the trial and at the end of the designated storage periods. The results of this experiment indicate that including 10, 20, or 30% dehydrated poultry waste in the diet of hens had no significant deleterious effect on the quality of shell eggs as measured by Haugh units, storage weight loss, color, odor, and/or microbial content. (Miner-Iowa State)

0021 - E2, E3

EFFECT OF MANURE APPLICATION, AERATION, AND SOIL pH ON SOIL NITROGEN TRANSFORMATIONS AND ON CERTAIN SOIL TEST VALUES,
Wisconsin Univ., Madison. Dept. of Soils.
R. J. Olsen, R. F. Hensler, and O. J. Attoe.
Soil Science Society of America Proceedings, Vol 34, No 2, p 222-225, March-April 1970. 2 fig, 2 tab, 10 ref.

Descriptors: *Nitrification, *Denitrification, *Farm wastes, *Aeration, Soil tests, Rates of application.
Identifiers: N recovery, Field moisture capacity, *Soil nitrogen transformations, Soil pH, Nitrate production.

Nitrate production under aerobic conditions was directly related to rate of manure application, period of incubation and soil pH, but was stopped under anaerobic conditions. Average recovery by chemical analysis of N applied as manure to a Plainfield sand at relatively high rates and incubated for 37 weeks was 77% for aerobic conditions and 24% for anaerobic conditions. The addition of manure tended to increase soil pH and the contents of organic N, available P and exchangeable K, Ca, and Mg, particularly at the higher rates. They also increased the field moisture capacity of a Plainfield sand. However, on an acid Ella loamy sand the two highest rates of manure caused a reduction of the values for field moisture capacity, apparently the result of formation of a waxy material that tended to repel water absorption. (Miner-Iowa State)

0022 - A5, D4

SIMPLE SYSTEM FOR AERATING MANURE LAGOONS,
DeKalb AgResearch, Inc., Ill.
Jay Gilliland.
Poultry Digest, Vol 29, p 330-331, July 1970. 1 fig.

Descriptors: *Farm wastes, *Poultry, *Sedimentaitation, *Aeration, Anaerobic conditions, Aerobic conditions, Odors, Sulfides, Methane, Construction costs, Operation and maintenance, Cost analysis, Erosion, Waste water treatment.

An aerated lagoon system was designed to treat the 1780 cu. yds of manure produced annually by two 30,000-hen automatic environmental controlled laying houses, instead of relying on spreading the manure on the land. A 100 ft by 200 ft lagoon with a12 ft. depth and a two-to-one side slope was constructed at a cost of $900, having an estimated 10 year life. A six nozzle irrigation sprinkler run by a centrifugal irrigation pump with a 5 hp motor provides aeration at a cost of $2.20 per day. Water is drawn from just below the surface and sprayed into the air in order to reduce odors. The methane and hydrogen sulfide gases generated by anaerobic action on the lagoon bottom are dissipated by aerobic bacteria near the top and their odor eliminated. This method has been demonstrated to be a low costs disposal, low cost upkeep system particularly suited for this job. (Lowry-Texas)

0023 - C1

ATTRACTION OF COPROPHAGOUS BEETLES TO FECES OF VARIOUS ANIMALS,
Georgia Coastal Plain Experiment Station, Tifton.
G. Truman Fincher, T. Bonner Stewart, and Robert Davis.
The Journal of Parasitology, Vol 56, No 2, April 1970, p 378-383. 2 tab, 20 ref.

Descriptors: *Farm wastes, *Insects, *Habitats, Animal, Intermediate hosts.
Identifiers: *Beetle species, Pit traps, Feces, Woodland habitat, Swine pasture, Dairy pasture.

Beetles were attracted to pit traps baited with the feces of one of 12 different animals in 3 habitats.

Comparison of the 3 habitats showed marked differences in beetle fauna. Most dung beetles were captured in traps baited with swine feces. Swine and opossum feces attracted 57.7% of all beetles captured and 74.8% of the Phanaeus species which are the major intermediate hosts of swine spirurids in southern Georgia. Captured beetles comprised 12 genera with more than 18 species. (White-Iowa State)

0024 - A9, C4
PROBABLE SOURCES OF SALMONELLAE ON A POULTRY FARM,
Punjab Agricultural Univ., Hissar (India). Dept. of Veterinary Bacteriology and Hygiene.
S. M. Goyal, and I. P. Singh.
British Veterinary Journal, Vol 126, No 4, p 180-184, 1970. 2 tab, 17 ref.

Descriptors: *Farm wastes, *Salmonella, *Poultry, *Farm, Domestic animals, Rodents, Reptiles.
Identifiers: Salmonellosis, Transmission, Cross-infection.

This study was undertaken to determine various sources of Salmonellae on a poultry farm. Pigs, sheep, and other domestic animals were checked, as well as rats, sparrows, birds, and wall lizards. Eight Salmonellae types were isolated from poultry, pigs, rats, wall lizards, and house sparrows. S. anatum was isolated from all these sources and S. stanley from rats and poultry, indicating the possibility of cross-infection due to multiple foci of Salmonella infections. Rodents, free-flying birds and lizards were considered as important sources of Salmonellae. (White-Iowa State)

0025 - A9, B1
BACTERIAL CONTAMINATION IN POULTRY HOUSES AND ITS RELATIONSHIP TO EGG HATCHABILITY,
Pennsylvania Univ., University Park. Dept. of Poultry Science.
C. L. Quarles, R. F. Gentry, and G. O. Bressler.
Poultry Science, Vol 49, No 1, p 60-66, 1970. 8 tab, 15 ref.

Descriptors: *Farm wastes, *Bacteria, *Poultry, *Fertility, Eggs.
Identifiers: *Egg contamination, Egg hatchability, Air sampler, Litter houses, Litter nests, Wire floors, Roll-away nest.

This study was designed to determine if there was any relationship among poultry house contamination, egg contamination and hatchability. A high density sloping wire floor system was compared with the conventional litter floor system. Rates of egg production and fertility were similar in both systems. Litter houses averaged 9 times as many bacteria per cubic foot of air as wire floor houses. An attempt was made to study the level and transmission of coliform type bacteria as related to type of house and nest used. Hatchability of eggs in wire flood pens was superior to eggs from litter floor pens. Fungal contamination of air was approximately the same for both systems. (White-Iowa State)

0026 - C4
A RAPID AND SIMPLE METHOD FOR THE DETECTION AND ISOLATION OF SALMONELLA FROM MIXED CULTURES AND POULTRY PRODUCTS,
Iowa State Univ., Ames. Dept. of Food Technology.
Daniel Y. C. Fung, and Allen A. Kraft.
Poultry Science, Vol 49, No 1, p 46-54, 1970. 1 fig, 7 tab, 7 ref.

Descriptors: *Isolation, *Salmonella, *Poultry, *Cultures, Farm wastes.
Identifiers: Poultry products, Motility flask, Concentrations, Strains.

This report deals with results obtained using a new rapid method of Salmonellae detection and isolation in mixed cultures, turkey and chicken products, and whole eggs. The paper describes a simple system, combining biochemical and physical properties of Salmonella, which can detect small numbers of Salmonella in the presence of large numbers of competitive organisms. Motility multilayered agar flasks were used in the test. Typical complete Salmonella reactions were obtained in the control flask as early as 17-36 hours of incubation, as compared with 48-96 hours by conventional methods. This system has the potential as a simple and rapid method for large scale screening test for Salmonellae in a variety of commercial food products. (White-Iowa State Univ)

0027 - C5
EFFECT OF STRESS ON SWINE: HEAT AND COLD EXPOSURE AND STARVATION ON VANILMANDELIC ACID OUTPUT IN THE URINE,
Guelph Univ. (Ontario). Dept. of Nutrition.
M. P. Stefanovic, H. S. Bayley, and S. J. Slinger.
Journal of Animal Science, Vol 30, No 3, p 378-381, 1970. 1 fig, 2 tab, 12 ref.

Descriptors: *Hogs, Air temperature, *Urine, Amino acids, *Farm wastes.
Identifiers: Vanilmandelic acid output, Starvation, Metabolic response.

Tests were performed on 3 Yorkshire pigs in which they were subjected to normal conditions, extreme temperatures of 5 and 33C, and finally starved for 10 days at 20C. The urinary excretion of 3-methoxy - 4-hydroxymandelic acid (VMA) was measured when the pigs were housed in cages maintained at a room temperature of 20C. Observations of the VMA content was also made at times the pigs were under the stress conditions. The pigs increased in weight from 8 to 30 kg. during the 70 day experiment. Under normal temperature they excreted 10 mg of VMA per 24 hours. This increased to between 20 and 30 mg when the pigs were exposed to the low temperature. Exposure to the high temperature resulted in an excretion of 20 mg per day, but starvation caused a rapid decline to 3 mg per day. The excretion returned to normal values very rapidly when the animals were refed. These observations are discussed in relation to those made by other authors with other species on the effects of stress on the release and metabolism of catecholamines and their excretion in the urine, and it is suggested that the urinary output of VMA offers a convenient method of measuring physiological response to stress in the pigs. (White-Iowa State)

0028 - A8, B3, E4
HOUSEFLY LARVAE: BIODEGRADATION OF HEN EXCRETA TO USEFUL PRODUCTS,
Agricultural Research Service, Beltsville, Md.
C. C. Calvert, N. O. Morgan, and R. D. Martin.
Poultry Science, Vol 49, No 2, p 588-590, March 1970. 2 tab, 3 ref.

Descriptors: *Farm wastes, *Livestock, *Manure, *Poultry, Insects, Waste treatment, Ultimate disposal, Waste disposal, Odor.
Identifiers: House fly, Hen, Fly eggs, Manure treatment, Waste utilization.

This report presents the results of experiments to establish the concentration of fly eggs that can be used to process hen excreta most efficiently, and a means of separating the house fly pupae from the processed hen excreta and to simplify their collection. Within four days after seeding with house fly pupae the odor of the manure became unobjectionable. After eight days the excreta was reduced to an essentially odorless and friable material. The separated pupae were utilized as a protein source in the diet of growing chicks. (Miner-Iowa State)

0029 - E3
DRIED POULTRY MANURE AS CATTLE FEED,
NAAS, Cambridge.
C. B. Fairbairn.
Poultry Digest, July 1970. p 331, Vol. 29, No. 341.

Descriptors: *Farm waste, *manure, *poultry, drying.
Identifiers: Manure feeding, poultry manure, nutritional value.

Presents data on the nutritional value of dried poultry manure with and without litter. The energy value for dried litter is 500 calories per pound which is about one third that for grain. Protein value was similar to cereal. It was shown to be suitable for inclusion in intensive beef rations. (Miner-Iowa State)

0030 - D4, E2
TREATMENT OF DAIRY MANURE BY LAGOONING,
Washington State Univ., Pullman.
Surinder K. Bhagat, and Donald E. Proctor.
Journal Water Pollution Control Federation, Vol 41, No 5, 1969, p 785-795. 9 fig, 7 tab, 6 ref.

Descriptors: *Farm wastes, *Farm lagoons, *Biodegradation, Algae, Biochemical oxygen demand, Anaerobic digestion, Aerobic treatment, Chemical oxygen demand, Storage capacity, Effluents, Construction.
Identifiers: *Dairy manure, Total solids, Volitile solids, Non-degradable solid.

Because of high solids content of dairy manure waste, anaerobic lagoons can be used satisfactorily as a primary waste treatment. Average removals of BOD, COD, TS, and VS above 86 percent can be accomplished with an applied loading of 70 lb VS/day/1000 Cu. Ft. (1120 g/day/cu. m.). An anaerobic lagoon can act as a sedimentation, flotation, and anaerobic digestion process unit while simultaneously providing long-term storage for non-degradable solid residue. The effluent from the anaerobic lagoon retains most of the nutrients present in the raw manure waste and thus has fertilizer value. The effluent has organic matter which can be oxidized. The effluent can be applied to a field or subjected to further treatment. The secondary treatment can be an aerated lagoon, oxidation ditch, or an oxidation pond. The results of the batch type aerobic treatment indicated that an effluent BOD at 20 mg/l can be achieved by a 24-hr. aeration period. (Christenbury-Iowa State)

0031 - C2, C3
VOLATILIZATION AND NITRIFICATION OF NITROGEN FROM URINE UNDER SIMULATED CATTLE FEED LOT CONDITIONS,
Agricultural Research Service, Fort Collins, Colo. Soil and Water Conservation Research Div.
B. A. Stewart.
Environmental Science and Technology, Vol 5, No 7, p 579-582, July 1970. 1 fig, 7 tab, 7 ref.

Descriptors: *Nitrification, *Cattle, *Soils, Ammonia, Nitrogen Moisture content, Depth, Chemical oxygen demand, Farm wastes, Urine.
Identifiers: *Feed lots.

Virtually all the recent growth in cattle feeding has been in feeding units of 10,000 head or more in which cattle are confined in pens allowing 6 to 20 sq meters per animal. Animal wastes resulting from these large feeding operations cause concern in many areas. Disposal of the accumulation of solids wastes is difficult and in some cases run-off from these lots has caused pollution of streams and lakes. Feeding operations can cause high nitrogen concentrations in the underground water supply. There are large differences in the amount of nitrate found under feed lots: some contain large amounts, other nearly nitrate free, both at shallow and deep depth. The objectives were to simulate some feed lot conditions and study the nitrification and

volatilization weights of nitrogen added as cattle urine to soil in an attempt to determine some of the factors governing nitrate accumulation under feed lots. Urine accounts for about half of the nitrogen excreted by cattle. When urine was added every two days to an initial wet soil at a rate of 5 ml per 21 cm sq, less than 25% of the nitrogen was lost as ammonia and about 65% converted to nitrate. When urine was added every 4 days to initially dry soil, essentially all the water evaporated between the urine additions, and 90% of the nitrogen was lost as ammonia. These findings suggest that the stocking rate and other management factors should be considered in pollution of the unit. (Hancuff-Texas)

0032 - E2
NATURAL FILTERS FOR AGRICULTURAL WASTES,
Soil Conservation Service, Washington, D.C.
W. E. Bullard, Jr.
Soil Conservation, Vol 34, No 4, November 1968, p 75-77. 2 fig.

Descriptors: *Farm wastes, *Sprinkler irrigation, *Organic wastes, *Waste water disposal, Air pollution, Water pollution, Odor, Effluents, Sewage effluents, Dilution, Decomposing organic matter, Insects, Mites, Bacteris, Fungi, Algae, Nitrites, Nitrates, Detergents, Phosphates.
Identifiers: *Biologic 'disposers', Microscopic organisms, Papermill waste effluent, Cheese factory waste waters.

Farmers and processors of farm products are finding that the waste products of their operations generally can be returned to the land with less hazard to the environment than when discharged into streams. By completing the natural cycle of growth, death, and decay on the land where crops are produced they make use of a legion of 'disposer' organisms in the soil capable of decomposing organic wastes on site. When sprayed on grass or crops, the effluent serves the dual purpose of irrigating and fertilizing the field, thus, agriculture has the potential means of disposing of its own wastes and preventing or reducing environmental pollution. Numerous examples are given of returning sewage treatment effluents, pulp and papermill effluents, and cheese factory waste waters, among others, to the land by sprinkler irrigation. The principle behind these successful operations is that of getting material produced from the land back onto the land where they can be used again in production. (White-Iowa State)

0033 - E2
IRRIGATING WITH ANIMAL WASTE,
Soil Conservation Service, Hermiston, Oreg.
Clarence Underwood.
Soil Conservation, Vol 34, No 4, November 1968, p 81-82. 3 fig.

Descriptors: *Farm wastes, *Hogs, *Irrigation, *Sewage disposal, Effluent, Soil conservation, Odor, Fertilization, Lagoons, Sprinkler irrigation, Nitrogen, Waste dilution, Water pollution.
Identifiers: *Soil Conservation Service, Velocity-controlled water outlets, Holding basin.

Two brothers purchased a civilian housing facility from the Umatilla Army Depot and converted the 57 units to hog production. Wastes from the 22,000 hog per year facility are flushed into a gutter, through a sewer system and into the first of two lagoons. A second holding basin allows additional settlement and dilution of solids. From here it is pumped to irrigate about 500 acres of land. The brothers estimate that their system puts about 5 pounds of nitrogen per acre on a field each time it is irrigated. The crops are fertilized, little odor is noticeable, and no water pollution has been detected. (White-Iowa State)

0034 - C3
A RAPID EXTRACTION AND QUANTIFICATION OF TOTAL LIPIDS AND LIPID FRACTIONS IN BLOOD AND FECES,
Pittsburgh Univ., Pa. Dept. of Pathology.
J. S. Amenta.
Clinical Chemistry, Vol 16, No 4, 1970, p 339-346. 8 fig, 19 ref, 1 tab.

Descriptors: *Lipids, *Laboratory tests, Chemical analysis, Farm wastes.
Identifiers: *Feces, Plasma, Lipid fractions, Clinical laboratory, Cholesterol.

An analytical system for plasma lipids suitable for use in the large and small clinical laboratory is presented. Lipids are extracted into a chloroform-methanol solvent and concentrated into a chloroform phase by a wash with an aqueous $CaCl_2$ solution. This extract is used to estimate total lipids and (after separation by thin-layer chromatography) the major lipid factions. A single acid dichromate reagent is used for all quantification of fecal lipids. Lipids in other body fluids can be conveniently analyzed with this flexible method. (Christenbury-Iowa State)

0035 - A5, B1, D1, E3
TREATMENT OF BEEF-CATTLE WASTE WATER FOR POSSIBLE REUSE,
North Dakota State Univ., Fargo.
G. L. Pratt, R. E. Harkness, R. G. Butler, J. L. Parsons, and M. L. Buchanan.
Transactions of the ASAE, Vol 12, No 4, 1969, p 471-473. 2 fig, 3 tab, 19 ref.

Descriptors: *Farm wastes, *Cattle, *Septic tank, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Effluents, Aeration, Dissolved oxygen, Turbidity, Aluminum.
Identifiers: *Settling tank, *Slatted floor, *Reuse, Total solids, Volatile solids, Aluminum sulfate.

Removing solid materials from wastes that have been washed from a livestock barn with water can be accomplished in several ways. In trials at the North Dakota Agricultural Experiment Station settling tanks were evaluated. Treatments of overflow from the settling tank by aeration and chemical coagulation were compared with settling only. The equipment consisted of an 8x8 foot animal shelter with a steel-slatted floor. Manure was washed from under the floor to a settling tank. A secondary treatment tank was installed to receive overflow from the settling tank. A pump end holding tank was used so that the effluent from the secondary treatment tank could be used in washing the floor under the steel slats. Aeration and treatment with alum did not upgrade the waste water sufficiently to make the water odorfree. It was also colored. Other treatment will be needed to remove the odor before the water can be suitable for reuse in washing the building. (White-Iowa State)

0036 - A9, E3
OBSERVATIONS ON THE EFFECT OF THE RE-USE OF BROILER LITTER ON THE INCIDENCE OF MAREK'S DISEASE,
Delaware Univ., Newark.
G. W. Chaloupka, R. W. Lloyd, J. F. Gordy, and L. M. Greene.
Poultry Science, Vol 47, p 1660, 1968.

Descriptors: *Farm wastes, *Condemnation, *Poultry, *Disinfection, Public health, Pollution abatement, *Diseases.
Identifiers: *Marek's disease, Broiler house, Litter re-use, Leucosis, Immunity, Causative agent.

Four different studies involving several trials have been conducted at the University of Delaware Substation in which the performance of broilers grown on re-used litter was compared to those grown on new litter. These studies over a period of several years have shown that broiler condemnations due to leucosis have in most instances been lower for the broilers grown on re-used litter. This substantiates the findings of many field studies and by at least one private research farm. These results would indicate that a failure to clean out and disinfect the broiler house before placing each new lot of chicks is not a primary factor in increasing the incidence of Marek's disease. It is not known whether these results are due to developing a partial immunity due to contact with the causative agent in the litter at an early age, or whether the causative agent is destroyed in some way in the reused litter. (White-Iowa State)

0037 - A2, F2
WATER POLLUTION CONTROL LEGISLATION,
Cornell Univ., Ithaca, N.Y.
Raymond C. Loehr.
Condensation of report NA68-304 available from ASRE, St. Joseph, Mich. 49085, $0.50. Agricultural Engineering, Vol 50, August 1969, p 468-470. 8 ref.
Descriptors: *Farm wastes, *Water pollution, *Legislation, Water pollution control, Water Quality Act, Biochemical oxygen demand, Phosphates, Effluents.
Identifiers: *Treatment processes, Aerobic oxidation pond, Aerated lagoon, Oxidation ditch, Minimum removal efficiencies, Water quality criteria.

Agricultural production facilities must consider waste disposal as an important aspect of their operations. Waste treatment and disposal facilities are becoming important parts of agricultural production facilities. They must be evaluated whenever expansion or establishment of new facilities is underway. Highly efficient secondary treatment processes perhaps including nutrient removal and disinfection may be necessary for discharging waste waters to surface waters. The need for and cost of these processes should cause a re-evaluation of the comparative costs of handling, treatment, and disposal of agricultural wastes as a solid. Land disposal is another alternative. When agricultural wastes are handled to avoid polluting surface waters, other types of pollution must be avoided. Mere transferral of pollution from one sphere to another will no longer be tolerated. These are among the aspects which this paper deals with. (White-Iowa State)

0038 - A2, B1, E2
PONDS STOP POLLUTION FROM FEEDLOTS,
Soil Conservation Service, Salina, Kans.
George R. Smith, and F. DeWitt Abbott.
Soil Conservation, Vol 34, No 4, Nov 1968, p 78-79. 2 fig.

Descriptors: *Farm wastes, *Water Quality Act, Ponds, Kansas, Water pollution, Dams, Runoff, Soil, Sprinkler irrigation.
Identifiers: *Feedlots, Soil Conservation Service, Detention ponds, Kansas State Department of Health, Solid waste, Liquid waste.

In compliance with the Federal Water Quality Act of 1965 and a 1967 Kansas State law a northwest Kansas feedlot is retaining and disposing of animal wastes in a non-pollutional manner. The 14,000 head beef feedlots is located at the headwaters of a subdrainage area of Hackberry Creek. The feedlot, covering 100 acres, drains into two intermittent natural draws. Each draw has a pair of detention ponds. One collects solid wastes, and below this a second pond holds drainage from the first pond. Pipes with slide gates provide controlled drainage of liquids from the solid-waste ponds into the liquid waste ponds. The dams were built to state health department standards to contain 3 inches of runoff

from the feedlot. The excess water from the lower ponds will be used for irrigation. The ponds are flat bottomed to facilitate removal of solid wastes. (White-Iowa State)

0039 - D4

LABOR-FREE MANURE DISPOSAL,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
Rex Wilmore.
Farm Journal, Vol 93, No 8, August 1969, p 26C-26D. 1 fig.

Descriptors: *Farm wastes, *Aeration, *Lagoons, Aerobic bacteria, Effluent, Sprinkler irrigation, Storage capacity, Water pollution, Odors, Efficiencies, Slurries, Oxygen, Organic matter, Pumps, Labor, Costs, Management.
Identifiers: *Floating aerator, Suspended solids, Volatile solids.

Research at Purdue University indicates that a floating aerator in a lagoon can provide a low cost system that promises to avoid pollution dangers and saves labor. Manure is dumped into the lagoon once each day although it is better to have it continuously trickle in. Extra water is added to bring the solids content down to 2% or 3% for top efficiency. The aerator, a big doughnut-like float with an electric motor on top driving an impeller, runs continuously. The impeller forces a spray of slurry up over the float, mixing air into the lagoon, so aerobic bacteria can break down manure without odors. Periodically a small pump pulls out some of the mixed slurry and sprinkles it through a 'big gun' type nozzle onto grassland. The irrigation lowers the lagoon, which allows more water dilution and removes the suspended solids that won't decompose. Other advantages include low labor cost as compared to pits and spreaders, and minimal management. Its biggest disadvantage might be getting the manure into the lagoon each day. (White-Iowa State)

0040 - B3

PHYSICAL AND BIOLOGICAL EVALUATION OF FIVE LITTER MATERIALS,

Purdue Univ., Lafayette, Ind. Dept. of Animal Sciences.
Paul L. Ruszler, and James R. Carson.
Poultry Science, Vol 47, p 1712, 1969.

Descriptors: *Farm waste, *Poultry, *Absorption, Moisture, Particle size, Laboratory tests, Waste water treatment, Waste treatment, Water pollution effects.
Identifiers: *Litter materials, Field conditions, Peanut shells, Pine bark, Ground cobs, Wood shavings, Cane pomace.

The usefulness of peanut shells, pine bark, ground cobs, wood shavings and cane pomace as litter materials in rooster production was evaluated under laboratory and field conditions on the basis of their physical properties and effects on the birds during a 14-week growing period. When the amount and rate of moisture exchange was compared, it was found that all five materials differed significantly. When ranked by grams of moisture absorbed per gram of dry weight, cane was highest, followed by shavings, cobs, shell, and bark. The materials with the smaller particle sizes absorbed less total moisture in both growing house and laboratory tests. The same materials rated low in breast blister incidence, but without statistical significance. (White-Iowa State)

0041 - C1, E2

THE EFFECTS OF FARMYARD MANURE ON MATRIC SUCTIONS PREVAILING IN A SANDY LOAM SOIL,

National Vegetable Research Station, Wellesbourne (England).
P. J. Salter, G. Berry, and J. B. Williams.
Journal of Soil Science, Vol 18, No 2, 1967, p 318-328. 3 fig, 2 tab, 25 ref.

Descriptors: *Farm wastes, *Soils, *Soil moisture, Field capacity, Wilting point, Equations.
Identifiers: *Soil matric suctions, Ryegrass, Available-water capacity, Moisture characteristic.

Soil matric suctions under a crop of ryegrass on farmyard manure-treated and untreated plots were determined over a total period of 24 weeks from March to November. The soil moisture characteristic of each plot was determined five times throughout this period, and for each plot and on every occasion a linear relationship was found between moisture content and log matric suction. A formula was derived to account for the seasonal changes in moisture characteristic - and it was then possible to obtain matric suction values from the soil moisture contents obtained from twice-weekly sampling of each plot. Although differences between available-water capacity of the manured and unmanured plots were small throughout the 6-month period of sampling, the soil matric suctions of the manured plots were almost always lower than those of the unmanured plots. The lower suctions prevailing in the manured soil could be a factor contributing to the higher yields of ryegrass obtained from the manured plots as compared with those obtained from the unmanured plots. (White-Iowa State)

0042 - A3, E2

STREAM ENRICHMENT FROM FARM OPERATIONS,

Wisconsin Univ., Madison.
Neal E. Minshall, Stanley A. Witzel, and Merle S. Nichols.
Journal of the Sanitary Engineering Division, Proceedings of ASCE, Vol 96, No SA2, April 1970, p 513-524. 2 fig, 5 tab, 4 ref.

Descriptors: *Farm wastes, *Fertilizers, *Runoff, Nitrogen, Phosphorus, Potash, Wisconsin, Water pollution, Nutrients, Precipitation, Rates of application, Corn, Frozen ground.
Identifiers: *Nutrient losses, Collection tanks.

In order to obtain information on the amount of fertilizer materials lost in runoff water from farm lands under cultivation, eight plots, 10x40 ft. in size, were established on the University of Wisconsin Agricultural Experiment Station Farm near Lancaster, Wisconsin. Investigations involving fertilizer and manure applications and losses in surface runoff were begun in 1966 and were continued through 1969. Each plot was completely surrounded by a galvanized metal border which prevented surface runoff from entering or leaving the plots, located on a 10% to 12% slope. Runoff was collected in a trough at the lower end and funneled to a measuring tank. Manure was applied at the rate of 15 tons per acre in the winter and spring. Later corn was planted in 30 inch rows on the contour. Up to 20% of N, 13% of P, and 33% of K nutrients in winter applied manure, on frozen ground, may be lost under conditions favoring maximum early spring runoff. Nutrient losses in surface runoff from plots having manure applied in the summer and incorporated into the soil were less than from check plots, which received no manure. (White-Iowa State)

0043 - E3

FUMIGATION AND REUSE OF BROILER LITTER,

Hawaii Univ., Honolulu. Dept. of Animal Sciences.
Ernest Ross.
Poultry Science, Vol 47, 1968, p 1711-1712.

Descriptors: *Farm wastes, *Poultry, *Fumigants, Broods, Performance, Mortality, *Waste treatment.
Identifiers: Weight gains, Feed conversion, Reused litter, Litter, Methyl bromide.

A series of experiments was conducted to compare the performance of broiler chicks reared on fresh and reused wood shavings litter. In addition, the effect of methyl bromide fumigation of reused litter on subsequent chick growth, feed conversion and mortality was studied. Non-fumigated fresh and reused litters served as controls. Methyl bromide fumigation reduced the total bacterial population of reused litter. This reduction, however, did not result in any significant improvement in body weight gains, feed conversion or mortality. The performance of the chicks reared on the fumigated litter was similar to that of chicks reared on reused litter and slightly superior to that of chicks reared on fresh wood shavings litter. The mortality o f chicks reared on fresh litter was slightly lower than in the groups on the reused litters. (White-Iowa State)

0044 - B3, D4, E3

THE DIGESTION OF POULTRY FECES UNDER CAGES,

Auburn Univ., Ala. Dept. of Poultry Science.
J. R. Howes.
Poultry Science, Vol 47, p 1682, 1968.

Descriptors: *Farm wastes, *Poultry, *Aerobic conditions, Odor, Aerobic bacteria, Fertilizer, Nitrogen, Stabilization, *Waste treatment.
Identifiers: *Absorbent substrate, *Cage operation, *Inoculation, Control plots.

A series of small experiments were carried out under cages with and without concrete floors, using various absorbent substrates for poultry feces. After an initial buildup period, the feces and substrate was inoculated with aerobic bacteria and aerobic conditions maintained by disturbing the surface cake at intervals. These experiments led to a field trial without any absorbent substrate at a large cage operation in south Florida, which has now been in operation for 18 months. Odors and flies have been largely eliminated except in control plots and spraying for fly control greatly reduced. The bulk of the fecal pile was less than half the volume of the control plots due to stabilization of nitrogen and water losses. Feathers were digested if they were incorporated into the fecal pile and the resulting material was a homogenous, odorless fertilizer which has been used in urban gardens and on golf greens. (White-Iowa State)

0045 - C5

THE POTENTIAL DIGESTIBILITY OF CELLULOSE IN FORAGE AND FAECES,

University of New England, Armidale (Australia). Dept. of Agronomy.
R. J. Wilkins.
Journal of Agricultural Science, Vol 73, No 1, 1969, p 57-64. 1 fig, 6 tab, 35 ref.

Descriptors: *Farm wastes, *Cellulose, *Digestion, *Incubation, Grasses, Forages, Sheep, Nitrogen, Carbohydrates, Organic matter, Analytical techniques.
Identifiers: *Potential digestibility, *Digestibility coefficients, *Cellulose digestibility, Duration of digestion, Rumen, Ryegrass, Cooksfoot, Callide Rhodes grass, Samford Rhodes grass, Lignified and cutinized tissue.

The potential digestibility of cellulose is defined as the maximum digestibility obtainable when the conditions and duration of digestion are not limiting factors. Techniques for measuring potential cellulose digestibility were examined and the relationship between potential digestibility and in vivo cellulose digestibility was explored for a range of grasses. Cellulose digestibility was found to reach a maximum value after 5 days incubation in vitro. No further cellulose was digested when the residues

from an initial incubation for 6 days were incubated with a second rumen liquor inoculum. The values measured after a single incubation of 6 days duration were similar to cellulose digestibility coefficients measured by the suspension of ground forage samples in nylon bags in the rumen for 6 days. Plant factors appear to limit further digestion and the residue from prolonged digestion in vitro consisted only of lignified and cutinized tissue. Potential cellulose digestibility measured by either of the above techniques was higher than cellulose digestibility in vivo. The difference varied between forages and when the difference was large, the digestibility of cellulose in faeces was high. It is suggested that measurements of the potential digestibility of cellulose in feed and faeces may be of use in estimating the digestibility of grazed herbage. (White-Iowa State)

0046 - A5, A10, F3

FARM WASTE DISPOSAL-AMENITY AND GOOD NEIGHBOURLINESS,

K. B. C. Jones.

Great Britain Ministry of Agriculture, Vol 77, No 4, p 165-167, April 1970.

Descriptors: *Farm wastes, *Odor, *Water pollution, *Building codes.
Identifiers: *Noise, *Nuisances, *Legal action, Solid refuse.

A general picture of waste pollution in England's country-side is shown by comparing today's production and disposal with that of yester-year's. Nuisances that are annoying to both farmers and city-dwellers are described. The rights and liabilities of both farmer and city-dwellers are outlined. (Miner-Iowa State)

0047 - F4

PRINCIPLES AND PRACTICES OF BEEF CATTLE FEEDLOTS,

Queensland Univ., Brisbane (Australia). Dept. of Animal Husbandry.
W. J. Pryor.
Australian Veterinary Journal, Vol 46, No 4, April 1970, p 173-177. 2 tab, 1 fig, 17 ref.

Descriptors: *Cattle, *Animal diseases, *Costs, Profit, Nutrient requirements, Silage, Sorghum, Wheat, Performance, Water pollution control.
Identifiers: *Feedlots, Feelot management, Feeding systems, Green chop.

It is believed the emergence of a large feedlot industry will be dependent primarily on two factors, the first being the availability of cheap feed and the availability of store cattle at a price which will permit a margin after they have been lot fattened, and the other, the introduction of a satisfactory national system of carcass grading and identification. A description is given of the principles involved in the management of feedlots with special reference to conditions operating in northern Australia. The importance of concentrate to roughage ratios and protein and mineral requirements are stressed. Diseases have played only a minor part in feedlot management in Australia thus far, and it is suggested that the veterinarian can play a more useful role in supplying sound advice on economic feeding and management. (White-Iowa State)

0048 - E2

SOIL FERTILITY UNDER CONTINUOUS CULTIVATION IN NORTHERN NIGERIA. I. THE ROLE OF ORGANIC MANURES,

R. G. Heathcote.
Experimental Agriculture. Vol 6, No 3, p 229-237, 1970. 13 tab, 14 ref.

Descriptors: *Trace elements, *Limiting factors, Farm wastes, Fertilizers, Crop response, Deficient elements.
Identifiers: Organic fertilizers, Nigeria, Organic manures.

Soil acidity, incipient potassium deficiency, and a deficiency of one or more trace elements were limiting factors in three trials of long-term soil fertility changes under continuous cultivation in the Sudan Savanna zone of Nigeria. The effectiveness of organic manures is explained largely or wholly in terms of these factors, since no evidence has yet been found to suggest that the addition of organic matter as such is of value. (Christenbury-Iowa State)

0049 - D4, E2

USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT RENOVATION AS A FUNCTION OF DEPTH AND APPLICATION RATE,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. K. Koelliker, and J. R. Miner.
Transactions of the American Society of Agricultural Engineers, Vol 13, No 4, p 496-499, July-August 1970. 3 fig, 4 tab, 19 ref.

Descriptors: *Denitrification, *Nitrogen, *Irrigation, Farm wastes, Chemical oxygen demand, Lagoons, Nitrates, Nitrites, Ammonia, Bacteria, Treatment, Disposal, Anaerobic conditions, Waste water treatment.
Identifiers: *Nitrogen balance, Nitrobacter, Nitrosomonas, Lagoon effluent, Application rates.

This paper reports the findings from a study where lagoon effluent was applied to soil for final treatment. The active soil profile appears to offer great potential as a final treatment media for partly treated animal wastes. Anaerobic livestock-lagoon effluent sprinkled on grass-covered soil profile reduced the COD, phosphorous, and nitrogen concentrations 95, 99, and 80 percent, respectively in 3 months. Loading range was 13.9 to 30.5 in. of lagoon effluent. Removal of COD was attributed to biological activity and physical filtration in the upper inches of soil. Phosphorus reduction resulted from chemical activity of the clay fraction near the soil surface. Nitrogen reduction was attributed primarily to dentrification in the soil profile. It was recommended that if nitrogen reduction is a goal in waste water disposal, a rather wet schedule should be followed. The applied waste water should contain some organic load so that a substrate will be provided for the denitrifying bacteria. (Christenbury-Iowa State)

0050 - B1, F4

TREATMENT AND DISPOSAL OF ANIMAL WASTES,

Cornell Univ., Ithaca, N.Y.
Raymond C. Loehr.
Industrial Water Engineering. Vol 7, No 11, p 14-18, November 1970. 3 fig.

Descriptors: *Farm wastes, Lagoons, Drying, Nutrients, Disposal, Inorganic compounds, Nitrogen, Phosphorus, Nitrification, Denitrification, Confinement pens, Waste water treatment.
Identifiers: Holding tanks, In-house ditches, Oxidation ditches, Separation of wastes, Composting, System.

Due to confinement feeding of livestock it has become doubtful from the profit standpoint to recycle manure by applying it to land. There has been an increase of 120% in the number of cattle of feed in the last 15 years. Laws are being considered which make it mandatory to reduce the pollution potential of livestock waste. The nine most feasible systems for animal waste disposal are discussed. These systems utilize either holding tanks, in-house ditches, separation of wastes, or drying and composting. These systems will remove most of the organic-oxygen-demanding material but not the inorganic nutrients. Land disposal has been effective for disposal of phosphorous. However land disposal for nitrogen may not be adequate. Two techniques for reducing the nitrogen load in animal waste is through ammonia release and the nitrification-denitrification cycle. (Christenbury-Iowa State)

0051 - A3

IMPACT OF AGRICULTURAL POLLUTANTS ON WATER USES,

Robert S. Kerr Water Research Center, Ada, Okla.
James P. Law, Jr., and Harold Bernard.
Transactions at the American Society of Agricultural Engineers, Volume 13, No 4, p 474-478, July-August 1970. 3 tab, 23 ref.

Descriptors: *Farm wastes, *Irrigation, *Salinity, *Pollutants, *Fertilizers, *Water pollution sources, Biochemical oxygen demand, Chemical oxygen demand, Disposal, Livestock, Agricultural chemicals, Aquatic life, Water quality, Fish, Dissolved oxygen, Aesthetics, Recreation, Pollutant identification.
Identifiers: *Agricultural pollutants, *Aesthetic value, Total salt, Primary contact recreation, Secondary contact recreation.

This paper discussed the water pollution potential of agricultural sources. Animal wastes, irrigation return flows, fertilizer application, and pesticides are the primary sources of agricultural pollutants. The water-quality criteria for water supplies are discussed as related to agricultural contaminants. Data is presented for the desirable and permissible limits of concentration for the various contaminants. Agricultural is responsible for a major portion of the total salt in many rivers and streams. Data is given for the proposed safe limits of water salinity for livestock. The impact that agricultural pollutants has on fish, other aquatic life, and wildlife is discussed. Examples are cited where pollutants have adversely affected fish and wildlife. Now is the time to build the cost of clean water into all of our operations. (Christenbury-Iowa State)

0052 - A4, C3

NITROGEN CONTAMINATION OF GROUNDWATER BY BARNYARD LEACHATES,

Guelph Univ. (Ontario). Dept. of Soil Science.
R. W. Gillham, and L. R. Webber.
J Water Pollut Contr Federation, Vol 41, No 10, p 1752-1762, Oct 1969. 11 p, 10 fig, 2 tab, 13 ref.

Descriptors: *Farm wastes, *Cattle, *Leaching, *Water pollution sources, Path of pollutants, Water pollution effects, Nutrients, Groundwater movement, Nitrogen, Waste water (Pollution).
Identifiers: Cattle wastes, Feedlot wastes.

A zone of nitrogen-contaminated groundwater associated with a barnyard was studied to determine the quantity of inorganic nitrogen reaching the groundwater from the barnyard. From piezometric potential and hydraulic conductivity measurements, quantitative flow nets were drawn permitting groundwater discharge calculations. An increase from 2 to 15 mg/l inorganic nitrogen occurred in the groundwater as it passed beneath the barnyard. This resulted in a contribution of 4.4 lb (2.0 kg) of inorganic nitrogen made by the barnyard to the groundwater during the 5-month study period. The concentration of nitrogen was related to the direction of groundwater flow and was dependent on the presence of conditions suitable for the leaching of nitrogen and the dilution potential of the local groundwater flow system. The surface topography proved to be a poor indication of the direction of groundwater flow. (Knapp-USGS)

0053 - B3

FARMYARD MANURE HANDLING.

Ministry of Agriculutre, Fisheries and Food, Lon-

don (England).

Mechanization Leaflet For Farmers and Growers, No 8, December 1965. 6 p.

Descriptors: *Farm waste, *Disposal, *Equipment, Operations, Waste water treatment.
Identifiers: *Machinery, *System, Loaders, Spreaders, Scrapers, United Kingdom.

This leaflet describes the more important types of equipment and working methods used at present in the United Kingdom for farmyard manure handling. Loading and spreading equipment are discussed. Recommendations are made as to the most efficient methods of combining the available men and equipment into an operating system for manure disposal. (Christenbury-Iowa State)

0054 - A1, F4

POLLUTION POTENTIAL OF LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
James N. Dronbush.
Sponsored by the SDSU College of Agriculture and Biological Sciences, and the College of Engineering. Proceedings South Dakota Agriculture and Water Quality - A Symposium on Water Pollution, 1970, p 37-46, 4 tab, 3 fig.

Descriptors: *South Dakota, *Runoff, *Pollutants, Farm wastes, Lagoons, Cost sharing, Locating, Cattle.
Identifiers: *Pollution potential, *Population equivalents, Feedlots.

The overall pollution problem for livestock feeding operations may not be as critical in South Dakota as has been assumed. Certain climatic factors appear favorable, nevertheless, feedlots poorly located with excessive drainage may be expected to cause problems especially to lakes. General principles are available as guide lines for construction to control pollution and cost sharing is available. Although research can be expected to provide greater related knowledge, there appears to be little excuse for delaying the program of active feedlot pollution control particularly with all planned new construction for expansion of the feeding industry. (Christenbury-Iowa State)

0055 - F4

MISSION IMPOSSIBLE: DISPOSE ANIMAL WASTES,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. Paul Taiganides.
Purdue University, Engineering Extension Service, Bulletin No 135, p 542-549, 1969. 1 fig, 4 tab, 10 ref. (Proceedings 24th Industrial Waste Conference).

Descriptors: *Transportation, *Disposal, *Management, Farm wastes, Lagoons, Production, Anaerobic digestion, Aerobic treatment, Biochemical oxygen demand, Gases, Dehydration, Odor.
Identifiers: *Generation, *Processing, *Utilization, Waste management, Anaerobic lagoons, Gas production, Composting.

The development of a 'waste management technology' analogous to the new patterns of animal production and in harmony with our need to keep our natural resources from being polluted is not an impossible mission but rather a challenging mission whose resolution is requiring of engineers and scientists the same ingenuity that has been shown in developing modern methods of production of consumer goods. This paper discusses the changes and trends in the components of animal waste management. The discussion is divided into five areas: waste generation, waste transportation, waste processing, waste utilization and waste disposal. (Christenbury-Iowa State)

0056 - D4

PRELIMINARY RESULTS OF A NOVEL BIOLOGICAL PROCESS FOR TREATING DAIRY WASTES,
Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Ronald L. Antonie, and Fred M. Welch.
Purdue University, Engineering Extension Service, Bulletin No. 135, p 115-126, 1969. Proceedings 24th Industrial Waste Conference.

Descriptors: *Equipment, *Aerobic conditions, *Biological treatment, *Biomass, Farm wastes, Aeration, Microorganisms, Biodegradation, Chemical oxygen demand.
Identifiers: *Loading rate, Rotating Biological Contractor, Field test.

Field testing of a device called the 'Rotating Biological Contractor' or 'RBC' is the subject of this paper. The device consists of a series of discs which are mounted on a shaft and rotated while partially submerged in the waste to be treated. A microbial film develops on the surface of the discs. The rotation of the discs carry the microorganisms into the air for aeration so that they can carry on aerobic activity. The field tests have shown that the RBC can effectively treat waste from a dairy plant. Varying weather conditions have no apparent effect on RBC effectiveness. RBC characteristics of a large microbial population, flexible aeration capacity, little maintenance, low power requirements and predictable performance make the RBC an attractive process for biological treatment of dairy wastes. (Christenbury-Iowa State)

0057 - A5, A6, B1

THE MENACE OF NOXIOUS GASES IN ANIMAL UNITS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. Paul Taigonides, and Richard K. White.
Transactions of the ASAE, Vol 12, No 3, 1969, p 359-362, 367. 2 tab, 18 ref.

Descriptors: *Farm wastes, *Gases, *Effects, Carbon dioxide, Oxygen, Ammonia, Hydrogen sulfide, Methane, Lethal limit, Toxicity, Cattle, Hogs, Poultry, Ventilation, Treatment.
Identifiers: *Concentrations, Storage pits, Pit cleaning, Lethal situations.

The paper begins with a description of noxious gases and it is noted that animal deaths have occurred as the result of an accumulation of these gases. The gases, their properties and characteristics listed, are carbon dioxide, ammonia, hydrogen sulfide, methane, and other gases. Oxygen is listed to show its indispensability inside a confinement building. Animal response to menacing concentrations of these gases is described. A table lists different properties of the noxious gases and their physiological effects on the animals. Possibly fatal concentrations are noted, along with the potentially lethal situations which may bring about these concentrations. Among these situations are ventilation breakdowns, pit stirring and pit cleaning. Finally, the control of noxious gases is emphasized. Preventive measures, moderating the effects of noxious gases, and treatment of affected animals are all discussed. (White-Iowa State)

0058 - B2, E3

REUSE OF WASH WATER FOR CLEANING CAGED LAYER HOUSES,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
R. L. Witz, G. L. Pratt, and J. L. Sell.
Transactions of the ASAE, Vol 12, No 6, p 807-812, November 1969. 7 fig.

Descriptors: *Recirculated water, Farm wastes, Poultry, Storage tanks, Equipment, Odor.
Identifiers: Flushing gutters, Manure.

A liquid manure handling system was designed for a poultry house. Manure is collected in concrete gutters beneath the cages. A flushing process is used to clean the gutters. A wooden scrape is forced down the length of the gutter by pressure exerted by water that had been added behind the scrape. The water was collected in an outside pit for reuse. This system has been effective for reducing the total quantity of water required for cleaning the poultry house. (Christenbury-Iowa State)

0059 - F4

THE MANAGEMENT OF LIVESTOCK MANURE,
California Univ., Davis. Dept. of Agricultural Engineering.
S. A. Hart.
Transactions of the ASAE, Vol 3, p 78-80, 1960. 4 fig, 1 tab, 13 ref.

Descriptors: *Farm wastes, *Disposal, *Management, Storage, California, Dehydration, Livestock, Fertilizers, Value.
Identifiers: *Composting, *Sanitation, Processing, House fly, Musca domestica, Carbon to nitrogen ratio, Production.

Manure management will seldom be a profit-making part of the farming enterprise. In most cases the cost of proper handling will exceed the value of the manure as a fertilizer or soil amendment. Even so, manure handling is as necessary a chore as is feeding or animal care. Through proper manure management the net cost of handling the manure can be minimized and the sanitation requirements of the farming operation fulfilled. The procedures of systems engineering are applicable to the management of livestock manure, and can be stated as the specific operations of: (a) gathering and cleaning up the manure, (b) storing or processing it, and (c) utilizing or disposal of it. (Christenbury-Iowa State)

0060 - A4, F3

RELATION OF AGRICULTURE TO GROUNDWATER POLLUTION: A REVIEW,
North Carolina State Univ., Raleigh.
J. W. D. Robbins, and G. J. Kriz.
Trans Amer Soc Agr Eng, Vol 12, No 3, p 397-403, May-June 1969. 7 p, 2 tab, 97 ref.

Descriptors: *Agricultural engineering, *Groundwater, *Pollutants, *Farm wastes, Agriculture, Pollution abatement, Farm management, Waste water (Pollution), Pesticides, Insecticides, Herbicides, Bibliographies, Saline water, Irrigation water, Waste water disposal, Waste disposal, Water pollution, Water pollution control, Water Pollution sources.
Identifiers: Groundwater quality, Pollution control.

Groundwater is a water resource and a potential medium for receiving wastes. Agricultural enterprises produce wastes that can lead to rapid degradation of groundwater. Agricultural engineers are responsible for evaluating agricultural groundwater pollution problems and recommending control and abatement measures. The purpose of this paper is to orient agricultural engineers on groundwater pollution problems caused by agricultural practices in 3 general areas: (1) evaluation of groundwater as a receiving medium for agricultural wastes; (2) characterization of the source of the pollutants; and (3) delineation of the types of solutions needed for agricultural groundwater quality problems. Agricultural groundwater pollutants reviewed are animal wastes, fertilizers, pesticides, plant residues, and saline waste water. (USBR)

0061 - A3
SURFACE RUNOFF AND NUTRIENT LOSSES OF FENNIMORE WATERSHEDS,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering. State of Wisconsin.
S. A. Witzel, Neal E. Minshall, M. Starr Nichols, and John Wilke.
Transactions of the ASAE, Vol 12, No 3, 1969, p 338-341. 4 tab, 3 fig, 5 ref.

Descriptors: *Surface runoff, *Nutrients, Fertilizers, Farm wastes, Nitrogen, Phosphorus, Potassium, Wisconsin, Agricultural watersheds, Discharge, Soils, Topography, Geology, Cover crops, Weirs, Precipitation, Snow.
Identifiers: *Runoff sampler, Fennimore, Wisconsin.

The paper describes the soils, geology, topographic features and cover of a 330 acre watershed near Fennimore, Wisconsin. The watershed was subdivided and wiers were placed with semi-automatic runoff samplers to sample winter runoff water. The amount of commercial fertilizer as well as manure that was applied was determined. The runoff samples were analyzed and the amount of nutrients lost was calculated from the wier calibration. The amount of runoff during the winter of 1967 was about twice the 29 year average. The nutrients lost in surface runoff were much greater than those in the base flow of southwestern Wisconsin streams. In a year of average runoff, assuming nutrient losses directly proportional to runoff, the losses would be 2 lb. nitrogen, 0.6 lb. phosphorus and 4 lb. potassium per acre. (White-Iowa State)

0062 - A2, B1, D1
MANAGEMENT OF CATTLE FEEDLOT WASTES,
Iowa State Water Resources Research Inst., Ames.
Richard R. Dague, and Kenneth J. Kline. Iowa State Water Resources Research Institute Report No 69-4, Iowa University, Project Completion Report, June 30, 1969. 195 p, 99 fig, 20 tab, 19 ref, 4 append.

Descriptors: *Farm wastes, *Confinement pens, *Waste treatment, *Waste disposal, Lagoons, Water pollution control, Water pollution sources.
Identifiers: Feedlot wastes, Waste management.

The effects of hydrologic factors on the control of runoff from open feedlots were studied. Management and treatment techniques are discussed and evaluated. Rainfall, runoff, and streamflow are the primary factors to consider in managing cattle feedlot runoff. The nature, volume, and rate of delivery of runoff are directly related to rainfall. Storage requirements depend upon the volume of runoff, whereas the retention pond discharge rate should be proportional to streamflow. Terraces and retention ponds will reduce the pollution from cattle feedlot runoff. Application to land appears to be the most practical method of disposal for both the solids and the liquid. When applied to agricultural land, the waste has some economic value. Retention ponds may not remove sufficient amounts of suspended solids, BOD, COD, and nutrients to provide safe effluents for disposal to streams. (Knapp-USGS)

0063 - A3, A6, A7, A9
SOIL POLLUTANTS: THEIR ORIGIN AND BEHAVIOR,
Guelph Univ. (Ontario). Dept. of Microbiology.
D. E. Elrick, J. W. Biggar, and L. R. Webber.
Journal Soil Water Conservation, Vol 21, p 7-11, 1966. 3 fig, 26 ref.

Descriptors: *Pollutants, *Pesticide residues, *Degradation (Decomposition), Farm wastes, Pollutant identification, Effluents, Pesticides, Sewage, Domestic wastes, Disposal, 2-4-D, DDT, Chlorides, Radioactive wastes, Air pollution effects.
Identifiers: *Contaminants, Biological contaminants.

Pesticides, industrial and municipal wastes, radioactive materials, microbes, and other potential pollutants are coming in contact with our soils in ever increasing amounts. This article discusses certain sources of soil contaminants and outlines a few of the research techniques being used in an attempt to understand their behavior in soils. Agricultural chemicals may become harmful pollutants if improperly used. Sewage and industrial wastes make up the bulk of contaminating substances produced by our society. Waste disposal is related to biological contamination of water supplies by bacteria and viruses. Radioactive contamination and some air pollutants come into contact with the soil. The movement of some of the soil pollutants is discussed. (Christenbury-Iowa State)

0064 - C5
URINARY CREATININE AS AN INDEX COMPOUND FOR ESTIMATING RATE OF EXCRETION OF STEROIDS IN THE DOMESTIC SOW,
Purdue Univ., Lafayette, Ind.
R. E. Erb, S. A. Tillson, G. D. Hodgen, and E. D. Plotka.
Journal Paper No 3644, Purdue University Agricultural Experiment Station. Journal of Animal Science, Vol 30, No 1, p 79-85, January 1970. 5 tab, 20 ref.

Descriptors: Farm wastes, Urine, Hogs, Livestock, Animal physiology.
Identifiers: *Steroids, *Creatinine, Index compound.

During two experiments urine was collected form 36 yearling sows to estimate rate-of-excretion of creatinine and to evaluate its use as an index compound. Excretion rate averaged 205 mg/hr. and 1.35 mg/hr./kg live weight for Experiment I as compared to 201 mg/hr. and 1.38 mg/hr./kg live weight for Experiment II. Measurement of urine volume for 48-hr. allows estimation of creatinine excretion rate of sows with coefficients of variability of 7-8%. In comparison, the coefficients of variability were 18 and 13%, respectively, for 12-hr. and 24-hr. periods. These experiments show that the ratio, microgram steroid per mg urinary creatinine is an accurate method for expressing rate of excretion of steroids in urine. (Christenbury-Iowa State)

0065 - F4
AGRICULTURE POSES WASTE PROBLEMS.

Environmental Science and Technology, Vol 4, No 12, p 1098-1100, December 1970. 2 fig.

Descriptors: *Farm wastes, *Pollutants, *Wastes identification, *Environmental effects, Water pollution sources.
Identifiers: *High intensity farming, Contamination, Plant emissions, Government action.

Increasing concentration and intensity of agricultural activities necessary to the development and prosperity of the economy, are responsible for many new environmental issues. Primary sources of pollution resulting from agricultural practices can be grouped as: animal wastes, wastes from processing of raw agricultural products, rural domestic wastes, and sediment from land; also plant nutrients from fertilizers, inorganic salts and minerals resulting from irrigation, pesticides, aeroallergens and infectious agents contribute to the problem; particulate and gaseous substances derived from the combustion of wastes and natural plant emmissions add to the problem. A brief description of these sources and some possible solutions are presented. (Christenbury-Iowa State)

0066 - B2, C2, D4
THE EFFECTS OF VOLUME AND SURFACE AREA ON THE RATE OF ACCUMULATION OF SOLIDS IN INDOOR MANURE DIGESTION TANKS,
Nebraska Univ., Lincoln.
Ali A. Al-Timimi, W. J. Owings, and John L. Adams.
Poultry Science, Vol 44, p 112-115, 1965. 3 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, *Digestion tanks, Volume, Least squares method, Overflow, Lagoons, Waste treatment.
Identifiers: *Surface area, Dry matter, Hen weight, Feed consumption, Egg weight.

Ten stainless steel tanks were utilized to form four volume and two surface area allowances. Leghorn type pullets were placed in eight inch cages over the tanks and their manure was allowed to accumulate in liquid for 20 weeks. At the end of each 2 week period, dry matter determinations were made and hen weight, feed weight and egg production were recorded. The dry matter percentages were put on a 3.5 cu. ft/bird basis and the changes in per cent dry matter from one period to another were calculated. Cubage and surface area per bird seemed to have no significant effects on the rate of digestion of the solids in the tanks. Periods and the interaction between treatments and periods were highly significant. Although the manure output is influenced by factors such as hen weight, feed consumption and egg weight, none of these factors showed any significant effect, because of the uniform distribution of the hens assigned to the treatments. Liquid overflow was inversely related to the surface area per bird. At least 3.5 cu. ft of water per bird is needed to provide for biennial cleaning. (White-Iowa State)

0067 - B1, D1
EFFLUENT DISPOSAL - STILL A MAJOR PROBLEM,
Wright Raine Ltd.
W. T. A. Rundle.
Journal and Proceedings of the Institution of Agricultural Engineers, Vol 21, p 134-139, 1965. 5 fig, 5 tab.

Descriptors: *Farm wastes, *Slurries, Sludge, Sprinkler irrigation, Pumping, Storage tanks, Labor, Volume, Rates of application.
Identifiers: *Field spreading, Vacuum tanks, Mechanical agitation.

Equipment and methods of manure disposal used in handling manure slurries are described. The equipment is broadly divided into two categories including mobile trailer type equipment and pumping equipment. Several examples of each are given. Tables list the waste production and labor required for each system as a function of volume handled. A digester is also described, which reduces the volume of material put in by 20%, and produces a sludge with no smell. It is suggested that the cost of this operation would be prohibitive. A discussion follows centering on problems and solutions to problems which have arisen from the systems discussed. (White-Iowa State)

0068 - B1, F2
POSSIBLE DEFENSES AGAINST NUISANCE COMPLAINTS,
Illinois University.
H.W. Hannah.
Poultry Digest, p. 601, December 1970.

Descriptors: *Legal aspects, farm wastes, poultry.
Identifiers: Nuisance complaints.

H.W. Hannah has outlined six possible defenses that may be used by poultrymen against nuisance complaints. These include that the plaintiff is oversensitive and/or does not have the facts correct. The poultryman may claim that he was

there first and/or that the area is zoned for agricultural use. The poultryman may claim that he has considerable investment in the operation. The poultryman may claim that the conditions will improve if granted additional time. (Christenbury-Iowa State)

0069 - B2, E2, F2
CONNECTICUT REQUIREMENTS FOR LIQUID MANURE DISPOSAL,
Connecticut Public Health Department

Poultry Digest, December 1970, p. 583.

Descriptors: *Connecticut, *regulation, *liquid wastes, farm wastes, pollutants, wastes disposal, water pollution.
Identifiers: Liquefied manure.

The Connecticut Public Health Department has set forth requirements that poultrymen and others must follow. Liquefied manure should be spread on level fields so that it does not come within 200 feet of any watersupply. No liquefied manure should be applied to frozen or snow-covered ground. No liquid manure should be applied when ground is saturated with rainfall or groundwater. No more than 5,000 gallons of liquid manure per acre should be applied at any one time. The fields should be given a rest period so that digesting of organic material can occur in the soil. (Christenbury-Iowa State)

0070 - E2
SOILS AS AN ANIMAL WASTE DISPOSAL MEDIUM,
Minnesota Univ., St. Paul. Dept. of Soil Science.
William P. Martin.
Journal of Soil and Water Conservation, Vol 25, p 43-45, March-April 1970. 18 ref.

Descriptors: *Farm wastes, *Sails, Nitrogen, Phosphorous, Potassium, Soil water, Water pollution, Soil contamination, Soil surveys, Nutrients, Fertilizers, Soil properties, Value, Soil chemical properties, Soil physical properties, Soil erosion, Sedimentation, Minnesota.
Identifiers: Waste disposal medium.

Pollution of the soil-water complex occurs mostly because we have no other medium for waste disposal. The author discusses the various reactions which can be expected in soil with respect to nitrogen, phosphorous and potassium. The importance of erosion and sedimentation control is also pointed out. It was stressed that considerable additional information is needed if we are to maximize the use of the soil as a waste disposal medium in such a way as to minimize pollution. We must manage our natural resources to accomodate our waste disposal needs with a minimum of pollution and still produce nutritious food in adequate amounts for our rapidly increasing population. (White-Iowa State)

0071 - A2, B1, C5
ENGINEERING ANALYSIS OF CATTLE FEEDLOTS TO REDUCE WATER POLLUTION,
Texas Technological Coll., Lubbock. Dept. of Civil Engineering.
W. Grub, R. C. Albin, D. M. Wells, and R. Z. Wheaton.
Transactions of the American Society of Agricultural Engineers, Vol 12, 1969, p 490-492, 495. 2 tab, 5 fig, 3 ref.

Descriptors: *Farm wastes, *Cattle, *Water pollution sources, Runoff, Precipitation, Nitrogen, Phosphorus, Biochemical oxygen demand, Slopes, Surfaces, Feeds, Silage, Management, Design, Waste water treatment.
Identifiers: *Feedlots, *Ration composition, Feedlot layout, Waste accumulation.

Incorporating both engineering and biological aspects, this report contains an analysis of data and suggests management and design practices that could reduce materially the pollution contributed by the confined land area where feeder cattle are maintained. The study was conducted in two phases. The first phase was concerned with the waste accumulation on the feedlot surface as influenced by ration. The second phase of the project was concerned with determining the quality of liquid runoff as related to the rations fed to cattle, as related to the time of accumulation of the manure pack. For the first phase, ration composition, its effect on quantity of excretion, and changes in the accumulated wastes are looked at. For the second phase, the effects of precipitation, surfacing material, land slope, depth of waste accumulation, feedlot layout, and ration composition are evaluated. Nitrogen, phosphorus and BOD were used as measures of pollution. (White-Iowa State)

0072 - E3
A NOTE ON THE UTILISATION BY CHICKENS OF ENERGY FROM FAECES,
Queensland Univ., Brisbane (Australia). Dept. of Animal Husbandry.
W. J. Pryor, and J. K. Connor.
Poultry Science, Vol 43, p 833-834, 1964. 2 tab, 2 ref.

Descriptors: *Farm wastes, *Poultry, Energy, Wheat, Sorghum, Nitrogen.
Identifiers: *Metabolizable energy, Bomb calorimeter, Ration.

Four groups of male chickens aged 22 days which had been on a trial to determine the metabolizable energy of grain sorghum, were allotted at random two to each treatment. Two groups were fed crushed grain sorghum. The remaining two groups were fed a ration consisting of 80% crushed grain sorghum mixed with 20% feces resulting from a previous wheat trial. All four rations contained a standard broiler mineral and vitamin supplement. The results showed that the feces had a metabolizable energy value of approximately 30% of the feed from which it originated. (White-Iowa State)

0073 - F2
STOCKMEN'S LIABILITY UNDER THE MISSOURI NUISANCE LAW,
Missouri Univ., Columbia.
Donald R. Levi, and John C. Holstein.
Science and Technology Guide, Published by the University of Missouri-Columbia Extension Division; File: Ag Econ 3 3/70, 7M. p 581-584, (Mar 1970).

Descriptors: *Legal aspects, *Regulation, Farm wastes, Missouri.
Identifiers: *Pollution laws, *Nuisance law, *Legal procedure, *Liability, Lawsuits, Stockmen.

There is no one thing a livestock operator can do and gain absolute protection under the nuisance law. Thus, it is imperative that you attempt to prevent such lawsuits from arising. This implies that those who follow a 'good neighbor' policy are less likely to be sued. Try to avoid causing your neighbors discomfort. This guide only discusses some general principles affecting the civil liability of feedlot operators under the nuisance laws. If you are faced with potential air or water pollution problem, don't hesitate to disucss it with your attorney. (Christenbury-Iowa State)

0074 - D4
AEROBIC DIGESTION OF SWINE WASTE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. D. Jones, J. C. Converse, and D. L. Day.
Proceedings of CIGR (Commission Internationale du Genie Rural), p 204-211, 1969. 7 fig, 2 ref.

Descriptors: *Oxygenation, *Aeration, *Foaming, Biochemical oxygen demand, Farm wastes, Swine, Lagoon, Dissolved-oxygen, Aerobic treatment, Odor, Gases, Liquid wastes, Waste water treatment.
Identifiers: *Oxidation ditch, *Total solids, Loading rate, Defoaming agent, In-the-building treatment.

An oxidation ditch for in-the-building treatment of swine waste was evaluated. Odorless aerobic treatment could be obtained under the self-cleaning slatted floors of a confinement building by connecting the ends of the liquid-manure gutters and adding a rotor aerator. The results indicate that loading rates of 6 cu. ft. or less per hog are not suitable for in-the-building, oxidation-ditch treatment. Loading rates of 8 cu. ft. per hog were most satisfactory. Oil was used as a defoaming agent when required. No foaming was encountered at loading rates higher than 8.5 cu. ft. per hog provided sufficient oxygen was supplied. The mixed-liquor, 5-day BOD of swine waste was reduced from 40,000 to 3,000 to 10,000 milligrams per liter. (Christenbury-Iowa State)

0075 - B1, C3, D4, F1
HOG WASTE DISPOSAL BY LAGOONING,
Illinois Dept. of Public Health, Springfield, Ill. Div. of Sanitary Engineering.
Charles E. Clark.
Journal of the Sanitary Engineering Division, Proceedings of the American Society of Civil Engineers, Vol 91, No SA6, p 27-41, December 1965. 5 tab, 1 fig, 9 ref.

Descriptors: *Farm wastes, *Farm lagoons, Odor, Scum, Gases, Bubbles, Biochemical oxygen demand, Chemical oxygen demand, Coliforms, Sampling, Depth, Volume, Septic tanks, Dissolved oxygen, Costs, Nutrients, Chlorophyta, E. coli, Antibiotics, Nitrogen, Potassium, Phosphorus, *Hogs.
Identifiers: *Lagoon supernatant, Shock loading, Surface area, Farrowing house, Feeding house, Total solids, Volatile solids, Enterococcus, Penicillin, Algal population.

The material presented consists of on-site observations and test results obtained from samples collected from an operational farm lagoon in Illinois. The program centered on this lagoon since others around it had failed. The system itself is described and possible solutions given as to why it does work. Chemical properties of the lagoon supernatant and the raw waste are compared. On the basis of observations made during this program, the most likely problem will be process failure caused by antibiotic effect, temperature change or shock loading. Studies are underway concerning the harvesting and feeding of algae from the lagoon. Operational problems as well as costs are evaluated for the total system. Finally, a practical system is suggested for the disposal of hog wastes. (White-Iowa State)

0076 - A3, A4, C3
NITRATE AND OTHER WATER POLLUTANTS UNDER FIELDS AND FEEDLOTS,
Agricultural Research Service, Fort Collins, Colo. Soil and Water Conservation Research Div.
B. A. Stewart, F. G. Viets, Jr., G. L. Hutchinson, and W. D. Kemper.
Environmental Science and Technology, Vol 1, No 9, p 736-739, September 1967. 2 fig, 1 tab, 1 ref.

Descriptors: *Nitrogen, *Nitrates, *Farm wastes, Groundwater, Water pollution, Water table, Soils, Irrigation, Fertilizers, Precipitation, Corn, Hydraulic conductivity, Carbon, Oxidation-reduction potential, Alfalfa, Ammonium compounds, Colorado.
Identifiers: Feedlots, Soil cores, Groundwater pollution, South Platte.

Agriculture's effect on nitrate pollution of groundwater was investigated in the South Platte valley of

Colorado. The valley is intensively farmed and contains many concentrated livestock feeding operations. A water table, generally between 3 and 20 meters below the surface, underlies much of the area. The average total nitrate-nitrogen to a depth of 6.7 meters in the profiles for the various kinds of land use was: alfalfa (13 cores), 70; native grassland (17 cores), 81; cultivated dry land (21 cores), 233; irrigated fields not in alfalfa (28 cores), 452; and feedlots (47 cores), 1282 kg. per hectare. Groundwater samples often contained high concentrations of nitrate, and those obtained beneath feedlots contained ammonium-nitrogen and organic carbon. (White-Iowa State)

0077 - B1, F4

FARM WASTE DISPOSAL IN RELATION TO CATTLE,

National Agricultural Advisory Service, London (England).
J. Gibbons.
Water Pollution Control, Vol 67, No 6, 1968, p 622-626, 2 tab, 4 ref.

Descriptors: *Disposal (Wastes), *Waste treatment, *Cattle, *Livestock, *Farm wastes, Costs, Silage, Effluent, Economic impact, Digestion, Drains, Groundwater, Streams, Buildings, Construction.
Identifiers: *Farm waste disposal, *Farm waste production, *Cow cubicles, *Dry-land farm, *Silage effluent, *Wet farms, Population equivalents of farm waste, Farming patterns, Solid systems, Organic irrigation, Slurry handling, Cubicle-housing/law labour system, Storage.

Changes in the pattern of farming and consequent effects on the nature of manure disposal problem on farms are discussed. Modern systems of dairy farming, including the special impacts of widespread production of silage, and the growth of the cubicle system of housing are examined. The consequent effluent disposal problems are evaluated. Design of disposal systems must take into account: animal waste quantity estimates and the population equivalents of these farm wastes. Also, a vital factor in design requirements is evaluation of the changing patterns of farming. Waste treatment and disposal are discussed from the viewpoints of solid systems, handling organic irrigation methods, and slurry handling methods. The factors affecting storage requirements and capacities are analyzed. An important consideration in most systems is to keep the volume of contaminated liquid to a minimum and this is a vital factor in building design. Silage effluent treatment is given special attention because of the serious pollution problem which it can create. Special efforts are required to keep silage effluent from entering drains, streams, or groundwaters. Proper system design must consider land use, the type of existing facilities, the scale of enterprise, and type of livestock. Economic and technical considerations jointly should underlie the final design decisions. (D'Arezzo-Texas)

0078 - D4

OXYGENATION CAPACITIES OF OXIDATION DITCH ROTORS FOR CONFINEMENT LIVESTOCK BUILDINGS,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Don D. Jones, Donald L. Day, and James C. Converse.
Purdue University, Engineering Extension Service, Bulletin No. 135, p 191-208. 12 fig, 5 ref. Proceedings 24th Industrial Waste Conference.

Descriptors: *Dissolved oxygen, *Oxygenation, Farm wastes, Equipment, Odor, Mass transfer, Theoretical analysis.
Identifiers: *Oxidation ditch, Alpha factor.

The oxidation ditch is one of the most successful methods for treating the staggering volume of animal manure that is being produced at the present time. The purpose of this paper is to present the oxygenation capacities of five aeration rotors tested at the University of Illinois. The rotors were tested in actual field installations with clean tap water in the ditch and the livestock removed. The parameter studies were blade immersion, blade design, rotor speed, and gross power requirements. There is little or no difference in oxygenation capacities between the angle iron bladed rotor and the rectangular plate rotor. The increase in oxygenation capacity is almost linear with depth of immersion or rotor speed. (Christenbury-Iowa State)

0079 - A3, C3

SOURCES OF NITROGEN AND PHOSPHORUS IN WATER SUPPLIES - TASK GROUP REPORT.

Journal of the American Water Works Association, Vol 59, p 344-366, March 1967. 8 tab, 1 fig, 64 ref.

Descriptors: *Nitrogen, *Phosphorus, Farm wastes, Eutrophication, Great Lakes, Distribution, Fertilizers, Ammonia, Nitrates, Nitrites, Phosphorus, Compounds, Domestic wastes, Detergents, Industrial wastes, Nutrients, Fuels, Water treatment, Rivers, Runoff, Drainage water, Sediment transport, Cultivated lands, Water fowl, Atmosphere, Rainfall, Nitrogen fixation.
Identifiers: *Fertilizer consumption, Concentrations, Urban runoff, Dustfall, Historical trends.

The results of this survey have indicated that nitrogen and phosphorus nutrients are contributed to water in significant quantities from a variety of man-made and natural sources. Data taken from a small scale were extrapolated to large areas of the country. This brings attention both on the sources of most significance as well as on the sources for which additional information is most needed. The estimation of nutrient contributions from various sources is presented in tabular form. The complete elimination of nitrogen and phosphorus nutrients from surface water supplies does not appear economically feasible because the sources are so widespread. Therefore, appropriate efforts must be made to cope with many of the problems that have been created, and increased effort must be devoted to the development of better methods for prevention of algal growth in reservoirs. A more concentrated effort by the water utility profession to reduce the detrimental effects caused by eutrophication of water supplies is recommended. (White-Iowa State)

0080 - C2

FLOW PROPERTIES OF ANIMAL WASTE SLURRIES,

Pennsylvania State Univ., University Park.
Mahesh Kumar, H. D. Bartlett, and N. N. Mohsenin.
Paper presented at the 1970 winter meeting American Society of Agricultural Engineers, Chicago, Dec 8-11, 1970, Paper No 70-911. 28 p, 7 fig, 2 tab, 26 ref.

Descriptors: *Slurries, *Viscosity, *Viscometers, Farm wastes, Viscous flow, Temperature, *Flow characteristics, Moisture content, Shear strength.
Identifiers: Shear diagrams, Flow behavior indices, Dilution, Pseudoplastic flow, Apparent viscosities, Newtonian fluids, Total solids.

The flow properties of animal waste slurries were studied with the use of a coaxial cylinder-type viscometer to determine shear diagrams, flow behavior indices, viscosity indices and apparent viscosities in relation to dilution, temperature and sawdust bedding content of the slurries. The viscosity of manure slurry decreases with increase in dilution. Flow is Newtonian for total solid content below five per cent. Addition of sawdust decreases the viscosity of slurries. Viscosity of fresh manure decreases with increase of temperature. Manure slurry of four to six percent total solids content is a good compromise between excessive volume of handling and power requirement. (Christenbury-Iowa State)

0081 - B1, C3, C5, E2

DISTRIBUTION OF ARSENIC FROM POULTRY LITTER IN BROILER CHICKENS, SOIL, AND CROPS,

Salsbury Labs., Charles City, Iowa. Dept. of Biochemistry.
Joseph L. Morrison.
Journal of Agricultural and Food Chemistry, Vol 17, p 1288-1290, November 1969. 5 tab, 27 ref.

Descriptors: *Arsenic, *Farm wastes, *Poultry, Soil, Crops, Assay, Alfalfa, Clovers, Correlation analysis, Groundwater, Pesticides.
Identifiers: *Poultry litter, *Arsenical feed additives, Hydrolized feather meal, Poultry tissue, Roxarsone.

The effect of the presence of organoarsenicals from feed additives in poultry house litter was investigated with respect to the distribution of arsenic in chickens raised on this litter, to the distribution of arsenic in soil fertilized with this litter, and to the distribution of arsenic in crops raised on soil fertilized with this type litter. Although measurable amounts of arsenic (15-30 ppm) were found in the litter, the arsenic content of soil and crops was unaffected by the use of poultry litter as fertilizer. Similarly, the arsenic content of birds was unaffected when raised on this type litter. (White-Iowa State)

0082 - C4, E4

HOUSE FLY PUPAE AS FOOD FOR POULTRY,

Agricultural Research Service, Beltsville, Md.
C. C. Calvert, R. D. Martin, and N. O. Morgan.
Journal of Entomology, Vol 62, No. 4, August 1969, p 938-939, 2 tab, 2 ref

Descriptors: *Waste disposal, *Organic matter, Proteins, Poultry, Foods, Nutrients, Soybeans, Laboratory tests.
Identifiers: *House flies, Pupae, Fats, Waste utilization.

A study was conducted as a part of the waste utilization program to determine if the larvae of the house fly could be used to produce protein and fat from human wastes. Due to the difficulty of collecting sufficient larvae for this experiment, fly pupae were used. Pupae were obtained from a culture that had been maintained at the Beltsville Fly Control Laboratory for 60 generation and held at -10LC until needed. The pupae were dried, ground in a small Wiley mill and analyzed for protein, fat, ash, moisture and other substances. The composition of the amino acid indicated that the protein was of a quality similar to meat or fish meal. In two separate 2 week tests, day old chicks were fed one of two formulations containing fly pupae as a protein and fat source. The results indicate that the fly pupae provided enough protein of sufficient quality to support normal growth of chicks during the first two weeks of life. This study is preliminary and more work is required before a valid comparison can be made with the soybean meal now used. It is conceivable that the house fly could be used to convert waste materials into usable, high quality nutrient supplements and thereby assist in alleviating some of the problems of organic waste disposal. (Goessling-Texas)

0083 - A1, F4

BEEF FEEDLOT OPERATIONS IN ONTARIO,

Department of Energy, Mines and Resources,

Burlington (Ontario). Canada Centre for Inland Waters.
A. R. Townsend, S. A. Black, and J. F. Janse.
Journal of the Water Pollution Control Federation, Vol 42, Part 1, p 195-208, February 1970. 3 fig, 10 tab, 10 ref.

Descriptors: *Livestock, *Farm mangement, *Farm lagoons, *Runoff, Seepage, Waste storage, Waste disposal, *Farm wastes.
Identifiers: *Cattle feedlots, *Animal housing, *Manure storage.

The beef feedlot industry in Ontario is described with respect to its environmental pollution problem. Approximately 100,000 cattle are on Ontario feedlots with an estimated 300 heat or less per feedlot. Four different types of housing and the associated handling of animal wastes as well as types of pollution from the feedlots is discussed. Animal waste storage should be designed to provide six months capacity and lot runoff storage facilities should be sized to hold the winter snow melt and spring rains until proper waste disposal. The report concludes that feedlot waste disposal will continue to be storage and land disposal rather than treatment and effluent discharge. The three main causes of pollution have been feed storage seepage, feedlot runoff, and land disposal runoff. This report recommends aeration systems such as rotors, aspirators, surface mechanical, and diffused air tubing for odor control. (Waid-Texas)

0084 - A5, B2, C3

FATTY ACID CONTENT AS A MEASURE OF THE ODOUR POTENTIAL OF STORED LIQUID POULTRY MANURE,
Guelph Univ. (Ontario). Dept. of Microbiology.
R. G. Bell.
Poultry Science, Vol 49, No 4, p 1126-1129, July 1970. 4 fig, 7 ref. Ontario Dept of Food and Agr No 695-04 Research Council of Canada No A5730.

Descriptors: *Poultry, *Legislation, *Odor, Farm wastes, Liquid wastes, Gas chromatography.
Identifiers: Fatty acid content, Odor potential.

An attempt was made to find a correlation between odour and the concentration of volatile fatty acids in stored liquid poultry manure. Using both gas chromatographic and column partition chromatographic analysis procedures a relationship between the odour and the fatty acid content of stored liquid poultry manure was observed. A total fatty acid content of 0.1% is suggested as a maximum level to be deemed acceptable for new installations and 0.2% as a minimum level for the initiation of prosecution which may be contemplated for existing facilities. (Christenbury-Iowa State)

0085 - A6, B2

DANGEROUS GASES IN AGRICULTURE.
Ministry of Agriculture, Fisheries and Food, London (England).

Agriculture, Vol 77, No 9, p 431-432, September 1970.

Descriptors: *Gases, Farm wastes, Storage pits, Slurries, Accidents, Waste treatment.
Identifiers: Bacterial decomposition.

Gases from slurry pits can be dangerous to animals and concentrations fatal to man can occur. During storage and bacterial decomposition of the slurry causes a breakdown in organic matter and the release of gases. Recommendations are given that should help prevent accidents. (Christenbury-Iowa State)

0086 - C1, E3

THE APPARENT DIGESTIBILITY OF ENERGY AND PROTEIN IN TOPLAN DRIED POULTRY MANURE,
The University Department of Agriculture, Reading & Thornber Bros. Ltd., Mytholmroyd, Halifax.
B. Lowman, and D. W. Knight.
Animal Production, Vol. 11, No. 2, 1969, p. 276.

Descriptors: *Diets, *farm wastes, *poultry, organic matter, nitrogen, copper, energy, barley, sheep value.
Identifiers: *Digestibility trial, *dried poultry manure, dry matter, crude protein, starch equivalent, feed stuff.

A digestibility trial was carried out to study the apparent digestibility of farm components of dried poultry manure, these being dry matter, organic matter, energy, nitrogen, and copper. Five diets were made consisting of various proportions of dried poultry manure and barley, including pure dried poultry manure and pure barley. These diets were each given to 4 castrated male sheep (20 in all), in a randomised block design for a ten-day experimental period. The apparent digestibilities of Toplan dried poultry manure were determined by actual measurement from the pure dried poultry manure diet, and by extrapolation from the other diets. The value of Toplan dried poultry manure was examined in terms of digestible crude protein, metabolizable energy and starch equivalent, and the value of the Toplan dried poultry manure as a feeding stuff for various classes of form livestock was examined in relation to the Agricultural Research Council's recommendations. (White-Iowa State)

0087 - D4

AEROBIC DIGESTION OF CATTLE WASTE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. D. Jones, B. A. Jones, Jr., and D. L. Day.
Transactions of the American Society of Agricultural Engineers, Vol 11, 1968, p 757-761. 18 fig, 2 tab, 4 ref.

Descriptors: *Farm wastes, *Cattle, *Biochemical oxygen demand, Chemical oxygen demand, Aerobic treatment, Sludge, Aeration, Digestion, Regression analysis, Waste treatment.
Identifiers: *Loading rates, *Aerobic digestion, Dairy cattle, Beef cattle, Volatile solids, Fixed solids, Digesters.

The effectiveness was studied of the aerobic digestion process in the treatment of dairy and beef-cattle wastes. Waste from livestock being fed a high-concentrate ration was added in varying loading rates to laboratory aerobic digesters. This experiment indicates that, in the future, less emphasis should be placed on COD, VS, and FS and more on the measurement of BOD, which is a better indication of microorganism activity. BOD reductions of 70,60, and 76 percent and total VS reductions of 20,15, and 0 percent, respectively were obtained for loading rates of 125, 150, and 200 ml. from dairy cattle. Similar results were obtained using beef cattle waste. Under conditions similar to those prevailing in this study, significant reductions in biodegradable organic concentrations can be obtained. (White-Iowa State)

0088 - F1

POULTRY MANURE DISPOSAL - IS THERE A PROBLEM,
C. T. Riley.
Agriculture, Vol 73, 1966, p 110-112.

Descriptors: *Poultry, Costs, Nutrients, Farm wastes, Fertilizers, Value, Waste disposal.
Identifiers: Muck, Handling, Removal.

The cost is examined associated with removal of poultry manure from the house to the disposal point. It is costing the poultry farmer a shilling per bird per year to remove the muck. The fertilizer value of poultry manure should not be overlooked. Farmers dispose enough manure that would be worth 160 units of nitrogen, 160 units of phosphorus and 70 units of potash if applied to a crop. (Christenbury-Iowa State)

0089 - C1, E1

TREATMENT, USE, AND DISPOSAL OF WASTES FROM MODERN AGRICULTURE,
Water Pollution Research Lab., Stevenage (England).
A. B. Wheatland, and B. J. Borne.
Water Pollution Control, Vol 69, No 2, p 195-208, February 1970. 12 tab, 21 ref.

Descriptors: *Farm wastes, *Animal wastes, *Wastes disposal, *Waste treatment, *Waste water disposal, *Waste water treatment, *Biological treatment, *Sludge disposal, *Sludge treatment, Odor, Aerobic treatment, Incineration, Filtration, Hogs, Cattle, Poultry.
Identifiers: *Manures, *Vegetable washings.

With the trend toward larger concentrations of more animals on smaller areas of land nearer population centers, and the trend of the food industry to require washing and packing of vegetables on the farm, the farmer is faced with new problems in waste and waste water treatment and disposal. Values for quantity of excreta, solids, BOD, COD, PV, organic carbon, and total nitrogen are given for cattle, hogs, sheep, poultry, and man. Recent experimental work on animal waste treatment and disposal is discussed. The problem investigated was odor control during storage and spreading of piggery slurry by means of aeration. Problems which occurred included foaming and bulking of the slurry. The treated supernatant was to be recycled for use in washing the animal pens. Possible future methods of treating animal wastes include incineration, wet oxidation, and disposal at sea. Several analyses of vegetable washing waste waters are presented, giving volumes, pH, solids, BOD, COD, PV. Due to the variable nature of the processes involved in vegetable preparation, the actual degree of contamination of the waste water cannot be predicted accurately. Treatment includes minimizing the quantity of waste water to be treated, and primary, biological and sludge treatment and disposal. Primary treatment includes screening and sedimentation. Biological treatment can be by lagoons, aerated lagoons, oxidation ditches, extended aeration, conventional activated sludge, contact stabilization, spray irrigation, biological filtration, or high rate filtration. Sludges can be conditioned, dewatered and disposed at sea or on land. (Makela-Texas)

0090 - A3

WILSCHWITZ RUNOFF SAMPLER,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
S. A. Witzel, J. T. Wilke, and F. L. Schmitz.
Transactions of the American Society of Agricultural Engineers, Vol 11, No 6, 1968, p 883, 886. 3 fig, 1 ref.

Descriptors: *Runoff, *Nutrients, *Sampling, Farm wastes, Weirs, Nitrogen, Phosphorus, Potassium, Water levels, Pollutant identification.
Identifiers: Prediction equations, Wilschwitz sampler, Water stage recorder.

The sampler was developed for the purpose of automatic collection of water samples from the flood runoff of small watersheds. It was intended to be used for measuring plant nutrient contained in runoff and not for determining suspended sediment loads. The installation of the Wilschwitz sampler in conjunction with a weir and water stage recorder provides an inexpensive means of obtaining runoff samples at various stages. The unique feature of the sampler is that it operates without auxiliary power. Details of the sampler's construction and operation

are given in the article. Data gathered with this sampler are to be used in developing prediction equations relating the rates and amounts of runoff to the plant nutrients lost. If such correlations can be made, equations may be programmed to estimate amounts of nitrogen, phosphorus, potassium or other elements that may be anticipated in the surface water runoff. (White-Iowa State)

0091 - A5, C3, C5

MOISTURE INCREASES MANURE ODORS,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.

D. C. Ludington, and A. T. Sabel.

Poultry Digest, September 1970, p 445-446. 1 fig, 2 tab, 1 pic.

Descriptors: *Farm wastes, *Odors, Air pollution, Poultry, Ammonia, Hydrogen sulfide, Waste dilution, Chromtography, Organic acids, Pollutant identification.

Identifiers: Masking agents, Counteractants, Deodorants, Organoleptic test.

Studies of handling livestock wastes have shown that increased dilution facilitates faster settling of manure solids; thus requiring constant agitation for efficient removal of solids. Despite some apparent handling advantages of diluted animal wastes, other considerations such as lack of odor control, quantity of material to be handled, availability of water for dilution, and certain pollution may combine to preclude handling as liquid waste. Odor strengths of animal manures have been measured using liquid dilution and vapor dilution. Agitation of liquid manure causes odors to be released and their strength to increase rapidly. A combination of gas chromotographic and organoleptic techniques have been used to determine the chemical compounds responsible for the offensive odor of accumulated liquid poultry manure. Organoleptic tests indicate that the organic acids, mercaptans and sulfides are especially important malodorous components, in addition to the odorous gases ammonia and hydrogen sulfide. An organoleptic test was developed for evaluating over 40 commercial odor control products to use with liquid waste. Masking agents and counteractants were found to be the most effective. The better procedure for controlling air pollution is to prevent the formation of odors rather than attempt to control. A manure-handling system that incorporates moisture removal apparently has some merit. (White-Iowa State)

0092 - B1

SEEK DATA IN FEEDLOT RESEARCH.

South Dakota State Univ., Brookings.

South Dakota Farm and Home Research. Vol XXI, No 2, Spring 1970, p 22-27. 2 tab, 8 fig.

Descriptors: *Farm wastes, *South Dakota, *Design criteria, Cattle fertilizers, Biochemical oxygen demand, Water pollution.

Identifiers: *Feedlots, *Farm terraces, Population equivalents, Constituents.

This is a preliminary report of research aimed at coming up with information that can be used by livestock producers, governmental agencies and persons concerned with commercial feedlot design and construction. Some advantageous conditions for feedlot expansion in South Dakota are discussed. Pollution constituents in animal waste and runoff quantities are considered in making some general recommendations as to the design or layout at a feedlot. Six sketches are utilized in presenting some do's and don't's in feedlot design. (Christenbury-Iowa State)

0093 - A2, B2, C2

HYDROLOGIC ASPECTS OF FEEDLOT WASTE CONTROL,

Iowa State Water Resources Research Inst., Ames.

Richard R. Dague, Wayne L. Paulson, and Kenneth J. Kline.

State Water Resources Research Institute Report No. 69-2, Iowa University, 1969. 37 p, 13 fig, 10 tab, 7 ref. OWRR Project A-022-IA.

Descriptors: *Farm wastes, *Confinement pens, *Waste treatment, *Waste disposal, Lagoons, Water pollution control, Water pollution sources.

Identifiers: Feedlot wastes, Waste management.

The hydrologic factors that require consideration when designing systems for the control of cattle feedlot runoff are considered. A discussion of several methods of controlling feedlot wastes is presented. Significant conclusions: (1) A significant reduction in water pollution from cattle feedlot run off can be accomplished by employing relatively simple and inexpensive runoff control facilities. The size of such facilities can be determined using established techniques for hydrologic and water quality analyses; (2) Using procedures similar to those described herein, it would be possible for control agencies to establish the minimum size of runoff control facilities for each region or major stream basin for each of several possible ultimate runoff disposal practices; and (3) Caution should be exercised in applying the term 'population equivalent' to cattle feedlot wastes. Any use of the term must consider the fact that the fraction of the total waste that enters water is extremely variable from one location to another and is heavily dependent upon the quantity and time variation in precipitation, the cattle density on the feedlot, and the topographic characteristics of the lot.

0094 - D4

THE INFLUENCE OF AERATION ON THE COMPOSTING OF POULTRY MANURE-GROUND CORNCOB MIXTURES,

Guelph Univ. (Ontario). Dept. of Microbiology.

R. G. Bell.

Journal of Agricultural Engineering Research, Vol 15, No 1, p 11-16, 1970. 5 fig, 2 tab, 8 ref.

Descriptors: *Farm wastes, *Aeration, *Poultry, Laboratory tests, Odor, Salmonella sp., Temperature, Depth, Microorganisms, Waste water treatment.

Identifiers: *Composting, Corncob mixtures, Canada, Microbial activity.

The influence of the rate of aeration on 1.5m colums of composting mixtures of 2 parts poultry manure and 1 part ground corncob was investigated. The results indicate that the optimum aeration rate for the production of a stable sanitary compost was 4 liters of air/m2/min for every 10 cm. of composting material up to a maximum depth of about 2.4 m. A detailed discussion of the materials, methods and results is presented. (Christenbury-Iowa State)

0095 - D4

BIO-OXIDATION OF SWINE WASTE BY THE ACTIVATED-SLUDGE PROCESS,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.

Ronald E. Hermanson, Thamon E. Hazen, and Howard P. Johnson.

Transactions of the American Society of Agricultural Engineers, Vol 12, No 3, 1969, p 342-348. 5 fig, 1 tab, 19 ref.

Descriptors: *Farm wastes, *Hogs, *Activated sludge, *Model studies, Anaerobic conditions, Farm lagoon, Regression analysis, Least squares method, Biochemical oxygen demand, Aeration, Settling basins, Nitrogen, Temperature, Effluent, Dissolved oxygen, Hydrogen ion concentration, Waste water treatment.

Identifiers: *Extended aeration, BOD-reduction efficiency, Mixed liquor, Aeration tank, Suspended solids.

The purpose of this research was to investigate the extended-aeration, activated-sludge process of swine waste treatment. Two objectives were: (1) to develop a mathematical model for the BOD-reduction efficiency of the process, and (2) to verify the model and evaluate its coefficients by conducting experiments with a laboratory-scale plant. The components of the activated-sludge treatment plant were as follows: (1) an aeration tank; (2) an aeration system; (3) a sedimentation tank; and (4) a mechanism for returning settled activated sludge to the aeration tank. The experimental model was comprised of an aeration tank and a sedimentation tank made of Plexiglas, with two galvanized sheet metal sedimentation tanks as alternates. Three capacities were required in the sedimentation section to provide suitable detention times over the range of flow rates used. The following conclusions resulted from this research. (1) Effluent from an anaerobic lagoon is sufficiently constant to be a practical influent substrate for model studies. (2) Excessive solids loss because of denitrification can be avoided by proper design of the sedimentation tank, provided the flow rate does not vary widely. (3) The mathematical model satisfactorily predicted the BOD-reduction efficiency of an extended-aeration, activated-sludge plant, as evidenced by the reasonably high multiple r2 (0.92) and the low standard error (2.6 percent) of the experimental regression equation. (4) The aeration tank of an extended-aeration activated-sludge plant for the treatment of the effluent from an anaerobic swine lagoon designed according to the equation developed. (White-Iowa State)

0096 - A5, A6, C3

IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.

J. A. Merkel, T. E. Hazen, and J. R. Miner.

Transactions of the American Society of Agricultural Engineers, Vol 12, No 3, 1969, p 310-313 and 315. 5 fig, 1 tab, 11 ref.

Descriptors: *Farm wastes, *Hogs, *Odor, *Gases, Confinement pens, Sulfur compounds, Ammonia, Amino acids, Porteins, Carbohydrates, Lipids, Organic acids, Solubility, Hydrogen ion concentration, Chromatography, Alcohols, Sulfides, Salting, Absorption, Condensation, Pollutant identification.

Identifiers: Acid-forming, Methane-producing, Manure storage pit, Amides, Amines, Carbonyls, Esters, Mercaptans.

In addition to the already known fixed gases, CO2, CO, H2S, NH3, CH4, etc., the environment within a confinement swine unit was found to contain a complex mixture of volatile organic intermediates. These intermediates are important in the characteristic odor resulting from the storage of manure and are suspected as being important in animal and building performance. Consideration of physical as well as organic, biochemical phenomena indicated that the important intermediate products of anaerobic manure decomposition include organic acids, amines, amides, alcohols, carbonyls and sulfides. Qualitative chemical analysis confirmed the presence of these homologous groups, except for organic acids that were decomposed upon formation by the high pH maintained within the manure storage pit. To identify individual compounds within the swine environment, concentration of the volatile gases was required. Selective absorption, liquid salting and selective condensation were each used in an effort to separate and concentrate the homologous series. Once separated, the series were subjected to chromatographic analysis for separa-

tion and identification. Physiological odor investigations have been conducted to indicate the important compounds in the specific odors in swine buildings. Work to date indicates that the major odor constituents are from the amine and sulfide groups. Further work is under way to separate these compounds. (White-Iowa State)

0097 - B2, D4

POULTRY MANURE LAGOON DESIGN,

California Univ., Davis. Agricultural Extension Service.

Robert A. Parsons, Fred Price, and W. C. Fairbank.

Poultry Digest, Vol 29, No 344, p 485-488, October 1970. 6 fig.

Descriptors: *Farm wastes, *Poultry, *Lagoons, *Design criteria, *Odor, Cleaning, Recirculated water, Costs, Anaerobic conditions, Anaerobic bacteris, Aerobic conditions, Aerobic bacteria, Aeration, Waste water treatment.

Identifiers: *Flushing gutter, Macerated chicken carcasses, Floating debris, V-trough, Washout system, Overload, Malfunctions, Gutter design, Thiopedea roses.

This paper deals with lagoon design criteria for poultry manure. A lagoon is a satisfactory means of poultry manure disposal. The lagoon should be used only in rural areas that are tolerant of varied but dilute odors of farm production. Overloading is about the only cause of lagoon malfunction. Size requirements, construction, flushing system, and lagoon operation are discussed. (Christenbury-Iowa State)

0098 - C1, D4

BEEF CONFINEMENT SYSTEMS - OXIDATION DITCH,

Minnesota Univ., Minneapolis. Dept. of Agricultural Engineering.

J. A. Moore, R. E. Larson, R. O. Hegg, and E. A. Allred.

Paper No 7331 in the Scientific Journal Series, Minnesota Agricultural Experiment Station; and Paper No 70-418, American Society of Agricultural Engineers, July 1970.

Descriptors: *Farm wastes, *Cattle, Chemical oxygen demand, Biochemical oxygen demand, Ventilation, Rotors, Foaming, Temperature, Hydrogen-ion concentration, Dissolved oxygen, Nitrogen, Ammonia, Waste water treatment.

Identifiers: *Oxidation ditch, Beef cattle, Loading rates, Solids.

The oxidation ditch has been used in Minnesota for two years for treatment of beef cattle wastes. It has been operated as a batch system with various loading rates and environmental conditions. Results are evaluated on the basis of BOD, COS, TS, TVS, pH, nitrogen, temperature of the waste, and odor and foam control. Waste management systems are employed by beef operators to meet certain objectives. These objectives may vary widely depending on such factors as management, labor requirements, climate, size and nature of operation, land availability, soil type and geologic formation and population density. No one waste system is best for all operations. Each system has advantages and disadvantages to offer for any given operation. The oxidation ditch offers the following characteristics: very low odor level, waste storage eliminates runoff, volume reduction of solids, reduction of pollution strength, concentration of some elements, necessity of continuous operation, one of more expensive treatment systems, and a buildup of solids on the bottom. Based on the results obtained from 2 1/2 years of research the authors feel that the oxidation ditch does have a place in treating beef cattle waste from confinement operations. (White-Iowa State)

0099 - D4

REMOVAL OF NITRATE BY AN ALGAL SYSTEM,

California State Dept. of Water Resources, Fresno. San Joaquin District.

Randall L. Brown.

Environmental Protection Agency - Water Quality Office, Water Pollution Control Research Series, April, 1971, 132 p, 58 fig, 27 tab, 59 ref. EPA Program 13030 ELY.

Descriptors: Agricultural wastes, Water pollution control, *Biological treatment, *Nitrates, Treatment facilities, Algae, *Waste water treatment, *Algal control, *Aquatic weed control, California.

Identifiers: *Algae stripping, Scenedesmus, Algal growth, Algal harvesting, *San Joaquin Valley (Calif).

An algal system consisting of algae growth, harvesting and disposal was evaluated as a possible means of removing nitrate-nitrogen from subsurface agricultural drainage in the San Joaquin Valley of California. The study of this assimilatory nitrogen removal process was initiated to determine optimum conditions for growth of the algal biomass, seasonal variations in assimilation rates, and methods of harvesting and disposal of the algal product. A secondary objective of the study was to obtain preliminary cost estimates and process design. The growth studies showed that about 75 to 90 percent of the 20 mg/l influent nitrogen was assimilated by shallow (12-inch culture depth) algal cultures receiving 2 to 3 mg/l additional iron and phosphorus and a mixture of 5 percent CO_2. Theoretical hydraulic detention times required for these assimilation rates varied from 5 to 16 days, depending on the time of the year. The total nitrogen removal by the algal system, assuming 95 percent removal of the algal cells, ranged from 70 to 85 percent of the influent nitrogen. The most economical and effective algal harvesting system tested was flocculation and sedimentation followed by filtration of the sediment. The algal cake from the vacuum filter, containing about 20 percent solids, was then air- or flash-dried to about 90 percent solids. The market value for this product as a protein supplement was estimated to be about $80 to $100 per ton. Miner-Iowa State)

0100 - A3, A4, B1, C1, E2

ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT,

Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.

O. E. Cross, A. P. Mazurak, and L. Chesnin.

Preprint, presented at American Society of Agricultural Engineers 1971 Winter Meeting, Chicago, Illinois, December 7-10, 1971, Paper no 71-906. 23 p, 8 fig, 9 ref. OWRR B-003-NEB (3).

Descriptors: *Farm wastes, *Cattle, Rates of application, *Furrow irrigation, Surface runoff, Groundwater movement, Nitrogen, Phosphorus, Potassium, Electrical conductivity, Crop response, Nutrients, Percolation, Sudangrass, *Path of pollutants, Pollution abatement.

Identifiers: *Feedlot wastes, Runoff losses, Surface runoff pollution.

Beef feedlot manure was applied to plots at levels of 0, 40, 120 and 260 tons dry matter per acre. The manure was disk plowed into the soil at 4, 8, and 12 inch depths. A sorghum-sudan forage was seeded at three plant populations, a 'low,' 'medium,' and 'high' density and was furrow irrigated according to standard irrigation techniques. Data was documented as to: pollutional potential of surface runoff water, pollutional contribution to underground water supply, physical and chemical changes in the soil, irrigation techniques, and crop response. The conclusions are the result of one year's test. Nitrogen and sodium displacement did not pollute the surface runoff water. The transport of potassium restricted the runoff to irrigation uses only. However, the underground water was not affected by the plots and retained its potable quality. Additional information is required to establish irrigation techniques; however, to date conclusions are: (1) the initial intake rate of water into the soil increases as higher manure loadings are applied, (2) the basic intake rate is higher on areas plowed 8 inches deep as compared to areas plowed 4 or 12 inches deep, and (3) the basic intake rate increases with time elapse after application. The application of manure increased the crop yield with the exception of the 260 ton application. (Bundy-Iowa State)

0101 - B3, E3

MANURE MANAGEMENT - COSTS AND PRODUCT FORMS,

Los Angeles County Agricultural Extension Service, Calif.

J. Van Dam, and C. A. Perry.

California Agriculture, Vol 22, No 12, December 1968, p 12-13. 2 tab, 2 fig.

Descriptors: *Farm wastes, *Cattle, *Marketing, *Costs, Volume, Profit, Management.

Identifiers: *Feedlots, *Processing plant, Stockpiles, Packaging, Bulk, Pulverizer, Product forms, Delivery, Removal.

A study to determine the actual cost of removal and disposal of manure from a beef feedlot in Los Angeles County was completed by the Agricultural Extension Service. Manure was prepared for marketing in three basic forms and sold under four pricing conditions. Manure processing, packaging and marketing began with the mounding of the manure in the corrals followed by its removal to a compost stockpile. Manure was allowed to cure in a compost pile at least six months before processing. The manure could then be marketed unprocessed as composted manure; marketed processed as composted bulk; and marketed processed as composted packaged manure. The combined fixed and variable costs per cubic yard amounted to 10.5 cents for the unprocessed product, 65 cents for the processed bulk and $1.88 for the packaged processed form. The weighted average price received per cubic yard was $3.80 for the packaged, $2.40 for the processed bulk, and $1.40 for the unprocessed bulk manure. A livestock feedlot operator can probably make a profit from the sale of manure. (White-Iowa State)

0102 - A1, B1, F2

POLLUTION CONTROL - FEEDLOT OPERATIONS,

Iowa State Univ., Ames.

J. R. Miner, E. R. Baumann, T. L. Willrich, and T. E. Hazen.

Journal of the Water Pollution Control Federation, Vol 42, No 3, p 391-398, March 1970. 1 tab, 6 ref.

Descriptors: *Livestock, *Pollution abatement, Waste disposal, Reservoirs, Waste treatment, Cattle, Sewage treatment, Farm wastes, Iowa, Hogs, Poultry.

Identifiers: *Feedlot, Population equivalent.

The increase in labor cost and a shortage of personnel has caused an increase in feedlot population. The result has been a concentration of livestock waste level. Techniques of feedlot waste systems design are reported, and methods of collecting and disposing of the waste are discussed. These cattle, swine, and poultry feedlot operations are similar. Types of flooring and methods of cleaning are discussed. Treatment and disposal of the waste are commented on, including tank storage and hauling, anaerobic lagoons, aerobic lagoons, surface irrigation systems and oxidation ditches. The limiting factors of various treatments in relation to feedlot waste are reported. Zoning regulations are suggested as a partial solution to nuisance complaints which are generated by concentration of livestock in feedlots. (Hancuff-Texas)

0103 - A6, C2
NITROGEN ENRICHMENT OF SURFACE WATER BY ABSORPTION OF AMMONIA VOLATILIZED FROM CATTLE FEEDLOTS,
Agricultural Research Service, Fort Collins, Colo. Soil and Water Conservation Research Div.
G. L. Hutchinson, and F. G. Viets, Jr.
Science, Vol 166, No 3904, p 514-515, Oct 1969. 1 fig, 1 tab, 6 ref.

Descriptors: *Nitrogen, *Surface water, *Absorption, *Ammonia, Eutrophication, Water pollution sources, Nitrogen compounds, Nutrient cycling, Fertilization, Colorado, Precipitation (Atmospheric), Lakes, Streams.
Identifiers: *Nitrogen pollution, *Cattle feedlots, Seeley Lake (Colo), Nitrogen (Total), Nitrogen (Inorganic), Nitrogen enrichment.

A method is described for estimating nitrogen enrichment of surface waters resulting from volatilization of ammonia from cattle feedlots and its subsequent absorption into lakes and streams. Rates of ammonia absorption into dilute sulfuric acid (0.01 normal) measured near feedlots were as much as 20-fold greater than controls; estimated annual absorption (in kilograms/hectare) of 73 at site about 0.4 kilometers west of 90,000-unit feedlot can be compared with 3.9 at control site with no feedlots or irrigated fields within 3 milometers and no large feedlots or cities within 15 kilometers. Ammonia absorbed by surfaces of natural waters are apparently about half that estimated by method described. That a large feedlot can enhance nitrogen enrichment of aqueous surfaces at some distances is suggested by evidence that a fivefold increase in distance from a feedlot decreased mean ammonia absorption rate by approximately one-half. Absorption rates from smaller lots were approximately 25% of large one, but above fourfold greater than control. Authors believe that wide fluctuations in ammonia absorption rates reflect the moistness of feedlot surfaces, rapid drying enhancing volatilization and absorption. Authors conclude that such feedlots are substantial sources of nitrogen pollution for nearby surface waters. (Eichhorn-Wisconsin)

0104 - A2
MODELING FEEDLOT RUNOFF POLLUTION,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering; and Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
J. R. Miner, R. I. Lipper, and L. E. Erickson.
Transactions of the ASAE, Vol 10, No 4, p 497-501, 1967. 5 tab, 8 fig, 7 ref.

Descriptors: *Farm wastes, *Runoff, *Chemical oxygen demand, *Model-studies, Cattle, Water pollution, Hydraulic models, Discharge, Depression storage, Hydrographs, Hydrology, Rainfall intensity, Simulated rainfall.
Identifiers: *Feedlot, *Stirred tank with injection model, Concentration, Nonsurfaced lot, Concrete-surfaced lot, Soil cover complex number.

Most emphasis of this paper was on quality aspects of feedlot runoff; however a brief discussion of possible hydraulic models is given. Three concentration models are described and their ability to predict feedlot runoff water quality is shown. The three are, the stirred tank concentration model, stirred tank with injection concentration model, and the series-stirred tanks with injection concentration model. The three concentration models provided progressively better data representation as their complexity increased. Two experimental cattle feedlots especially designed for runoff investigation were used in the study. Associated with the feedlots were rainfall simulation and measuring equipment, and runoff measuring and proportional sampling facilities. One lot was concrete surfaced, the other had concrete only around feed bunks. Tempered by good judgement, feedlot models can be used to help predict organic concentration of runoff from a feedlot. When an improved hydraulic model is developed, it can be combined with either of the single, stirred tanks to provide a single feedlot model to predict overall water-pollution potential. (White-Iowa State)

0105 - A5, C2, C3
AMMONIA AND AMINES: COMPONENTS OF SWINE-BUILDING ODOR,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner, and T. E. Hazen.
Transactions of the ASAE, Vol 12, No 6, 1969. 3 p.

Descriptors: *Farm wastes, *Hogs, *Odors, *Ammonia, Atmosphere, Anerobic digestion, Proteins, Amino acids, Isolation, Chemical properties, Density, Physical properties, Absorption, Chromatography,
Identifiers: *Amines, *Odor thresholds, Concentration, Boiling points, Dissociation constants, Detection, Animal chambers.

This paper represents another step in defining the atmosphere within the swine confinement building. Ammonia and the closely related amines are known to be produced during the decomposition of both animal and vegetable proteins. Research work involving gases over decomposing manure indicate amines, ammonia and sulfur containing compounds are probably important constituents of the swine odor. The paper outlines the formation of ammonia and amines, and gives threshold odor levels for them in air. Physical and chemical properties of the different amines are given as well as methods of isolation and detection. Experimental data was taken from two animal chambers which provided substantial control over environmental conditions. The measured concentrations of ammonia were less than the threshold odor levels, indicating one of two explanations must be true: (a) Ammonia is not an important component of the hog house odor or (b) the odor producers are additive in effect and ammonia can be perceived at concentrations below its threshold when combined with other odorous compounds. Chromatographic analysis was used for detection of the different amines. (White-Iowa State)

0106 - D4
OXIDATION DITCHES FOR WASTE DISPOSAL,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Donald L. Day.
International Journal Of Farm Building Resources, No 2, December 3, 1968, p 2-7. 9 fig, 9 ref.

Descriptors: *Farm wastes, *Hogs, *Biochemical oxygen demand, *Rotors, Foaming, Sludge, Effluent, Odors, Carbon dioxide, Oxygen, Depth, Dissolved oxygen, Electric power, Electric power costs, Volume, Velocity.
Identifiers: *Oxidation ditch, Population equivalent, Suspended solids, Slatted floors, Extended aeration.

The oxidation ditch is an efficient low-cost process for the treatment of municipal waste. It has several aspects that seem desirable for use in confinement livestock waste-treatment systems. The aerobic method is an odorless process with final products of water, carbon dioxide, and stable minerals. The oxidation ditch can be integrated into a self-cleaning slatted floor system. However, control of foaming is an immediate problem that must be solved before the process can be unconditionally recommended, even just for control of the odors in the gutter and when spreading on land. Operational criteria must be developed if the method is to serve for complete treatment of livestock manure, with an effluent that can be accepted by public health and water board standards. Adaptations of the oxidation ditch for the treatment of livestock manure are surely forthcoming, in view of the intense research that is in progress in the United States and abroad. However, until the current problems are resolved, the disposal of livestock manure in a manner that does not have an odor nuisance and a water pollution hazard remains a complicated problem. (White-Iowa State)

0107 - B3, D2
DRYING POULTRY MANURE INSIDE THE POULTRY HOUSE,
Pennsylvania State Univ., University Park. Dept. of Poultry Science.
Glenn O. Bressler.
Agricultural Engineering, Vol 51, No 3, p 136, March 1970.

Descriptors: *Farm wastes, *Poultry, *Drying, Ventilation, Waste storage.
Identifiers: *Poultry manure.

In this drying system droppings are removed at a very low moisture level, cutting weight of material to be handled by two-thirds. Eight 3000-cfm circulating fans are mounted about 22 ft. apart directly below 2 lines of water troughs that run the full length of the house. Fans are about 10 in. above the manure; air velocities over the droppings are about 250 to 750 fpm. A spike-tooth harrow is pulled daily through the accumulating droppings to stir them and to draw partially dried droppings into the high-velocity airstream. From the pit the droppings go either to truck or manure spreader or to a hammermill to be finely ground and bagged. The amount of water removed daily to prevent excess humidity and to dry the manure ranged from 6-9 gallons per hour. These results are from a flock of 3246 pullets and cockerels at 22 weeks in a 30-ft. by 100-ft. environment-controlled laying house. (White-Iowa State)

0108 - C4, C5
EFFECTS OF FEED CONSUMPTION ON BIOCHEMICAL OXYGEN DEMAND OF STEER EXCRETA,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
K. C. Mills, B. F. Parker, and I. J. Ross.
Transactions of the ASAE, Vol 12, No 1, 1969, p 133. 2 ref.

Descriptors: *Farm wastes, *Cattle, *Biochemical oxygen demand, Feeds, Silage, Grains, Pastures, Oxidation, Aerobic treatment, Sampling, Testing.
Identifiers: *Feed composition, Steers, Alsterberg modification, Winkler method.

The objective of the study on which the paper is based was to determine some of the effects of animal-feed composition of the rate of aerobic breakdown of animal waste. If differences in rate of aerobic breakdown occur because of feed composition, these differences should be proven by conducting biochemical oxygen demand tests on the wastes from animals on different feed. Thus excreta for BOD tests were obtained from three groups of steers being fed on all grain, grain and silage, and on pasture. The data for the pasture had much greater variability from week to week. Data on all tests are available in the original thesis and ASAE paper No. 67-930. It was concluded that the composition of animal feed will change the biochemical oxygen demand of animal excreta. This fact should be considered when designing aerobic systems for treating animal wastes. (White-Iowa State)

0109 - B3, C5
SOME CAUSES OF WET POULTRY MANURE,
Georgia Univ., Athens.
O. W. Charles.
Georgia Poultry Tips, August 1, 1970. Poultry Digest, September 1970, p 431.

Descriptors: *Farm wastes, *Poultry, *Moisture

content, Water consumption, Strain, Salts, Carbohydrates, Lipids, Proteins, Water pollution sources.
Identifiers: *Ration, Water intake, Uric acid.

Excessive moisture in poultry manure may be due to a number of factors, among which is a tendency for certain strains of birds to produce higher percentage of moisture in the fecal material than other strains. Water represents by far the largest portion of fresh poultry manure. Reports of several researchers are cited as to moisture content and differences in strain. It was found that moisture content of the droppings of low water consuming strains was only 50%, while moisture content of droppings in the high water consuming strain reached 71%. Excessive amounts of salt and a concept of balance in the ration are also discussed as causes of excessive moisture. (White-Iowa State)

0110 - C4

ISOLATION OF SALMONELLAE FROM RENDERED BY-PRODUCTS AND POULTRY LITTER CULTURED IN ENRICHMENT MEDIA INCUBATED AT ELEVATED TEMPERATURES,
Massachusetts Univ., Amherst. Dept. of Veterinary and Animal Sciences.
C. F. Smyser, G. H. Snoeyenbos, and Barbara McKie.
Avian Diseases, Vol 14, No 2, 1970, p 248-254, 6 tab, 13 ref. US Public Health Service Grant UI 00159-05.

Descriptors: *Poultry, *Salmonella, *Incubation, Farm wastes, Isolation, Temperature, Hydrogen ion concentration, Indicators.
Identifiers: *Enrichment media, Poultry litter, Rendered bynproducts, Plating medium.

Three enrichment media incubated at 42 plus or minus 1C were compared for isolating Salmonellae from rendered animal and marine by-products, and two of the media were compared for poultry litter. Salmonellae were recovered from 317 of the 755 rendered samples and from 203 of the 235 litter samples examined. Selenite brilliant-green sulfapyridiae (SBG sulfa), dulcitol selenite sulfapyridine (DSES), and tetrathionate brilliant-green (TBG) were equally effective. Each enrichment incubated at the elevated temperature was significantly more effective than TBG incubated at 37C for isolating salmonellae from fish meal. Essentially no difference was noted between brilliant-green (BG) agar and brilliant-green sulfadiazine (BGS) agar as a plating medium. The pH of the enrichment media at the termination of incubation could not be used as an indicator of the presence or absence of salmonellae. (White-Iowa State)

0111 - A5, D2

UNDER-CAGE MANURE DRYING SYSTEM SOLVES ODOR PROBLEMS,
Cloisterdale Farms, Ephrata, Pa.
Glenn H. Herr.
Farm Service Bulletin, July-August, 1970. Poultry Digest, Vol 29, No 344, p 476-479, October 1970. 4 fig.

Descriptors: *Farm wastes, *Poultry, *Odors, *Aeration, *Disposal, Economics, Aerobic conditions, Forced drying, Liquid wastes, Drying, Lagoons, Anaerobic bacteria, Costs, Waste water treatment.
Identifiers: *Stirring, Odor-causing bacteria, Semi-dry manure.

This paper deals with the problems and their solutions encountered by a commercial poultry farm with odors and waste management. The various systems that were tried unsuccessfully are discussed. Their solution was one developed by Dr. Glenn Bressler and co-workers at Pennsylvania State University for drying the manure. The system employs a stirring device and forced air to keep the manure aerobic. The manure is dried to one-third its original weight which has eliminated many of their disposal problems. The cost of the system is discussed. (Christenbury-Iowa State)

0112 - F4

CURRENT TRENDS IN FARM WASTE DISPOSAL,
Ministry of Agriculture, Fisheries and Food, London (England).
C. T. Riley.
Water Pollution Control, Vol 69, No 2, p 174-179, February 1970. 3 tab.

Descriptors: *Animal wastes, *Farm wastes, Cattle, Hogs, Poultry, Odor.
Identifiers: *Manure, *Population equivalents.

Much emphasis has been placed on farm waste disposal in the past five years. Reasons for this include the increased size of livestock units, nearness of units to consumers, recent legislation on river pollution control and water resources, and reaction from the public and farm workers to flies and odor associated with animal wastes. In 1967, the total volume of excreta produced by livestock in the United Kingdom was 121 million tons, with a population equivalent of 136 million. Much of this excreta is spread on the land by ranging animals. The remainder must undergo some form of disposal by man. The wastes can be handled in any of four basic methods. (1) as a solid, it is stored and spread on land once or twice a year. (2) as a semi-solid, it is spread daily. (3) as a slurry, it is handled by vacuum tanker, stored, and spread. (4) as a liquid, it is washed by water to a storage tank and spread by spray irrigation. The trend is toward solid or semi-solid handling. Factors affecting disposal method include land availability, land area, volum of excreta, soil type, crops to be grown, and climatic conditions, especially rainfall. More emphasis is now placed on planning of waste disposal before starting farm projects. Odors can be eliminated by aeration of wastes in the tanker before spreading or spraying on the land. (Makela-Texas)

0113 - B1

LOCATING A POULTRY ENTERPRISE,
Illinois Univ., Urbana.
S. F. Ridlen, and Hugh S. Johnson.
Illinois Monthly Poultry Suggestions, July 1970. Poultry Digest, Vol 29, No 344, p 495-496, October 1970.

Descriptors: *Locating, Farm wastes, *Poultry, Eggs, Water pollution control.
Identifiers: *Enterprise, Neighbor problems.

The chief characteristics that should be evaluated in selecting the location of a poultry enterprise are discussed. These include land cost, tax rate, water supply and topography; electricity, labor, feed supply and transportation should be considered; human population, zoning, acceptance of poultry by local people and relationship to market are important. (Christenbury-Iowa State)

0114 - A1, B1, F1, F4

SWINE MANURE -- LIABILITY OR ASSET,
Purdue Univ., Lafayette, Ind.
David H. Bache.
Paper presented at the American Pork Conference, Des Moines, Iowa, March 3, 4, and 5, 1970. 13 p, 10 ref.

Descriptors: *Farm wastes, *Economics, *Costs, Water pollution, Air pollution, Confinement pens, Storage capacity, Fertilizers, Swine, Cattle, Poultry, Lagoons, Odor, Oxidation, Legislation.
Identifiers: *Assets, *Liability, Slatted floors, Land disposal, Innovators penalty, Pollution abatement grants.

Swine manure is a very modest asset on crop farms and it can be a major liability on those production units with no crop land base. A literature and research review gives costs and economic value of different manure treatment systems through the past ten or fifteen years. Conclusions reached include: there is no waste disposal problem with a pasture system, there is no economically feasible alternative to the spreading of solid manures, smaller swine production units will probably find that lagoon disposal is the optimum technique for handling hog wastes, and larger production units will be shifting to the use of slatted-floors, under floor manure forage, and liquid disposal systems. Public concern and legislation is discussed. (White-Iowa State)

0115 - F4

MANAGEMENT OF FARM ANIMAL WASTES.
American Society of Agricultural Engineers, St. Joseph, Mich.
Proceedings National Symposium on Animal Waste Management, May 1966, 161 p. Michigan State University, ASAE Publication No. SP-0366.

Descriptors: *Farm wastes, *Management, *Public health, *Water pollution sources, *Livestock, *Waste disposal, *Slurries, *Lagoons, *Biological treatment, Waste storage, Physical properties, Odor, Distribution systems, Irrigation, Labor, Environmental sanitation, Sludge treatment, Incineration, Feeds.
Identifiers: Feedlot runoff, Production, High density systems, Handling, Slatted floors, Materials, Handling, Liquid manure, Equipment design, Waste management, Oxidation ditches, Composting, Kjeldahl nitrogen, Coprophagy.

The National Symposium on Animal Waste Management had three main objectives: (1) To delineate the problem of managing animal waste, (2) To evaluate our current technology in the management of our farm wastes (technology in the farm waste management was divided into methods of handling, treatment, utilization, and disposal) and (3) To stimulate and give new direction to future research in solid wastes management. Fifty-one papers were presented representing eighty-nine professionals - from industry, campus and government; from manufacturing, research, extension and regulatory agencies; as animal scientists, bacteriologists, economists, engineers, and sanitarians. The last three pages of the publication are devoted to ASAE recommendation (ASAE R292): Uniform Terminology for Rural Waste Management. (Christenbury-Iowa State)

0116 - C2, C3, C4

PHYSICAL, CHEMICAL AND BACTERIOLOGICAL PROPERTIES OF FARM WASTES (BOVINE ANIMALS),
Michigan State Univ., East Lansing.
S. A. Witzel, E. McCoy, L. B. Polkowski, O. J. Attoe, and M. S. Nichols.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No. SP-0366, p 10-14, May 1966. 10 tab, 19 ref. USDI No. 8 RO1 SW 00042-02.

Descriptors: *Farm waste, *Waste disposal, *Cattle, *Biochemical oxygen demand, Chemical oxygen demand, Anaerobic conditions, Aerobic conditions, Hydrogen ion concentration.
Identifiers: *Lagoon flora, *Population equivalents, *Liquid manure, Liquid manure tank, Volitile solids, Plant response.

This report characterizes pollutants derived from farm animal (Bovine) waste. Wastes were collected from dairy bulls, dairy cows, and beef cattle. The

wastes were analyzed for volume, suspended solids, percent BOD and COD. Further analysis show the effects of treating manure on yield and recovery of N, P, and K by corn plants. The data indicate that high concentrations of bacteria (dead or alive), volatile solids, BOD and COD are found in waste from bovine animals. The study indicated that reduction by lagoon retention, settling, aerobic or anaerobic digestion does not remove sufficient amounts of volatile solids, BOD and COD to provide safe effluent for disposal in streams. Indications are that liquid manure handling by farmers may be the most feasible approach for waste disposal. (See also W71-01992). (Christenbury-Iowa State)

0117 - C1, F5
DUCK-PROCESSING WASTE,
Robert S. Kerr Water Research Center, Ada, Okla.
Grover L. Morris.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No. SP-0366, Michigan State University, May 1966, p 15-18. 6 tab, 6 ref.

Descriptors: *Farm wastes, *Poultry, *Coliforms, Biochemical oxygen demand, Chemical analysis.
Identifiers: *Evisceration, Long Islands ducks, Waste loads.

Objectives of the study were (a) to measure and evaluate duck processing plant waste loads and (b) to observe plant operations for possible reduction in total water use by redistribution or by reuse of certain waters presently discharged to waste after one use, or by a combination of redistribution and reuse. Study of two duck-processing plants located on Long Island provides data pertaining to water use, waste loads, and general operation. The finished product is a high-quality duck of considerable delicacy. Water use in duck-processing plants seems high when compared with water used in chicken processing. Means of reducing the amount of water used are discussed.
(Christenbury-Iowa State)

0118 - A7, A9, C4
HEALTH ASPECTS AND VECTOR CONTROL ASSOCIATED WITH ANIMAL WASTES,
Public Health Service.
W. M. Decker, and J. H. Steele.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No. SP-0366, Michigan State University, May 1966, p 18-20. 12 ref.

Descriptors: *Farm waste, *Zoonoses, *Salmonella, *Mycobacterium, *Diseases, Water pollution sources, Public health.
Identifiers: *Pathogenic organisms, Brucella, Leptospira.

The diseases contracted by man from animals are discussed. Q fever, Anthrax, Salmonellosis, Tuberculosis, Brucellosis, and Leptospirosis are the major diseases examined. The source of the disease and the means by which man contracts the diseases are presented. Other pathogenic organisms arising from animals are mentioned.
(Christenbury-Iowa State)

0119 - A8
BIOLOGICAL INTERRELATIONSHIPS BETWEEN FECES AND FLIES,
California Univ., Berkeley.
John R. Anderson.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No. SP-0366, Michigan State University, May 1966, p 20-23. 35 ref.

Descriptors: *Farm wastes, *Domestic wastes, Confinement pens, Livestock.
Identifiers: *Filth flies, *Livestock-husbandry operations, *Fly populations, Livestock production methods, High-density confinement.

This report discusses the effects on fly populations as affected by changes in livestock production methods. Field research has indicated that the foremost cause for the prodigious number of flies today is the recent widespread occurence of low-area, high-density concentrations of animals in all phases of livestock-husbandry operations. Although recent changes in livestock husbandry have created serious fly problems, the possibilities for constructively managing manure to avoid or reduce the production of flies under today's low-area, high-density confinement of animals appear much better than with previous technologies.
(Christenbury-Iowa State)

0120 - A2, C2, C3, C4
STORMWATER RUNOFF FROM CATTLE FEEDLOTS,
Kansas State Univ., Manhattan.
J. R. Miner, L. R. Fina, J. W. Funk, R. I. Lipper, and G. H. Larson.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 23-27. 8 tab, 9 fig, 11 ref.

Descriptors: *Water pollution, *Detention reservoirs, *Farm waste, Waste storage, Nitrogen compounds, Organic waste, Rainfall intensity, Coliforms, Streptococcus, Chemical oxygen demand, Bacteria.
Identifiers: Rainfall duration, Feedlot runoff, Bacteriological activity, Kjeldahl nitrogen, Pollution potential.

Runoff characteristics from two experimental cattle feedlots were studied. Runoff was high-strength organic waste containing large quantities of nitrogenous compounds. The nitrogenous matter was being transformed continuously by bacteriological activity. More organic matter and Kjeldahl nitrogen were found in the runoff (a) with low-intensity rainfall, (b) with moist conditions preceding rainfall, and (c) during warm weather. Cattle feedlot runoff was a concentrated source of bacteria that normally are used to characterize water quality. Hydrologic characteristics of feedlot waste contribute to their stream-pollution potential. A detention pond seems feasible to prevent some of the slugging nature of the material. Diverting all rainfall not falling directly on the feedlot surface around the entire facility and maintaining lots so their litter remains as dry as possible were helpful in minimizing stream pollution potential.
(Christenbury-Iowa State)

0121 - C2
PHYSICAL PROPERTIES OF ANIMAL MANURES ASSOCIATED WITH HANDLING,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 27-32. 5 tab, 8 fig, 11 ref.

Descriptors: *Physical properties, Bulk density, *Farm wastes, Liquid wastes, Particle size, *Poultry, *Cattle.
Identifiers: Volatile solids, Fixed solids, *Flowability, Freezing point, *Production.

This paper is concerned with various physical properties of chicken and dairy cow manure that have a relationship to handling. The properties are considered mainly from the standpoint of both fresh and diluted manure. The information reported was obtained from analysis concerned with the physical properties of animal manures and represents a summary of those properties which are specifically related to handling. These properties are: (a) basic physical composition, (b) particle density and bulk density, (c) production, (d) particle size and distribution, (e) dilution, (f) settling rate, (g) suspended and dissolved solids, (h) flowability, and (i) freezing point. (Christenbury-Iowa State)

0122 - B1, C1, D1
METHODS OF HANDLING POULTRY-WASTE MATERIAL,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
C. E. Ostrander.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 32-33.

Descriptors: *Poultry, *Farm wastes, Waste storage, Waste disposal, Odors.
Identifiers: *Handling, High-density systems, Processing, Methods, Collecting.

This paper reports on manure handling methods employed in high-density poultry operations. Operations include: collecting, removal, storing, loading, spreading, processing and disposal. (See
(Christenbury-Iowa State)

0123 - B2, C2, F1
PUMPING MANURE SLURRIES,
California Univ., Davis. Dept. of Agricultural Engineering.
S. A. Hart, J. A. Moore, and W. F. Hale.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 34-38. 22 fig, 2 tab, 5 ref. Public Health Research Grant EF-265.

Descriptors: *Pump testing, *Slurries, *Farm wastes, *Waste disposal, *Performance, Waste dilution, Efficiencies, Contrifugal pumps.
Identifiers: Handling, Capacity, Positive displacement, Diaphragm, Input horsepower, Selection criteria.

The purpose of this report was to analyze the performance characteristics of the different kinds of pumps under various conditions. Five pumps, representing centrifugal, positive displacement, and diaphragm types were tested. A pump was always tested with water first. Fresh manure was then mixed with the water to form a slurry. This was kept well mixed both by recirculation by the pump and by continuous mixing of the storage tank. Some 300 individual runs were made in testing the five pumps with three manures at various speeds. Dilution was more important than kind of pump, thin slurries being most satisfactory. Practical and economic conditions are discussed relating to pump selection. (Christenbury-Iowa State)

0124 - B2, C2
ENGINEERING PROBLEMS IN YEAR-ROUND DISTRIBUTION OF WASTE WATER,
Pennsylvania State Univ., University Park, Pa. Dept. of Agricultural Engineering.
E. A. Myers.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 38-41. 1 tab, 2 fig, 6 ref.

Descriptors: *Sprinkling, *Distribution systems, *Sewage disposal, Farm wastes, Freezing, Winter, Distribution patterns.
Identifiers: Deflector stationary sprinklers, Year-round irrigation.

This paper presents some of the problems encoun-

tered which may be considered in the design, installation, and operation of irrigation systems for animal-waste disposal. The system used to distribute waste water at Penn State is first explained briefly. Then the problems encountered are discussed under the headings: pumping, pipe system, and irrigation heads.
(Christenbury-Iowa State)

0125 - B1, C2
SLOPING FLOORS FOR BEEF-CATTLE FEEDLOTS,
California Univ., Davis.
S. R. Morrison, V. E. Mendel, and T. E. Bond.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 41-43. 3 tab, 4 fig, 3 ref.

Descriptors: *Cattle, *Farm wastes, Confinement pens, Performance, Disposal.
Identifiers: *Slatted floor, *Sloping floor, *Feedlots, Weight gains, Cattle behavior, Feed efficiency.

Limited tests on sloping floors for cattle feedlots indicate that slopes up to 7 deg do not depress weight gains or feed efficiency. A slope of about 5 deg is sufficient for removal of most of the manure, but unless some flushing arrangement is employed, manure will build up near the feed bunk. Stalls have little value in preventing this build-up. A slat-covered pit at the lower end of the slope allows manure to move freely off the floor and serves as a satisfactory storage. (Christenbury-Iowa State)

0126 - B3
MATERIALS HANDLING AND LABOR IN FREE-STALL AND LOOSE HOUSING,
Purdue Univ., Lafayette, Ind.
W. E. Schmisseur, C. M. Brown, Jr., J. L. Albright, W. M. Dillon, and A. C. Dale.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 43-45. 3 tab, 17 ref.

Descriptors: *Farm wastes, *Cattle, Disposal, Labor.
Identifiers: *Materials handling, *Free-stall, *Loose housing, Bedding.

In the winter and spring of 1964-65 Purdue University conducted two 6-month studies in Lafayette and Cuzco, Indiana, comparing free-stall to loose housing. For one free-stall comparison, 20 stalls were place in one-third of the area of each of two pole-type barns. The remaining areas were used for loose housing. Ninety cows were divided into four individual lots. Each free-stall unit housed 20 cows, with 25 cows in loose housing. All four lots were treated and handled similarly. Straw was used as bedding. Daily work sheets showing time used to bed the cows, scrape alleys, pounds of bedding used, and the pounds of manure removed daily were kept on all groups. Two pole-type barns were also used in the other free-stall comparison. One barn was used for loose housing; the other contained 32 free stalls; 26 animals were housed in each barn. Sawdust was used to bed all animals for half of the experiment; straw was used for the rest of the experiment. (Christenbury-Iowa State)

0127 - B1, D1, E1
CATTLE-MANURE HANDLING AND DISPOSAL SYSTEMS ON THE WEST COAST,
Washington State Univ., Pullman. Dept. of Agricultural Engineering.
E. H. Davis.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 45-47. 3 ref.

Descriptors: Cattle, *Farm wastes, *Farm management, Project planning, Environmental sanitation.
Identifiers: Loafing sheds, Liquid manure, *Health authorities, Alleyways, Holding tanks.

Stall housing, an acceptable practice, produces manure which requires special handling. The method of handling and disposing of manure in a sanitary manner depends on climatic conditions and management practices. Disposal of animal wastes is part of the livestock enterprise and should be charged to this operation. As animals and people get closer together in heavily populated areas, disposal of animal wastes in a sanitary manner becomes increasingly important. Close working relationships with state health departments is essential. Additional research is needed concerning lagoon, nitrate contamination of underground water supplies, grinding units for processing beef and dairy manures, and agitation equipment for large holding tanks. (Christenbury-Iowa State)

0128 - E1
MACERATION FOR DISPOSAL OF DEAD POULTRY,
California Univ., Davis. Dept. of Agricultural Engineering.
J. A. Moore, and W. C. Fairbank.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 47-49. 2 fig, 2 ref.

Descriptors: *Farm wastes, Disposal, Farm lagoons, Septic tanks, *Waste disposal, *Poultry, Equipment slurries.
Identifiers: *Macerator, Composting, Thin bed drying, *Equipment design.

The development of a macerator for dead poultry is reported. Several initial designs were investigated. Combining all the findings of the preliminary investigation in the final design of the second chopper-type macerator has led to the development of a satisfactory dead-bird macerator. Systems for disposal of the macerated poultry are discussed and evaluated. Slurry systems, lagoons, heated septic tanks, artificial composting, and thin bed drying were judged to be satisfactory for disposing fo the macerated poultry.
(Christenbury-Iowa State)

0129 - C2
WATER METABOLISM STUDIES MAY ASSIST WITH WASTE DISPOSAL,
Texas A and M Univ., College Station. Dept. of Poultry Science.
J. H. Quisenberry, D. D. Malik, and Ramon Ibarbia.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 49-51. 10 tab.

Descriptors: *Farm wastes, *Poultry, Waste disposal, Odor, Clays, Bentonite, Genetics, Confinement pens, Eggs diets.
Identifiers: Waste management, Water excretion, Drippings, Laying bird.

For many poultry operations, attempts to solve the waste-management problems can best be accomplished by concentrating on methods of obtaining dry or drying the droppings to a manageable level. Three methods have been tested and were reported in this paper. These are: (a) use of splashboards under cage operations, (b) genetic selection for low water excretors. Each of these has its appropriate place in bird management and should be used by poultrymen as their specific needs require.
(Christenbury-Iowa State)

0130 - E2
DISPOSAL OF POULTRY MANURE BY PLOW-FURROW-COVER METHOD,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Agricultural Engineering.
Charles H. Reed.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 52-53. 1 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, *Waste disposal, Odor, Slurries, Furrows, Soil disposal fields.
Identifiers: *Waste management, *Plow cover, Liquid manure, Flies.

The disposal of liquid manure by the plow-furrow-cover technique appears to be an excellent conservation method. The upper soil layer is used as the disposal medium; there is no opportunity for flies to breed or even feed. In a closed handling system there are no detectable odors. With this method from 1 to 2 in. of slurry is deposited in a plowed furrow 6 to 8 in. deep. Immediately after deposition, a single-bottom plow covers the manure, making the next furrow; this can be done in one or two operations. Depositing and completely covering 2 in. of slurry, equivalent to 225 tons per acre, has been very successful. This paper describes the development of the method, the initial disposal programs, and the proposed experimental program to determine the maximum rate of disposal on a limited land area. (Christenbury- Iowa State)

0131 - E2
DISPOSAL OF HOUSEHOLD WASTES IN THE SOIL,
Southern Illinois Univ., Carbondale; and Ohio State Univ., Columbus.
J. H. Jones, and G. S. Taylor.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 53-55. 1 tab, 2 fig, 5 ref.

Descriptors: *Farm wastes, *Septic tanks, *Sewage disposal, *Conductivity, Soil disposal fields, Sewers, Construction, Absorption, Rural areas.
Identifiers: *Soil absorption, *Soil clogging, Household wastes.

Generally the most satisfactory method of disposing of human excreta and household wastes in rural areas is the septic tank soil sbsorption system. While studies show that this is a safe system of household wastes disposal, many systems are malfunctioning; a high percentage of these failures is due to soil absorption difficulties. Thus the utility of the system depends on the size of the absorption field, the waste load, soil conditions, and the construction and installation of the absorption field. This paper discussed the criteria that should be used when designing a septic-tank system. The factors affecting the satisfactory operation of the system are presented. Construction and installation practices are examined. Conditions affecting soil clogging are presented along with conductivity vs cumulative outflow graphs.
(Christenbury-Iowa State)

0132 - C4, D4
REQUIREMENTS FOR MICROBIAL REDUCTION OF FARM ANIMAL WASTES,
South Dakota State Univ., Brookings. Dept. of Bacteriology.
Edward C. Berry.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 56-58. 2 tab, 1 fig, 13 ref.

Descriptors: *Farm wastes, *Lagoons, *Biodegradation, *Sewage bacteria, Odor, Anaerobic conditions, Aerobic conditions, E. coli, Bac-

teria, Fungi, Actinomycetes, Protozoa, Algae.
Identifiers: *Chemical environment, *Physical environment, Phage, Fermentor, Facultative, Microaerophilic, Inoculation.

The cardinal principle on which all sanitation reduction work is based is to provide an environment in which the micro-organisms can bring about conversion of undesirable material to a non-offensive and stable state in the shortest possible time. To bring this about it is necessary to consider (a) the wastes we want reduced and their end products and (b) the organisms that we want to perform this chore for us. The micro-organisms involved in manure reduction are to be found in the following groups: (a) bacteria (aerobic, anaerobic, microaerophilic, facultative or obligate), (b) fungi, (c) actinomycete, (d) protozoa, (e) algae, and (f) phage. Each organism finds its optimum environment under fairly restricted environmental conditions. This paper gives examples of the most common micro-organisms and the effect the environment has on their activity.
(Christenbury-Iowa State)

0133 - D4
AEROBIC TREATMENT OF SWINE WASTE,
Illinois Univ., Urbana.
R. L. Irgens, and D. L. Day.
Laboratory study is reported in more detail in 'Journal of Agricultural Engineering Research', 11: (1) 1-10, 1966, R. L. Irgens and D. L. Day. Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 58-60. 8 fig, 3 tab.

Descriptors: *Farm waste, *Aerobic treatment, *Aeration, Biochemical oxygen demand, Chemical oxygen demand, Oxidation.
Identifiers: Swine waste, Waste collection pits, Slotted-floor, Oxidation ditch.

From the results of these tests, it was calculated that for aerobic stabilization of the waste, about 6 cu. ft. of tank volume per pig would be required and approximately 1.2 lb 02 per lb of BOD (0.65 lb BOD per 125-lb pig per day), or 2500 cu. ft. of air pen lb of BOD at 3 per cent efficiency of oxygen utilization. The aerobic process for treating swine waste is odor-free and does not attract flies. The only gas that is produced is carbon dioxide which to a large extent will remain in solution as bicarbonate. The organic matter that is not oxidized to carbon dioxide and water is converted to stable solids, which are easily dewatered and dried on a sand bed. The effluent has a low BOD and is free from ammonia. It seemed feasible to develop an oxidation ditch inside a swine production bulding utilizing self-cleaning slatted floors.
(Christenbury-Iowa State)

0134 - B2, D4
OPERATING CHARACTERISTICS OF TWO AEROBIC-ANAEROBIC DAIRY MANURE TREATMENT SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Agricultural Engineering; and New Holland Machine Co., Pa.
N. W. Webster, and J. T. Clayton.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No. SP-0366, Michigan State University, May 1966, p 61-65. 2 tab, 14 fig, 20 ref. USDI water research act of 1964 (Public Law 88-379).

Descriptors: *Farm wastes, *Anaerobic conditions, *Aerobic conditions, *Aeration, Sedimentation, Dissolved oxygen, Biochemical oxygen demand.
Identifiers: *Dairy manure, Aerators, Aeration tanks, Sedimentation tanks, Systems, Volatile solids.

Two aerobic waste-treatment systems were designed and tested for use in treating dairy manure. The systems were combinations of aeration and settlement for the purpose of reducing the pollution capabilities of the waste and to make it possible to use the treated effluent for transporting the fresh waste. The system utilizing anaerobic primary settlement and secondary aeration system was selected as the best suited for agricultural use. A system using primary aeration with secondary settlement did not operate satisfactorily.
(Christenbury-Iowa State)

0135 - C1, D4
TRICKLING FILTERS AS A DAIRY-MANURE STABILIZATION COMPONENT,
Massachusetts Univ, Amherst.
D. O. Bridgham, and J. T. Clayton.
Manage Farm Animal Wastes, Amer Soc Agr Eng, St. Joseph, Mich, pp 66-68, 1966. 3 p, 6 fig, 3 tab, 9 ref. OWRR Project A-009-MASS.

Descriptors: *Trickling filters, Filters, *Waste treatment, Sewage effluents, *Farm wastes, Effluents, Settling Basins, *Cattle, *Dairy industry, Wastes, Biochemical oxygen demand, Pollution abatement.

Trickling filters are an effective means of reducing the polluting qualities of dairy manure and a possible means of treating effluent for discharge or recirculation. Loading rate and waste temperature have a great effect on the quality of the effluent. Nine points were plotted for this experiment and labeled according to average BOD of the effluent under respective conditions. Assuming a linear relationship between points, a topograph was drawn for various qualities of effluent. With bubbling aeration, a 1000-lb cow would require 334 cu ft of storage and treatment volume for 6 months of operation between sludge removals. An aeration tank, 134 cu ft in volume, was operated at 95 deg F. The estimated size for 70 deg F operation was 200 cu ft. Experiments support Webster's value for sizing primary sedimentation tanks of 200 cu ft per cow for biannual sludge removal. Test results show the volume of trickling filter required per cow to meet specific temperatures and effluent qualities. Experiments suggest a sedimentation tank volume of about 114 cu ft per cow instead of the 248 cu ft actually used. Therefore, a trickling filter system would require from 346 to 391 cu ft of tanks per cow to produce an effluent BOD of 200 ppm.

0136 - D4
ON-SITE COMPOSTING OF POULTRY MANURE,
Auburn Univ., Ala. Dept. of Agricultural Engineering.
J. R. Howes.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 68-69.

Descriptors: *Farm wastes, *Poultry, *Aerobic conditions, Microorganisms, Peat, Cellulose, Aerobic treatment.
Identifiers: *Composting, Fecal material, *Litter, Heat of composting, *Litterlife.

Although composting dates back to antiquity, the composting of poultry litter in situ is new. A culture of 46 species of micro-organisms was mixed into a base of peat and various minerals. This active mixture was spread at the rate of 1/2 lb. per sq. ft. on poultry litter that was at least 6 in. deep and contained an appropriate balance of cellulose and fecal material. Water used to clean the house interior was added to the litter and then mechanically mixed to initiate aerobic action. After heat of composting had subsided, birds were placed on the litter. This process is relatively inexpensive. It overcomes problems associated with obtaining and disposing of litter; provides odor and fly-free environments; permits birds to be safely replaced on the same litter shortly after diseased stock has been removed or the houses flooded; permits humidification of poultry houses; keeps dust to a minimum and enables house interiors to be washed, thus increasing sanitation and equipment efficiency.
(Christenbury - Iowa State)

0137 - B2, C1, D4
PRIMARY TREATMENT OF SWINE WASTES BY LAGOONING,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
T. L. Willrich.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 70-74. 2 fig, 7 tab, 14 ref. U. S. Public Health Research Grant EF00410.

Descriptors: *Farm wastes, *Anaerobic conditions, *Design criteria, *Performance, Lagoons, Anaerobic bacteria, Chromatium, Rhodothece, Odor, Gases, Sludge.
Identifiers: *Sludge accumulation, *Swine wastes, *Waste treatment lagoons, *Anaerobic lagoons, Micro lagoons, Lagoon feeding, Gas production, Odor production.

A brief history of lagooning at Iowa State University is presented. The design and problems associated with operation of the lagoon are presented. Data was taken over a period of 8 years to arrive at recommendations for construction of lagoons. Factors discussed include: detention times and sludge accumulations, loading rates, lagoon performance, gas production, odor production, micro-lagooning, lagoon feeding, and design criteria. The recommended design criteria are: (1) For anaerobic lagoons which will receive fairly uniform and frequent (one-a-week or less) loadings: allow a minimum of 1 cu. ft. of lagoon water volume per pound of total animal weight confined in a hog-finishing building, plus additional lagoon volume for sludge storage. (2) For lagoons which will recieve non-uniform and intermittent loading: allow a minimum of two cu. ft. of lagoon water volume per pound of total animal weight confined in a hog-finishing building, plus additional lagoon volume for sludge storage.
(Christenbury-Iowa State)

0138 - B2, C1, D4
DESIGN CRITERIA FOR ANAEROBIC LAGOONS FOR SWINE MANURE DISPOSAL,
Nebraska State Dept. of Health, Lincoln.
David R. Curtis.
Proceedings National Symposiun on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 75-80. 5 fig, 5 tab.

Descriptors: *Farm wastes, *Anaerobic conditions, *Chemical oxygen demand, *Biochemical oxygen demand, *Odor, *Hydrogen ion concentration, Lagoons, Temperature, Oxidation-reduction potential, Alkalinity.
Identifiers: *Kjeldahl nitrogen, *Volatile acids, *Swine waste, Anaerobic lagoons.

On-site investigations were conducted at 10 selected lagoons to confirm data collected through questionnaires and to observe the actual operation. Data collected included: Number of swine served, sketch of the plan and elevation views, chemical data on samples collected at various times during the study, and a typical cross section of the lagoons showing how solids have accumulated. The temperatures in the lagoons ranged from 70 to 80 F, with temperatures of 75 F and above more prevalent. Oxidation reduction potential (ORP) data indicated that anaerobic conditions were present at all times in the lagoons. Chemical analyses have proved to be effective diagonostic in-

struments in evaluating the probable cause of objectional odors from lagoon installations. The determinations of greatest significance were pH, Kjeldahl nitrogen, volatile acids, alkalinity, BOD and COD. Design criteria for hog lagoon installations for Nebraska are given. Operational procedures are outlined that should improve the chances for successful lagoon operations. (Christenbury-Iowa State)

0139 - D1
CATTLE-MANURE TREATMENT TECHNIQUES,
Kansas Univ., Lawrence. Dept. of Civil Engineering.
R. W. Agnew, and R. C. Loehr.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 81-84. 1 fig, 5 tab, 10 ref.

Descriptors: *Farm wastes, *Lagoons, *Anaerobic digestion, *Aeration, Activated sludge, Solid wastes, Runoff, Chemical oxygen demand, Biochemical oxygen demand, Laboratory tests, Alkalinity.
Identifiers: *Waste characteristics, *Polishing unit, *Anaerobic lagoons, *Aeration systems, Settled solids, Solids handling, Solids disposal, Runoff control, Volatile acids, Kjeldahl nitrogen.

The characteristics of commercial lagooning operations were discussed. It was pointed out that there was a need for extensive planning in the design and operation of lagoons. It was suggested that a combination of an anaerobic lagoon and an aeration unit may be most practical for most installations. Data was presented and discussed concerning the characteristics of anaerobic lagoons, aeration systems, and the settled solids. A potential treatment facility was proposed and discussed as to the cost, colids handling, solids disposal, efficiency, and runoff control. (Christenbury-Iowa State)

0140 - D2
DEWATERING CHICKEN MANURES BY VACUUM FILTRATION,
Clarkson Coll. of Technology, Potsdam, N.Y., and New York State Dept. of Health, Albany.
E. A. Cassell, A. F. Warner, and G. B. Jacobs.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 85-91. 5 tab, 9 fig, 32 ref. N.Y. State Dept. of Health (Contract No. C-18768).

Descriptors: *Farm wastes, *Sludge treatment, *Poultry, *Dewatering, Laboratory tests, Sewage sludge, Filtration, Municipal wastes.
Identifiers: *Sludge conditioners, *Vacuum filtration, Chemical-sludge conditioners, Conditioner dosage, Liquid requirements, Solids demand.

The sludge conditioning and vacuum filtration characteristics of sewage sludges and chicken manures were found to be vastly different. Most of the sewage sludges were dewatered with FeC13, FeC13 and lime conbinations, cationic polyelectrolyte, and non-ionic polyelectrolyte sludge conditioners. None of these effectively promoted the dewatering of chicken manures. On the other hand, the anionic polyelectrolyte effectively dewatered chicken manure, but not the sewage sludges. The anionic polyelectrolyte can reduce the specific resistance of chicken manures by as much as a factor of 15 and produce filter cakes with as high as 25 percent total solids. (Christenbury-Iowa State)

0141 - D2
REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS (PART I),
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
Otis E. Cross.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 91-93. 7 fig.

Descriptors: *Farm wastes, *Dewatering, *Electro-osmosis, Laboratory tests, Cathodes, Poultry.
Identifiers: Moisture distribution, Expelling water.

This investigation was designed to determine the effectiveness of expelling water from poultry excrement by the electro-osmosis phenomena. Three factors were selected as being the most critical: amount of electric current, time, and distance between electrodes. Twelve plastic tubes were placed in a horizontal position. Each tube was 2 in. ID and 65 cm. long. The piston-type anode was carbon and maintained constant pressure upon the excrement sample by means of a weighted-lever arrangement. The cathode was a 1 mm. copper screen. The tests were conducted with three sample lengths: 40, 25, and 10 cm. The electro-osmosis phenomena produced a 57 percent decrease in moisture content. The amount of expelled water was a function of current flow, time, length of sample, and moisture content of the sample. (Christenbury-Iowa State)

0142 - D2
REMOVAL OF MOISTURE FROM POULTRY WASTE BY ELECTRO-OSMOSIS (PART 2),
Michigan State University, East Lansing. Dept. of Agricultural Engineering.
F. V. Nurnburger, C. J. Mackson, and J. Davidson.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 93-95. 7 fig.

Descriptors: *Farm wastes, *Electro-osmosis, *Dewatering, Poultry.
Identifiers: *Joule heating, *Gravity flow, Current flow.

This investigation was undertaken to study the effects of various electrode materials on the liquid expelled from chicken excrement by the process of electro-osmosis. It utilized the effects of joule heating and gravity flow. The results from using 5, 10, 15, and 20 v d-c were that 20 v d-c gave the best results. Of the three materials used, stainless steel gave the best performance, copper was the poorest, and steel was intermediate. The maximum moisture-content reduction was 4.8 percent wb based on 22 hr. of operation at 20 v. This was not sufficient to reach a pelletable level from the initial value of 80 percent wb. The cost of the electric energy used was 12.7 cent per gallon of liquid removed based on the rate of 2 cent per Kw-hr. (Christenbury-Iowa State)

0143 - D2, E4
DESTRUCTION OF CHICKEN MANURE BY INCINERATION,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel, and D. C. Ludington.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 95-98. 2 tab, 4 fig, 12 ref. N.Y. State Department of Health (Contract No C18965).

Descriptors: *Farm wastes, *Incineration, Poultry, Laboratory tests, Heat balance, Natural resources.
Identifiers: *Combustion, *Solid fuels, Volatile solids, Mass balance, Fixed carbon, Ash, Heat of combustion, High heat value, Low heat value, Energy balance.

The volatile solids in chicken manure represents considerable energy. Incineration is a process which utilizes this energy for destruction of the organic portion of the manure. The application of existing combustion theory to the incineration of chicken manure is difficult beacuse of lack of basic property information and the variability of the material. The incineration process is very dependent on the moisture content of the manure. A laboratory incinerator has been constructed to investigate the incineration process. Initial trials of the incinerator have been restricted to partially dried manure. Considerable information has been obtained. Future application of incineration will depend on cost factors and possible air pollution hazards. A mass and heat balance for a typical incineration trial is given in an Appendix to the paper. (Christenbury-Iowa State)

0144 - A2, C1, D1
TREATMENT OF DUCKWASTES AND THEIR EFFECTS ON WATER QUALITY,
Virginia State Water Control Board, Richmond.
R. V. Davis, C. E. Cooley, and A. V. Hadder.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 98-105, 10 tab, 7 ref.

Descriptors: *Farm wastes, *Coliforms, *Poultry, *Oysters, *Water quality, Salmonella, Biochemical oxygen demand, Environmental effects, Settling basins.
Identifiers: *Rappahannock River, Pilot pond, Barnhardt Farms, Inc., MPN (Most probable number), Raw wastes, Duck run.

Early in 1963 a six-month study was undertaken to determine the effect of coliform organisms in the treated wastes from two duck farms on water quality in an oyster-producing and recreational area of the Rappahannock River near Urbanna, Virginia. Before the treatment facilities were installed, water quality in the area was questionable for recreation purposes and was restricted for direct marketing of shellfish. Treatment consists of alternately used earthen settling basins for removing solids, followed by 4-day retention earthen basins. These remove essentially all settleable solids and reduce the most probable number of coliform organisms per 100 ml. by 90 to 95 percent. On the basis of data collected from the river, restrictions from the public oyster beds were lifted. Satisfactory recreational water quality now exists throughout the area, except very near the discharges. (Christenbury-Iowa State)

0145 - E3
VALUE OF BROILER LITTER AS FEED FOR RUMINANTS,
Virginia Polytechnic Inst., Blacksburg; Cornell Univ., Ithaca, N.Y.; and Kansas State Univ., Manhattan.
J. P. Fontenot, A. N. Bhattachanya, C. L. Drake, and W. H. McClure.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 105-108. 7 tab, 11 ref.

Descriptors: *Farm wastes, *Poultry, *Sheep, *Cattle, *Feeds, Proteins, Metabolism, Ruminants, Feeding rates.
Identifiers: Nutritive value, Broiler litter, Digestible protein, Digestible energy, Metabolizable energy, Total digestible nutrients, Carcass grade, Rate of gain.

Information has been presented concerning the nutritive value of broiler litter for ruminants. The litter samples analyzed contained an average of 32 percent crude protein, dry basis. In autoclaved litter, true protein accounted for 45 percent of the total nitrogen. In metabolism trials with wethers, 25 and 50 percent autoclaved peanut-hull and wood-shaving broiler litters replaced corresponding amounts of a corn-hay ration. There were no sig-

nificant differences in digestible protein, digestible energy, metabolizable energy, and TDN content between kinds and levels of litter. Average values were 22.7 percent, 2440 kcal per kg, 2181 kcal per kg, and 59.8 percent, respectively. It was found in fattening trials that rate of gain and carcass grade were not significantly different for beef steers fed mixtures containing 25 percent ground peanut-hull or wood-shaving broiler litter than for those fed a conventional fattening mixture.
(Christenbury-Iowa State)

0146 - E3

UTILIZATION OF ANIMAL WASTE AS FEED FOR RUMINANTS,
Auburn Univ., Ala. Dept. of Animal Science.
Aw. brady Anthony.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 109-112. 13 tab, 23 ref.

Descriptors: *Farm wastes, *Cattle, *Chemical analysis, Feeds, Silage, Nutrients, Amino acids, Vitamins.
Identifiers: *Feedlot manure, *Steers, *Digestion coefficients, *Average daily gain, Manure, Carcass data.

Analysis of feedlot manure showed it to be a valuable source of vitamins and amino acids. Washed manure was mixed with a concentrated feed and successfully fed to steers. When unwashed manure was combined with a concentrated mixture or with silage and fed to steers, animal gain and feed efficiency were not improved. Fresh feedlot manure proved to be a valuable ration component when it was either washed or autoclaved. Fresh feedlot manure was blended with coastal bermudagrass hay to make a palatable and nutritious low-moisture silage. (Christenbury-Iowa State)

0147 - B1, E3

COPROPHAGY AND USE OF ANIMAL WASTE IN LIVESTOCK FEEDS,
Texas Tech. Univ., Lubbock.
R. M. Durham.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 112-114. 6 tab.

Descriptors: *Farm wastes, *Feeds, *Livestock, Poultry, Cattle, Catfishes, Sheep, Swine, Eggs.
Identifiers: *Coprophagy, *All-concentrate ration, Feedlot steers, Digestion coefficient.

This paper reports observations of coprophagy in cattle consuming an all-concentrate ration and the feeding of rations containing manure from these cattle to poultry, cattle, swine and catfish. The all-concentrate ration was composed of 89% ground milo, 10% cottonseed meal and 1% vitamin-mineral supplement. The manure was ground in a hammer mill without prior drying and mixed with other ration ingredients for feeding. Coprophagy has been observed in cattle consuming limited quantities of the all-concentrate ration. All-concentrate cattle manure has been successfully fed to growing pullets and laying hens. The all-concentrate manure has been fed to feedlot steers with generally favorable results to limit feed consumption. Catfish can make rapid gains on feedlot manure if care is taken to prevent oxygen depletion. (Christenbury-Iowa State)

0148 - E3

ROLE OF THE RENDERER IN THE USE AND DISPOSAL OF ANIMAL WASTES,
Triangle E By-Products Co., Harrisonburg, Va.
E. L. Foerster, Sr.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 114-117.

Descriptors: *Farm wastes, Poultry, Cattle, Chemical analysis, Economics, Disposal, Equipment, Digestion tanks, Nutrients.
Identifiers: *Rendering, *Fallen stock, Protein content, Coprophagy.

Mr. Foerster gives a general history of the rendering industry in the United States. He explains the role of the industry in disposing of fallen animals. He gives an analysis for a typical product from a rendering plant. Some data is presented concerning the economics of the rendering process. Through cooperation, the rendering plant can provide a useful and efficient service in disposing of fallen stock. (Christenbury-Iowa State)

0149 - D4

EVALUATING ADAPTABILITY OF PASTURE GRASSES TO HYDROPONIC CULTURE AND THEIR ABILITY TO ACT AS CHEMICAL FILTERS,
Agricultural Research Service, Beltsville, Md.; and Maryland Univ., College Park.
Harry J. Eby.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 117-120. 6 fig.

Descriptors: *Farm wastes, *Hydroponics, *Effluents, Nutrients, Municipal wastes, Lagoons, Grasses, Aquatic environment, Root development, Light penetration.
Identifiers: Plant-nutrient removal percentage, Fertilizer value, Nutrient extraction potential, Surface area.

The possibility of using hydroponics as a means of removing nutrients from sewage-treatment plants and lagoons is discussed. Several grasses were studied with rye and tall fescue showing the most promise. Data is presented in graph form showing the plant-nutrient removal percentages. Two appendices are given. Appendix I shows the projected yield capabilities of the various forage grasses with the nutrient-extraction potential based on laboratory-scale sampling. Appendix II shows the method for computing the size of the hydroponic system required for any given volume of effluent.
(Christenbury-Iowa State)

0150 - B1, F1

PROBLEMS OF CATTLE FEEDING IN ARIZONA AS RELATED TO ANIMAL-WASTE MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
Thomas M. Stubblefield.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 120-122. 11 ref.

Descriptors: *Farm wastes, *Cattle, *Legal aspects, Relocation, Area development, Odor, Arizona.
Identifiers: *Cowtowns, *Feedlots, Metropolitan areas, Manure.

Problems associated with locating large numbers of cattle near metropolitan areas are discussed. The particular problems with large feeders in Arizona and their solutions are presented. Feedlot manure selling for as high as $5 per ton in the 1940's now is a liability costing $1 to $1.50 per ton to remove. It has been advantageous for the feedlots to relocate near farming areas for more efficient disposal of the manure. To circumvent problems with residential areas, 'cowtowns' are being developed. (Christenbury-Iowa State)

0151 - B2, D1, E1, F1

ECONOMIC EVALUATION OF LIQUID-MANURE DISPOSAL FOR CONFINEMENT FINISHING OF HOGS,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
Richard P. Kesler.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 122-125. 6 tab, 2 ref.

Descriptors: *Farm wastes, *Swine, *Disposal, *Economics, *Annual cost, Lagoons, Storage capacity, Size, Nutrients, Ultimate disposal, Liquid wastes.
Identifiers: Manure, Total lagooning, Hauling and spreading, Recovery rate, Fertilizer nutrients, Salvaged nutrients.

Manure is a valuable by-product of the hog industry. This manure must be disposed of on the land to obtain its inherent value. Factors that should be considered in choosing a manure disposal system are (a) amount of manure that is produced, (b) fertility content of the manure and its value as a replacement for commercial fertilizer, (c) disposal costs of each system, and (d) availability of cropland on which to spread the manure. An extensive economic analysis of three disposal systems is presented: (I) Total hauling and spreading, (II) Total lagooning, and (III) Partial hauling and spreading and lagooning. Three sizes of hog operation were considered in the comparison: 500, 1500, and 2500 head. (Christenbury-Iowa State)

0152 - B2, D1, E1, F1

ECONOMICS OF LIQUID-MANURE DISPOSAL FROM CONFINED LIVESTOCK,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
W. H. M. Morris.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 126-131. 6 tab, 1 fig, 16 ref.

Descriptors: *Farm wastes, *Cost analysis, *Disposal, *Value, *Nutrients, Chemical oxygen demand, Biochemical oxygen demand, Cost comparison, Economic feasibility, Economics, Anaerobic conditions, Aerobic treatment, Liquid wastes, Irrigation.
Identifiers: *Production model, Losses in storage, Value of manure, Utilization, Oxidation ditches.

Some of the problems in estimating the costs and returns from handling manure have been discussed. Removal of the manure from the livestock production areas has not been discussed. In general, the scale and efficiency of the operation and prevention of dilution of the manure determine if the manure can be spread in the fields at a cost equal to or less than the value of the nutrients used by the crop. Aerobic and anaerobic treatment of manure in special low-cost facilities designed for use on the farm seem to be practical solutions. No profitable method of industrial utilization of livestock manure can be forseen. (Christenbury-Iowa State)

0153 - E3

POULTRY MANURE MARKETING,
Pennsylvania State Univ., University Park.
Herbert C. Jordan.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 132-133.

Descriptors: *Farm wastes, *Marketing techniques, Fertilizers, Poultry analysis, Value, Economics.
Identifiers: *Bagging, *Processing.

A survey was conducted between 1961 and 1963 concerning marketing poultry manure. Information concerning the following topics was collected: General, Bagging Manure, Processing, Supplemental Mixture, and Marketing. Cost associated with bagging and minimum analysis (nitrogen, phosphoric acid, potash) is given for bags ranging from 2.5 to 80 pounds per bag. A summary of the data is presented pointed out that fresh manure is worth about $5 a ton to the soil ($20 per ton on a dry weight basis). Poultry manure used as an organic soil conditioner is and perhaps will remain the greatest and most common use of poultry manure. (Christenbury- Iowa State)

0154 - F4

FARM-WASTE MANAGEMENT TRENDS IN NORTHERN EUROPE,

Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
E. P. Allred.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 133-136. 1 fig.

Descriptors: *Farm wastes, *Disposal, Equipment.
Identifiers: *Northern Europe, Family-size farm, Oxidation ditches, Disposal practices.

Farmers throughout most of northern Europe are faced with many of the same waste-disposal problems as those confronting American farmers. Methods and equipment used for waste disposal are discussed with emphasis on the 'family-size' farm. Those individuals working with oxidation ditches are quite optimistic with its performance. When one compares rural waste-disposal practices in Europe with those in America, there are noticeable differences in both equipment and methods. Surprisingly the greatest differences occur, however, in the people themselves and their attitude toward rural waste disposal. (Christenbury-Iowa State)

0155 - B2, C5, E2

PLANT RESPONSE TO MANURE NUTRIENTS AND PROCESSING OF ORGANIC WASTES,

Forschungsanstalt fuer Landwirtschaft, Brunswick (West Germany).
Cord Tietjen.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 136-140. 3 tab, 9 fig, 12 ref.

Descriptors: *Farm wastes, *Liquid wastes, *Nutrients, Urine, Nitrogen cattle, Swine, Fertilizers.
Identifiers: *Gulle, *Plant response, Plant nutrients, Manuring, Feces.

To produce gulle (liquid manure) from cattle feces and to apply it for manuring, the grassland has for a long time been the common way of disposal of animal waste in the Alpine foreland. New labor-saving barn arrangements, tools and implements promote the practice of gulle utilization both for grassland and cropland. It was learned by field and pot experiments that gulle can exert a strong influence on plant growth. The physiological efficiency of gulle nitrogen is several times higher than that of nitrogen in common barnyard manures. Range of variation is great depending on gulle processing and composition. Quality of manure, its contents and ratio of plant nutrients depend on kind of animals, individual properties of animals, feeding, dilution by water or other additives, barn arrangement, collection and storage facilities. It is recommended that animal excrement be processed to a standardized manure - a full gulle that can be characterized by its ratio of plant nutrients. (Christenbury-Iowa State)

0156 - D4

BIOLOGICAL TREATMENT OF ANIMAL WASTES,

Netherlands Rijkswaterstaat, Arnhem.
Henri M. J. Scheltinga.
Proceedings National Symposium on Animal Waste Management, ASAE Publication No SP-0366, Michigan State University, May 1966, p 140-143. 7 tab, 3 fig, 10 ref.

Descriptors: *Farm wastes, *Activated sludge, *Biological treatment, Swine, Laboratory tests, Nitrogen, Cost, Biochemical oxygen demand.
Identifiers: *Nitrogen balance, *Holland, *Oxidation ditch, Nitrification, Bio-industries.

This paper discussed treatment of farm wastes in Holland. Chemical and mechanical treatment alone have not proven satisfactory. Laboratory and full scale treatment experiments have been conducted. Aeration, anaerobic decomposition, activated sludge treatment, and oxidation ditch experiments have been performed. Foaming has been experienced in some tests. Nitrification and nitrogen balance for farm wastes are discussed. The cost associated with the treatment facilities were considered. (Christenbury-Iowa State)

0157 - F4

ANIMAL WASTE MANAGEMENT.

Cornell Univ., Ithaca, N.Y.

R. C. Loehr, Editor. In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, January 13-15, 1969. 414 p.

Descriptors: *Farm wastes, *Hogs, *Cattle, *Water pollution, *Air pollution, Soil contamination, Rates of application, Poultry, Sheep, Biochemical oxygen demand, Chemical oxygen demand, Dissolved oxygen, Hydrogen ion concentration, Oxidation Lagoons, Lagoons, Aeration, Soils, Moisture content, Fertilizers, Nitrogen, Phosphorus, Potash, Economics, Legal aspects, Legislation, Water quality act, Water table, Odors, Rotors, Aerobic conditions, Anaerobic conditions, Digestion, Antibiotics, Irrigation, Oxygen, Rotations, Hydrology, *Waste water treatment.
Identifiers: *Oxidation ditch, Land disposal, *Feedlots, *Confinement, Population equivalent, Slatted floors, Decomposition.

The increase in high density confined animal production operations in the past decade has led to a number of environmental quality problems, such as air and water pollution. The 1969 Conference attempted to bring knowledgeable individuals from many disciplines together to mutually discuss various aspects and potential solutions to the animal waste management problem. Forty-six papers, reports, and speeches are presented in the proceedings. Such diverse topics as hydrology, economics, odor measurement, lagooning, aerobic digestion, and land disposal are presented. Research and studies in many fields are reported. (White-Iowa State)

0158 - F3

REFLECTIONS ON POLLUTION CONTROL,

Zurn Industries, Inc., Washington, D.C.
Leon W. Weinberger.
In: Animal Waste Management, Proceedings, Cornell University, Conference on Agricultural Waste Management, p 1-3, 1969.

Descriptors: *Farm wastes, *Water pollution, *Water quality, *Cost-benefit ratio, Water pollution control, Environment, Waste water treatment.
Identifiers: *National policy, National misconception.

Dr. Weinberger expresses three personal viewpoints dealing with national policy on water pollution control, cost benefit analysis in water pollution control, and finally comments on the greatest myth or misconception in water pollution control. This national misconception being that we do not know how to solve the problems of water pollution control. Dr. Weinberger asks everyone to speak out and be heard on the way that you want to have our environment. (White-Iowa State)

0159 - F4

ENVIRONMENTAL POLLUTION--NOW AND IN THE YEARS AHEAD,

Office of Science and Technology, Washington, D.C.
Donald R. King.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 4-8, 1969.

Descriptors: *Farm wastes, *Environment, Legal aspects, Research and development, Design standards, Waste treatment, Waste disposal.
Identifiers: *Agricultural Pollution, Resource conservation, Waste uses, Land planning.

The report points out several avenues that warrant research attention; among them the following: (1) The potential benefits to control which may result from changing the character of animal wastes. (2) Information is needed on present control approaches to make them more generally applicable. (3) The tremendous volume of animal wastes produced necessitates the development and application of new and more effective treatment and disposal methods. (4) Additional attention to potential uses for animal wastes would be desirable. (5) Land use planning also warrants emphasis. (6) Additional information also will be needed on the relationships of wastes to agricultural production which can be used to assist in establishing standards. (White-Iowa State)

0160 - A2, B1, D1, F1

EFFECTS OF WATER QUALITY STANDARDS ON THE REQUIREMENTS FOR TREATMENT OF ANIMAL WASTES,

Federal Water Pollution Control Administration, Washington, D.C.
Harold Bernard.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 9-16. 1 tab, 2 fig, 5 ref.

Descriptors: *Farm wastes, *Legal aspects, *Water quality act, Biochemical oxygen demand, Chemical oxygen demand, *Water quality standards, Municipal wastes, Industrial wastes, Waste water treatment.
Identifiers: FWPCA, Animal feedlot, *Disposal requirements, *Waste treatment standards, Environmental backlash, Interstate waters.

Changes that have taken place in water quality standards are discussed. The purpose of the standards is to: (a) provide an engineering base for the design of waste treatment works by municipalities and industries without uncertainties in waste disposal requirements in interstate waters. (b) Serve as a clear public (local) policy statement on the use or uses to which specific segments of interstate waters may be put after due consideration of all the factors delineated above. The effect of these changes in standards is discussed with relation to the treatment of animal wastes. Future municipal B.O.D. loads and their subsequent treatment costs are brought out. It is mentioned that the FWPCA is interested in receiving proposals to demonstrate new or unique treatment and control techniques for animal wastes, especially in conjunction with an on-going operation. Only with the cooperation and leadership of the industry itself can techniques be developed to meet the various

water quality standards and enable the industry a growth unimpeded by any environmental backlash. (White-Iowa State)

0161 - B1, F3

THE CHALLENGE OF ANIMAL WASTE MANAGEMENT,

Cornell Univ., Ithaca, N.Y.
Raymond C. Loehr.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 17-22. 5 ref.

Descriptors: *Farm wastes, Odors, Waste water treatment.
Identifiers: *Animal production, *Waste management, Environmental quality, Interrelationships of animal production, Study and research.

There is a woeful lack of understanding of the interrelationships between various aspects of animal production and waste management. It is to this point and to these relationships that this paper is addressed. The long term approach for animal production must be based upon not only optimal production of the product, but also on management of the entire production scheme such that it is consistent with the maintenance of acceptable environmental quality not only to the animals, and to the producers, but to society as a whole. The problem of animal waste management is actually many problems. It consists of technical, economic, social, educational, and perhaps above all, a communications problem. The talents of individuals from many disciplines are needed to produce better solutions to the problem. We need to initiate more studies that will take an overview of the animal production operation, feasible waste management systems, and their interrelationships. These studies should develop information that can be used as predictive and/or decision making tools to anticipate and minimize problems that may result. Herein lies the greatest challenge of animal waste management. (White-Iowa State)

0162 - D1, F4

THEORY AND FUTURE OUTLOOK OF ANIMAL WASTE TREATMENT IN CANADA AND THE UNITED STATES,

Toronto Univ. (Ontario). Dept. of Civil Engineering.
P. H. Jones.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 23-36. 2 tab, 27 ref.

Descriptors: *Farm wastes, *Biochemical oxygen demand, *Biological treatment, *Oxygen, Water pollution, Nitrogen, Odors, Carbon, Waste water treatment, Aeration, Aerobic treatment, Anaerobic digestion.
Identifiers: Pollution potential, Waste characteristics, Integrated farming, Aerobic composting.

This paper presents some of today's theories on waste treatment and their effectiveness, both socially and physically. The paper tells of the pollution potential and characteristics of animal waste, as well as some of the waste treatment objectives. Theoretical formulas are presented for the introduction of oxygen into an aqueous system, and the reduction of BOD. Potential solutions to the waste treatment problem are listed and summarized as follows: integrated farming, anaerobic holding, aerobic systems, complete treatment, anaerobic digestion, drying and incineration, and aerobic composting. Research needs are given, as well as a look to the future for what may be possible. (White-Iowa State)

0163 - D4

DESIGN PARAMETERS FOR THE STABILIZATION OF HIGHLY ORGANIC MANURE SLURRIES BY AERATION,

Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
Albert F. Vickers, and Emil J. Genetelli.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 37-49. 7 fig, 6 tab, 11 ref.

Descriptors: *Farm wastes, *Poultry, *Aerobic treatment, *Biochemical oxygen demand, Dissolved oxygen odor, Waste water treatment.
Identifiers: Aerobic stabilization, Manure slurry, Ultimate disposal, Loading parameter, Suspended solids.

It has been determined in this research that aerobic stabilization basins are not suitable for the complete treatment of slurries of poultry manure. However, the aerobic stabilization basins do provide satisfactory pretreatment prior to ultimate disposal. This treatment provides sufficient stabilization of the manure to eliminate nuisance problems when ultimately disposed of on land. The critical loading parameter determined in this bench scale system is a volume loading of 60 cubic feet of aeration basin per pound of applied BOD in the manure slurry. The average BOD reduction in the unsettled effluent was 87% with an average solids destruction of 53%. Foaming difficulties were encountered after the critical loading parameter determined was exceeded. (White-Iowa State)

0164 - C1, D4

SWINE WASTES, CHARACTERIZATION AND ANAEROBIC DIGESTION,

Kansas Agricultural Experiment Station, Manhattan.
Lawrence A. Schmid, and Ralph I. Lipper.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 50-57. 4 tab, 2 fig, 3 ref.

Descriptors: *Farm wastes, *Anaerobic digestion, Swine, Biochemical oxygen demand, Chemical oxygen demand, Methane, Odor, Waste water treatment.
Identifiers: *Digester, Waste digestion, Feed ration.

Laboratory and field tests were undertaken to show the effectiveness of anaerobic digestion as a possible solution to swine waste treatment. The following conclusions are made from the study: (1) The waste characteristics can be related to pounds of waste per unit pound of live weight. (2) If organic removal is the desired objective, it can best be done by solids removal from the fresh wastes resulting in COD reductions of 90%. (3) Mixing is required in the anaerobic digestion phase to disperse the fresh waste. (4) Normally, the efficiency of anaerobic treatment can be increased by increasing the solids retention time. (5) Results have shown that conventional anaerobic digestion cannot be practiced on raw undiluted hog wastes which include the urine. (6) Digestion only for liquifaction does not require the close environmental control required to stimulate growth of methane bacteria. (7) Design for the objective of waste liquifaction for the purpose of reuse as flushing water, ultimate disposal on land, and ease of handling can be one answer to the problem of handling and treatment of wastes from confinement feeding of swine. (White-Iowa State)

0165 - B3, C5, D4

AEROBIC DECOMPOSITION OF SOLID WASTES FROM CATTLE FEEDLOTS,

Texas Technological Coll., Lubbock. Dept. of Civil Engineering.
D. M. Wells, R. C. Albin, W. Grub, and R. Z. Wheaton.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 58-62. 4 fig.
Descriptors: *Farm wastes, *Moisture content, Cattle, Temperature, Nitrogen, Phosphorus, Waste water treatment.
Identifiers: *Aerobic stabilization, *Composting process.

This is a progress report on research being conducted on the aerobic stabilization of solid beef feedlot wastes and is concerned with the composting process and with the effect of feed, management, and climate on waste stabilization. Two general areas were reported in the paper, one concerned with composting in open air piles and the other with composting in a specially built drum type digester. Forty per cent reductions in volume and 20% losses in dry matter were noted. The most rapid rate of stabilization seemingly takes place during the first few days of the process, with a steady decrease in the rate of stabilization occurring with time. (White-Iowa State)

0166 - C3, D4

ANALYSIS FOR OXYGEN TRANSFER COEFFICIENTS IN ROTOR AERATION SYSTEMS,

Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
John J. Kolega, Gordon L. Nelson, and Quintin B. Graves.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 63-75. 9 fig, 4 tab, 13 ref.

Descriptors: *Farm wastes, *Equations, Oxygen, Dissolved oxygen, Oxygenation, *Model studies, Waste water treatment.
Identifiers: *Rotor aerator, *Oxidation ditch, Oxygen transfer.

The laboratory method described presents a technique for use in the engineering design and analysis of a horizontal rotor aerator system in livestock waste management. This procedure can be used to obtain quantitative prediction equations to estimate the oxygen transfer coefficients for a selected range of operating conditions. Once the prediction equation for a given system is developed, it can be further used to evaluate new applications provided the parameters fall within the range of the predicted equation developed. An equation for estimating the oxygen transfer coefficients per revolution of rotor was obtained with a model rotor aerator using distilled water as the liquid. Rotor aerator performance curves illustrating how the prediction equation can be used in livestock waste system design and management were also developed. (White-Iowa State)

0167 - A5, C3, D4

AEROBIC STORAGE OF DAIRY CATTLE MANURE,

Purdue Univ., Lafayette, Ind. School of Civil Engineering.
Don E. Bloodgood, and C. M. Robson.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 76-80. 2 tab, 1 fig, 4 ref.

Descriptors: *Farm wastes, Cattle, Aeration, Temperature, Odor, Chemical oxygen demand, Waste water treatment.
Identifiers: Dairy cattle, Loading rates, Kjeldahl nitrogen, Degradation, Volatile solids.

Laboratory tests with seven liter, aerated containers were performed in 4C and 24C rooms. Loading rate of 60, 80, 100, and 120 grams of wet raw dairy manure per day were used at both temperatures. Conclusions were made from the results of the experiment as follows. (1) The amount of leading does not influence the degree of degradation that takes place. (2) The tests indicate a decrease in volatile solids of 20 per cent at 4C and

42 per cent at 24C. (3) Appreciable amounts of material with a COD are removed in the aerobic storage process. (4) The Kjeldahl nitrogen concentration of material remaining after aerobic storage is higher after the storage period. (5) Foaming is a real problem in the aerobic storage of manure from dairy cattle. (6) Aerobic storage of manure from dairy cattle has promise of minimizing the odor problem encountered in the spreading of unaerated material after storage. (White-Iowa State)

0168 - B2, C3, C4, D4, E3

AEROBIC DIGESTION OF DILUTED ANIMAL MANURE IN CLOSED SYSTEMS - TEMPORARY EXPEDIENT OR LONG RANGE SOLUTION,

Massachusetts Univ., Amherst. Dept. of Civil Engineering.
J. T. Clayton, and T. H. Feng.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 81-87. 6 fig, 1 ref.

Descriptors: *Farm wastes, *Aerobic treatment, *Anaerobic digestion, *Effluents, Cattle, Biochemical oxygen demand, Nitrates, Hydrogen ion concentration, Waste water treatment.
Identifiers: *Sedimentation tanks, *Degradation, Volatile solids.

The pilot scale manure treatment system studied was an adapted composite of two aerobic-anaerobic dairy manure treatment systems. It was designed to process the waste of one mature dairy cow, together with the water necessary to flush the manure from the barn. The system consisted of a 2000 gallon primary sedimentation tank, a 1000 gallon aeration tank, and a 200 gallon final sedimentation tank. The effluent was collected and analyzed at three different points in the closed system. Graphs of total solids, volatile solids, pH, BOD, and nitrate content versus time are given for the three effluent collection points. The overall objective was to design a system the effluent from which could be used as a flushing and transport medium for subsequent cleanings of a dairy cow housing facility, or be discharged into a water course. (White-Iowa State)

0169 - C3, D3

INFLUENCE OF CHEMICAL TREATMENTS UPON DIGESTIBILITY OF RUMINANT FECES,

Agricultural Research Service, Beltsville, Md. Animal Husbandry Research Div.
L. W. Smith, H. K. Goering, and C. H. Gordon.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 88-97. 10 tab, 11 ref.

Descriptors: *Farm wastes, *Cattle, *Digestion, Sheep, Orchardgrass, Alfalfa, Ruminants, Waste water treatment.
Identifiers: Sodium hydroxide, Sodium peroxide, In vitro fermentation, Chemical treatment.

Sodium hydroxide and sodium peroxide treatment of orchardgrass and alfalfa cow feces resulted in large decreases in the cell wall (CW), cellulose, hemicellulose, and lignin contents. Treatment with sodium chlorite changed composition little except for a large reduction in lignin content. True CW digestibility was increased several fold by each treatment as measured by an in vitro fermentation technique. Corn silage rations containing 25% of the total dry matter (DM) as either untreated or 3% sodium peroxide treated orchardgrass feces were consumed equally well as an all corn silage ration by sheep. Lower intake was observed for a corn silage ration which contained 50% similarly treated feces also on a dry matter basis. Digestibility coefficients for the various components of the feces portion of the rations were calculated by difference. Addition of 3% sodium peroxide to feces increased average DM, 29; nitrogen, 25; CW, 55; cellulose, 41; and hemicellulose, 90 digestibility units over that of the untreated feces. Neither concentration nor molar ratios of ruminal volatile fatty acids changed due to the inclusion of treated or untreated feces in rations for sheep. (White-Iowa State)

0170 - E3

THE VALUE OF HYDROLYZED AND DRIED POULTRY WASTE AS A FEED FOR RUMINANT ANIMALS,

Pennsylvania State Univ., University Park.
T. A. Long, J. W. Bratzler, and D. E. H. Frear.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 98-104. 12 tab.

Descriptors: *Farm wastes, *Feeds, *Nitrogen, Poultry, Cattle, Sheep, Waste water treatment.
Identifiers: *Hydrolyzed poultry waste, Rations, Feedlot performance, Digestion coefficient, Carcass characteristics.

Information was presented concerning the value of heat treated poultry waste as a source of nutrient for ruminant animals. In a metabolism trial, whethers were fed a semi-purified ration in which the nitrogen was supplied by hydrolized poultry waste, cooked poultry waste, or soybean oil meal. The digestion coefficients for crude protein differed significantly (PA.05) between all rations. Nitrogen excreted in the feces was significantly lower for the soybean oil meal ration than for the poultry waste ration. No other significant differences were observed. It was found in a fattening trial with steers that rate of gain, feed efficiency, and carcass grade were not significantly different for beef steers fed rations in which the supplemental nitrogen was supplied as soy bean oil meal, hydrolized poultry waste or dried poultry waste. Rate of gain was higher (PA.05) for the steers fed the ration containing urea. The treated poultry waste rations were readily consumed by the steers and no undesirable effect on carcass characteristics were found. (White-Iowa State)

0171 - E3

CATTLE MANURE: RE-USE THROUGH WASTELAGE FEEDING,

Alabama Agricultural Experiment Station, Auburn.
W. Brady Anthony.

In: Animal waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 105-113. 9 tab, 1 fig, 10 ref.

Descriptors: *Farm wastes, *Cattle, Feeds, Performances, Waste water treatment.
Identifiers: *Wastelage, Yeast fermentation.

Manure collected daily from a concrete floor of a pen housing steers was blended with a fattening feed in the ratio of 2:3. The wastelage system was developed for more flexibility. Wastelage is the combining of fresh manure with ground grass hay in the ratio of 57:43 with storage in a silo until fed. Five conclusions were drawn from the study. (a) Fresh feedlot manure can be mixed with concentrate and fed successfully to cattle with a considerable saving in feed used per unit of beef produced. (b) Wastelage represents a flexible system of removing manure daily, blending it with hay, and storing as silage. (c) Elimination of pollution from steer feedlots can be obtained through use of the wastelage plan. (d) Yeast can be produced on fluidized and aerated manure. About 68% of manure dry matter appears recoverable in the yeast fermentation product. (e) Feedlot manure properly handled is a valuable product for conversion to an animal feed. (White-Iowa State)

0172 - E2

SPECIFICATIONS FOR EQUIPMENT FOR LIQUID MANURE DISPOSAL BY THE PLOW-FURROW-COVER METHOD,

Rutgers - The State Univ., New Brnuswick, N.J. Dept. of Agricultural Engineering.
Charles H. Reed.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 114-119. 8 fig.

Descriptors: *Slurries, *Disposal, Farm wastes, Poultry, Waste water disposal.
Identifiers: *Plow-furrow-cover, Utilization.

A condensation is presented of experimental work that was done on land application of poultry manure slurries. Several pieces of equipment and different operations were looked at. Most incorporated a single bottom 16 in. plow operating 7 in. to 8 in. deep. Manure was deposited in the furrow and then covered. Tank trailers and commercial liquid manure tanks were used to transport and funnel the slurry into the furrow. General performance specifications for plow-furrow-cover equipment is included. (White-Iowa State)

0173 - C3, E3

USE OF POULTRY MANURE FOR CORRECTION OF Zn and Fe DEFICIENCIES IN PLANTS,

Colorado State Univ., Fort Collins. Dept. of Agronomy.
B. F. Miller, W. L. Lindsay, and A. A. Parso.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 120-123. 2 tab, 6 ref.

Descriptors: *Farm wastes, *Fertilizers, Poultry, Iron, *Corn, Waste water treatment.
Identifiers: *Micronutrient deficiency, Zinc.

A greenhouse study was conducted with corn on a soil deficient in available Zn and Fe. Fifteen fertilizer combinations including N,P, Zn, Fe, poultry manure and poultry manure ash were used. Adequate K was supplied by the soil. The results of this study are interpreted as showing that poultry manure is beneficial for the correction of Zn and Fe deficiencies. This benefit is supplementary to its value as an NPK fertilizer. Furthermore, the organic fraction of poultry manure is important in rendering Zn and Fe more available to plants. This beneficial effect is greater in the case of Fe than Zn, but it is significant in both cases. The findings of this study support the hypothesis that manure and other organic wastes may either supply or give rise to natural chelating agents that aid in the solubilization of insoluble micronutrient elements in soil and thereby render them more available to plants. (White-Iowa State)

0174 - A2, A4, C3, E2

THE NITROGEN PROBLEM IN THE LAND DISPOSAL OF LIQUID MANURE,

Guelph Univ. (Ontario). Dept. of Soil Science.
L. R. Webber, and T. H. Lane.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 124-130. 3 tab, 1 fig, 13 ref.

Descriptors: *Farm wastes, *Nitrogen, *Groundwater, Nitrates, Water pollution sources, Waste water treatment.
Identifiers: *Nitrogen pollution, Crop utilization, Pollution control.

Segments of research are presented that lead to the preparation of guidelines outlining the cropland requirements for the utilization and disposal of the nitrogenous compounds in liquid manures. The objective in land spreading was two-fold: (a) to apply the waste at such rates that the practice will be nitrogen utilization for crop production at optimum use-efficiency; and (b) to apply the waste at such rates that the practice becomes primarily one of disposal while not contributing to environmental pollution (air, water, soil). Tables show the dif-

ferent rates of application and how the nitrogen is removed. Recommendations are given as to how much land is required for crop utilization and pollution control for different livestock operations. (White-Iowa State)

0175 - D1

STATUS REPORT ON WATER POLLUTION CONTROL FACILITIES FOR FARM ANIMAL WASTES IN THE PROVINCE OF ONTARIO,

A. R. Townshend, K. A. Reichert, and J. H. Nodwell.

In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 131-149. 14 tab, 5 fig, 9 ref.

Descriptors: *Farm wastes, *Water pollution control, Cattle, Hogs, Poultry, Lagoons, Waste water treatment.
Identifiers: *Population equivalent, *Confinement housing, Pollution potential, Concentrations, Land disposal, Oxidation ditch.

Farm animal waste problems of the agricultural industry in Ontario are concentrated on the liquid manure water pollution control facilities presently serving swine, beef cattle, dairy cattle, and poultry confinement housing operations. It is concluded that based on present technology and economics, the approach to animal waste disposal in Ontario for the forseeable future should continue to be one of storage and land disposal rather than treatment and effluent discharge to water courses. The status report estimates the pollution potential of farm animal wastes; outlines the present methods of handling liquid manure from confinement operations; tabulates animal waste characteristics, loadings, and population equivalents; gives field data and experiences on typical water pollution control facilities; and concludes with guidelines on the selection, design, and operation of farm waste systems. (White-Iowa State)

0176 - D4, E2

DISPOSAL OF DAIRY CATTLE WASTES BY AERATED LAGOONS AND IRRIGATION,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale, J. R. Ogilvie, A. C. Chang, and M. P. Douglas.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 150-159. 11 fig.

Descriptors: *Farm wastes, *Oxidation lagoon, *Sprinkler irrigation, Biochemical oxygen demand, Chemical oxidation demand, Oxidation-reduction potential, Odor, Irrigation, Waste water treatment.
Identifiers: Dairy cattle.

The system studied the aerobic type using a lagoon for storage and treatment but relying solely on sunlight and algae for oxygen. A mechanical surface aerator was used to supply oxygen and for mixing. An overhead sprinkler irrigation system was used in conjunction with the treatment lagoon. The liquid was applied to cropland (grassland) beside the lagoon. Perameters measured included BOD, COD, total solids, volatile solids, pH, and total gallons of influent and effluent; temperature, DO, pH and oxidation-reduction potential of the mixed liquor; distribution of effluent by irrigation; and odor associated with the area. Tentative conclusions were reached as a result of work to date: (a) The system is odorless. (b) The system provides a place to dispose of wastes at all times. (c) Nutrients are saved and are returned to the land. (d) With proper operation, runoff into streams and ditches is minimized. (e) Pollutional characteristics of all wastes are greatly lowered. (f) Cost of installation and operation do not appear to be excessive. (g) A relatively small amount of labor is required. (White-Iowa State)

0177 - B2, D4

FIELD TESTS OF OXIDATION DITCHES IN CONFINEMENT SWINE BUILDINGS,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Don D. Jones, Donald L. Day, and James G. Converse.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 160-171. 15 fig, 1 ref.

Descriptors: *Farm wastes, *Hogs, *Rotors, Oxygen demand, Biochemical oxygen demand, Chemical oxygen demand, Waste water treatment.
Identifiers: *Oxidation ditch, *Confinement buildings, Total solids, Volatile solids.

Tests at the University of Illinois were conducted using two buildings with oxidation ditches. Detention time, rotor speed, rotor immersion, and loading rates were varied. Oxygen demand, solids, BOD and COD were measured periodically and plotted by a digital computer. Problems with foaming and ammonia odor were encountered, but solved by altering the liquid depth and rotor immersion. Apparently the velocity of the waste in the ditch seems to be the controlling factor in oxidation ditch operation. Adequate velocity and oxygenation occurred when the immersion of the aeration rotor into the waste was equal to approximately one-third of the liquid depth. A liquid volume of 200 to 250 cubic feet of ditch volume per foot of rotor length served to maintain a velocity that prevented solids from settling in the ditch. With sufficient gutter volume to give 50 days detention time, the aerobic digestion process can reduce the 5-day BOD of hog waste from approximately 35,000 mg/l to around 3000 mg/l. (White-Iowa State)

0178 - D4

STUDY OF THE USE OF THE OXIDATION DITCH TO STABILIZE BEEF ANIMAL MANURES IN COLD CLIMATE,

Minnesota Univ., Minneapolis.
J. A. Moore, R. E. Larson, and E. R. Allred.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 172-177. 3 fig.

Descriptors: *Farm wastes, *Climates, *Air temperature, Biochemical oxygen demand, Chemical oxygen demand, Cattle, Rotors, Stabilization, Waste water treatment.
Identifiers: *Oxidation ditch, *Slatted floor.

When loaded at the rate of one animal per 210 cu. ft. of liquid it appears that the oxidation ditch can be operated in cold weather. From results of this trial it can be projected that the oxidation ditch can successfully function to contain and provide minimal treatment to beef cattle wastes in cold climate with the pollutional threat stored until spring. At that time the liquid which is too polluted to be discharged to a waterway might be applied to a receptive soil media for further treatment. The results of a summer operation at a loading rate of one animal per 140 cu. ft. of liquid, indicate that the system achieved an 87% reduction of 5 day BOD. Additional treatment will be required however, because the BOD of the slurry was 22,000 mg/l at the end of the test period. Results indicate that the oxidation ditch system can be used to treat beef waste in climates which experience extended periods of sub-freezing temperatures, although digestion is minimal at these temperatures. Some foaming resulted but was not a limiting parameter. Normal operation has resulted in a low odor level. Sludge buildup was not a problem with an annual cleanout cycle. (White-Iowa State)

0179 - C3, D4

CHANGES IN COMPOSITION OF CONTINUOUSLY AERATED POULTRY MANURE WITH SPECIAL REFERENCE TO NITROGEN,

Guelph Univ. (Ontario).
J. B. Edwards, and J. B. Robinson.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 178-184. 5 fig, 2 tab, 8 ref.

Descriptors: *Farm wastes, *Nitrogen, Poultry, Aeration, Nitrification, Denitrification, Oxidation-reduction potential, Rotors, Waste water treatment.
Identifiers: *Nitrogen loss, *Oxidation ditch.

The objectives were (a) to study the nitrogen transformation in continuously aerated liquid manure, (b) to determine the most efficient means of eliminating nitrogen from waste (for situations in which sufficient land is not available to meet guidelines for pollution control) and (c) to determine what steps must be taken to prevent losses of nitrogen from liquid manure (for situations in which crop utilization is an integral part of the operation, and sufficient land is available). The study was limited to liquid poultry manure and this report deals, in a preliminary way, with changes in nitrogen components in such waste continuously aerated in both laboratory units and in an oxidation ditch. The results show that the mechanical rotor as operated was not capable of maintaining strictly aerobic conditions in the ditches for more than a few days. In spite of this, odor did not become a problem. From the limited data obtained, the oxidation ditch appears to be a useful device for controlling the ultimate nitrogen content of the manure before land utilization. By encouraging the nitrification-denitrification sequence nitrogen can be removed and, presumably, by inhibiting nitrification, nitrogen could be conserved. (White-Iowa State)

0180 - B2, D4

FARM WASTE DISPOSAL FIELD STUDIES UTILIZING A MODIFIED PASVEE OXIDATION DITCH, SETTLING TANK, LAGOON SYSTEM,

Farmland Industries, Inc.
Gerald R. Foree, and Richard A. O'Dell.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 185-192. 7 tab, 6 fig, 8 ref.

Descriptors: *Farm wastes, *Hogs, *Lagoons, *Efficiencies, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen-ion concentration, Waste water treatment.
Identifiers: *Oxidation ditch, *Settling tank, Total solids, Fixed solids, Volatile solids.

The system studied was two buildings, capable of holding 10 sows and litters apiece, located over oxidation ditches. The ditches emptied into a settling tank which in turn emptied into a lagoon. Measurements of dissolved oxygen, temperature, pH, BOD, COD, various solids determinations, various nitrogen determinations, and bacterial quantitation were taken and presented in 7 tables and 5 graphs. The data indicated that the oxidation ditch itself operated at approximately 50% efficiency under optimum operating conditions. The total system ditch, settling tank and lagoon appeared to operate between 70 and 90 per cent efficiency, depending on the research parameter studied. (White-Iowa State)

0181 - F4

FEEDLOT POLLUTION CONTROL - A PROFILE FOR ACTION,

Federal Water Pollution Control Federation, Kansas City, Mo. Missouri Basin Region.
John M. Rademacher, and Anthony V. Resnik.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 193-202. 17 ref.

Descriptors: *Farm wastes, *Water pollution control, *Legislation, Groundwater, Water Quality Act.

Identifiers: *Feedlots, *Animal production, Research, Regulation.

This paper set the stage for the presentation of technical papers which followed at the Cornell University Animal Waste Management Conference. The background of animal production and examples of the pollution problem were given. Factors causing the problem of animal waste disposal were discussed as well as accomplishments to date. These accomplishments included Federal laws to control pollution. A profile for action was presented as a model for action. The essential elements were Re-education, Research and Regulation. He states that we have neither adequate knowledge for control nor full cooperation and involvement of all levels of Government and the private sector to solve the problems resulting from feedlot operations. More attention must be given to feedlot location and research devoted to the institutional problems of animal waste management. There must be an organized and coordinated, interdisciplinary approach to animal waste disposal. (White-Iowa State)

0182 - A2, C2, C3, C4

CATTLE FEEDLOT WATER QUALITY HYDROLOGY,

Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
T. E. Norton, and R. W. Hansen.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management; 1969, p 203-216. 2 tab, 14 fig, 14 ref.

Descriptors: *Farm wastes, *Cattle, *Hydrographs, *Water quality, Rainfall simulators, Rainfall intensity, Biochemical oxygen demand, Runoff, Alkalinity, Water pollution control, Waste water treatment.
Identifiers: *Feedlot runoff, *Hydrology characteristics, Surface storage, Effective depth, Overland flow.

The hydrologic and quality characteristics of runoff waste water resulting from precipitation on cattle feedlots are presented. The overall objective of the study was to determine if the hydrology characteristics could be correlated with the quality characteristics through a modification of the flat plate model of overland flow. Once this correlation was established, the results were used to predict the quantity and quality of the runoff from existing feedlots. The field equipment consisted of rainfall simulation equipment and a sample collection and control device. Runoff was collected and analyzed from a 28 sq. ft. plot in 18 separate runs on 13 different feedlots. The pollution characteristics of BOD, dissolved solids and alkalinity were correlated with an effective depth of overland flow. The correlation method and equations developed were used in an example of BOD prediction. (White-Iowa State)

0183 - A2, B1, C5

THE EFFECT OF FEED, DESIGN AND MANAGEMENT ON THE CONTROL OF POLLUTION FROM BEEF CATTLE FEEDLOTS,

Texas Technological Coll., Lubbock. Dept. of Agricultural Engineering.
W. Grub, R. C. Albin, D. M. Wells, and R. Z. Wheator.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 217-224. 5 fig, 2 tab.

Descriptors: *Farm wastes, *Cattle, *Runoff, Biochemical oxygen demand, Nitrogen, Phosphorus, Water pollution control.
Identifiers: *Feedlots, *Composition of wastes, Rations, Feedlot layout, Waste accumulation.

Incorporating both engineering and biological aspects, this report contains an analysis of data and suggests management and design practices that could materially reduce the pollution contributed from the small but densely populated feedlot area. The composition and quantity of wastes is looked at. The type of ration and changes in accumulated wastes are discussed in relation to the former topics. The effects of precipitation, surfacing material, land slope, depth of waste accumulation, feedlot layout, and ration composition are discussed with respect to composition and quantity of runoff. (White-Iowa State)

0184 - C3, C4, D4

TREATMENT OF WASTES FROM BEEF CATTLE FEEDLOTS - FIELD RESULTS,

Cornell Univ., Ithaca, N.Y.
Raymond C. Loehr.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 225-241. 8 fig, 4 ref.

Descriptors: *Farm wastes, *Cattle, *Anaerobic conditions, Alkalinity, Biochemical oxygen demand, Chemical oxygen demand, Ammonia, Nitrates, Nitrites, Rainfall, Water pollution, Digestion, Waste water treatment.
Identifiers: *Feedlots, *Aerobic stabilization, *Polishing unit, *Intermittent loading, Volatile acids, Volatile solids, Total solids, Turbine blower.

Results are presented from a field demonstration study to investigate an anaerobic-aerobic treatment system for beef cattle feedlot waste water, some of the management aspects of such a system are discussed, and data are presented on the quality of runoff from beef cattle feedlots. The demonstration system consisted of a 40,000 gallon anaerobic unit which overflowed into a 15,000 gallon aerobic unit. Aerobic stabilization was accomplished by means of a turbine blower and a simple diffuser system. The effluent from the aeration unit flowed to a polishing unit which provided for separation of the residual solids. The ability of this system to reduce the pollution from feedlot runoff was demonstrated. The system was able to absorb shock loads of waste that were periodically scraped into the anaerobic unit. The results of the study showed that frequent addition of wastes to the system, frequent mixing of the anaerobic unit, and removal of only a portion of the contents of the anaerobic unit materially assisted the satisfactory performance of the unit and the maintenance of equilibrium conditions. The individual units have been shown to function adequately with a minimum of attention. Further treatment would be required before the effluent could be released to a receiving stream. (White-Iowa State)

0185 - F4

WASTE DISPOSAL MANAGEMENT,

Cornell Univ., Ithaca, N.Y.
Charles E. Ostrander.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 242-244.

Descriptors: *Farm wastes, Nitrogen, Mortality, Water pollution effects, Incineration, Storage, Odor, Disposal, Water pollution sources.
Identifiers: Compost, Nuisance, Pollution hazard, Residential areas, Neighbors.

The immediate concern of the author was the improvement and the prevention of further destruction of our environment. He spoke of the magnitude of the agricultural waste problem indicating the greatness of the technological and economic aspects. The importance of animal waste as a source of organic nitrogen was pointed out, as were the dangers of inorganic nitrogen. Methods of handling and storage were brought out. The problem of disposing of mortality cases and possible solutions was discussed. Stress was placed on the creation of a favorable image of agriculture in the eyes of the public. (White-Iowa State)

0186 - D2, E3, F1

MANURE CONSERVATION,

HUPSI Corp., Wabash, Ind.
Robert M. LaSalle, Jr., and Mark Launder.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 245-248. 1 fig.

Descriptors: *Farm wastes, *Fertilizers, Poultry, Potash, Air-conditioning, Gross profit, Costs, Dehydration, Waste water treatment.
Identifiers: *Phosphoric acid, Anhydrous ammonia, *Manure conservation.

Tests were conducted in the fall and winter of 1967 on a proposed system of manure conservation. Poultry manure was stabilized and used as a fertilizer rather than going through a bio-degradation process. Troughs were placed under the chickens and a weak phosphoric acid solution flowed by gravity under subsequently lower cage levels and finally into a sump from which it was pumped to the upper most levels. Droppings were immediately stabilized, denatured, and deodorized upon falling into the solution. Additional treatment consists of buffering to reduce the acidity to the proper value for fertilizer and adding potash to increase the potash values to that commensurate with the nitrogen and phosphate analysis for commercial use. Buffering can be done with anhydrous ammonia or potash so that either the nitrogen or potash values are augmented. By these means control is available to bring the final product to any desired fertilizer analysis. An analysis of 10-3-2 can command a price of $61.60 per ton with a gross profit of $14.50 if dehydration is used. By refrigerating the solution flowing under the chickens, the chicken house is completely and perfectly air conditioned. (White-Iowa State)

0187 - A5, B2, D4

CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS,

Guelph Univ., (Ontario). Dept. of Poultry Science.
J. P. Walker, and J. Pos.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 249-253. 3 fig, 1 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, *Performance, Anaerobic conditions, Aerobic conditions, Mortality, Odor, Biochemical oxygen demand, Waste water treatment.
Identifiers: *Oxidation ditch, Feed conversion, Aerator, Population equivalent, Egg production.

The hen housed egg production, feed conversion and mortality performance of caged layers in a pen with oxidation ditches was slightly better than that of caged layers in pens with liquid manure, storage tanks. The odor in the pens with oxidation ditches was less offensive than in the pens with anaerobic storage. Aerators, however, should be installed outside the pen area. The tank design is very important from the standpoint of liquid circulation, and clean-out. A drain to a sump hole for cleaning is essential. The foaming problem, while controlled by commercial anti-foaming agents, limits the practical application of aerators for poultry until a more economical means is found. Cage systems that do not need dropping boards (eg. full stair-steps) should be used; this would eliminate shock loading, reduce odors and labor requirements. (White-Iowa State)

0188 - A6, B1, D1

PROBLEMS AND PRACTICES IN SOME SYSTEMS OF MANURE HANDLING IN

NORTHERN EUROPE,
Cornell Univ., Ithaca, N.Y. Dept. of Animal Science.
A. M. Meek, W. G. Merrill, and R. A. Pierce.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 254-259. 4 fig, 6 ref.

Descriptors: *Farm wastes, *Cattle, *Storage, Odor, Disposal, Waste water treatment.
Identifiers: *Dairy cattle, *Handling system, Slatted floors, Poisonous gases, Agitation, Free-stall housing.

Dairy manure handling systems and operations were visited in Scotland, England, Denmark and Sweden. The various types of systems consisted of under-building and outside-underground storage facilities with some type of pump or shuttle agitation system. Many incorporated steel or concrete slatted floors with manure storage pits underneath. Problems of odor and poisonous gases were discussed. A list of 15 safety points for the prevention of gas problems was given. Symptoms of gas poisoning were also listed. (White-Iowa State)

0189 - A5, C3
MEASUREMENT OF THE ODOR STRENGTH OF ANIMAL MANURES,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 260-270. 6 fig, 4 tab, 10 ref.

Descriptors: *Farm wastes, *Odor, Poultry, Anaerobic conditions, Pollutant identification, Waste water treatment.
Identifiers: *Vapor dilution, *Threshold Odor Number, *Odor Intensity Index, Liquid dilution, Panel, Batch condition, Odor strength, Ranking.

Strength is a characteristic of an odor that can be measured. In contrast to characteristics such as quality and occurrence which rely only on individual opinion, strength allows associating a number with an odor. This can be very valuable for comparing manure handling systems as to odor production. Measurement of odor strength is usually accomplished by determining the magnitude of dilution required so that the odor is just detectable (olfactory threshold). The human nose is utilized as the detector. The application of the measurement of odor strength to animal manures was attempted in the laboratory. The method of liquid dilution and the method of vapor dilution were investigated. Vapor dilution looks at the odors arising from the manure while liquid dilution is concerned with the odors in the manure or the odor potential of the manure. Fifteen conclusions and observations were made as a result of the study. (White-Iowa State)

0190 - A5, B1, C3, C4
MICROBIOLOGICAL AND CHEMICAL CHANGES IN POULTRY MANURE ASSOCIATED WITH DECOMPOSITION AND ODOR GENERATION,
Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
William E. Burnett, and Norman C. Dondero.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 271-291. 18 fig, 1 tab, 53 ref.

Descriptors: *Farm wastes, *Poultry, *Odor, Aerobic bacteria, Anaerobic bacteria, Ammonia, Hydrogen sulfide, Sulfur bacteria, Waste water treatment.
Identifiers: *Olfactory threshold test, *Odor Intensity Index, *Threshold odor numbers, Uric acid, Odor panel, Volatile organic acids.

Changes in the microbial and chemical composition of batch lots of 'dry' and 'liquid' poultry manure during decomposition were related to the production of offensive odors. The decomposition of uric acid by both aerobic and anaerobic uricolytic bacteria appeared to be related to the formation of significant quantities of ammonia. The number of sulfate-reducing bacteria, including Desulfovibrio species, increased during the course of decomposition of liquid poultry manure. These organisms were implicated as producers of some of the hydrogen sulfide in liquid poultry waste. There were apparent correlations between an increase in odor intensity of liquid manure with increased storage time and the concentrations of volatile organic acids, ammonia, and sulfides. (Miner-Iowa State)

0191 - A5, D3
CHEMICAL ASPECTS OF ODOR REMOVAL IN SOIL SYSTEMS,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. C. Gumerman, and D. A. Carlson.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 292-302. 6 fig, 1 tab, 7 ref.

Descriptors: *Farm wastes, *Odor, *Hydrogen sulfide, Soil moisture, Waste water treatment.
Identifiers: *Soil filter, *Removal mechanism, Detention time, Reaction temperature.

On the basis of the data presented, it was found possible to postulate mechanisms which describe the removal of hydrogen sulfide species on soil in both wet and dry conditions. Removal of high concentrations of hydrogen sulfide from moving air streams is performed much more efficiently by dry soil than wet. Inter-related parameters which influence the removal of hydrogen sulfide by dry sterile soil are detention time, reaction temperature, amount of hydrogen sulfide entering, concentration of hydrogen sulfide, and the total flow rate. A method of design optimization is presented which determines for a given concentration and influent gas temperature, the total flow rate at which the maximum removal of hydrogen sulfide per unit time results. It is felt this design optimization method should be restricted to air streams containing only hydrogen sulfide, until further research delineates the removal mechanism for other odorous gases. (White-Iowa State)

0192 - A5, A6, D2
POULTRY HOUSE DUST, ODOR AND THEIR MECHANICAL REMOVAL,
Harry J. Eby, and G. B. Willson.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 303-309. 1 tab, 5 fig, 6 ref.

Descriptors: *Farm wastes, *Poultry, *Odor, *Dusts, Filters, Waste treatment.
Identifiers: Foam pad filters, Clogging.

Tests of plastic foam pad filters as a method of trapping the odor carrying dusts from a poultry house exhaust fan air stream have shown that foam pads of 10 to 40 pores per square inch are effective. However, the tests show that such pads become clogged with dust in about 6 to 9 hours of operation. Vacuum cleaning and water washing methods of cleaning for continued use were ineffective and the high initial cost of the foam filter material were deemed to make this method impractical. Tests of a device in which the exhaust air is deflected tangentially across a 1/2 inch mesh screen showed that such methods would remove at least a portion of the odor carrying dust. These were also deemed impractical in that the filter ability would appear to be a direct function of the relative humidity and as such would be the least efficient when low relative humidity within the poultry house would make the dust problem the greatest. Other methods of possible filtering techniques were discussed. (White-Iowa State)

0193 - A3, C2, C3, C4, D4
CHARACTERISTICS OF AQUEOUS SOLUTIONS OF CATTLE MANURE,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
John C. Ward, and E. M. Jex.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 310-326. 5 fig, 4 tab, 25 ref.

Descriptors: *Farm wastes, *Cattle, *Aqueous solutions, Biochemical oxygen demand, Dissolved solids, Hydrogen ion concentration, Foaming, Oxidation-reduction potential, Coagulation, Waste water treatment.
Identifiers: *Volatile solids, *Colloidal properties, Activation energy.

The primary objective was to investigate the aqueous characteristics (biochemical oxygen demand, conductivity, pH, oxidation-reduction potential, coagulation and colloidal properties, dissolved solids, volatile solids, and foaming) of solutions of cattle manure containing the combined urine and feces present in samples from cattle feedlots. This information could then be used in the design of facilities for treating runoff from cattle feedlots. It was assumed that treatment of this runoff would probably be by means of lagoons used to capture the runoff, and that these lagoons would be artificially aerated. In this type of aerobic treatment, the biochemical oxygen demand is satisfied in much the same way as in a stream. Formulas were developed and explained and 25 references were utilized. (White-Iowa State)

0194 - C4
TYPICAL VARIATIONS ENCOUNTERED IN THE MEASUREMENT OF OXYGEN DEMAND OF ANIMAL WASTES,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. Paul Taiganides, and Richard K. White.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 327-335. 2 tab, 7 fig, 9 ref.

Descriptors: *Farm wastes, *Biochemical oxygen demand, *Oxygen demand, Temperature, Hogs, Cattle, Poultry, Sheep, Pollutant identification, Waste water treatment.
Identifiers: *Warburg, *Sewage Seeding, *BOD oxygen probe, Dilution effects.

Tables and figures were presented to emphasize the inherent variability in the parameters used in measuring oxygen demand. Reliable values of oxygen demand are essential because they are used as design parameters in waste treatment plants. Past and present experiments are being done with large numbers of replicates for each experiment to determine a reliable range of values for the various oxygen demand parameters of animal wastes. BOD was expressed in milligrams of oxygen required per gram of total solid matter (mg O_2/g TS) since values reported in ppm or mg/l are useless because of the large variability in solid content of the waste and the high dilutions needed for the BOD test. Three methods of determining the BOD of animal waste were tested. These were the standard test, the BOD oxygen probe and Warburg. Effects of temperature and seeding with sewage were also explored. (White-Iowa State)

0195 - C5, D4
ROLE OF EXCRETED ANTIBIOTIC IN MODIFYING MICROBIAL DECOMPOSITION OF FEEDLOT WASTE

Colorado State Univ., Fort Collins. Dept. of Microbiology.
S. M. Morrison, D. W. Grant, Sister M. P. Nevins, and Keith Elmund.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 336-339. 1 tab, 2 ref.

Descriptors: *Farm wastes, *Antibiotics, Cultures, Cattle, Confinement pens, Biodegradation, Pesticide residues, Assay, Water pollution sources.
Identifiers: *Chlortetracycline, *Biological stabilization, Feedlot, Manure decomposition, Microbial decomposition, In situ manure.

The results presented in this paper are derived from studies on the process of biological stabilization of feedlot manure and the acceleration of the stabilization process. It is a specific study on some microbial inhibitions which may be playing a role in the biodegradation of feedlot waste. Samples of manure were taken from pasture, in situ manure from feedlot pens, and stockpiled manure from a feedlot. Cultures of the filter-sterilized manure extract gave rather conclusive evidence that the substance causing growth inhibition in the extracts was chlortetracycline residue in the excreted manure. It was calculated that 75% of the ingested antibiotic was excreted in the feces. Temperature tests indicate that during the winter months biodegradation of manure is not only inhibited by cold temperatures but also by the persistence of the antibiotic residue and the continuous deposition of antibiotic containing fresh manure. (White-Iowa State)

0196 - C3, E3

THE INFLUENCE OF VARIOUS FACTORS ON POULTRY LITTER COMPOSITION,
Pennsylvania State Univ., University Park. Dept. of Animal Science.
F. F. El-Sabban, T. A. Long, R. F. Gentry, and D. E. H. Frear.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, 1969, p 340-346. 4 tab, 18 ref.

Descriptors: *Farm wastes, *Poultry, Nitrogen, Carbohydrates, Insulation, Ventilation, Mineralogy, Moisture, Correlation analysis, Nutrients, Waste water treatment.
Identifiers: *Litter composition, *Nutritive value, Dry matter, Crude protein, True protein, Ether extract, Crude fiber.

A study was conducted to determine the chemical composition of poultry waste (litter and manure), relevant to its possible utilization as a source of nutrients. Litter samples were obtained from 33 broiler houses and 22 laying houses. Fresh manure was secured from 5 houses having layers in cages. The dry matter content was determined and samples were analyzed for crude protein, true protein, crude fiber, ether extract, and total ash. In addition, twelve mineral elements were determined. Poultry litter was found to contain considerable amounts of nutrients, particularly nitrogen and carbohydrates. Various factors such as bird type, bird density, kind of litter base material, litter depth, and poultry house conditions (ventilation, insulation, and house temperature) were all found to affect the proximate components of poultry litter. If poultry waste is to be utilized for its nutritive value for plants or animals, it is recommended that each batch be chemically analyzed before use. Although a limited number of samples was available, variation in composition was sufficient to warrant their individual analysis. (White-Iowa State)

0197 - D2

REMOVAL OF WATER FROM ANIMAL MANURES,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 347-362, 1969. 8 fig, 2 tab, 12 ref.

Descriptors: *Farm wastes, *Poultry, *Moisture content, Odor, Weight, Volume, Humidity, Waste water treatment.
Identifiers: *Equilibrium moisture content, *Relative humidity, Handling characteristics, Volatile solids, Drying times, Thermal removal.

The removal of water from animal manures changes the handling characteristics of the manure, reduces the weight and volume to be handled, and reduces the offensive odor of the manure. Water can be removed from manure by mechanical, thermal, and absorptive means. Mechanical methods such as direct pressing present the difficulty of the removed water containing considerable volatile solids. Thermal removal was investigated from the standpoint of utilizing a thin layer, unheated air, and very low or 'static' air velocity. The equilibrium moisture content of chicken manure is comparable with other agricultural hygroscopic materials. Equilibrium moisture content values are presented for temperatures 70, 90, 110F. Drying times for chicken manure under these conditions is in terms of days. Drying times are greatly influenced by sample variation. Effects of humidity on drying time are significant but sample variation has an effect similar to a plus or minus 15% relative humidity change. Moisture loss from a 'deep' layer of manure is less than that from a free water surface. (White-Iowa State)

0198 - F4

LIVESTOCK PRODUCTION VS. ENVIRONMENTAL QUALITY - AN IMPASSE,
Economic Research Service, Washington, D.C. Natural Resource Economics Div.
Joseph P. Biniek.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 363-368, 1969. 14 ref.

Descriptors: *Farm wastes, *Economic efficiency, Water Quality Act, Air pollution, Odors, Water pollution control.
Identifiers: *Livestock production, *Production efficiency, *Environmental quality, Quality standards, Public conern, Economic development.

The possibilities of merging the two objectives of production efficiency and environmental quality are explored. To establish a basis for merging the two objectives, the author discusses environmental quality, quality standards, and public concern. Secondly he reviews the changing concepts of economic efficiency and illustrates these changes by discussing four stages of economic development. The discussion is concluded with a section devoted to the merging of the two objectives, environmental quality and production efficiency. An impasses can be averted, but it will require new modes of thought, and constructive responses to new situations. (White-Iowa State)

0199 - A1, B1, D2, D4, F1

RELATIVE ECONOMICS OF ANIMAL WASTE DISPOSAL BY SELECTED WET AND DRY TECHNIQUES,
Resource Engineering Associates, Inc., Stamford, Conn.
Robert W. Okey, Robert N. Rickles, and Robert B. Taylor.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 369-387, 1969. 5 fig, 17 tab, 11 ref.

Descriptors: *Farm wastes, *Cattle, *Cost analysis, Effluent, Biochemical oxygen demand, Chemical oxygen demand, Odor, Aeration, Nitrogen, Denitrification, Ultimate disposal, Incineration, Waste water treatment.
Identifiers: Wet systems, Dry systems, Effluent standards, Clarifier systems, Biological conversion, Solids conditioning system, Scrubbing system, Ancillary system.

The report presents the basic elements required for the design of two waste treatment facilities to handle the wastes from feedlots carrying 500, 1000, 5,000, 10,000, and 25,000 animals. The plants were designed to meet specified liquid and gaseous effluent standards. The standards selected are believed to be consistent with present and projected effluent requirements. It should be noted that some water courses may not be able to assimilate effluents of the quality discussed here. The two systems designed and costed in this work employed on one hand more or less conventional liquid waste treatment procedures; the other employed incineration and treated the undiluted animal waste as delivered as a solid waste, i.e., sludge. The capital and operational cost of these systems were computed and related to the number of animals and the gain anticipated in the feedlot. A waste treatment cost in terms of animal-years and per pound was then obtained. Five conclusions were reached as a result of the study, among them, that wet systems are more expensive to own and operate than systems designed to handle solids. (White-Iowa State)

0200 - E2, E3, F1

THE ECONOMICS OF POULTRY MANURE DISPOSAL,
New York State Coll. of Agriculture, Ithaca.
R. E. Linton.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 388-392, 1969.

Descriptors: *Farm wastes, *Poultry, *Economics, *Land use, Fertilizers, Nitrogen, Phosphorus, Potash, New York, Disposal, Waste water treatment.
Identifiers: *Land disposal, *Cost calculations, *Waste management, Transportation costs, Catskill resort industry.

This study was initiated in response to the general problem of conflicts over rural land use, particularly those involving farm operations. More specifically and as a notable example, the study dealt with the problems of conflict between poultry and other land uses. The problem of land use conflict related to waste management was approached through the aspect of recognizing the internal costs to farmers of some of the alternatives in waste management. As a result of the study one particular pattern of manure disposal seemed to justify serious consideration and was singled out for discussion and cost calculations. This pattern included some means of land spreading as a practical and acceptable disposal method. Comments were made about the value of poultry manure in replacing commercial fertilizer, and this value is discussed as a means of at least partial disposal cost recovery. (White-Iowa State)

0201 - E2, F1

ECONOMIC RETURN FROM VARIOUS LAND DISPOSAL SYSTEMS FOR DAIRY CATTLE MANURE,
Cornell Univ., Ithaca, N.Y.
L. W. McEachron, P. J. Zwerman, C. D. Kearl, and R. B. Musgrave.
Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 393-400, 1969. 11 tab, 13 ref.

Descriptors: *Farm wastes, *Fertilizers, *Rotations, Cattle, Economics, Soil types, Disposal, Waste water treatment.
Identifiers: *Dairy cattle, Land disposal, Continuous corn, Lima silt loam, Manure hauling and spreading, Total digestible nutrients.

Census of Agriculture data are presented to indicate that dairy cattle manure could well be disposed of on the land. Farm cost accounting data are presented to indicate that cost per ton of hauling and spreading averaged $1.92 for farms with free stalls and about 140 cows to $3.18 for those with stanchions and 65 cows. Percent yield increase on crops grown per ton of manure applied range from .4% for oats to 6.6% for alfalfa. These percent yield increases were generalized without regard to mineral fertilization and applied to Warren's (1968) yield data for the state of New York at various farming levels. Without a charge for hauling and spreading dairy cattle manure crop yield returns ranged from $1.42 per tone to a deficit of $0.26. (White-Iowa State)

0202 - A5, B2, F1

ECONOMIC EVALUATION OF LIQUID MANURE SYSTEMS FOR FREE STALL DAIRY BARNS,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics.
George L. Casler.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 401-406, 1969. 3 tab.

Descriptors: *Farm wastes, *Economics, *Value, Cattle, Costs, Odor, Fertilizer, New York, Waste water treatment.
Identifiers: *Liquid manure system, *Labor distribution, *Labor requirements, Dairy cattle, Free stall barns.

The purpose was to evaluate liquid manure systems in free-stall dairy barns primarily from an economic viewpoint. If a liquid manure system is to be justified, such justification will have to be based on other advantages in addition to increased manure value and reduced labor requirement. The primary other advantage is the possibility of not hauling manure at periods of peak labor demand for planting and harvesting crops. However, to actually reap the benefits of improved labor distribution, a dairyman needs a reasonably long storage period and must very carefully plan his cleaning schedule. In addition, the very unpleasant odor created at the time the storage tank is emptied precludes the use of a liquid manure system in areas where neighbors would object to this odor. It appears to the author that the air pollution or odor problem is much more serious with a liquid manure system than with daily apreading. (White-Iowa State)

0203 - F2, F3

WHO SHOULD REGULATE POULTRY CONFLICT PROBLEMS,

Cornell University, Ithaca, N.Y. Coll. of Agriculture.
David J. Allee, and Pierre Clavel.
In: Animal Waste Management, Proceedings Cornell University Conference on Agricultural Waste Management, p 407-414, 1969. 5 ref.

Descriptors: *Farm wastes, *Poultry, *Technology, Local governments, State government, Odor, Communication, Waste water treatment.
Identifiers: *Regulatory mechanisms, Industry committee, Political resources, Waste management technology, Conflict, Resolution of problems.

Economic and social theory applicable to conflict situations, such as those that arise downstream or downwind from poultry houses, has some ability to indicate directions for administered solutions to these problems. Based upon such theory, related research and a case study of a number of ways in which rural communities have dealt with situations of stress between components of the community, the outlook for regulatory devices is appraised. An informal voluntary industry committee approach is found to be as effective in bringing together necessary technical expertise and social regulatory mechanisms as any other approach which the limited resources of many rural communities can support. It is suggested that because of a shortage of administrative and political resources many rural areas will resist effective resolution of conflict problems due to agricultural wastes until finally controls will be imposed by essentially urban oriented units of government. (White-Iowa State)

0204 - F4

POULTRY POLLUTION: PROBLEMS AND SOLUTIONS.

Michigan Agricultural Experiment Station, East Lansing.

Research Report 117, Farm Science, July 1970. 55 pages.

Descriptors: *Farm wastes, *Poultry, *Dehydration, Eggs, Nitrogen, Diets, Feeds, Odor, Water pollution, Air pollution, Soil contamination, Disease, Insects, Standards, Land use, Septic tanks, Sludge disposal, Digestion, Ventilation, Rates of application, Corn, Nitrate, Chemical properties, Drying, Moisture content, Nutrients, Taste.
Identifiers: Environmental quality, Indoor lagoons, Laying hens, Feed conversion, Egg production, Dehydrated poultry waste, Feed efficiency.

The report contains eleven articles with an introduction and a table compilation of properties of poultry waste that were analyzed. Reports on indoor septic handling of poultry manure and effect of application rate of chicken manure on corn yields are presented. A large part of the report deals with drying and feeding poultry manure to laying hens. Results of feeding dehydrated poultry waste to laying hens and its effect on egg production, feed conversion, body weight, egg weight, shell thickness, Haugh score, egg taste, and quality changes during storage are presented. Acceptability and digestibility of poultry and dairy wastes by sheep is also reported. Bacteriological procedures and current research being carried out at Michigan State University conclude the report. (White-Iowa State)

0205 - F4

INTRODUCTION,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
H. C. Zindel, and C. J. Flegal.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, July 1970, p 4-7.

Descriptors: *Farm wastes, *Poultry, Odor, Water pollution, Air pollution, Soil contamination, Technology, Nitrates, Nitrites, Disease, Insects, Treatment, Disposal, Standards, Land use.
Identifiers: *Environmental quality, *Confinement production, Animal management, Facility design.

The introductory remarks explain that agriculture-related pollution is but one part of a large national problem; so it must be considered together with municipal, industrial, marine and all other types of pollution in developing an integrated plan for improving the quality of our environment. The volume of livestock wastes produced is a function of the degree concentration and the size of individual production units. Animal wastes are of concern in water, air, and soil pollution. Examples of the increasing numbers of livestock and poultry being produced are given. New and improved technology is needed to handle the wastes from these animals. Problems discussed concerning pollution are: disease, odor, soil contamination, and insects. Four areas of emphasis are given that encompass the elements of a program for controlling animal wastes. (See also W71-03555) (White-Iowa State)

0206 - A5, B2, D4

POULTRY MANURE HANDLING BY INDOOR SEPTIC TANKS (SO-CALLED 'INDOOR LAGOONS'),

Michigan State Univ., East Lansing. Dept. of Poultry Science.
J. A. Davidson, and C. J. Mackson.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, July 1970, p 8-9.

Descriptors: *Farm wastes, *Poultry, *Septic tanks, *Sludge, Sludge disposal, Digestion, Odor, Ventilation.
Identifiers: *Indoor lagoons, Laying hens, Compressed air agitation, Paddle wheel agitation, Floor space.

The report details the use of shallow water filled tanks for the disposal of poultry manure. The experiment was carried on for 5 years, during which time several variations were used. The original experiment consisted of a tank 10' x 24' x 2' deep in a pen 20' x 24'. The tank was filled with 18" of water and all droppings were caught in the tank. The second year, compressed air was used to agitate the material. Approximately 9 inches of sludge was cleaned out after 11 months of operation. Flies were no problem. Successive experiments used different amounts and methods of agitation. Each year the sludge accumulation was cleaned out with a septic tank service truck. Indoor septic tanks (indoor lagoons) covering 1/2 the floor space can handle the droppings from 300 laying hens for at least 11 months. This means one annual cleaning. This method could be used in cage operations. (White-Iowa State)

0207 - E3

THE EFFECT OF APPLICATION RATE OF CHICKEN MANURE ON THE YIELD OF CORN,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
L. S. Robertson, and John Wolford.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, July 1970, p 10-15. 4 tab.

Descriptors: *Farm wastes, *Poultry, *Chemical properties, *Rates of application, Hydrogen ion concentration, Phosphorus, Potassium, Soil tests, Corn, Crop production, Michigan, Nitrate, Magnesium, Carbon.
Identifiers: *Plant food content, Huron County Michigan.

The report begins by giving an indication of the magnitude of the poultry manure problem in Michigan. Tables showing the chemical characteristics and plant food content of chicken manure are presented. The effect of high rates of manure application upon soil test results are shown. The application of 46.4 tons/acre of manure significantly increased the levels of phosphorus, potassium, magnesium, nitrate, and percent of carbon in the soil. At the same time, the pH level was reduced from 7.7 to 7.1. An experiment involving different rates of poultry manure application, one fertilizer application, and no treatment was used to determine the effect of chicken manure on corn grain yield. The use of commercial fertilizer did not increase corn yields. Previous field management made this result expected. The use of several rates of manure has not greatly affected the yields. The use of 46.4 tons/acre tended to decrease corn yields slightly. It is not known at the present time whether this apparent depression is real. The data suggest that a tremendous iuantity of chicken manure can be incorporated into the soil without any opportunity for damage to a corn crop. (White-Iowa State)

0208 - D2

DRYING ANIMAL WASTE,

Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
T.C. Surbrook, J. S. Boyd, and H. C. Zindel.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, East Lansing. July 1970, p 16-20. 5 tab, 1 fig.

Descriptors: *Farm wastes, *Poultry, *Cattle, *Hogs, *Drying, Moisture content, Nutrients, Bulk density, Costs, Screens, Electric power.
Identifiers: *Dryer operation, Hammermill, Drying chamber, Fuel consumption.

The report gives details and test results from a machine used for drying animal waste. Production figures for the drier while processing different kinds of animal excreta are given. Details of the drier operation are described. Initial moisture contents ranged from 72 to 82 percent. The machine incorporates inclined shaking surfaces and screens, a hammermill and temperatures from 200 to 1100F. The drier successfully processed dairy, beef, swine and poultry excreta. Costs to produce one ton of the dried product are given. A table gives projected numbers of animals which the machine might serve. Density and nutrient levels of the dried excreta are listed. Odors were less intense than that of fresh excreta. (White-Iowa State)

0209 - E3

THE UTILIZATION OF POULTRY WASTE AS A FEEDSTUFF FOR GROWING CHICKS,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. J. Flegal, and H. C. Zindel.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, July 1970, p 21-28. 5 tab, 21 ref.

Descriptors: *Farm wastes, *Poultry, *Dehydration, Amino acids, Analysis, Chemical properties, Diets, Nutrients, Bacteria, Feeds, Efficiencies, Weight, Mortality.
Identifiers: *Feed composition, Dehydrated poultry waste, Significance, Feed efficiency.

Two experiments were conducted to determine the nutritional value of dehydrated poultry waste (DPW) for growing chicks from 1 to 28 days of age. The four-week mean body weight of Leghorn-type chicks was not influenced when up to 20 percent of the diet consisted of the DPW. Diets which contained levels of 10 and 20 percent DPW, when fed to broiler-type chicks, resulted in a reduction in four-week mean body weight; 5 percent DPW had no influence on the four-week mean body weight. Food efficiency was inversely related to the level of DPW in the diet; i.e., the higher the level of DPW, the poorer the feed efficiency. However, in the trial in which broiler-type chicks were used, added fat placed in the diet which contained 20 percent DPW improved weight gain and feed efficiency. It is suggested that the DPW used in these trials was a low energy product. (White-Iowa State)

0210 - E3

THE RESULT OF FEEDING DRIED POULTRY WASTE TO LAYING HENS ON EGG PRODUCTION AND FEED CONVERSION,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. J. Flegal, and H. C. Zindel.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, July 1970, p 29-30. 2 tab.

Descriptors: *Farm wastes, *Poultry, Eggs, Feeds, Diets, Corn, Lipids, Calcium, Phosphorus.
Identifiers: *Egg production, *Feed conversion, Dried poultry waste, White Leghorn layers.

Four replicates of eight birds each were fed one of thirteen possible diets which were presented in tabular form. The 416 White Leghorn type layers were on test for 139 consecutive days. Each hen was confined in an individual cage having a floor area of 8 x 16 inches. The percent egg production on a hen housed basis and kilos of feed per dozen eggs produced are also presented in tabular form. These data are presently being statistically analyzed to determine the differences, if any, between the various treatments. It appears that hens receiving control rations containing 10, 20, and 30 percent dried poultry waste have respectively lower production and higher feed requirements per dozen eggs. (White-Iowa State)

0211 - E3

THE EFFECT OF FEEDING DEHYDRATED POULTRY WASTE ON PRODUCTION, FEED EFFICIENCY, BODY WEIGHT, EGG WEIGHT, SHELL THICKNESS AND HAUGH SCORE,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. J. Flegal, and H. C. Zindel.
In: Research Report 117, Farm Science, MSU Agricultural Experimental Station, July 1970, p 31-33. 3 tab.

Descriptors: *Farm wastes, *Poultry, *Dehydration, *Diets, Feeds, Eggs, Lipids, Efficiencies, Performance, Weight, Protein, Nitrogen.
Identifiers: *Production, *Feed efficiency, Body weight, Egg weight, Shell thickness, Haugh score, Significant difference.

In this egg production experiment, one replicate of 18 twenty-six-week-old Leghorn type pullets was placed on each of five different rations. The rations varied from 0% to 40% dehydrated poultry waste (DPW) plus fat. The production trial was conducted for 366 days with the birds in individual cages on a 15-hour-per-day light schedule. Protein-nitrogen supplied in each of the rations was calculated to be equal. The highest percent egg production resulted in those birds which received 10% DPW in the ration. Although production varied from 61.62% to 53.16% production, there was no significant difference in hen housed production. Feed efficiency again was inversely proportional to the amount of DPW in a ration, with the best efficiency having 0% DPW in the ration. However, an addition of animal fat to the ration resulted in a slight improvement in feed efficiency. It is also interesting to note that those birds which received more than 10% DPW in their diet did not increase in body weight comparable to the control ration. The egg weight became smaller as the percent of DPW was increased in the diet. These differences were not significantly different. Although there were slight differences in shell thickness, again there were no significant differences due to the diet in any of these rations. All of the experimental rations had a significantly higher Haugh score than the control diet. The Haugh scores ranged from 67.7 to 76.8. (White-Iowa State)

0212 - E3

THE EFFECT OF FEEDING DEHYDRATED POULTRY WASTE TO LAYING HENS ON THE TASTE OF THE RESULTING EGGS,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. J. Flegal, H. C. Goan, and H. C. Zindel.
In: Research Report 117, Farm Service, MSU Agricultural Experiment Station, July 1970, p 34-38. 2 tab, 9 ref.

Descriptors: *Farm wastes, *Poultry, *Dehydration, Diets, Eggs, Evaluation, Taste, Control.
Identifiers: *Dehydrated poultry waste, Taste test, Consumer Preference Panel.

Poultry feces, from caged layers, were collected and dried. The resulting product was designated as dehydrated poultry waste (DPW). DPW was fed at dietary levels of 10, 20 and 30 percent to Single Comb White Leghorns in individual wire cages. A cage-type laying diet was used as a control. The diets were fed for four months before any eggs were collected for taste panel evaluation. Eggs from each treatment group were hard-cooked and prepared for a Consumer Preference Panel. The eggs were evaluated on the basis of taste difference and then ranked for preferred taste. The dietary levels of DPW fed had no significant (pA.05) effect on the taste of eggs. Panel members were unable to detect any consistent taste difference for the DPW and control eggs. Two thirds of the time, panel members liked the taste of the DPW eggs over the taste of the control eggs. In each ranking test, panel members preferred the control eggs over the DPW eggs. (White-Iowa State)

0213 - E3

ACCEPTABILITY AND DIGESTIBILITY OF POULTRY AND DAIRY-WASTES BY SHEEP,
Michigan State Univ., East Lansing.
J. W. Thomas.
In: Research Report 117, Farm Science, MSU Agricultural Experiment Station, July 1970, p 42-44. 2 tab.

Descriptors: *Farm wastes, *Poultry, *Sheep, *Cattle, Protein, Nitrogen, Animal metabolism, Digestion, Cellulose, Lignins, Fiber, Diets.
Identifiers: Total digestible nutrients, Dry matter, Digestibility, Soybean meal, Nutritive value.

Dried poultry and dairy wastes as about one third the total mixed ration were readily accepted by sheep. The complete ration was about 60% digestible with a TDN value of about 56. The digestibility of the poultry feces was more than that of the dairy feces. Protein of these wastes was less digestible than that of soybean meal but had a biological value equal to that of soybean meal for growing sheep. (White-Iowa State)

0214 - F4

RELATIONSHIP OF AGRICULTURE TO SOIL AND WATER POLLUTION.
Cornell Univ., Ithaca, N.Y.

Proceedings, Cornell University Conference on Agricultural Waste Management, January 19-21, 1970. Ithaca, 1970. 270 p.

Descriptors: *Soils, *Farm wastes, *Fertilizers, Groundwater, Precipitation, Potassium, Poultry, Cattle, Hogs, Nitrogen, Nitrate, Phosphorus, Phosphates, Rates of application, Nutrients, Effluent, Aquifer, Ammonia, Soil contamination, Water pollution, Water table, Oxidation lagoon, Irrigation, Aeration, Biochemical oxygen demand, Chemical oxygen demand, Odor, Biological treatment, Costs, Denitrification, Nitrification, Sludge, Storage, Nutrient requirements, Florida, Nebraska, Surface runoff, Infiltration.
Identifiers: *Feedlots, Oxidation ditch, Slotted floors, Aerator, Spreading, Land disposal.

The 1970 Conference attempted to bring knowledgeable individuals from many disciplines together to discuss various aspects of the problem. It was designed to serve as a mechanism for transmitting new research findings to those interested in this area and to demonstrate that agriculture is aware of its potential contributions to environmental pollution as well as its responsibility to society to find methods of alleviating such pollution while increasing the efficiency of production. The Conference played a useful role in providing communication across disciplines. Thirty-two papers are published in the proceedings dealing with all areas of agricultural pollution. (White-Iowa State)

0215 - B3, E2
MOVEMENTS OF NUTRIENTS FROM POULTRY MANURE IN SOIL,
Rutgers University.
J. E. Steckel.
Relationship of Agriculture to Soil and Water

Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, 1970, p. 30.
Descriptors: *Farm wastes, *poultry, soils, soil water, lysimeters, depth, precipitation, potassium, calcium, magnesium, sodium, nitrate, chlorine, sulfates, phosphates, rates of application.
Identifiers: *Plow-furrow-cover

Poultry manure was Plow-Furrow-Cover (PFC) applied at depths of 6 to 7 inches into Freehold sandy loam (20% clay in the B horizon) on June 6 1968. The application rates were 0, 15, 30 and 40 tons of water-free equivalent per acre. Soil water samples were taken with suction lysimeters of depths of 12, 18, 24, 36, and 48 inches. Chemical analysis of the water has included determinations of the contents of K, Ca, Mg, Na, NH_4-N, NO_3-N, NO_2-N, Cl, SO_4 and PO_4. Analytical data was presented from samplings of October 4, 1969 (391 days and 50 inches of rain after PFC). The October 14 sampling indicated increased element concentrations were again increased, even at the 48-inch depth. Data were presented on the amount of elements dissolved in the soil water for each of the 5 depths studied, and for the total in the 9 to 48-inch soil depth. (White-Iowa State)

0216 - A4, A9, C3

GROUNDWATER QUALITY AND FLUCTUATIONS IN A SHALLOW UNCONFINED AQUIFER UNDER A LEVEL FEEDLOT,
Department of Agriculture, Lincoln, Nebr.
L. N. Mielke, J. R. Ellis, N. P. Swanson, J. C. Lorimor, and T. M. McCalla.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 31-40. 2 tab, 4 fig, 13 ref.

Descriptors: *Farm wastes, *Cattle, *Groundwater, *Nitrate, Aquifer, Discharge, Aquifer characteristics, Effluent stream, Groundwater recharge, Transmissivity, Water level fluctuations, Ammonia, Nebraska, Soil contamination, Observation wells, Water table, Infiltration.
Identifiers: *Feedlot, Platte River Valley.

The quality was investigated of the groundwater in the proximity of a level feedlot on a permeable soil with fluctuating high water table. At the feedlot site, the aquifer consists of 30-35 feet of high quality gravel having a coefficient of transmissibility in the range of 90,000-120,000 gallons per day per foot. Aquifer recharge occurs as a result of direct precipitation and interflow from the valley uplands. Six observation wells were installed in the vicinity of the feedlot as well as six water level measuring wells. Two recording wells, constructed of 4-inch diameter aluminum irrigation pipe, were jetted into the gravel aquifer. The water table depth at the feedlot varies with the season. Groundwater level changes reflect major rainstorms within hours after the event. The maximum groundwater elevation under the feedlot was approximately 2 feet below the soil surface. Soil cores were taken to determine the quantity of nitrate which could move into the water table. Low levels of nitrate were found below the first foot. Ammonia was present in only moderate amounts below 3 feet (A30ppm) and rapidly decreased in concentration with increased depth to the water table. Analysis of the core samples indicated that downward movement of nitrates and other forms of nitrogen in the soil was minor. The 12-15 inches of manure pack decreased the actual penetration depth of the nitrogen into the profile. Some samples exhibited levels of nitrate that exceeded Public Health standards (10ppm). This may have been due to the application of anhydrous ammonia prior to the first irrigation. Generally, the nitrate analysis showed relatively low nitrate level in the profile.
(White-Iowa State)

0217 - A3, A4, A9, E2

POLLUTION FACTORS ASSOCIATED WITH EXCESSIVE POULTRY LITTER (MANURE) APPLICATION IN ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
Leslie H. Hileman.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 41-47. 9 tab, 1 fig, 5 ref.

Descriptors: *Farm wastes, *Poultry, Water pollution, Soil contamination, Rates of application, Soil tests, Phosphorus, Potassium magnesium, Salts, Ions, Nitrates.
Identifiers: *Poultry litter, Mono-valent ions, Di-valent ions.

There is an estimated one million tons of poultry manure or manure plus litter produced from 390.. million chickens and turkeys grown in Arkansas annually. The waste manure-litter is being returned to the soil often at rates exceeding 10 tons per acre annually. The data presented indicates that soil pollution and related problems may occur. These problems can be considered as: (1) excess soluble salt, (2) chemical imbalance with particular reference to K and the mono-valent to di-valent ratio, (3) excessive nitrate production and accumulation to toxic levels in forage and farm water supplies, and (4) forages deficient in magnesium for adequate animal nutrition. Further studies are needed to understand the mechanisms by which these conditions are carried out in the soil medium so that effective measures can be taken to prevent soil and water pollution. (White-Iowa State)

0218 - A2, D4

REDUCING THE POLLUTION POTENTIAL OF LIVESTOCK WASTES WITH IN-THE-BUILDING OXIDATION DITCHES,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
D. L. Day.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970. Ithaca, 1970, p 77-84. 11 fig, 3 ref.

Descriptors: *Farm wastes, Oxidation lagoon, Irrigation, Aeration, Biochemical oxygen demand, Odor, Aerobic treatment, Labor, Rotors, Denitrification, Coagulation, Effluent.
Identifiers: *Oxidation ditch, *Slotted floors, Aerator, Clarifier.

A low-odor, low-labor, system of managing livestock wastes from animal to field is discussed. The system consists of (1) a confinement building for livestock, with self-cleaning, slotted floors; (2) an oxidation ditch beneath the slotted floors; (3) a nonoverflow of mixed liquor from the oxidation ditch; and (4) irrigating equipment for removing surplus liquids and solids from the lagoon and distributing them on nearby land when convenient for the operator. This system greatly improves the quality of the waste water, but without further treatment the waste water would probably not meet quality criteria for the receiving water. Thus the main advantages of the system are: low labor, low odor, low stream-pollution potential, and operator convenience. (White-Iowa State)

0219 - B2, D4, F1

THE CONCEPTUAL DESIGN OF AN ECONOMICALLY FEASIBLE ANIMAL WASTE DISPOSAL SCHEME,
Resource Engineering Associates, Wilton, Conn.
R. W. Okey, and R. N. Rickles.
In: Relationship of Agriculture To Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 85-97. 11 tab, 4 fig, 11 ref.

Descriptors: *Farm wastes, *Cattle, *Biological treatment, Treatment facilities, Capital costs, Operating costs, Installation costs, Sludge, Centrifugation, Denitrification, Phosphorus, Nitrogen, Incineration, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Feedlot, Population equivalent, Waste management, Clarifier, Transport system.

Based on earlier work, a complete system for the capture, transport and treatment of the wastes from a 25,000 animal lot was presented. System capital costs are seen to be about $1.00 - $2.00/ton, and operating costs are around $3.00 - $4.00 per ton of wet waste. These costs result in a cost/lb gained of less than half a cent to about a cent. The costs for the least expensive system are an order of magnitude below feed costs. The installation costs are in the order of $15.00 to $40.00/animal or less than the capital cost as the least expensive confinement scheme. Economic feasibility is a combination of many things. One of the most important is the relevance of a particular item when all the costs are considered. The costs of waste treatment at feedlots would appear to represent roughly the same fraction of the total costs as seen in other industries. (White-Iowa State)

0220 - B2, F1

THE ECONOMICS OF STORING, HANDLING AND SPREADING OF LIQUID HOG MANURE FOR CONFINED FEEDER HOG ENTERPRISES,
M. F. McKenna, and J. H. Clark.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 98-110. 12 tab.

Descriptors: *Farm wastes, *Hogs, *Storage capacity, Chemical analysis, Fertilizers, Storage tanks, Value, Soil contamination, Nitrogen, Phosphorus, Potassium, Nutrient requirements, Linear programming.
Identifiers: *Spreading, Seasonal application, Disposal costs.

The main hypothesis made at the outset of the study, that the economically optimal storage capacity would be affected by the density of hogs per acre and the crops under cultivation on the farm was supported. Of these two factors it was found that the ratio of hogs per acre was the more significant. For a spreading operation with the relatively high fixed costs associated with spreading, farms with smaller herd sizes were seen to encounter significantly higher spreading costs per hog than farms with larger herds. In some cases the extent of these costs will be sufficient to cancel out the positive value of the manure as a replacement for commercial fertilizer. It would therefore appear that significant savings might be realized if hog operators were to enter rental or custom arrangements for manure spreading. The overall conclusion reached in the study was that for Ontario conditions a land utilization program for the liquid manure supply does represent an economic means of handling the animal waste management problem.
(White-Iowa State)

0221 - E3

LAND DISPOSAL OF DAIRY FARM WASTE,
Florida Univ., Gainesville. Dept of Agricultural Engineering.
A. R. Overman, C. C. Hortenstine, and J. M. Wing.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 123-126. 3 fig, 2 ref.

Descriptors: *Farm wastes, *Cattle, Dairy industry,

Effluent, Nitrogen, Phosphates, Soil contamination, Groundwater, Water pollution, Florida, Sprinkler irrigation, Rates of application, Nitrate, Oats, Waste disposal.
Identifiers: *Dairy cattle, Land disposal.

Wastes from 160 cows in a new milking barn at the University of Florida are collected in a 20,000-gallon holding tank and removed daily. An open impeller pump is used to deliver effluent to sprinkler guns which apply 1/4, 1/2, and 1 inch per week. The plots were seeded to oats, with no mineral fertilizer added. Measurements were taken to determine effectiveness of the oats in utilizing nutrients. Groundwater samples were extracted weekly at depths of 30,45, and 60 cm. for chemical analysis. Results are reported for nitrate and orthophosphate content. It is concluded that the soil plant system can be effective in renovation of waste water farm animal operations. Removal of nitrogen and phosphorus is greatly enhanced by plant growth. Nutrient removal was found adequate up to an application rate of 1 inch per week effluent with solids content of about 0.115 percent. It appears that a more intense application rate could be used. (White- Iowa State)

0222 - A4, C3

THE NITROGEN CYCLE OF A DAIRY FARM,
Connecticut Agricultural Experiment Station, New Haven.
C. R. Frink.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 127-133. 4 fig, 1 tab, 11 ref.

Descriptors: *Nitrogen, *Nitrogen cycle, Farm wastes, Nutrients, Fertilization, Foliar application, Corn, Silage, Efficiencies, Nitrate, Groundwater, Ureas.
Identifiers: *Nitrogen conversion, Yield, Foliar fertilization.

Analyses of nutrient cycling on dairy farms in the Northeast have shown that significant quantities of nitrogen may be lost to groundwater. Calculations of the efficiency of nitrogen conversion on these farms revealed that losses to the environment increased dramatically as farm size decreased. Milk production was not affected by the increased nitrogen imported onto the farm while yields of corn silage increased only slightly. Thus, the total nitrogen imported onto the smaller farms could apparently be reduced without seriously reducing productivity. In addition, losses to the environment during cycling of the required amounts of nitrogen can be reduced by foliar applications to the growing crop, selection of varieties with high yield and nitrogen content, increased plant populations, and more extensive use of cover crops.
(White-Iowa State)

0223 - B1, C3, E2

NITROGEN TRANSFORMATIONS AND PLANT GROWTH AS AFFECTED BY APPLYING LARGE AMOUNTS OF CATTLE FEEDLOT WASTES TO SOIL,
Southwestern Great Plains Research Center, Bushland, Tex.
A. C. Mathers, and B. A. Stewart.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 207-214. 8 fig, 2 tab, 3 ref.

Descriptors: *Farm wastes, *Cattle, *Nitrification, Denitrification, Nitrate, Nitrogen, Ammonia, Carbon dioxide, Greenhouses, Laboratories, Carbon, Rates of application, Incubation, Phosphorus, Potassium.
Identifiers: *Feedlots, *Nitrogen transformations, Pullman silty clay loam, Yield.

The objectives of these studies were: (1) to determine the decomposition rates and nitrogen transformations of animal wastes when applied to soil at various rates; and (2) to study the effects on plant growth of applying large amounts of animal wastes to soil. Studies were carried out with 0, 1, 2.5, 5, 10, and 20% rates of cattle feedlot waste added to Pullman silty clay loam in both laboratory and greenhouse tests. Three conclusions were reached: (1) When feedlot waste was mixed with soil, evolution of C and transformation of N were rapid. In 90 days, about 50% of the C was evolved as CO_2 and an equivalent amount of N was recovered as NH_3 evolved, or as NH_4.. and NO_3- in the soil. (2) Nitrification was influenced by application rate of manure and moisture content of the soil during incubation. (3) In a greenhouse study, one unit of N from ammonium nitrate was equivalent to 2.4 units of N supplied in feedlot waste.
(White-Iowa State)

0224 - A2

HYDROLOGIC STUDIES FOR EVALUATION OF THE POLLUTION POTENTIAL OF FEEDLOTS IN EASTERN NEBRASKA,
Department of Agriculture, Lincoln, Nebr.
Norris P. Swanson, Lloyd N. Mielke, and Jeffery C. Lorimor.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 226-232. 15 ref.

Descriptors: *Farm wastes, *Cattle, *Runoff, Overland flow, Surface runoff, Infiltration, Water pollution, Erosion, Evaporation, Discharge, Settling basins, Precipitation, Slopes, Storage, Time, Nebraska.
Identifiers: *Feedlots, Mulch, Water stage recorder, Manure pack, Intensity.

Four questions are discussed which arise as a result of large numbers of cattle contained in feedlots in eastern Nebraska. There were two primary objectives of the research. First, the annual water balance of the feedlots was to be defined. The second objective was to characterize the water leaving the feedlots in overland flow or by percolation through the profile. The data collected provide only rough comparison, but should serve to put the probable runoff, erosion, and infiltration, or retention of water on a feedlot into perspective with the better known hydrologic characteristics of cropped land. In eastern Nebraska, this can be summarized as follows: (1) Infiltration on an established beef feedlot appears to be restricted to water storage in the manure pack, with very limited water movement through the profile; (2) the runoff from a feedlot, and hence the pollution potential, is a function of the area of the lot; (3) annual runoff from a beef feedlot may be two or three times that of adjacent cropland, and (4) despite increased runoff in comparison adjacent cropland, the protective mulch of the manure pack keeps erosion losses below those of the cropland.
(White-Iowa State)

0225 - A3, F1

LEGAL RESTRAINTS ON AGRICULTURAL POLLUTION,
Virginia Polytechnic Inst., Blacksburg. Water Resources Research Center.
William R. Walker.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 233-241. 31 ref.

Descriptors: *Water pollution, *Farm wastes, Water Quality Act, Legislation, Discharge, Pesticides, Riparian rights, Odors, Zoning.
Identifiers: *Agricultural pollution, *Common law, State regulations, Federal regulations, Equity, Trespass, Liability, Nuisance, Negligence, Strict liability.

The basis is discussed for recovery under common law for agricultural pollution. These include actions for trespass, nuisance, negligence, and strict liability. However, agricultural pollution is not likely to be effectively controlled with private litigation. The federal government has the necessary legislation to play a leading role in agricultural water pollution abatement and it is designed to encourage the states to take a more aggressive role. Public awareness of the seriousness of the pollution problem in general is ever increasing. State laws banning the use of DDT, and HEW decisions to phase out the use of some of the persistent pesticides would indicate that public pressure for action in the field of agricultural pollution will be increasing. Thus there would seem to be little doubt that the law has a continuing and expanding role to play if agricultural pollution is to be controlled.
(White-Iowa State)

0226 - A3, C3

A BALANCE SHEET METHOD OF DETERMINING THE CONTRIBUTION OF AGRICULTURAL WASTES TO SURFACE WATER POLLUTION,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics.
David A. Schultz.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 251-262. 8 tab, 9 ref.

Descriptors: *Water quality, *Farm wastes, *Nutrients, Nitrogen, Phosphorus, Potassium, Fertilizers, Water pollution, Sediments, Pesticides, Regions, Basins, Time.
Identifiers: *Balance Sheet Method, Nutrient losses, Biologic inputs.

To the extent that the data are accurate, the paper presents a Balance Sheet Method that will show explicitly the quantity of nutrients contributed by agricultural activities to a stream. From this, one can determine the relative importance of agricultural pollution given knowledge of the total amount of nutrient pollution. Combining this information with that available on water quality and contributions from other sources, a waste management association will be able to more accurately determine the share that the agricultural industry will have to pay of the total cost of a program to maintain an abundant quantity of good quality water for all uses. Using this general method as well as modifying and improving the procedure will aid society's efforts toward effective water pollution control for all rivers and lakes in the United States.
(White-Iowa State)

0227 - C2, E2

RATES OF WATER INFILTRATION RESULTING FROM APPLICATIONS OF DAIRY MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
P. J. Zwerman, A. B. Drielsma, G. D. Jones, S. D. Klausner, and D. Ellis.
In: Relationship of Agriculture to Soil and Water Pollution; Proceedings, Cornell University Conference on Agricultural Waste Management, Rochester, January 19-21, 1970, Ithaca, 1970, p 263-270. 6 tab, 17 ref.

Descriptors: *Farm wastes, *Cattle, *Infiltration, Time, Corn, Alfalfa, Wheat, Rotations, Rainfall simulators, Rates of application, Fertilizers, Sur-

face runoff, Rainfall.
Identifiers: *Dairy cattle, Intensity, Plots, Mass infiltration.

Sixty randomly selected plot locations were subject to infiltration tests with a rainfall simulator. Three successive tests of one half hour each were applied to the same plot. These results represent the effects of fourteen years of past management on seed beds prepared for corn. The rainfall rate was two and one half inches per hour. A two-by-two factorial and a two-by-four factorial experimental design were utilized. The two-by-two comparisons involved six tons of dairy manure plowed down versus no manure on continuous corn for grain at two rates of mineral fertilization. Manure increased infiltration by 27 percent, heavy mineral fertilization without manure on the last run resulted in a 60 percent decrease in infiltration as compared to manure with moderate mineral fertilization. The two-by-four factorial study again involved six tons of manure plowed down versus no manure on four rotations: (1) continuous corn for grain, (2) corn-oats-alfalfa-alfalfa, (3) corn-corn-oats-alfalfa-alfalfa, and (4) wheat-alfalfa-alfalfa-alfalfa-alfalfa. Manure did not significantly increase rates of infiltration. All rates of fertilization were very moderate. Only rotation No. 4 gave a significant 16 percent increase in rate of infiltration.
(White-Iowa State)

0228 - A5, F3
RAISING LIVESTOCK IN THE URBAN FRINGE,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. Ronald Miner.
Agricultural Engineering, Vol 51, No 12, p 702-703, December 1970.

Descriptors: *Odor, *Pollution abatement, Farm wastes, Pollutants, Legal aspects, Livestock, Planning management.
Identifiers: Urban-fringe.

More people in this country demand more and better-quality livestock production. However, the population is extremely sensitive to water and air quality. The livestock producer should recognize that there will soon be no livestock production area where environmental pollution is acceptable. All livestock production enterprises must be planned as though they will operate in the urban fringe. Livestock production units can and do cause pollution of the air and waterways if improperly managed. The most frequent complaint leveled at urban-fringe livestock production is that of odors. Through proper design and management the livestock operations may be made acceptable to the public. (Christenbury-Iowa State)

0229 - F4
THE FARM ROLE IN WATER QUALITY MANAGEMENT,
Soil Conservation Service, Beltsville, Md.
Hollis R. Williams.
Water and Sewage Works, Vol 115, October 1968, p 463-464.

Descriptors: *Farm wastes, *Sediments, *Fertilizers, Insecticides, Herbicides, Water pollution, Watershed Protection and Flood Prevention Act, Channels, Cattle, Poultry, Pollution abatement.
Identifiers: Soil Conservation Service.

This article is based on information contained in an address by Williams to the Federal Water Quality Association. It is stated that three things find their way from farm lands into waterways to form major pollution problems. These are sediment, agricultural chemicals, and animal wastes. Sediment is the most significant of the three. Sediment also adsorbs phosphate and pesticides and carries them in streams. The major source of sediment is farmland, however, housing developments, new roads and other construction produces extremely large quantities of sediment. Four areas are mentioned which need continuing attention to control the erosion problem. The increased use of fertilizer is pointed out along its pollution capabilities. Research is currently being done to study the behavior of fertilizers, insecticides and herbicides on soils, water and plants. The problem of animal waste is also discussed. Four tools are pointed out as being necessary to achieve the goal of clean rivers and streams and successful control of pollution on farmlands as well as urban areas. (White-Iowa State)

0230 - A1, B1, D1, F4
CATTLE WASTES - POLLUTION AND POTENTIAL TREATMENT,
Kansas Univ., Lawrence. Dept. of Civil Engineering; and Kansas Univ., Lawrence. Environmental Health Engineering Lab.
Raymond C. Loehr, and Robert W. Agnew.
Journal of the Sanitary Engineering Division, ASCE, Vol 93, No SA4, p 55-72, August 1967. 2 fig, 9 tab, 29 ref.

Descriptors: *Farm wastes, *Cattle, *Water pollution sources, Rivers, Fishkill, Moisture content, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Anaerobic digestion, Oxygen demand, Lagoons, Hydrogen ion concentration, Effluent, Aeration, Sludge, Runoff, Waste water treatment.
Identifiers: *Feedlots, Cattle production, Pollution potential, Loading rages, Profit potential, Waste characteristics, Total solids, Population equivalent, Digesters, Anaerobic lagoons.

The problem of cattle feedlot waste treatment and the results illustrated in this paper can be summarized as follows: The diversified family farm is giving way to specialized large-scale factory-type operations such as beef cattle feedlots. Farm enterprises which formerly were dispersed over large remote land areas are now concentrated in small areas, frequently near communities, and intensify problems of waste disposal. Runoff from feedlots is a significant problem and treatment systems must be able to handle slug loads and flows without causing stream pollution. The profit potential and the amount of concern of the feedlot operator for adequate waste treatment will dictate the type of system that will be practical and economical. The quantity and the undesirable qualities of the wastes from a beef feedlot are such that a combination treatment system may be the most successful. A combined anaerobic-aerobic lagoon system has significant potential. The effluent from an anaerobic lagoon is potent and must receive further treatment before discharge to a receiving stream. Even after adequate removal of organics, the effluent may pose a problem because of its color and its fertilization capacity. (White-Iowa State)

0231 - C5
THE INFLUENCE OF FEED ADDITIVES ON THE BIOCHEMICAL OXYGEN DEMAND ANALYSIS FOR SWINE WASTES,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
John David Ariail.
Master of Science Thesis, 1970. 72 p, 12 fig, 44 ref. OWRR Project A-048-NC (1).

Descriptors: *Farm wastes, *Hogs, *Lagoons, *Biochemical oxygen demand, Chemical oxygen demand, Water properties, Copper, Zinc, Wastes, Lagoons, Manure, Waste water treatment, Waste identification.
Identifiers: *Swine wastes, Swine feces, Chlorotetracycline, Fecal streptococcus.

The influence of feed antibiotic, chlorotetracycline, copper and zinc concentrations and sample dilution upon the standard 5-day biochemical oxygen demand (BOD5) analysis was investigated with swine feces, lagoon influent and lagoon effluent. The swine-growing center utilized for sample collection included a confinement facility with concrete floors that were washed daily and an unaerated overflow lagoon. The data indicated the mean COD/TS ratio for fresh swine feces to be 1.08 grams per gram, the BOD5/TS ratio to have a mean of 0.33 grams per gram, and the VS/TS ratio to have a mean of 0.82. This study indicated that for a 100 lb. hog, the daily COD in the waste was 0.64 pounds; BOD 0.31 pounds; total solids 0.48 pounds and volatile solids 0.33 pounds. The membrane filter technique outlined in Standard Methods for the determination of the fecal streptococcus content of swine wastes was superior to the membrane filter technique utilizing KF broth. (Miner-Iowa State)

0232 - A2, C3, C5, E3
CONTROL OF WATER POLLUTION FROM SOUTHWESTERN CATTLE FEEDLOTS,
Texas Tech Univ., Lubbock. Water Resources Research Center.
D. M. Wells, W. Grub, R. C. Algin, G. F. Meenaghan, and E. Coleman.
Proceedings, 5th International Water Pollution Research Conference, July-August 1970, Paper II-38. 19 p, 20 tab. FWPCA Demr. Grant 13040, Texas Water Quality Board Contr. IAC (68-69).

Descriptors: *Farm wastes, *Cattle, *Manure, *Runoff, Biochemical oxygen demand, Nutrients, *Aerobic treatment, Anaerobic digestion, Irrigation, Waste water treatment.
Identifiers: *Feedlot runoff, Plant toxicity.

The objectives were to determine the characteristics of solid and liquid wastes resulting from cattle feedlot operations in the southwest U.S., to determine the treatability of these wastes by aerobic and anaerobic treatment systems and to determine whether or not the wastes produced could be used in a beneficial manner for the growing of cash crops. The feedlots studied included concrete-surfaced lots, dirt-surfaced lots, and controlled environmental chambers located on the Texas Tech University campus. Among their conclusions were that within reasonable limits, quality of runoff was not materially affected by type of ration fed or quantity of precipitation. Treatment of runoff resulting from precipitation on beef cattle feedlots is not feasible by conventional treatment systems. Direct application of runoff from concrete-surfaced lots was highly detrimental to the crops they tested. Direct application of runoff from dirt lots had an inhibitory effect on most crops tested except Midland Bermuda grass. Storage of runoff in unlined ponds may result in substantial pollution of the groundwater in the vicinity. They concluded that liquid systems for handling cattle feedlot wastes were not feasible. (Miner-Iowa State)

0233 - A2, A4, C1, D4, E2
EFFLUENT QUALITY FROM ANAEROBIC LAGOONS TREATING FEEDLOT WASTES,
Kansas Univ., Lawrence. Dept. of Civil Engineering.
Raymond C. Loehr.
Journal Water Pollution Control Federation, Vol 39, No 3, March 1967, p 384-391. 6 tab, 12 ref.

Descriptors: *Farm wastes, *Cattle, *Lagoons, Kansas, Biochemical oxygen demand, Odor, Dusts, Groundwater, Surface waters, Water pollution, Volume, Value, Soil environment, Temperature, Biodegradation, Anaerobic conditions, Mixing, Depth, Stabilization, Organic matter, Color, Nitrogen, Ammonia, Coliforms, Alkalinity, Hydrogen ion concentration, Equilibrium, Waste water treatment.
Identifiers: *Feedlots, *Anaerobic lagoons, Population equivalent, Slug load, Lagoon operation, Biological system, Surface area/volume ratio, Loading parameters, Volatile solids, Detention times.

Even under ideal equilibrium conditions, the liquid effluent from anaerobic lagoons treating livestock and feedlot wastes could pollute a receiving body of water. The quality of the effluent is decreased during the startup operations. The effluent is high in oxygen-demanding material, solids, and nitrogen. Subsequent treatment units are advisable to remove the solids and most of the oxygen-demanding material. Seasonal temperature variations will alter the effluent quality. The settled solids that need to be removed periodically from the anaerobic lagoon undergo considerable degradation, stabilization, and concentration. They are less potent than the entering untreated solids. However, their quality is such that they should not enter receiving waters. Land disposal offers an acceptable method of disposal for these solids. Anaerobic lagoons are not the complete answer to avoiding the pollution of natural waters by livestock and feedlot wastes. When used in combination with subsequent units to treat the effluent from the lagoons, anaerobic lagoons may be useful component process for livestock and feedlot wastes that have a high solids content. (White-Iowa State)

0234 - F4

FARM WASTES.

Proceedings of Symposium, Farm Wastes, The Institute of Water Pollution Control, The University of Newcastle upon Tyne, 1970. 148 p.

Descriptors: *Farm wastes, Disposal, Legislation, Slurries, Composting, Disease, Legal aspects, Hazards, Toxicity, Public health, Odors, Costs, Design criteria, Treatment, Adsorption, Reverse osmosis, Confinement pens, Hogs, Equipment, Microorganisms, Farm lagoons, Irrigation, Aeration, Aerobic treatment, Anaerobic treatment, Biochemical oxygen demand, Chemical oxygen demand, Biological treatment.
Identifiers: Health, Public nuisance, Population equivalents, Swine, Slatted floors, Oxidation ditch, Flushing gutter, Systems, Gas production, United Kingdom.

The two day symposium was attended by over 200 delegates including representatives from local authorities, river authorities, universities, agricultural colleges and research stations, nationalized industries and consultants. The various Ministries were well represented, with over 60 delegates. Those attending included delegates from Canada, Denmark, Eire, Holland and the United States. Nineteen technical papers were presented. A discussion of each paper is included. Four sessions were conducted: An introductory session, 4 papers; Problems off the farm, 3 papers; Minimizing the waste problem, 7 papers; and Waste treatment and disposal on the farm, 5 papers.
(Christenbury-Iowa State)

0235 - F4

ORIGINS AND NATURE OF FARM WASTES,

National Agricultural Advisory Service, London (England).
K. B. C. Jones, and C. T. Riley.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 1, p 7-14, 1970. 9 tab.

Descriptors: *Farm wastes, *Disposal, Rain water, Costs, Cattle, Hogs, Poultry, Planning, Legislation, Legal aspects, Economics, *Waste disposal.
Identifiers: *United Kingdom, Washing-down water, Nature of waste, Population equivalents, Origins of waste.

Waste disposal is discussed in relation to population expansion, diminishing acres, declining numbers of agriculture workers, economic pressures, limited natural water resources, and legal pressures. The origin and nature of the wastes that must be disposed of is discussed. The trends in planning and disposal patterns taking place were considered. The costs associated with disposal were examined in relation to the income produced. Food processing waste has created some disposal problems for farmers. The disposal problems created by fruit and meat processing are discussed in the last portion of the paper.
(Christenbury-Iowa State)

0236 - F3

ORIGINS AND NATURE OF FARM WASTES: DISCUSSION,

Gowan, Douglas.
Douglas Gowan.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 2, p 15-18, 1970. 1 tab.

Descriptors: Farm wastes, Disposal, Legislation, Discharge (Water), Sewers.
Identifiers: River authorities, Extensive farmer, Intensive farmer, United Kingdom, Public sewers.

Disposal of farm waste has become a major problem. A wholehearted effort is needed to deal with the problem, involving men, laboratories, and money. Also the farmers themselves must lend practical assistance. The law is there, and social and economic pressures are unlikely to ease. Nor is farming going to become less intensive, when this is the only way to profit, and the increasing public demand for food exists. All must combine to make sure that our inherent desire for increased water resources and pleasant-looking and smelling countryside facilities are one day realized.
(Christenbury-Iowa State)

0237 - E2

THE PROBLEM OF DISPOSAL OF FARM WASTES, WITH PARTICULAR REFERENCE TO MAINTAINING SOIL FERTILITY,

National Agricultural Advisory Service, Bristol (England). Soil Science Dept.
C. Berryman.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 3, p 19-23, 1970. 4 tab, 4 ref.

Descriptors: *Disposal, *Slurries, *Fertility, Farm wastes, Anaerobic conditions, Nutrients, Irrigation, Value, Fertilizers, Waste disposal.
Identifiers: *Animal slurry, *Composition, Organic irrigation.

This paper reviews the effect of farm waste, particularly in the form of animal slurry, on soil fertility. Slurry can supply an important part of the NPK requirements on the farm. The application of slurry to land is the most convenient and practical method of disposal, but problems due to a breakdown of soil structure can occur if an unsuitable soil receives excessive applications of slurry. The soil type is important when assessing the effect slurry disposal will have on the fertility of soil.
(Christenbury-Iowa State)

0238 - A9

THE PROBLEM ON THE FARM: ANIMAL HEALTH,

Ministry of Agriculture, Fisheries and Food, Norwich (England). Veterinary Investigation Service.
J. A. J. Venn.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 4, p 24-29, 1970. 41 ref.

Descriptors: *Toxicity, *Hazards, *Diseases, Farm wastes, Copper, Nitrogen, Potash, Lagoons, Slurries, Animal diseases, Bacteria, Viruses, Pathogenic bacteria.
Identifiers: United Kingdom, Toxic gases, Toxic chemicals, Parasites, Contamination, Health.

Health hazards associated with farm wastes have attained prominence with the development of intensive systems of husbandry. Whilst certain of the problems are unique to intensive systems, most of them are not new. This paper is an attempt to indicate some of them. An account is given of certain hazards to animal health arising from farm wastes, notably slurry and toxic chemicals. Possible ways of limiting these hazards are suggested. A discussion of the paper follows.
(Christenbury-Iowa State)

0239 - A9, A10

FARM WASTES: PUBLIC HEALTH AND NUISANCE PROBLEMS OFF THE FARM,

Chelmsford Rural District (Essex). Chief Health Inspector.
T. H. C. Bartrop.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 5, p 33-37, 1970. 5 ref.

Descriptors: *Public health, *Legislation, Farm wastes, Odors, Diseases, Bacteria.
Identifiers: *Public nuisance, Noise, Rats, Flies.

All nuisances and public health problems are preventable. To achieve this it is necessary to couple good siting and good design with good animal husbandry. Failure to do this voluntarily must inevitably lead to stricter planning control and the strengthening of public health law, for the development of intensive farming has outstripped controlling legislation. Agriculture, as an industry, claims certain privileges, but it cannot claim the privilege of causing a nuisance or a public health problem. (Christenbury-Iowa State)

0240 - A3, F2

WATER POLLUTION PREVENTION REQUIREMENTS IN RELATION TO FARM-WASTE DISPOSAL,

Thames Conservancy (England). Chief Purification Officer.
H. Fish.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 6, p 38-43, 1970.

Descriptors: *Farm wastes, *Legal aspects, Biochemical oxygen demand, Water pollution sources, Water quality control, Runoff, River regulation, Riparian waters, Groundwater, Legislation, *Disposal.
Identifiers: *United Kingdom, River authority, Common Law.

This article is concerned with the legal aspects of pollution and how they apply to agriculture. The ways in which farm waste can pollute water supplies and means of limiting the pollution effects are discussed. Large units located in close proximity to urban areas present the most difficult problems. Through cooperation between farmers and the river authority, the pollution effects of farm waste can be held at a minimum.
(Christenbury-Iowa State)

0241 - F1

SEWERS AND SEWAGE TREATMENT,

Chartered Civil Engineers, London (England); Newcastle-upon-Tyne Univ. (England).
James R. Simpson, and R. L. Hibberd.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne, Paper No 7, p 44-51, 1970. 2 fig, 2 tab, 13 ref.

Descriptors: *Costs, *Design criteria, *Sewage treatment, Farm wastes, Biochemical oxygen demand, Legislation, Dissolved solids, Tertiary treat-

ment, Sewers, Activated sludge, Capital cost.
Identifiers: River authority, Loading rates, Mogden formula, United Kingdom, Population equivalents, Suspended solids.

The purpose of this paper is to aquaint those unfamiliar with sewerage and sewage treatment with the general nature of the systems and processes. References to more detailed descriptions of the processes are included. Further, an attempt is made to answer the questions, 'Why and to what extent would a discharge with given characteristics affect the design of the sewers and the sewage-treatment works, and at what cost.' A formula for allocating waste treatment cost to agriculture is discussed. A discussion of the paper is included.
(Christenbury-Iowa State)

0242 - F5

MINIMIZING THE WASTE DISPOSAL PROBLEM IN VEGETABLE PROCESSING,
Electricity Council Research Center, Capenhurst (England).
F. Barrett.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 8, p 57-65. 7 fig, 4 tab.

Descriptors: *Apparatus, *Adsorption, *Reverse osmosis, Farm wastes, Desalination, Chemical oxygen demand, Recirculated water, Aeration, Flotation, Chlorination, Ultraviolet radiation, Biochemical oxygen demand, Equipment, Ozone, Biological treatment, Sludge disposal, Treatment.
Identifiers: *Food processing, Sterilization, Ozonation, United Kingdom, Vegetable processing.

This paper discusses possible mentods of treating waste from vegetable processing plants. The results obtained from a coagulation/flocculation unit have been encouraging. An aeration tower complex has been utilized for biological treatment. A pilot-scale adsorption unit and a reverse osmosis unit have been designed, built, and evaluated. A discussion and the reply to the discussion follows on page 106-109. (Christenbury-Iowa State)

0243 - B1, E1, F1

MINIMIZING POULTRY WASTE PROBLEMS,
National Agricultural Advisory Service, London (England).
C. T. Riley.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 9, p 66-72. 3 fig, 5 tab, 1 ref.

Descriptors: *Farm wastes, *Poultry, *Disposal, Costs, Biochemical oxygen demand, Odor, Land use, Sludge, Chemical properties, Physical properties, Fertilizers.
Identifiers: Composition, Hatchery waste, Broilers, United Kingdom.

This paper is divided into two parts; first an assessment of the industry and second an approach to some current problems. Manure from cage layers represents the major disposal problem in the poultry industry today. The physical and chemical properties of waste is given. In the main, poultry waste has to be returned to the land in some form. The disposal of manure from laying batteries is discussed in relation to minimizing the poultry-waste problems. Whether to handle the manure as a solid or liquid is examined. A discussion and reply to the discussion follows on page 106-109.
(Christenbury-Iowa State)

0244 - B1

MINIMIZING THE WASTE PROBLEM WITH PIGS,
National Agricultural Advisory Service, London (England).
C. G. Pointer.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 10, p 73-80. 7 fig.

Descriptors: *Confinement pens, *Design standards, *Hogs, Farm wastes, Slurries, Odor, Cleaning.
Identifiers: *Swine, Slatted-floor, Slurry systems, Sow feeders, Fattening house, Farrowing, United Kingdom, Manure handling, 'Ad-lib' feeding.

The first step towards minimizing the problems will be in the choice of site for the new pig unit. The larger the unit the more critical this decision will be. Subsequently the management and housing systems selected must be suited to the site. Systems have been described in this paper which minimize the problems. In existing problem units common sense and discretion can often avoid acute situations developing. It is hoped that economic solutions for these units will be evolved. In any event, there is always likely to be some smell from a piggery. A discussion and the reply to the discussion follows on page 106-109.
(Christenbury-Iowa State)

0245 - F4

MINIMIZING THE WASTE PROBLEM WITH CATTLE,
Newcastle-upon-Tyne Univ. (England).
M. M. Cooper.
Proceedings of Symposium: Farm Wastes: The Institute of Water Polution Control and The University of Newcastle upon Tyne. 1970. Paper No 11, p 81-83.

Descriptors: *Farm wastes, *Slurries, *Disposal, Cattle, Costs, Confinement pens.
Identifiers: *Cubicle system, Cowtels, United Kingdom.

This paper discusses some of the changes taking place in the cattle industry and the requirements for waste disposal. Many cattle producers require confinement areas for cattle for at least part of the year. Some of the systems being utilized for waste disposal are discussed. A discussion and the reply to the discussion follows on page 106-109.
(Christenbury-Iowa State)

0247 - B1, E1, F1

BUILDING DESIGN AND MANURE DISPOSAL,
Institutt voor Landbouwbedrijfsgebouwen, Wageningen (Netherlands).
J. C. Glerum, A. P. S. De Jong, and H. R. Poelma.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 13, p 94-100. 3 fig, 3 tab.

Descriptors: *Farm wastes, *Disposal, *Costs comparison, Cattle, Storage tanks, Slurries, Storage capacity, Design criteria.
Identifiers: Mucking-out, Mixed storage, Separate storage, Animal housing, Cubicle house.

In general, slurry systems are preferable to systems for handling solids and urine separately. Special reasons, for example difficulty in disposing of the manure, can cause separate storage to be used. If mixed storage is used the layout of the buildings must be adapted to the specific requirements of this system. Altering the buildings afterwards will usually be very expensive. The high capital cost of the slurry system will often be a drawback; this is especially the case for cowhouses where a considerable storage capacity is required. A discussion and the reply to the discussion follows on page 106-109. (Christenbury-Iowa State)

0248 - D4, E3

PIGGERY CLEANING USING RENOVATED WASTES,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
R. J. Smith, T. E. Hazen, and J. R. Miner.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 14, p 101-105. 1 fig, 13 ref. Grant EC 00283.

Descriptors: *Disposal, *Equipment, *Oxidation lagoons, Farm wastes, Design criteria, Confinement pens, Management, Recirculated water, Anaerobic conditions, Slurries, Sludge, Microorganisms.
Identifiers: *Oxidation ditch, *Flushing gutter, Manure removal.

A full-scale study of the possibility of renovating swine manure for use in manure transport was carried out. Preliminary anaerobic treatment and settling took place in a lagoon followed by secondary treatment in an oxidation ditch. Measurements of COD, BOD, nitrogen, solids and certain inorganic salts were made during the period February to May 1969. Assessment of the results showed that the system had considerable promise from the standpoint of confinement house environmental improvement and labour reduction. A stable and sanitary effluent was obtained at all times which showed no adverse effects upon the performance of the animals exposed to it. Rainfall precluded useful information being obtained concerning salt build-up or toxicity in the treatment system. No toxicity effects were apparent after continuous operation for 20 weeks. The test was terminated because of mechanical failures. A discussion and the reply to the discussion follows the paper on page 106-109.
(Christenbury-Iowa State)

0249 - B1, E2

LAND DISPOSAL AND STORAGE OF FARM WASTES. 1. PLANNING AND CHOICE OF SYSTEM,
National Agricultural Advisory Service, London (England). County Dairy Husbandry Adviser.
A. J. Quick.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 15, p 110-115. 1 tab, 6 ref.

Descriptors: *Farm wastes, *Disposal, *Effects, Slurries, Planning, Management, Dry farming, Storage, Equipment.
Identifiers: *Systems, *Comparison, Wash water, Wet farms.

This paper deals with the immediate problems facing the dairy farmer who finds himself in the economic squeeze, with the inevitable result that he will intensify his dairy enterprise. At the moment there is no universal solution to his problems, but they can be tackled, first by identifying the factors which will influence the choice of system (by factors are meant soil type, system of cow-housing, and unit size) and second, by selecting the most suitable system from the available alternatives.
(Christenbury-Iowa State)

0250 - B2, B3, E2

LAND DISPOSAL AND STORAGE OF FARM WASTES. 2. HANDLING AND DISTRIBUTION,
National Agricultural Advisory Service, London (England). National Livestock Mechanization Specialist.
J. I. Payne.
Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 16, p 116-121. 1 fig, 2 tab, 1 ref.

Descriptors: *Farm wastes, *Mechanical equipment, *Distribution, Slurries, Disposal, Treatment, Storage, Costs, Cattle, Irrigation.
Identifiers: *Handling, Removal, Solid manure, Organic irrigation.

The mechanization aspect of applying farm effluent to the land is governed by the physical state of the effluent, the stock housing system and the type of farm on which the stock enterprise is situated. Consequently three basic systems of handling manure onto the land have evolved. These are handling it as a solid manure, as a dense slurry, and as a diluted slurry. This paper discusses the equipment required for each of the handling systems. In general, if the manure can be kept solid the problems will be fewer. (Christenbury-Iowa State)

0251 - C1, D4

AEROBIC TREATMENT OF FARM WASTES,

North of Scotland Coll. of Agriculture, Aberdeen. Scottish Farm Buildings Investigation Unit.
K. Robinson, S. H. Baxter, and J. R. Saxon.

Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No. 17, p. 122-131. 1 tab, 9 fig, 26 ref.

Descriptors: *Aeration, *Mechanical equipment, *Aerobic treatment, Farm wastes, Odor, Slurries, Ventilation, Farm lagoons, Biochemical oxygen demand, Hogs, Chemical oxygen demand, Microorganisms, Dissolved oxygen, Laboratory tests, Waste water treatment.
Identifiers: Oxidation ditch, Aeration lagoon.

This paper is divided into two main sections - a review of existing commercially available methods of aerobic waste disposal and an outline of the project in Aberdeen for the study of pig-waste treatment. The review is limited to a description of aerobic methods and no specific attempt has been made to compare the relative merits of these systems, since a critical examination of some of them is one of the aims of our project. The characteristics of pig waste, its oxygen demands, and the influences of copper on bacterial activity are discussed. The factors influencing the growth and metabolic activity of micro-organisms are outlined and the problems of satisfactory methods of laboratory determinations are emphasized.
(Christenbury-Iowa State)

0252 - D4, E4

ANAEROBIC TREATMENT OF FARM WASTES,

West of Scotland Agricultural Coll., Glasgow. Dept. of Bacteriology.
Selwyn Baines.

Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No. 18, p 132-137. 1 tab, 20 ref.

Descriptors: *Farm wastes, *Anaerobic digestion, Anaerobic conditions, Anaerobic bacteria, Microorganisms, Sludge, Slurries, Mixing, Hydrogen ion concentration, Biochemical oxygen demand, Digestion, Design data, Methane, Waste water treatment.
Identifiers: Commercial applications, Gas production.

This paper describes the effects of anaerobic treatment and its application to farm wastes. A satisfactory methane fermentation can be established and maintained. The digested sludge is relatively inert, free from nuisance and more amendable to dewatering. The anaerobic digestion process also reduces the risk of pathogenic organisms causing human or animal diseases. The design and operation of an anaerobic treatment process is described. Several reports from commercial installations are included. (Christenbury- Iowa State)

0253 - D4, F1

TREATMENT OF FARM WASTES,

Instituut voor Landbouwbedrijfsgebouwen, Wageningen (Netherlands).
H. M. J. Scheltinga, and H. R. Poelma.

Proceedings of Symposium: Farm Wastes: The Institute of Water Pollution Control and The University of Newcastle upon Tyne. 1970. Paper No 19, p 138-142. 3 tab, 3 fig.

Descriptors: *Farm wastes, *Biological treatment, *Aerobic treatment, Farm lagoon, Activated sludge, Aeration, Slurries, Biochemical oxygen demand, Sludge, Cost comparison, Waste water treatment.
Identifiers: Oxidation ditch, Pasveer ditch.

This paper is related to biological treatment of farm animal waste. Aerobic treatment is described. A schematic of an oxidation ditch and an aeration pit is included. The economic aspect of the oxidation ditch versus the aeration pit is presented. A discussion of the paper is included.
(Christenbury-Iowa State)

0254 - D4, E3

AEROBIC STABILIZATION OF BEEF FEEDLOT WASTE,

Texas Tech Univ., Lubbock.
W. Grub, J. D. Martin, and L. L. Keeton.

Paper presented at the 1970 winter meeting American Society of Agricultural Engineers, Chicago, December 8-11, 1970, Paper No 70-909. 6 p.

Descriptors: *Anaerobic digestion, *Biological treatment, Farm wastes, Moisture content, Aerobic conditions, Oxygen requirements, Stabilization, Nitrogen, Waste water treatment.
Identifiers: *Composting, *Carbon to nitrogen ratio (C/N), Housefly.

Solid waste that had accumulated on Southwestern beef cattle feedlots was aerobically stabilized under controlled conditions in enclosed digesters and in open air piles. Conditions for stabilization were determined and changes of physical, chemical and biological characteristics were established. The organic stabilization of beef feedlot waste by composting is a feasible process. Organic beef feedlot waste is compostable in specially designed digesters or in exposed open air piles, to a biologically stable organic product, free from noxious odors and inset infestation. Stabilized waste can be stored in a wet or dry state without danger of heating, attracting insects, or causing noxious odors. The time of stabilization depends on the type of original feed material, the condition of the waste at the start of the composting period, and the management of the composting process. Composting requires skilled management to obtain satisfactory results.
(Christenbury-Iowa State)

0255 - A2, B3

EFFECTS OF MANURE DEPTH ON RUNOFF FROM SOUTHWESTERN CATTLE FEEDLOTS,

Texas Tech Univ., Lubbock.
L. L. Keeton, W. Grub, D. M. Wells, G. F. Meenaghan, and R. C. Albin.

Paper presented at the 1970 winter meeting American Society Agricultural Engineers, Chicago, December 8-11, 1970, Paper No 70-910. 7 p, 2 tab, 1 ref.

Descriptors: *Rainfall intensity, *Rainfall-runoff relationships, Farm wastes, Pollutants, Moisture content, Biochemical oxygen demand, Chemical oxygen demand, Waste water treatment, Water pollution sources.
Identifiers: Feedlot runoff, Feedlot slope, Water holding capacity.

With the increasing number of beef cattle in feedlots in the Southwestern United States has come a major water pollution problem. The effects of manure accumulation on quantity and quality of runoff from concrete and direct surfaced feedlots for various precipitation rates were determined. A relatively dry manure pack holds approximately one-half inch of rainfall per inch of manure depth. If runoff from a relatively dry mass occurs, large quantities of suspended and dissolved pollutants are carried off. Manure at 60 percent moisture minimizes the pollutants removed during feedlot runoff. The quality of feedlot runoff is primarily a function of the moisture content of the manure, the rainfall intensity, and the feedlot slope. (Christenbury-Iowa State)

0256 - E1, F1

USE ANIMAL MANURE EFFECTIVELY,

Arizona Agricultural Experiment Station, Tucson.
J. L. Abbott.

Agricultural Experiment Station and Cooperative Extension Service Bulletin A-55, The University of Arizona. 3 tab, 1 fig, 6 ref.

Descriptors: *Farm wastes, *Fertilizers, *Rates of application, *Return (Monetary), *Beneficial use, Livestock, Arizona, Feedlots, Disposal, Costs, Salts, Nitrogen, Organic matter, Waste treatment.
Identifiers: Manure, Composting.

This publication discusses some important considerations that should be taken into account concerning the use of animal manure as a fertilizer. A possible $90-per-acre return for a $20-per-acre investment is being overlooked by many Arizona farmers. The cost of applying manure is in the order of $2 to $14 per ton up to a 40 mile haul. The fertilizer value of manure is at least $2 per tone for available N and P. The value of organic matter must account for the balance in cost. The greatest value of manure may result from the indirect effects of the organic matter contribution on the physical condition of the soil and in maintaining the availability of certain soil nutrients. The soluble salts in manure commonly range from 5 to 10 percent on a dry basis. Recommendations for manure are seldom more than 5 tons per acre annually.
(Christenbury-Iowa State)

0257 - C5

DRINKING OF SULFATE-WATER BY CATTLE,

Nevada Univ., Reno.
H. J. Weeth, and J. E. Hunter.

Journal Paper No 168. Journal of Animal Science, Vol 32, No 2, p 277-281, 1971. 1 tab, 39 ref. West Reg Research Project W-46.

Descriptors: *Sulfates, *Sodium chloride, Farm wastes, Cattle, Toxicity, Water, Growth rates, Water pollution effects.
Identifiers: *Drinking water, Sulfate water, Hemoglobin.

This study was designed to characterize some of the effects on cattle of drinking water contaminated with a known concentration of sulfate. Nine growing Hereford heifers were offered as drinking water either tap-water, 5,000 ppm Na sub 2 SO sub 4-water or 4,110 ppm NaCl-water. The experimental design was a 3x3 latin square with replicates. Experimental periods were 30 days. Total urine was collected on the last 7 days with renal clearance observations being made on the sixth day. The season was summer. The heifers drank less, ate less and lost weight while consuming the sulfate-water. The sulfate ion caused a relative diuresis. Percent urine water of free-water intake was 33.8 with sulfate-water, but only 22.1% with tap water. Total hemoglobin concentration was unaffected by the saline drinking waters, however, the sulfate-water caused a 450% increase in methemoglobin concentration and the development of 416.9 mg/100 ml of sulfhemoglobin. The two nonfunctional hemoglobins comprise 6.2% of total hemoglobin at this time. Drinking the sulfate-water increased serum sulfate concentration 63.1%, increased renal filtration of sulfate 45.2%, but decreased renal reabsorption of sulfate by 27.5%. Drinking sulfate-water did not alter plasma calcium concentration

or renal excretion of calcium. A specific toxic effect of drinking the Na sub 2 SO sub 4-water was not apparent, however, the adverse effects seen were related to the sulfate ion. Only a slight polyposia and diuresis were observed with drinking of the NaCl-water. (Christenbury-Iowa State)

0258 - E4

GAS PRODUCTION FROM BEEF CATTLE WASTES,

Texas Tech Univ., Lubbock.

G. F. Meenaghan, D. M. Wells, R. C. Albin, and W. Grub.

Paper presented at the 1970 winter meeting American Society of Agricultural Engineers, Chicago, December 8-11, 1970, Paper No 70-907. 15 p, 9 fig.

Descriptors: *Anaerobic digestion, *Gases, Farm wastes, Chemical oxygen demand, Cattle, Carbon, Nitrogen, Hydrogen, Alkalinity, Methane, Biochemical oxygen demand, Waste treatment, Air pollution, Pollution abatement.
Identifiers: *Composting, *Gas production, Carbon to nitrogen ratio (C/N), Beef cattle, Carbonaceous material, Volatile acids.

A two-stage completely mixed isothermal digestion system having a capacity of 30 gallons/stage was fed wastes from a beef cattle controlled environment chamber. Gas production was monitored and analyzed by a wet test meter and a gas chromatograph, respectively. Physical and bio-chemical tests were also performed. This study indicates that a completely mixed, two stage anaerobic digestion system is technically feasible and can be used for obtaining nominal treatment of beef cattle wastes. Even with optimal conditions per stage such a system will not be sufficient for complete treatment. (Christenbury-Iowa State)

0259 - A1, C1, D1, F4

ANIMAL WASTES - A NATIONAL PROBLEM,

Cornell Univ., Ithaca. Dept. of Agriculture; and Cornell Univ., Ithaca. Dept. of Civil Engineering.

Raymond C. Loehr.

Proceedings of the American Society of Civil Engineers, Journal of the Sanitary Engineering Division, Vol 95, No SA2. 9 tab, 4 fig, 86 ref.

Descriptors: *Farm wastes, *Anaerobic digestion, *Aerobic treatment, Dehydration, Environment, Cattle, Hogs, Poultry, Sheep, Diets, Odors, Ruminants, Weight, Nitrogen, Phosphorus, Potassium, Waste water treatment, Confinement pens, Digestion, Proteins, Moisture content, Physical properties, Density, Chemical properties, *Water pollution sources, Waste dilution, Slurries, Biochemical oxygen demand, Runoff, Ammonia, Chemical oxygen demand, Oxygen demand, Nitrates, Surface waters, Effluents, Coliforms, Incineration, Aeration, Farm lagoons.
Identifiers: *Animal production, *Population equivalents, Fiber content, Manure production, Nuisance potential, Feedlots, Oxidation ditch, Slatted floors.

A state of the art summary is presented on the control and management of animal wastes. Items discussed include the magnitude of the problem, pollution that has been caused by animal wastes, feasible treatment processes, major problem areas, and areas for future activity. Animal production and their subsequent waste production, properties, and characteristics are discussed first. The pollution and nuisance potential is then pointed out with respect to population equivalents. Waste treatment and disposal processes and systems follow. A summary and conclusion point out problems and what direction should be taken in the future. The paper was 86 references. (White-Iowa State)

0260 - C4, E3

GROWTH OF MICROORGANISMS IN FRESH CHICKEN MANURE UNDER AEROBIC AND ANAEROBIC CONDITIONS,

Kentucky Univ., Lexington. Dept. of Agricultural Engineering; and Kentucky Univ., Lexington. Dept. of Animal Science.

Sally W. Jackson, B. E. Langlois, and T. H. Johnson.

Poultry Science, Vol 49, No 6, 1970, p 1749-1750. 1 fig, 5 ref.

Descriptors: *Feeds, *Farm wastes, Poultry, *Aerobic conditions, Bacteria, Microorganisms, Laboratory tests, *Anaerobic conditions, Disposal.
Identifiers: Waste re-use, Uric acid, Ruminant feeds.

Utilization of animal manure as feed not only would provide a new source of protein for animals, but also would help to reduce the pollution of the environment. While use of such material as feed is not permitted at this time, research is necessary in order to determine the feasibility of using manure as feed in the event it is made legal. This study was made to determine whether microorganisms contained in chicken manure could utilize constituents of the fresh manure and increase in number during aerobic or anaerobic fermentation. Results suggested that fresh chicken manure contains substrates capable of supporting aerobic but not anaerobic growth of bacteria. (Hazen-Iowa State University)

0261 - D4

ANAEROBIC DIGESTION OF FARM ANIMAL WASTES (DAIRY BULL, SWINE AND POULTRY),

Wisconsin Univ., Madison. Dept. of Civil Engineering; and Wisconsin Univ, Madison. Dept. of Agricultural Engineering.

Lorne C. Gramms, L. B. Polkowski, and Stanley A. Witzel.

Transactions of the ASAE, Vol 14, No 1, January-February 1971, p 7-11, 13. 10 fig, 4 tab, 7 ref.

Descriptors: *Anaerobic digestion, *Farm wastes, *Digestion, Laboratory tests, Sludge, *Chemical Oxygen Demand, Poultry, Cattle, Gases, Hydrogen ion concentration, Alkalinity, Settling velocity.
Identifiers: Volatile solids reduction, Gas production, Volatile acids, Dentition time.

Dairy bull, swine, and pultry wastes are amenable to anaerobic digestion. Anaerobic digests for dairy bull waste may be loaded at rates of 0.24 pound VS per cubic foot per day with detention times between 10 to 15 days for good reduction in volatile solids and COD. Anaerobic digesters for pultry waste should not be loaded at rates greater than 0.18 pound VS per cubic foot per day with detention times between 10 to 15 days. Although substantial reductions may be achieved in volatile solids, and COD, the ultimate disposal of the wastes would still be a problem. If long term anaerobic digestion were used it would allow storage until the sludge could be spread on the land to obtain the optimum fertilizer value for land management. Of the three wastes studied the specific resistance of the poultry waste was the only value that was similar to the specific resistance of anaerobically digested domestic sludge. (Hazen-Iowa State University)

0262 - A5, B1

WASTE HANDLING: WHAT ARE THE CHOICES,

Wisconsin Univ., Madison. Dept. of Agricultural Engineering.

O. I. Berge.

Hoard's Dairyman, Vol 116, March 25, 1971, p 353, 383. 1 fig.

Descriptors: *Farm wastes, *Waste water treatment, Waste disposal, Waste storage, Cattle, Odor, Fertilizers, Value.
Identifiers: *Waste handling, Waste utilization.

Waste disposal has long been a problem. Wastes must be removed periodically for good sanitation. For dairymen, the three major alternatives for handling manure are daily spreading, stockpiling for spreading when field conditions are more favorable, and liquid storage with spreading under more desirable conditions. All three systems depend on the availability of land for spreading within a reasonable distance of the cattle barn. No system of manure handling has been devised which is not likely to offend the nostrils of sensitive people. (Hazen-Iowa State University)

0263 - D4

REMOVAL OF PLANT NUTRIENTS BY MEANS OF AEROBIC STABILIZATION OF SLUDGE,

Illinois Univ., Urbana. Dept. of Microbiology; and Illinois Univ, Urbana. Dept. of Agricultural Engineering.

Roar L. Irgens, and H. Orin Halvorson.

Applied Microbiology, Vol 13, No 3, May 1965, p 373-386. 16 fig, 8 tab, 8 ref.

Descriptors: Chemical Oxygen Demand, *Biochemical Oxygen Demand, *Waste water treatment, *Sludge treatment, Sludge digestion, Denitrification, *Nutrients.
Identifiers: Digester supernatant fluid, Kjeldahl nitrogen.

In the convential treatment of sewage, the solids are normally disposed of by anaerobic digestion. This leaves a considerable amount of plant nutrients, such as nitrogen and phosphate, as soluble compounds which will eventually find their way into the plant's final effluent, since the supernatant fluid from the digesters is normally returned to the raw sewage. In a recent investigation, we found that, if the sludges were treated by an aerobic process, a significant portion of the carbonaceous matter was oxidized to carbon dioxide and water, and the rest was assimilated into microbial protoplasm. This process tied up the available nitrogen and phosphorus so that practically none remained dissolved in the suspending liquid. The accumulated solids, consisting mostly of microbial cells were separated very easily from the liquid leaving a slightly colored supernatant fluid that was water-clear, free from plant nutrients, and very low in BOD and COD. The overall process was accomplished in a detention time not exceeding 20 days, in contrast to anaerobic digestion which requires from 50 to 70 days. (Hazen-Iowa State University)

0264 - B2

HANDLING METHODS FOR LIQUID MANURE ARE TESTED,

D. W. Bates.

Hoard's Dairyman, Vol. 116, p 273, March 10, 1971, 3 fig.

Descriptors: *Waste disposal, Waste dumps, *Farm wastes, *Cattle, Storage tank, *Waste storage, Liquid wastes.
Identifiers: Barn heat.

Methods for handling liquid manure stored in a large external tank over an extended period of time were evaluated. The 150,000 gallon storage tank was constructed at a right angle to the end of a 60-cow tie stall barn. A cover of woven wire, polyethylene and baled straw was used in winter; the tank was uncovered in the summer. No conveyor system was installed. Waste heat from the barn's ventilation system was exhausted into the tank to prevent or reduce freezing. Pumps were used to level and remove the tank's contents. Conclusions are: (1) Manure stored in a large tank can be agitated and removed without difficulty under proper management; (2) Manure deposited in one end of a long tank will distribute itself sufficiently under its own weight so a conveyor is not necessary; (3) Waste heat from a barn's ventilation system

is valuable in preventing freezing in an exposed manure storage tank. (Hazen-Iowa State)

0265 - B1, C5

PENICILLIN BY THE POUND,

Margaret E. Duffy.

Environment, Vol 11, No 8, 1969, p 14-21. 2 fig, 40 ref.

Descriptors: *Animal pathology, Disease resistance, *Diseases, Farm wastes, Beneficial use, Poultry, Regulation, Feeds, Cattle.
Identifiers: *Antibiotics, Agricultural uses, Growth promotion, Disease prevention, Hormones, *Penicillin, Drugs, Side effects, Therapeutic value, Hemorrhages, FDA.

Antibiotics, hormones and many other medicines used to treat human sickness have found their way into agriculture. The drugs are used to treat animal diseases, to promote growth, to preserve food and to protect plants. Far more antibiotics are used on farms than in hospitals, and the growing reliance on these and other medicines in agriculture raises a host of problems. The most serious of these may be the appearance of resistance in microbes to antibiotic treatment. Most of the antibiotics used in agriculture are added to the feed of cattle, pigs, chickens and lambs in order to promote growth. Antibiotics have had a greater effect on chickens and pigs raised in a previously occupied and therefore unsanitary environment than those raised in sanitized or new quarters. Prolonged feeding with antibiotics has more than once been reported to result in a decreased growth response in chicks. Antibiotics do not promote growth in germ-free animals. Some of the harmful side effects are: allergic and toxic effects of drugs, alterations in microbial flora which can cause disease and the development of resistant strains of micro-organisms. Animals may accumulate antibiotics in blood and muscle tissue when given antibiotics in their feed. Hence, antibiotics may find their way into meat products if animals are slaughtered before antibiotic residues have disappeared. (Hazen-Iowa State University)

0266 - A5, B2, C5

CAGED LAYER PERFORMANCE IN PENS WITH OXIDATION DITCHES AND LIQUID MANURE STORAGE TANKS,

Guelph Univ. (Ontario). Dept. of Poultry Science.
J. P. Walker, H. L. Orr, and J. Pos.
Poultry Science, Vol 50, No 2, March 1971, p 501-505. 1 tab, 4 ref.

Descriptors: *Poultry, *Oxidation lagoons, *Confinement pens, *Performance, Waste disposal, Farm wastes, Waste treatment, Storage tanks, Slurries, Aeration, Equipment, Nitrogen, Odor, Design criteria.
Identifiers: Liquid manure, Egg production, Egg quality, Anti-foaming agent.

The increased size of poultry operations and the spread of urban areas has created problems in the disposal or utilization of poultry waste. These have been aggravated by the increased use of the liquid system of manure handling and its resultant odors. The purpose of this study was to evaluate the performance of caged layers housed in a pen utilizing oxidation ditches in contrast to caged layers housed in a pen with anaerobic liquid storage tanks. The conclusion is that hen housed egg production, egg quality, feed conversion and mortality performance of caged layers in pens with oxidation ditches was similar to that of caged layers in pens with liquid manure storage tanks. The odor in the pen with the oxidation ditches was less offensive than in pens with anaerobic liquid manure tanks. Modifications must be developed for oxidation ditches or other more economical means developed for oxidizing liquid poultry manure before it has practical application. (Hazen-Iowa State University)

0267 - F1

WASTE MANAGEMENT...WHAT DOES IT COST,

Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
Orrin I. Berge.
Hoard's Dairyman, Vol 116, April 10, 1971, p 420. 8 tab.

Descriptors: *Waste disposal, *Cost comparisons, *Farm wastes, Cattle, *Costs, Cost analysis, Annual costs, Capital investment, Fertilizers, Value.
Identifiers: Cost factors.

This article is an economic protection of the cost factors involved in handling wastes by daily hauling, stacking or liquid manure. Daily hauling requires the least investment and liquid manure systems the most. The annual costs for each of the systems are much closer than the investment figures. The cost of the waste handling systems may be offset to a considerable extent by the fertility value of the wastes. (Hazen-Iowa State University)

0268 - B3

MANURE STACKING.

Hoard's Dairyman, Vol 115, October 1970, p 1028, 1067. 3 fig.

Descriptors: *Waste disposal, *Waste dumps, *Waste storage, *Farm wastes, Management, Equipment.
Identifiers: Waste storage facilities.

The expense and problems involved with hauling wastes daily and the cost of liquid waste systems have caused agricultural engineers and dairy farmers to consider other ways of handling farm wastes, one of which is stacking. Unlike liquid waste systems, the amount of water that is mixed with the manure must be kept to a minimum. Another problem that may result with stacking is that of runoff from the stack itself. There is not the odor problem that exists in liquid systems. There are a number of stackers on the market; as it appears more dairymen will switch to stacking as a disposal system. (Hazen-Iowa State University)

0270 - A8, C4

RAPID CONCENTRATION OF STRONGYLE EGGS FROM EQUINE FECES FOR IN VITRO STUDIES,

Louisiana State Univ., Baton Rouge. Dept. of Veterinary Science.
Thomas R. Bello, and Virginia L. Gordon.
American Journal of Veterinary Research, Vol 31, No 12, p 2285-2288, December, 1970, 1 tab, 7 ref.

Descriptors: *Farm wastes, Laboratory tests, Nematodes, Eggs, *Separation techniques, Pollutant identification.
Identifiers: Equine, Horse, Laboratory procedures, *Strongyle eggs.

For in vitro studies, large numbers of strongyle eggs in equine feces were suspended, sieved, sedimented in water, and then floated in sucrose solution by centrifugation. The eggs were prepared for cultures by disinfecting with 1.2 to 1.3% sodium hypocholorite solution and washing in sterile Tyrode's solution containing antibiotics. This rapid concentration technique was 100.2 .. 2.2% efficacious based on eggs-per-gram (e.p.g.) fecal counts from 20 horses. (Christenbury-Iowa State)

0271 - E3

GROWING CORN IN GROWTH CHAMBERS WITH DIFFERENT MANURE TREATMENTS,

Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
Eugene Goering, R. I. Lipper, and H. L. Manges.
Unpublished Paper, Presented 1971 Mid-Central Meeting American Society of Agricultural Engineers, Paper No MC-71-104, 17 p, 10 tab, 6 ref.

Descriptors: *Farm wastes, *Crop response, Disposal, Laboratory tests, Plant tissues, Growth chambers, Cattle.
Identifiers: Manure, Application rates, Contamination.

The purpose of this experiment was to determine the effect on corn germination and early growth of different manure loading rates and to compare the effect of planting in manure mixed with soil against placement of seed above a manure layer. Germination and early growth of corn in plant growth chambers were adversely affected by applications of beef feedlot manure at rates ranging from 35 to 175 tons/acre, oven dry basis. The effects were different when manure was completely mixed with soil than when applied as a layer under a soil cover. (Christenbury-Iowa State)

0272 - E2, E3

A DOSING SIPHON FOR DISCHARGING CLEANING WATER INTO FLUSHING GUTTERS,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
H. L. Person, and J. R. Miner.
Unpublished paper presented at the 1971 Mid-Central Region Meeting American Society of Agricultural Engineers. Paper No MC-71-105, 22 p, 10 fig, 3 ref.

Descriptors: *Farm wastes, Design data, Equipment, Confinement pens, Test procedures, Theoretical analysis, Water pollution control.
Identifiers: *Flushing gutter, *Dosing siphon, Waste removal, Snifter.

An automatic dosing siphon has been designed, built, and used for discharging water into flushing gutters. An explanation of how the device operates as well as test data and design information are presented. The automatic dosing siphon is easy to design and build. The parts are commercially available. If proper precautions are taken to ensure that all joints are airtight, the automatic dosing siphon is a dependable device for discharging cleaning water into flushing gutters. (Christenburg-Iowa State)

0273 - C3, C5

ROLE OF EXCRETED CHLORTETRACYCLINE IN MODIFYING THE DECOMPOSITION PROCESS IN FEEDLOT WASTE,

Colorado State Univ., Ft. Collins. Dept. of Microbiology.
G. Keith Elmund, S. M. Morrison, D. W. Grant, and M. P. Nevins, Sr.
Bulletin of Environmental Contamination and Toxicology, Vol 6, No 2, 1971, p 129-131.

Descriptors: *Farm wastes, Biodegradation, *Biochemical oxygen demand, Bactericides, Toxicity, *Stabilization, Bioassay, Biological treatment, Diets, Water pollution effects, Feeds, Cattle, Ruminants, Pollutant identification.
Identifiers: Feedlot wastes, Dietary antibiotic, Rumen microflora, *Chlortetracycline.

Quantitative bioassays of fresh feedlot manure revealed that approximately 75 percent of the dietary chlortetracycline was excreted. The antibiotic concentration was 14 microgram g/gm of fresh feedlot manure, and 0.34 microgram g/gm of aged feedlot manure. Standard BOD5 values on manure from control steers and manures from steers receiving dietary chlortetracycline demonstrated that antibiotic supplementation of animal feeds may alter the microflora participating in the stabilization of feedlot manure. The effect of ingested chlortetracycline is two fold: (1) ingested antibiotic selects for a microbial population rela-

tively inefficient in the stabilization process and (2) antibiotic supplementation apparently alters the digestive processes in the animal, resulting in manures which are less biodegradable as measured by the standard BOD5 procedure. (Christenburg-Iowa State)

0274 - F4
POLLUTION, PESTICIDES AND THE PEOPLE - -- AGRICULTURE AND OUR NATURAL ENVIRONMENT.
Greater Des Moines Chamber of Commerce, Iowa. Agricultural Dept.

33rd Annual (Forum), National Farm Institute, February 11-12, 1971, Des Moines, Iowa, 107 p.

Descriptors: *Farm wastes, *Pesticides, *Sediment, *Water pollution effects, Fertilizers, Economics, Legislation, Water pollution control, Benefits, Costs, Agriculture standards, Water quality, Taxes, DDT, Population, Livestock, Environment, Sewage.
Identifiers: Conservancy districts.

The proceedings of the National Farm Institute include papers concerned with the various aspects of pollution and today's environment. Various pollutants which are discussed include farm wastes, fertilizers, pesticides, and sediment. In addition, other papers report on population aspects, legislation, economics of pollution control, and interest groups concerned with pollution. A wide array of views and potential control systems are examined. (White-Iowa State)

0275 - A3, F3
THE CITIZENS' VIEW OF POLLUTION,
League of Women Voters of the United States, Washington, D.C. Environmental Quality Program.
Donald Clusen, Mrs.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 7-13.

Descriptors: *Environment, *Water pollution effects, Pollution abatement, Legislation, Governments, Research and development, Water quality, Standards, Water Quality Act, Taxes, Agriculture.

The author attempts to give societies view of pollution while admitting that the role of spokesman is a dangerous one. Trying to describe pollution or what it is constitutes a problem as varied as trying to prescribe solutions. There is no national consensus on environmental questions unless it is that a problem exists and the time to deal with it is now. An aroused public must insist that more be done, and faster, to abate pollution. Equally important is the preparation of a number of alternatives. Water resource development must be viewed as an integral part of the national effort to protect and improve the quality of man's environment. The general public has demonstrated that they want their money spent for pollution abatement. People want to have a voice in the choices to be made, they want to see some progress made, and they want environmental concerns to have a higher priority - in government, business and agriculture. (White-Iowa State)

0276 - A3, A7
THE SPORTSMAN'S VIEW,
National Wildlife Federation.
Phillip Douglas.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 15-22.

Descriptors: *Pesticides, *DDT, Water pollution effects, Conservation, Biodegradation, Recreation, Diseases, Beneficial use, Toxicity, Solubility, Fish, Birds, Biocontrol, Cultural control.
Identifiers: *Biological concentration, Primary effects, Secondary effects.

Both sides of the pesticide problem are presented in this paper. Pesticides, and in particular DDT, have been used successfully to help control typhus fever, malaria, and dutch elm disease among others. These beneficial effects are sometimes offset by their harmful residues. The DDT molecule combines four properties that are responsible for its behavior in the environment: (1) toxicity to almost all animal life; (2) persistence; (3) mobility; and (4) solubility properties. Many examples of fish and bird fatality are pointed out as the result of the accumulation of DDT. Ususally these are the higher animals in carnivorous food chains. Twelve steps or courses of action are recommended to help alleviate the problem. (White-Iowa State)

0277 - A7
THE FARMERS' CONCERN,
Gilbert Stanek.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 23-29.

Descriptors: *Wastes, *Water pollution effects, Dieldrin, DDT, Mercury, Pesticides, Insecticides, Herbicides, Resistance, Research and development, Education, Regulation.
Identifiers: *Panic power, Mis-use, Tolerance level.

Farmers have four areas of concern in the environmental pollution field. The first is 'panic power' created by news media and other sources that cry out in unsure, uninformed voices about the uncertainties of pollution. The second area is mis-use or the improper handling of wastes and pesticides by farmers as well as non-farmers. The third area deals with tolerance levels. What criteria should be used and what levels should be set are questions which remain largely unanswered. The fourth area of concern to farmers is that they are a minority group. We are warned that if the American farmers' efficiency of production is jeopardized by banning of pesticide usage, the consumer will suffer through increased food prices because of reduced production. Research, education and regulation are key steps to preserve our standard of living. (White-Iowa State)

0278 - A1
POPULATION GROWTH RATE SHOULDN'T GET ALL THE BLAME,
Bureau of the Census, Washington, D.C.
Conrad Taeuber.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 31-39.

Descriptors: *Human population, *Growth rates, Fertility, Fecundity, Census, Cities, Water pollution effects, Natural resources.

Population growth characteristics of the United States are pointed out. The growth rate is traced from pre-war times to present, with projections being made for future growth. Pollution and other social ills are not primarily a result of our rate of population growth. Changing standards and habits, in activities, technology, and the style of life have much more to do with the accumulation and disposition of waste materials and pollutants than does the number of persons involved. (White-Iowa State)

0279 - A3, A4, A9
POLLUTION - HOW MUCH OF A PROBLEM COMES FROM FERTILIZERS,
Missouri Univ, Columbia. Water Resources Research Center.
George E. Smith.
In: 33rd Annual (Forum), National Farm Institue, February 1971, Des Moines, Iowa p. 40-48.

Descriptors: *Fertilizers, *Nitrogen, *Nitrate, Nitrite, Nutrients, Fertility, Toxicity, Eutrophication, Phosphorus, Water supply, Water walls, Runoff, Carbon dioxide, Oxygen, Photosynthesis, Water pollution, Soil contamination.
Identifiers: Metoglobenemia, Nitrate accumulation.

An objective view is given of fertilizer usage and its role as a pollutant. First concern for pollution from fertilizers was in connection with nitrate toxicity (metoglobenemia) in human infants and some species of livestock. Most of the water involved came from improperly constructed wells near livestock or where low rainfall caused nitrate accumulation in the soil from organic matters. Chemical fertilizers as well as city sewage, livestock wastes, and plant residues are all sources of nutrients which may cause eutrophication. Nitrate may accumulate in plant tissue to undesirable levels only under certain climatic and cultural conditions. A Missouri study of water supplies indicated that most nitrate contaminated wells were (1) in rural locations, (2) shallow, (3) poorly constructed, and (4) in areas where livestock production is the main source of farm income. There was a high degree of correlation between the occurrance and the concentration of nitrate in these wells and their proximity to livestock feeding areas or to septic tank tile fields. A final note is made of the corn farmer as an ecologist, whereby an acre of corn will use 10.5 tons of CO_2 while producing 2.5 tons of plant material and 8 tons of oxygen - enough to support 12 people for a year. (White-Iowa State)

0280 - A7
PESTICIDES,
Environmental Protection Agency, Washington, D.C. Pesticide Advisory Committee,
William M. Upholt.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa p 49-56.

Descriptors: *Pesticides, *DDT, Diseases, Insecticides, Public health, Toxicity, Pesticide residue, Hazards, Poisons, Beneficial use, Water pollution effects.
Identifiers: *Parathion, Malaria, Cancer.

Pesticides are discussed with three main areas of emphasis. DDT is used as an example, but the principles are intended to apply to pesticides generally. The first area of emphasis is of the beneficial use of DDT. Increased production and the control of malaria are two main benefits. Human health hazards from pesticides are next pointed out. Death and illness have been attributed to pesticide poisoning. Currently the human health hazard that is most controversial is the possibility of cancer or birth defects from exposure to pesticide concentrations. Environmental hazards are the last area of concern. Biological accumulation and persistence in the environment are two main problems. The author suggest a drastic reduction in the use of DDT as one solution. Pesticides are useful, but they all carry some risk of damage to man or the environment. (White-Iowa State)

0281 - A1, C1, D1, E1, F4
LIVESTOCK WASTE,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. Paul Taiganides.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 57-66, 1 tab.

Descriptors: *Farm wastes, *Cattle, Poultry, *By-products, Confinement pens, Water pollution effects, Odor, Organic matter, Moisture content, Runoff, Ammonia, Biochemical oxygen demand, Biological treatment, Drying.
Identifiers: *Animal production, *Coprology, Feedlots, Production efficiency, Waste properties, Population equivalent, Waste transport, Treatment processes.

A short comprehensive review is given of the changes in animal production and waste handling

techniques. The transition from pasture to confinement production has met the demand for agricultural food and fiber. There has been a corresponding increase in animal waste management problems. This has given rise to what the author refers to as coprology - manure science. Current coprological technology includes knowledge of manure characteristics, transport methods, waste treatment and utilization schemes, and disposal media. Disposal must be done in such a way and at such a rate that nature will be able to assimilate it without creating environmental problems. (White-Iowa State)

0282 - A3

SEDIMENT: EVERYBODY'S POLLUTION PROBLEM,
Soil Conservation Service, Washington, D.C.
Kenneth E. Grant.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 67-76, 1 tab, 8 ref.

Descriptors: *Sediment, Water pollution effects, *Sedimentation, Agriculture, Soil erosion, Right-of-way, Soil, Farm waste, Water quality, Watersheds, Flood damage, Value, Benefits, Soil surveys, Research and development, Land management.
Identifiers: Nonfarm sources, Soil Conservation Service, Soil capability, Universal Soil Loss Equation, Wind Erosion Equation, Mulch tillage, Conservation Needs Inventory.

Sediment is the nation's largest pollutant. It is not only a pollutant in itself, but a carrier of animal wastes and chemical pollutants. Examples of the enormity of the sediment problem are cited. Nonfarm sources of sediment are a serious and growing problem. The fight against soil erosion has been headed by more than 3000 local soil and water conservation districts in the United States. A Conservation Needs Inventory indicates that 63% of all privately owned land (cropland, pasture, range, forest, other) needs some type of conservation treatment. Examples of the effectiveness of conservation treatment. Examples of the effectiveness of conservation measures are given. Continuing research and cooperation is needed between agencies and the general public in the resource conservation area. (White-Iowa State)

0283 - F1

ECONOMICS OF POLLUTION CONTROL,
Iowa State Univ., Ames. Dept. of Economics.
John F. Timmons.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 77-85.

Descriptors: *Environment, *Water pollution control, Economics, Natural resources, Standards, Programs, Costs, Benefits, Watersheds, Agriculture, Water pollution effects.
Identifiers: *Environmental quality, Goals, Quality standard, Suspended sediment, Production costs.

The paper suggests some ideas and methods that appear useful in understanding and in resolving some of the difficult but important issues emanating from three environmental quality questions. First, what are the standards of environmental quality that can serve as policy and program goals and at the same time engender wide spread and continuing public understanding and support. Next, what are the costs, both monetized and nonmonetized, of both achieving and failure to achieve the stated standards of environmental quality. Thirdly, who pays the costs both with and without achievement of the standards of environmental quality and who gets the benefits. Since environmental quality is a national issue, the author has endeavored to identify and elaborate upon these three major considerations in our quest for improvements in the quality of the natural environment. (White-Iowa State)

0284 - F1

CURRENT CONSERVANCY LEGISLATION,
Iowa House of Representatives, Des Moines.
Dale M. Cochran.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 87-93.

Descriptors: *Soil conservation, *Legislation, Wind erosion, Drainage, Soil erosion, Water pollution effects, Sediment, Rivers, Fertilizers, Pesticides, Agriculture, Iowa.
Identifiers: *Conservancy Districts, Des Moines River, District soil commissioners, Non-farm sources, US Department of Agriculture.

The scope and content of Iowa's Conservancy District bill is explained in this paper. The bill resulted after a review and study of drainage laws indicated that flood control, water pollution, recreation, soil erosion, and others were closely related. Conservation efforts have become rather static for a number of reasons, among them apathy, large operators, and shifts to continuous row crops. The Conservancy bill, as proposed, would regulate farm and nonfarm sources of erosion both by wind and water. The local soil conservation district commissioners would be in charge of soil conservation compliance. Cost sharing would be available for those required to comply. Failure to comply could result in a court order requiring immediate compliance and loss of any cost sharing funds that might have been available. (White- Iowa State)

0285 - F3

POLLUTION CONTROL DECISIONS - WHO SHOULD MAKE THEM,
Resources for the Future, Inc., Washington, D.C.
Edwin T. Haefele.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 95-99.

Descriptors: *Water pollution control, *Pollution abatement, Governments, Legislation, Environment, Taxes, Water pollution effects, *Decision making.
Identifiers: Individual rights, Executive responsibility.

Four lessons have been learned in the developing history of our country to the problems of pollution control. The first lesson is the necessity for legislative determination of policy. Most environmental issues are not problems that can be solved but conflicts that must be resolved. Individual rights is the second lesson. All of us are exercising our individual rights to the detriment of all of us. Rightfull use by each individual is the central core of the problem of over use of common property resources. The need for executive responsibility is the third lesson. The fourth lesson involves connecting the notion of individual right with that of personal interest through the use of taxation and prices as regulatory devices. (White-Iowa State)

0286 - A1, F4

AGRICULTURAL BENEFITS FROM URBAN POLLUTION CONTROL,
Office of the Secretary of the Army, Washington, D.C.
John R. Shaeffer.
In: 33rd Annual Forum, National Farm Institute, February 1971, Des Moines, Iowa, p 101-107.

Descriptors: *Water pollution control, *Sewage treatment, Sewage, Benefits, Agriculture, Environment, Pollutants, Water pollution effects, Pumping, Viruses, Diseases, Fertilizers, Irrigation, Michigan costs.
Identifiers: *Environmental vision, Waste management, Treatment cells.

An environmental 'vision' is needed which encompasses the fact that the environment is a single interacting closed system, and that pollutants are potential resources out of place. Utilizing these ideas, a pilot waste water management scheme for Muskegon County, Michigan is outlined. Sewage is first pumped to the surrounding countryside where treatment calls convert the waste to an odorless clear liquid by using all the forces of nature - air, aerobic bacteria, gravity, sunlight, and time. The liquid is then used as irrigation water and the soil removes the remaining nutrients, heavy metals, and viruses. An under drainage system picks up the pure water and brings it to a stream. For 42 million gallons of Muskegon County sewage a day, 10 thousand acres of land were needed. The costs for the new system are less than bringing the existing plants up to a secondary level of treatment. (White-Iowa State)

0287 - B1, E1

METHODS FOR DISPOSAL OF POULTRY MANURE,
New Zealand Dept. of Agriculture, Christchurch.
P. D. Thompson.
New Zealand Journal of Agriculture, Vol 116, No 1, January 1968, p 44-49. 2 tab, 5 fig.

Descriptors: *Poultry, Fertilizer, Oxidation lagoons, Irrigation efficiency, Solid waste drying, Market value, Weight, Chemical analysis, Larvae, Waste treatment, Waste disposal.
Identifiers: *Cage, Broiler, Sewage sludge, Indoor lagoon, Droppings, Offensive smell, Breeding ground.

The disposal of poultry manure in its various forms can cause problems by the spread of the urban settlement. Disposal of poultry manure should be divided into three stages: the collection of droppings; the removal of the droppings; and the disposal or processing. The volume of poultry manure per 1000 laying birds per week is approximately 32 cubic feet per ton with a moisture content of 70 per cent. Approximately fifty acres of grassland is required to dispose of the annual manure produced from 2500 deep litter layers or 20,000 broilers. Sludge disposal is another method of handling manure. To handle the manure from 1000 birds at a dilution of 1:1, a holding capacity of 10 to 18 cubic feet per day is required. Most of these storage tanks do not exceed 1000 cubic feet. The disposal by irrigation is one of the common practices of emptying these tanks. Still another method of disposal is the lagoon. A newer method of disposal is drying the manure. This method is expensive, and therefore requires a sure market to be practical. Poultry farmers should realize the many profitable alternatives for the disposal of manure. (Bundy-Iowa State)

0288 - E3

FIELD CROP IRRIGATION WITH OXIDATION POND EFFLUENT,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering; and Mississippi Agricultural and Forestry Experiment Station.
J. B. Allen, and J. C. McWhorter.
American Society of Agricultural Engineers, Paper No 71-246. 29 p, 10 tab, 8 fig, 12 ref. OWRR A-040-MISS (3).

Descriptors: *Oxidation lagoons, *Biochemical oxygen demands, Furrow irrigation, Rainfall, Wheat, Soybeans, Sudangrass, Clovers, Alfalfa, Mississippi crop yield, Nutrient requirements, Nitrogen, *Irrigation efficiency, *Water reuse.
Identifiers: Test plot, Coliform density.

The purpose of this 18-month study was to investigate the use of oxidation pond effluent for the

irrigation of wheat, soybeans, sudax, alfalfa, and sweet clover in Mississippi. The study was conducted at the Agricultural and Biological Engineering Farm using effluent from a 2/3 acre oxidation pond located at the farm. All plots were furrow irrigated. Three irrigation treatments were used; irrigation with effluent, conventional irrigation, and no irrigation. A total of 23.8 inches of irrigation water was applied during the period from May 13, 1969 to October 29, 1970. The observed rainfall during this period was 81.95 inches, and the total of rainfall plus irrigation was 105.8 inches. At various times during the first growing season, samples of the effluent from the oxidation pond, the ground water beneath the plots, and stream flow from nearly sampling locations were collected for bacteriological and chemical analysis. The yield responses to both types of irrigation were small, probably because of a high ground water table at the plot location. There were no large yield responses resulting from the nutrients contained in the oxidation pond effluent. These nutrients were not sufficient to maintain a high level of crop production. (Bundy-Iowa State)

0289 - D3, F3

TREATMENT OF LONG ISLAND DUCK FARM WASTES,
Cornell Univ., Ithaca, N.Y. Dept. of Sanitary Engineering.
Charles D. Gates.
Journal Water Pollution Control Federation, Vol 35, No 12, December 1963, p 1569-1579. 7 fig, 2 tab, 16 ref.

Descriptors: *Ducks, *Chlorine, *Coliforms, *Water management, *Chlorination, Farm wastes, Water pollution, Biochemical oxygen demand, Lagoons, Sludge, Waste disposal, Laboratory tests, Microorganisms, Salmonella, Effluents, Shellfish, Waste treatment, Oxidation lagoons.
Identifiers: Residual coliform densities, Underwater lagoon, Most probable number.

The presence of year round duck farms in the Moriches Bay area has resulted in pollution which interferes with other legitimate uses of these waters. A study was made and the results are reported in this paper. The conclusion is that the successful disinfection of duck farm lagoon effluents by chlorination would require a number of additions to, and changes in, present treatment practice. These would include (1) a separate basin to provide 15 minute contact time between the chlorine and the settled effluent; (2) facilities for adding the chlorine and thoroughly mixing it with the effluent; (3) some means of dose and/or residual control of the chlorination by the farm operator; (4) some administrative means of ensuring compliance with this required treatment. (Hazen-Iowa State)

0290 - C4

CORYNEFORM BACTERIA IN POULTRY DEEP LITTER,
Edinburgh Univ. Dept. of Bacteriology.
H. E. Schefferle.
Journal of Applied Bacteriology, Vol 29, No 1, 1966. p 147-160, 2 tab, 57 ref.

Descriptors: *Bacteria, *Poultry, Farm wastes, Hydrogen ion concentration, Laboratory procedure, Decomposing organic matter, Biodegradation, Salt tolerance, Organic acids, Ureas, Vitamin B, Ammonia, Genetics, Classification, Pollutant identification, Waste treatment.
Identifiers: *Coryneform bacteria, Litter, Uric acid, Biochemical characteristics, Growth factors, Deep litter, Build up litter.

A detailed discussion of bacteria found in poultry litter is presented. The most frequently occurring bacteria in poultry litter is the coryneform. The paper discusses the characteristics and classification of the coryneform bacteria isolated during the investigation. The procedures for isolating and differentiation of the various strains is discussed. The actual counts of coryneform bacteria in the region 10 to the 9th power - 10 to the 11th power/g of fresh material did not appear to be related to the physical conditions of the litter. Three hundred and eleven strains of coryneform bacterial were examined and compared to those found in poultry litter. (Hazen-Iowa State)

0291 - C4

COMPARISON OF MEDIA FOR ISOLATION OF SALMONELLAE AND SHIGELLAE FROM FECAL SPECIMENS,
Center of Disease Control, Atlanta, Ga. Enteric Bacteriology Unit.
C. Dunn, and W. J. Martin.
Applied Microbiology, Vol 22, No 1, p 17-22, July 1971. 5 tab, 38 ref.

Descriptors: *Salmonellae, *Shigellae, *Pathogenic bacteria, Laboratory, Enteric bacteria, Bacteria, Isolation, Waste treatment.
Identifiers: Transport media, Plating media, Enrichment broth media, Bacteria population, Clinical specimens, Isolation rate, Recovery rate.

Five transport media, eight plating media, and three enrichment broth media for the isolation of salmonellae and shigellae were evaluated. Eight laboratories in widely separated regions of the United States participated in this evaluation by submitting 490 fecal specimens in the transport media provided. The results suggest that the newer transport media may not offer any advantage over the use of buffered glycerol-saline in the isolation of these enteric pathogens. Shigellae were best isolated by direct inoculation, whereas salmonellae were isolated in greater numbers after tetrathionate (without Brilliant Green) enrichment with subsequent culturing on the plating medium. The use of a variety of plating media is recommended for the recovery of a larger number of these enteric pathogens. (Bundy-Iowa State)

0292 - A3, A9

AGRICULTURAL LAND DRAINAGE AND STREAM POLLUTION,
John M. Henderson.
Proceedings of the American Society of Civil Engineers, SA6, Vol 88, November 1962. 4 tab, 11 ref, p 61-75.

Descriptors: *Water pollution sources, *Biochemical oxygen demand, *Drainage effects, Public health, Waste water treatment, Zoonoses, *Farm wastes, Waste identification, Diseases, Runoff, Chemical properties, Physical properties.
Identifiers: *Human disease hazards, Organic pollution, Health hazards, Waste characteristics, Water-borne diseases, Population equivalents.

The inherent characteristics of organic pollution contributed to agricultural land drainage by farm animals are investigated as well as whether this contribution can be a significant problem in stream pollution. The nature of abatement measures is outlined, together with their practicability and effectiveness. Human diseases hazards in water-borne animal wastes are reviewed. (Christenbury-Iowa State)

0293 - F4

SOUTHERN WORKERS REPORT RESEARCH,
W. M. Smith.
Poultry Digest, March 1971, p 136-137.

Descriptors: *Eggs, *Effects, *Poultry, *Farm wastes, DDT, Phosphorus, Proteins, Confinement pens, Oysters, Calcium, Feeds, Amino acids, Wheat, Sodium.
Identifiers: *Egg shells, Egg quality, Egg production, Albumen, Chicken housing, Cow manure.

The text gives summaries of papers presented at a recent meeting of the Association of Southern Agricultural Workers at Jacksonville, Florida. Lighting eggs during incubation may hasten their hatching. Egg production drops after six weeks of feeding DDT at 1200 ppm; shell thickness and shell weight are reduced about 10%. Wire-floor-reared pullets were heavier at 4 and 20 weeks, laid better, and lived better than those raised on litter. Oyster shell strengthens egg shells. Caged hens require more sodium in the ration than do those on litter. (Hazen-Iowa State)

0294 - A8, C4

MANURE MITES IN INTEGRATED FLY CONTROL.
Poultry Digest, February 1971. p 68.

Descriptors: *Poultry, *Biocontrol, Mites, Farm waste, Larvae, Environmental effects, Population, Predation, Air temperature, Pollution abatement, California.
Identifiers: *Fly control, Mesostigmatid, Thinoseis spinosus, Fuscuropoda vegetans.

The manure mite is a biological control method in which a predator population eliminates a fly problem. Several species of mites have been found in California as being associated with the poultry industry. Some of the different mites being associated with flies on poultry ranches include Mesostigmatid mite, Thinoseis spinosus, and the Fuscuropoda vegetans. These mites do not get on people or birds, but they stay in the manure. They are most active in the winter, and can easily be seen on the surface of the manure when it cools off. The manure mite is a major predator on fly eggs. The manure mite in itself will not control flies, but can be used along with pesticides for control. (Bundy-Iowa State)

0295 - B2, D4

OXIDATION DITCH IN CAGE LAYER HOUSE.
Poultry Digest, July 1971. p 337.

Descriptors: *Poultry, *Farm waste, Bacteria, Odor, Foaming, Water circulation, Solids, Waste treatment, Biochemical oxygen demand, *Waste water treatment, *Oxidation lagoons.
Identifiers: *Manure water mixture, Feathers, Mechanical failure, Cage laying house, Oxidation ditch.

An oxidation ditch under a laying flock presented no major problems during a two year study. This was a study made on a 936 bird caged flock in Northern Ireland. The oxidation ditch is 68 feet long with a channel width of 44 inches. The liquid depth is maintained between 3 1/4 to 3 1/2 feet deep for an approximate capacity of 1.8 cubic feet per bird. Waste production of the birds averaged 254 pounds per day with a biological oxygen demand of the fresh droppings of 40,860 parts per million. This was a daily B.O.D. load on the ditch of 10.3 pounds. It was necessary to empty the ditch completely when the solids content of the liquid rose above the 30,000 ppm level - about twice a year. Bacterial activity in the ditch during the first cycle of storage was responsible for loss of 43% of the total solids, 60% of the chemical and biological oxygen demand, and 66% of the nitrogen. The manure water mixture in the ditch was odorless. (Bundy-Iowa State)

0296 - B1, F5

A NEW APPROACH TO CAGE WASTE DISPOSAL IN A CANINE LABORATORY,
Veterans Administraton Hospital, West Roxbury, Mass. General Medical Research Dept.
P. Godin, and J. Belko.

Laboratory Animal Care, Vol 18, No 3, June 1968. p 401-404, 2 fig, 2 ref.

Descriptors: *Waste disposal, *Animal parasite, Laboratory, Labor, Moisture content, Water pollution control, Equipment, *Pollution abatement.
Identifiers: *Automatic flush waste system, Dog cage wastes, Compactness, Flushing.

The need for the improvement of animal housing to meet future standards prompted the design of a new type of animal cage at the Veterans Administration Hospital. This particular dog cage system has been in use for 3 years, housing 25 animals in a small area, yet meeting all the requirements for good animal care. The cages are custom-installed prefabricated fiberglass, featuring a central drain that ties into existing public sewer lines. An automatic flush system connected to the drain lines reduces both odors and labor. The general condition of the dogs have improved, and the number of parasites diminished with the way of cleaning. The relative humidity rises to 57% in the first hour after cleaning, then maintains a level of 47-50% throughout the day. This system may readily be adopted to existing or new animal facilities. (Bundy-Iowa State)

0297 - B3

BROODER-GROW CAGES OVER DEEP PIT,
Roland C. Hartman.
Poultry Digest, April 1971, p. 165-168.

Descriptors: *Poultry, *Farm wastes, Structural design, Ventilation, Waste storage.
Identifiers: Pit storage, Cages.

This article describes a brooder-growing house for pullets. The building measures 36' X 390' and has four 370' rows of double-decked cages on A-frames designed for starting 38,000 pullet chicks and rearing them until 20 to 22 weeks of age. The cages are set up over a deep pit. Air is exhausted from beneath the floor and brought in under the caves. Heat is supplied by a hot water pipe running down the center of each row of cages. (Parker-ISU)

0298 - A2, B1

MANAGING SWINE WASTES TO PREVENT POLLUTION,
Nebraska Univ., Lincoln. Agricultural Engineering Extension.
E. A. Olson.
Nebraska Farmer, April 1971, p. 18, 20, 22, 2 fig.

Descriptors: *Farm wastes, *Wastewater disposal, Lagoons, Waste storage, Settling basins, Hogs.
Identifiers: *Waste management, Nebraska Water Pollution Control Council.

The management of swine wastes to keep them from polluting our streams is one of the new production problems facing the swine producer. Site selection is especially important as related to odor problems and sufficient space for waste handling facilities. Runoff from swine lots must not reach streams. Therefore facilities must be built to store and dispose of wastes. This article discusses some systems and problems associated with swine waste disposal. (Parker-ISU)

0299 — E1, F5

HYDROLOGY OF SPRAY - RUNOFF WASTEWATER TREATMENT,
Robert S. Kerr, Water Research Center, South Central Region, Federal Water Pollution Control Administration U.S. Dept. of the Interior, Ada, Oklahoma.
Richard E. Thomas, James P. Law, Jr., Curtis C. Harlin, Jr.
Journal of the Irrigation and Drainage Division Proceedings of the American Society of Civil Engineers, Vol. 96, No. 3, 1970, P. 289-298. 4 tab, 4 fig, 15 ref.

Descriptors: *Hydrology, *wastewater treatment, *soil disposal fields, runff, systems analysis, water balance, water measurement, sprinkler irrigation.
*Identifiers: *Spray runoff, sprinkler application.

A 400-acre soil treatment system designed to treat 3.8 mgd of wastewater from a cannery was selected for a research study. Four watersheds with a total area of 11.4 acres were instrumented to evaluate the hydrology of the treatment system. The liquid measuring procedures used in the 12-month study accountd for 93% of the total liquid applies. On a monthly basis evaporative losses ranged from 9% to 35% of the liquid accounted for; and deep soil percolation ranged from 16% to 28% of the liquid accounted for. A change in the spray schedule from 6 hr per day to 8 hr per day and a reduction in the treatment area used from June through September suppressed but did not eliminate the effect of summer weather on the ratio of evaporative losses to runoff. During the 12-month study, evaporative processes accounted for 18% of the liquid; 61% returned to the surface stream as runoff; and 21% percolated through the soil. These values were obtained during a relatively wet year; therefore, evaporative losses could be expected to be relatively greater in normal and dry years. (Parker - ISU)

0300 — A1, B1, F4

WASTE MANAGEMENT OF LIVESTOCK OF THE PLAINS STATES WITH EMPHASIS ON BEEF CATTLE,
The Ad Hoc Interdisciplinary Committee on Feedlot Pollution of the Research Committee, Great Plains Agricultural Council.
The Research Committee by the Ad Hoc Interdisciplinary Committee on Feedlot Pollution of the Research Committee, Great Plains Agricultural Council, July 1969, pp. 1-11.

Descriptors: *Farm wastes, *livestock, odor, feedlots, air pollution, ammonia, sprinkler irrigation, lagoon, microbial, bacteria, runoff.
Identifiers: *Great Plains, Composting.

Representatives of the ad hoc committee met in Lincoln, Nebraska on February 10 to consider the charge outlined by the Research Committee of the Great Plains Agricultural Council: 'to study the scope and nature of current research on problems of feedlot pollution and to develop recommendations for consideration by the research committee at their next meeting." The ad hoc committee set up its organization at this meeting, outlined its procedure, identified sources of its information, and adopted the following resolution: "This Committee will be concerned with waste management of livestock of the Plains States with emphasis on beef cattle." At its second meeting on May 13 and 14, the ad hoc committee reviewed past and current research in the United States. It inventoried and discussed in detail the relevant research activity in th Great Plains. Problem areas were identified which, in the Committee's opinion, have special significance for the Great Plains and which appear to require additional research emphasis. This report summarizes the review of the national research effort and comments on its significance to research planners in the Great Plains. Current research in the Great Plains is outlined. Finally, this report states the Committee's recommendations for research emphasis in the Great Plains and for the establishment of a standing committeee to implement interstate coordination of research in waste management. (Bundy - ISU)

0301 - B1, F2

STATE AGENCIES REGULATING CONFINED ANIMAL FEEDING OPERATIONS,
Environmental Protection Agency, Washington, D.C.
J. M. Sweeten.
Environmental Protection Agency Division of Technical Operations Open-File Report (TO 01.0 .543/1) 1971. 37 p.

Descriptors: *Farm wastes, Federal Government, *State Governments, Regulation, Control, Feed lots, Standards, *Administrative agencies.
Identifiers: *Regulatory control.

State Agencies that regulate livestock feeding operations and their responsibility with respect to environmental problems are identified. The reader will thus know which agencies should be contacted about establishing a confined feeding operation, improving or expanding existing feeding facilities, and reporting nuisances arising from feedlots. The information was collected by sending a letter to each State solid waste planning agency requesting: (1) the name and address of all State agencies that should be contacted prior to establishing a confined feeding operation; (2) the types and limits of control exercised by these agencies. The types of agencies exerting regulatory control over animal feeding operations in each State are summarized in a table. The availability of technical assistance in designing feedlot and waste treatment systems is included when specifically mentioned by the respondent agencies. General observations regarding nationwide control over animal feeding operations are made. (Bundy-Iowa State)

0302 - A2, A9, C4

SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF,
Kansas State Univ., Manhattan. Dept. of Bacteriology.
J. R. Miner, L. R. Fina, and Cheryl Platt.
Applied Microbiology, Vol. 15, No. 3, May 1967, p 627-628, 1 tab, 10 ref.

Descriptors: *Farm wastes, *Runoff, *Pathogenic bacteria, Microorganisms, Cattle, Salmonella, Pollutant identification.
Identifiers: *Feedlot runoff, *Salmonella infantis, Litter.

Ten isolates of Salmonella infantis (serologically typed) were found in litter and runoff collected from two experimental feedlots near the Kansas State University campus. Pathogenic implications are discussed relative to recreation water sites. Agricultural runoff maybe a source of viable salmonellae. (Christenbury-ISU)

0303 - C4

METABOLIC FATE OF UBIQUINONE-7 Isolation and Identification of Metabolites in the Urine, Liver, Bile and Feces,
Takeda Chemical Industries Ltd., Osaka (Japan). Biological Research Labs.
Takeshi Fujita, Shigeharu Tanayama, and Ziro Suzuoki.
Journal of Biochemistry, Vol. 69, No. 1, 1971, p 63-71, 9 fig., 2 tab., 17 ref.

Descriptors: Radioactivity, Urine, Laboratory tests, Chromatography, Chemical analysis, Chemical properties.
Identifiers: *Ubiquinone-7, Urinary metabolites, Acid chromatography.

The metabolic conversion of methoxy-14C-labeled ubiquinone-7 was investigated in the rat following intravenous injection. From urine two radioactive metabolites were isolated and identified. The major metabolite is a new compound whose structure is 2,3-dimethoxy-5-methyl-6 (3'-methyl)-1, 4-benzoquinone (compound B) whereas the other one is gamma-lactone of 2,3-dimethoxy-5-methyl-6- (5'-carboxypentyl-3'-hydroxy-3'-methyl)-1, 4-benzo-quinone (compound A). Compound B accounted for about half of the urinary metabolites and compound A a quarter. Both metabolites were excreted as conjugates into urine. About 90% of the hepatic radioactivity was identified as unchanged ubiquinone-7. Chromatographic examinations indicated the occurrence of compounds A and B in bile and feces, presumably as conju-

gates. The main biotransformation of ubiquinone-7 was thus proved to be oxidative shortening of the side chain. The chain with 7 isoprenoid units was eventually degraded to 3-carboxy-3-methylpropyl group in compound B via 5-carboxypentyl-3-hydroxy-3-methyl group in compound A, possibly due to Beta-oxidation of the latter. Metabolic conversion of ubiquinone-7 to ubiquinone-9 or ubiquinone-10 was not recognized in the present studies. (Hazen-ISU)

0304 - A5, D1, E1

STATE OF THE ART REVIEW: TREATMENT AND DISPOSAL OF SWINE WASTES,

Mississippi State Univ., State College, and Soil Conservation Service, New Albany, Miss.
Adnan Shindala, and James H. Scarbrough.
Water and Sewage Works, Vol. 118, No. 2, p 50-57, February 1971. 2 fig, 4 tab, 44 ref.

Descriptors: *Odor, *Waste treatment, *Waste disposal, Chemical oxygen demand, Water pollution, Air pollution, Lagoons, Anaerobic digestion, Disposal, Farm wastes, Cattle, Confinement pens, Hogs, Biochemical oxygen demand, Alkalinity, Design criteria.
Identifiers: Odor production, Odor control, Environmental control, Swine, Characteristics, Loading rates.

Confinement production of animals yields large volumes of animal wastes which constitutes a tremendous oxygen demand on natural streams if not disposed of properly. Animal wastes disposal has become one of the major problems facing the livestock industry today. Among the many combinations of processes suggested for the treatment of animal wastes, lagooning has received the widest acceptance. The low cost of construction and operation of lagoons has resulted in their wide adoption for the treatment of all types of animal wastes. If properly located, designed, constructed, and maintained, anaerobic lagoons provide the most economical means of treating and disposal of swine wastes. Effluents from anaerobic lagoons are offensive and must receive further treatment. Anaerobic lagoons must only be used as an initial step rather than a complete facility and must be followed by other means of treatment prior to adequate and safe disposal of the effluents. (Hazen-ISU)

0305 - C3

RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES,

Indian Agricultural Research Inst., New Delhi. Div. of Soil Science and Agricultural Chemistry.
R. D. Laura, and M. A. Idnani.
Current Science, Vol. 40, No. 7, 1971, p 158. 1 tab, 3 ref.

Descriptors: *Drying, Nitrification, Nitrogen compounds, Nitrogen, Farm wastes.
Identifiers: Anaerobic fermentation, Microbial decomposition, Nitrogen mineralization.

Nitrogen in organic manures of animal or vegetable origin is complex in chemical nature due to its presence in the form of proteinaceous compounds which are largely insoluble in water. If such nitrogen is to be transformed to mineral forms which are easiy available to plants, the parent materials must be subjected to the agencies of decomposition in the soil. The effect of drying on the quantity of nitrogen mineralized in an animal manure, viz., dung spent-slurry is the object of an investigation. Sun-drying of spent-slurry has drastically reduced the rate of nitrogen mineralization. The reason may be irreversible desiccation of organic colloids of the manure on sun-drying and thus their increased resistance to subsequent microbial decomposition in soil. The conclusion is that apart from the chemical composition of an organic manure, the treatment given to it before applying to soil should also be taken into consideration while evaluating its nitrogen supplying power to growing plants. The practical implication is that to exploit full potential of the benefits that can be obtained from organic manures, they should never be subjected to drying before applying. (Hazen-ISU)

0306 - D4, F5

ANAEROBIC DIGESTION FAILURES,

Bergen County Sewer Authority, Little Ferry, N.J.
Stanley A. Peterson, and Herman R. Zablatzky.
Journal Water Pollution Control Federation, Vol 40, No 4, p 581-585, April 1968. 2 fig, 5 tab, 3 ref.
Descriptors: *Anaerobic digestion, *Alkalinity, Lagoons, Hydrogen ion concentration, Waste water treatment, Sludge, *Sludge digestion, Digestion (Decomposition).
Identifiers: Isolation, *Ammonium alkalinity, Thickeners, Volatile acids, Gas production, Sodium hydroxide, Potassium hydroxide, Calcium oxide, Gas agitation.

Two separate incidents of digester failure are discussed, along with the materials and methods used to help them recover. Parameters of pH, alkalinity, CO_2 content, volatile acids content, and gas production were continuously monitored and that data is presented in graphical form. Underconcentration of feed sludge may lead to failure by the depletion of alkaline buffering materials. Over concentration of feed sludge allows buildup of ammonium alkalinity to toxic levels. One of the essentials of good digester maintenance is early diagnosis of problems through close observance of the major parameters. Ideal sludge concentration varies from plant to plant and must be determined by the individual operator. (Lowry-Texas)

0307 - C4

ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS ARMIGERA AND ITS PERISTENCE IN ABIAN FECES,

Cape Town Univ., (South Africa). M. R. C. Virus Research Unit.
Hela Gitay, and A. Polson.
Journal of Invertebrate Pathology, Vol. 17, No. 2, p 288-290, 1971. 4 fig.

Descriptors: *Viruses, *Isolation, Farm wastes, Birds, Laboratory tests.
Identifiers: *Cattle egret, Procedure, Feeding habits.

This paper describes the procedures by which a granulosis virus was isolated. Feces of the Cattle egret, Arboela ibis, that feed on the caterpillars of the bollworm and the lucerne caterpillar were collected and found to contain intact inclusion bodies of granulosis virus but no polyhedra. The granulosis virus was isolated from the bollworm caterpillars, Heliothis armigera. (Christenbury-ISU)

0308 - B1

DEEP PIT SLAT-FLOOR BREEDING HOUSE,

Roland C. Hartman.
Poultry Digest, December 1970, p. 580-583. Fig. 7.

Descriptors: *Poultry, *Farmwastes, Ventilation, Design data.
Identifiers: *Slatted floor, Evaporative cooling.

This is a description of a slatted floor confinement house for poultry breeding flocks. The building has a 6 feet-5 inches ceiling height room above a 6 feet-0 inch pit, all above ground level. Slats are made of 2 X 4's split to 1 7/8 inches X 1 7/8 inches. Fans draw air from the pit area. The air enters through continuous vents near the ceiling passing first through an evaporative cooler made of a fogger and cooling pad. INCHEShese units were built by Pace/Setter Inc. on the high desert near Hesperia, California. (Parker-ISU)

0309 — A5, B1,D2

CONTROL OF POULTRY HOUSE EXHAUST ODORS,

USDA Agricultural Research Service,
George B. Willson.
Poultry Digest, p. 332-334, July 1971. 2 fig., 1 tab., 4 ref.

Descriptors: *Poultry, *odors, *particle size, air circulation, waste treatment, drying, wetting, air pollution effects, waste.
Identifiers: *Air filter system, water scrubbing, masking agents, ammonia-like odor, respirator.

Filtering exhaust air from poultry houses will reduce the odor. Pad-type filters were effective in removing the dust and reducing the odor, but clogged too quickly to be practical. Baffle impingement filters were evaluated for dust and odor control. The effectiveness of removing the dust and odor was improved when the vanes were washed clean. The study was conducted at Uniontown, Maryland in three 12,000 bird windowless caged laying houses. The spray of .8 gallons per minute per hen was required for the best results. The water was recycled through a storage tank to reduce the amount of water required to operate the system. It was concluded that water spray chambers can reduce substantially the odor exhausted from the building. Studies also showed there is not a direct relationship between dust and odor. (Bundy-Iowa State).

0310 - A6, D3

IMPROVEMENTS IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION,

Washington State Univ., Pullman. Coll. of Engineering.
W. L. Bamesberger, and D. F. Adams.
Environmental Science and Technology, Vol 3, p 258-261, 1969. 2 fig, 3 tab, 11 ref. Grant No. AP-00215 Division of Air Pollution, U.S. Public Health Service.

Descriptors: *Hydrogen sulfide, *Oxidation, Chemical reactions, Analytical techniques, Ions, Laboratory tests, Efficiency performance, Colloid suspension, Hydrogen ion concentration.
Identifiers: *Cadmium hydroxide, Absorption solution, Aspirator, Alkaline solutions, Jacobs method.

The technique of collecting hydrogen sulfide at ambient air concentrations in cadmium hydroxide suspension, in use for more than 10 years, is reported to prevent loss from sulfide oxidation. A comparison of this procedure with bromine microcoulometric titration and with calculations of the anticipated hydrogen sulfide concentrations produced in a laboratory gas dilution system revealed an unpredictable and nonreproducible loss of hydrogen sulfide as high as 80% during collection of a 2-hour impinger sample containing cadmium hydroxide suspension. Evidence is given of the photodecomposition of cadmium sulfide in the impinger and techniques are described to reduce loss of sulfide during sampling and storage. The suggested modification provides reproducible hydrogen sulfide recoveries. Reliable quantitative results were obtained. (Bundy-Iowa State)

0311 - A5, D4

WHY STIRRING MANURE REDUCES ODORS,

Pennsylvania State Univ., State College. International Poultry Industries Exposition.
Glenn O. Bressler.
Poultry Digest, p 60, February 1971.

Descriptors: *Anaerobic condition, *Air circulation, *Aeration, Anaerobic condition, Odors, Bacterial, Drying, Gases, Velocity, Movement, Air pollution, *Farm wastes, *Waste treatment.
Identifiers: Sewerage gas, Anaerobic bacteria.

Anaerobic bacterial action is the primary cause of the offensive odors in manure. High velocity air cir-

culating over the droppings hinders the bacterial action and reduces the odor. However, the high velocity air movement over the manure does not stop the bacterial action underneath the surface. To rid the odor producing gases from forming, the anaerobic bacteria must be destroyed. By aerating with fans and stirring several times daily, most of the anaerobic bacteria are destroyed. This combined operation destroys the odor as well as increases the speed of drying the droplets. (Bundy-Iowa State)

0312 - C4

REDUCTION AND ESTERIFICATION OF CHOLESTEROL AND SITOSTEROL BY HOMOGENATES OF FECES,
Montefiore Hospital, Bronx, N.Y.
R. S. Rosenfeld, and L. Hellman.
Journal of Lipid Research, Vol 12, No 2, 1971, p 192-197. 4 tab, 23 ref.

Descriptors: *Lipid, Microorganisms, *Waste treatment, Incubation, Aluminum compound, Waste water treatment, Acids.
Identifiers: *Cholesterol, *Sitosterol, *Feces, Free sterols, Bile acid, Estification.

Mixtures of cholesterol-1,2-3H and sitosterol 4-14C have been incubated with suspensions of feces in order to compare the behavior of the phytosterol with transformations known to take place with cholesterol under these conditions. Within the limitations of the study both labeled sterols were esterified to the same extent, and reduction of the delta 5 double bond to the saturated analogue proceeded equally in both substances. After correcting for procedural losses, the recoveries of 3H and 14C from the incubations were always less than the controls; this strongly indicates destruction of sterol by feces microorganisms. (Bundy-Iowa State)

0313 - B3, D2

TYPES OF MANURE DRYERS.
Poultry Digest, p 338-340, July 1971.

Descriptors: *Poultry, *Farm wastes, *Drying, Capital investment, Moisture content, Dehydration, *Waste treatment.
Identifiers: Rotary dryers, Conveyor dryers, Vibrating conveyor dryers, Vibrating type conveyor, Three pass drum, 2 stage drying.

With the increase in demand for poultry manure drying, several dryers operating on different principles have been put on the market. One type of dryer subjects manure to 1400 degrees of temperature in a rotating drum. Another type dryer uses the conveyor principle. The conveyor-type unit pulls the manure back and forth through a unit with air temperatures of 400 to 600 degrees. A modified version of the conveyor type vibrates. This is a new type expected to be on the market during the summer of 1971. The temperature ranges from 1000 degrees at the start and drops to 400 degrees. A three-pass drum method of drying utilizes hot gas temperatures up to 1800 degrees, and allows 75 feet of horizontal travel in a 25 foot drum. A two stage drying method is being promoted which will reduce the drying cost. The first stage uses mechanical stirrers on the manure aided by a high velocity air current. This first stage reduces the moisture without applying heat to the manure. While the second stage process drys the manure down to the desired moisture content. The two stage process allows more manure to be dryed or allows for a smaller dryer. (Bundy-Iowa State)

0314 - A5, A6, C3, C4, D1

GASES AND ODORS FROM POULTRY MANURE: A SELECTED BIBLIOGRAPHY,
Merck and Co., Rahway, N.J. Quinton Research Labs.
W. E. Burnett.
Poultry Science, Vol 50, No 1, p 61-63, January 1971. 35 ref.

Descriptors: *Poultry, *Odor, *Gases, *Farm wastes, *Bibliographies, Research and development, Management.

This is a bibliography of 35 articles pertaining to gases and odors from poultry wastes. The articles are grouped into three divisions: (1) The microbiology and chemistry of gas and odor production; (2) Identification and determination of gases and odors; (3) Odor control methods. (Hazen-Iowa State)

0315 — A7

IF COW MANURE BREAKS DOWN DDT. . . ,
R. C. Hartman.
Poultry Digest, March 1971. pp. 109.

Descriptors: *DDT, Farm wastes, Poultry, Insecticides.
Identifiers: * Decomposition, DDT, build-up.

Cow manure reportedly breaks down DDT in the soil in a few weeks. The question is raised as to whether poultry manure will work as well. Studies need to be made to determine whether it is necessary to use fresh poultry manure to degrade DDT, or whether processed manure can do the same job. (Hazen—Iowa State)

0316 - A5, A6, A9, C5

EFFECTS OF ATMOSPHERIC AMMONIA ON THE PIG,
Ohio Agriculture Research and Development Center, Wooster. Dept. of Agricultural Engineering; and Ohio Agriculture Research and Development Center, Wooster. Dept. of Animal Science.
D. P. Stombaugh, H. S. Teague, and W. L. Roller.
Journal of Animal Science, Vol 28, 1969, p 844-847. 2 fig, 2 tab, 7 ref.

Descriptors: *Hogs, *Ammonia, Air pollution, *Air pollution effects, Toxicity, Ventilation, Farm wastes, Confinement pens, Odor, Gases, Growth rates, Laboratory tests.
Identifiers: *Response, Anhydrous ammonia, Feed consumption, Feed efficiency, Concentration, Exposure time.

Duroc pigs were subjected to four levels of ammonia air contamination. Ammonia concentration had a highly significant adverse effect upon feed consumption and average daily gain. There was no significant effect upon efficiency of feed conversion. Corynebacterium and Pasteurella were isolated from the ethmoid turbinates of two animals, otherwise all gross, microscopic and bacteriological observations were unaffected by ammonia concentrations. Frequency of coughing was increased in animals exposed to the higher ammonia levels. (Hazen-Iowa State)

0317 - A5, A6, A9, D1

AIR POLLUTION ASPECTS OF ODOROUS COMPOUNDS,
Litton Systems, Inc., Bethesda, Md. Environmental Systems Div.
Ralph J. Sullivan.
Available from the National Technical Information Service as PB-188089, $3.00 in paper copy, $0.95 in microfiche. September 1969. 245 p, 3 fig, 444 ref. Contract No PH-22-68-25.

Descriptors: *Odor, *Air pollution effects, *Classification, Air pollution, Air environment, Pollution abatement, Costs, Property values, Farm wastes, Effects, Public rights, Theoretical analysis, Economics.
Identifiers: *Odor perception, *Sources, Detector, Nose, Description, Characteristics, Intensity, Acceptability, Public opinion, Allergies.

Offensive odors provoke people into complaining about air pollution. They may cause both mental and physiological effects such as nausea, headache, loss of sleep, loss of appetite, impaired breathing, and in some cases, allergic reactions. The most offensive odors come from Kraft paper mills, animal rendering plants, chemical plants, petroleum refineries, diesel engines, sewers and sewage treatment plants, and metallurgical plants. The most generally accepted method for abating most odor pollution problems is incineration. Other methods of control include: adsorption, chemical scrubbing, containment, process changes, and masking or counteracting the odors. The cost of abatement depends on the odor pollution problem and the source. The human nose is the only reliable odor detector. (Christenbury-Iowa State)

0318 - A2, A4, C3

RUNOFF, SOLID WASTES, AND NITRATE MOVEMENT ON BEEF FEEDLOTS,
Agricultural Research Service, Lincoln, Nebr.; and Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
C. B. Gilbertson, T. M. McCalla, J. R. Ellis, O. E. Cross, and W. R. Woods.
Journal Water Pollution Control Federation, Vol 43, No 3, Part 1, p 483-493, Mar 1971. 11 p, 2 fig, 6 tab, 18 ref.

Descriptors: *Farm wastes, *Water pollution sources, *Path of pollutants, *Confinement pens, Runoff, Water quality, Nitrates, Groundwater, Surface waters, Water pollution, Industrial wastes.
Identifiers: *Feedlot wastes.

A study of the effect of feedlot slope and cattle densities on the quantity and quality of runoff resulting from rainstorms and snowmelt, the downward movement of pollutants into the soil profile on unpaved feedlots, and the amount of solids accumulation on the feedlot surface revealed that feedlots with 18.58 sq m/head yielded 5.6 metric tons dry matter/day/ha, whereas those with 9.29 sq m/head yielded 7.6 metric tons/day/ha. Feedlot slope had little effect. About 30 percent of the solids were volatile. Runoff quantity and quality depended more on rainfall than slope or cattle density, but high-density lots yielded 130 to 170 percent more winter runoff than low-density lots. Winter runoff averaged 6.2 to 17.6 metric tons/ha-cm, with about 50 percent volatile. Nitrate movement in soil after 1 yr was minimal. (Knapp-USGS)

0319 - D4, E1

FARM WASTE DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale.
Cooperative Extension Service, Purdue University, AE-80, Feb 1971. 10 p, 1 tab, 5 fig, 34 ref.

Descriptors: *Farm wastes, *Waste disposal, *Lagoons, *Oxidation lagoons, Aerobic conditions, Anaerobic conditions, Algae, Organic matter, Volume, Drying, Odor, Nitrogen, Aeration, Hogs, Cattle, Poultry, Research and development, Soil, Soil contamination.
Identifiers: *Disposal systems, *Land disposal, Oxidation ditches, Aerated lagoons, Composting, Refeeding, Anhydrous ammonia, Waste characterization.

In this publication the present available alternatives for animal waste disposal and criteria for selection of these methods are presented. A brief literature review tells of research being done in all areas and aspects of animal waste disposal. Land disposal still remains the most suitable and most widely used disposal method. Research indicates that approximately 250 pounds of nitrogen can be added to each acre of soil without unduly polluting it. Other methods of disposal discussed are aerobic, anaerobic, and mechanically aerated lagoons, as well as oxidation ditches, composting, and drying. Recom-

mendations are made for the chemical treatment of animal wastes to reduce odors while spreading. (White-Iowa State)

0320 - F3

AGRICULTURAL WASTE IN AN URBAN ENVIRONMENT.

New Jersey Animal Waste Disposal Task Force.

Proceedings of the Conference, 'Agricultural Waste in an Urban Environment,' Atlantic City, New Jersey, Sept 14-17, 1970. New Jersey Animal Waste Disposal Task Force. 256 p.

Descriptors: *Farm wastes, *Water pollution control, *Environment, Waste disposal, Cities, Grants, Research and development, Legislation, Communication, Poultry, Cattle, Odor, Lagoons, Aeration, Nitrogen, Moisture content, Aeration, Costs, Sewage, Agriculture, *Waste water treatment, Waste treatment.
Identifiers: *Urban environment, Land-Grant Colleges, Funding, Public relations, Refeeding, Land disposal, Research needs, Biological systems, Waste handling, Research funds, Recycling.

The groundwork for the conference 'Agricultural Waste in an Urban Environment,' was laid several years ago when the New Jersey Animal Waste Disposal Task Force was formed. Since its formation the Task Force has moved in four directions in an effort to find a solution to the agricultural waste problem. These have consisted of studying current laws, making maximum use of available methods of disposal, utilization and odor control, encouraging research, and informing the public of the issues. The conference was based on these four approaches. Various resources available to deal with the problem were brought together and, consequently the attitude of people of all levels of the economy, both rural and urban, was determined; additional resources were discovered; new interests were created; better communications were established; the latest technology was reviewed; and a plan of action was developed. A resolution passed by the delegates calls for a national conference on this matter by appropriate Federal officials. The main purpose of the conference was to find a way for rural and urban communities to develop their economies and reach their full potentials without becoming a nuisance to each other. (White- Iowa State)

0321 - A5, D4, F5

WASTE DISPOSAL AND POLLUTION, POULTRY PROCESSING,

Ralston Purina Co., St. Louis, Mo. Engineering Waste Disposal Plant.
Rowland Retrum.
Proceedings of the Conference, 'Agricultural Waste in an Urban Environment,' New Jersey Animal Waste Disposal Task Force, p 64-75, Sept 14-17, 1970. 13 tab, 5 fig.

Descriptors: *Farm waste, *Poultry, Water pollution, *Waste water disposal, Sewage, Odor, Biochemical oxygen demand, Organic matter, Annual costs, Aeration, Aerobic treatment, Anaerobic digestion, Lagoons, Dissolved oxygen, Condensers, Incineration, Drying.
Identifiers: *Poultry processing, Solids, Rendering plants, Odor control, Chemical scrubbing, By-products.

It is the author's intention to attempt to define the problem of waste disposal and pollution with respect to poultry processing, to describe efforts now being made toward solution, to review cost effects, and to indicate promixing directions for accelerated investigation. The problems considered as the major pollution problems are feather litter, water pollution, sewage treatment odors, and rendering odors. Costs and other data are computed for an 80,000 bird per day broiler processing plant with a small associated rendering plant. Suggestions are made for decreasing the total waste load while increasing income. Systems for reducing the odor from both sewage treatment and rendering plants are explained. The odor problem is complex and there are no pat solutions. Any solution will be expensive. (White- Iowa State)

0322 - F1, F3

FUNDING FOR AGRICULTURAL WASTE RESEARCH,

Cornell Univ., Ithaca, N.Y.
N. C. Brady.
Proceedings of the Conference, 'Agricultural Waste in an Urban Environment,' New Jersey Animal Waste Disposal Task Force, p 89-98, Sept 14-17, 1970.

Descriptors: *Farm wastes, Research and development, Environment, Agriculture, Water pollution, Foods, Domestic wastes, Industrial wastes, Properties, Waste disposal, Grants, Population, Legislation, Education, *Costs.
Identifiers: *Research funds, Agricultural waste problem, Environmental quality, Intensive animal agriculture.

Three basic assumptions are made on which to establish a common ground. First the agricultural waste problem is serious. Secondly, agricultural waste problems are not extensions of those waste problems facing municipalities and industry. Thirdly, the solutions to the agricultural waste problem require knowledge that we do not now have. These assumptions lead to the fact that research and adequate funding are badly needed. The following are avenues that could be developed for solving agricultural waste problems in an urban environment: (1) Agriculture and its related industries must see environmental pollution as a major threat to themselves; (2) Agriculture should work closely with state and Federal legislators to obtain funding for direct application to State Experiment Stations and USDA research agencies; (3) Greater coordination between agencies is needed so that a larger proportion of the Federal Water Quality Administration's research funds can be used for animal waste studies; (4) We must not ignore the possibilities of reorienting research funds already available, and; (5) The training and education of professionals in agricultural waste management is needed. (White-Iowa State)

0323 — BI, CI, D2, E1

AGRICULTURAL WASTE RESEARCH NEEDS,

Cloisterdale Farms, Inc., Ephrata, Pennsylvania.
Glenn H. Herr.
Proceedings of the Conference, "Agricultural Waste in an Urban Environment," New Jersey Animal Waste Disposal Task Force, September 14-17, 1970, p. 109-117.

Descriptors: *Farm wastes, *poultry, *liquid wastes, *moisture content, volume, odor, ultimate disposal, toxicity, lagoons, sprinkler irrigation, pumping, annual costs, research and development,
Identifiers: *"Shud," community relations, liquid handling, hauling.

A poultry manure disposal method is explained which Cloisterdale Farms in Pennsylvania is presently converting to. With 360,000 hens and 35-40 tons of manure to dispose of daily, a liquid system consisting of lagoon, irrigation and hauling was soon found inadequate. One house was then converted to a semi-dry system in which "rakes" and airflow convert the 70-75% moisture raw waste into a 28-35% moisture product. Its advantages include easier handling, little or no odor, no restrictions on seasonal disposal, no great labor problem, and some as yet un-established value. Remodeling and operational costs are given. It is felt that a sizeable volume of funds is needed to support practical research in the waste disposal area. (White-Iowa State).

0324 - E1

DISPOSAL OF SOLID AGRICULTURAL WASTES - CONCEPTS AND PRINCIPLES,

Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
Raymond C. Loehr.
Proceedings of the Conference, 'Agricultural Waste in an Urban Environment,' New Jersey Animal Waste Disposal Task Force, p 126-134, Sept 14-17, 1970. 12 ref.

Descriptors: *Farm wastes, *Research and development, Waste disposal, Drying, Dehydration, Incineration, Beneficial use, Environment, Water pollution, Temperature, Moisture content, Odor, Feeds.
Identifiers: *Research needs, *Land disposal, Composting, Refeeding, Pyrolysis, Utilization, Waste management.

The state of development regarding suitable disposal methods for agricultural solid wastes is in an embryonic stage. A variety of techniques are possible but little information exists on the broad applicability of the techniques or on the detailed design and use parameter for the techniques with these wastes. Because of technical or economic difficulties, composting, drying and dehydration, incineration, and pyrolysis have not found wide application for animal solid wastes. Refeeding and land disposal offer the greatest opportunities for satisfactory disposal of animal wastes in the near future. The important research needs in the area of animal waste disposal include: (1) more thorough investigation of promising techniques, (2) utilization of non-traditional concepts, (3) evaluation of feasible disposal methods as part of animal production operations, (4) more and detailed cost information, and (5) broad interdisciplinary approaches and studies. (White-Iowa State)

0325 - E3

RECYCLING AND UTILIZATION OF BIODEGRADABLE WASTES IN THE SOIL,

Rutgers-The State Univ., New Brunswick, N.J. Dept. of Agricultural Engineering.
Charles H. Reed.
Proceedings of the Conference, 'Agricultural Waste in an Urban Environment,' New Jersey Animal Waste Disposal Task Force, p 135-139, Sept 14-17, 1970. 2 fig.

Descriptors: *Farm wastes, *Biodegradation, Waste disposal, Water pollution, Nitrogen, Nitrogen compounds, Nitrogen cycle, Research and development, Conservation, Soil, Environment, Agriculture.
Identifiers: *Recycling, Utilization, Biological systems, Materials balance.

The survival of man depends upon the intelligent use of agriculture with its inumerable physical, chemical and biological systems and cycles. The author emphasizes that all biodegradable organic wastes could and should be recycled and utilized by natural biological systems on specialized sites or farms. The ability of soils to filter and degrade organic wastes and immobilize potential pollutants is widely recognized. Plants are among the best known converters of nitrogenous compounds to non-pollutional materials. A figure depicts the nitrogen cycle and how organic wastes are recycled by the soil. A chart is presented showing a program for recycling biodegradable wastes. To achieve this objective an interdisciplinary approach must be taken, which will necessitate much research requiring many tax dollars. (White-Iowa State)

0326 - F4

AGRICULTURAL WASTE RESEARCH NEEDS,

Rutgers-The State Univ., New Brunswick, N.J Dept. of Agricultural Economics.
George W. Luke.

Proceedings of the Conference, 'Agricultural Waste in an Urban Environment,' New Jersey Animal Waste Disposal Task Force, p 140-141, Sept 14-17, 1970.

Descriptors: *Farm wastes, *Environment, Water pollution, Grants, Population, Surveys, Waste disposal, Volume, Odor, Livestock, New Jersey.
Identifiers: *Waste handling, Masking agents, Environmental quality, Residential areas.

Aided by a grant from the State Department of Health, the Department of Agricultural Economics conducted a survey of livestock enterprises in four agricultural counties in New Jersey to determine the volume of waste, the methods of handling waste, the cost of waste disposal, the attitude of farmers toward the problem of animal waste, and the location of farms relative to residential areas. The results of this survey are given and evaluated. Between 600,000 and 1 million tons of waste are produced and disposed of in the four counties annually. The typical method of disposal is on the land. Because the farms are small and confine only small numbers of animals, the threat to environmental quality is minimal. The closer to residential areas the more meticulous the farmers are in handling waste. Public agencies seeking to maintain environmental quality should consider educational programs emphasizing the most acceptable practices for the average size livestock farm. (White-Iowa State)

0327 - E3

RECYCLED POULTRY NUTRIENTS,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
Howard C. Zindel.
Poultry Digest, Vol 30 (351), May 1971, p 231-233. 2 tab.

Descriptors: *Cycling nutrients, Farm wastes, Poultry, *Waste treatment, Waste disposal, Diets.
Identifiers: *Dried poultry waste, Recycled nutrients.

The text gives results of tests in which dehydrated poultry manure was incorporated into livestock feed. The feed was given to white leghorn chickens, beef cattle, sheep, dairy cattle, young calves, and goats. Tests on turkeys are just getting started. Three tests on chickens given control rations, 25% DPW (dehydrated poultry waste), and 12.5% DPW, gave the following results in production: 74.5%, 71.9%, 71.0% respectively. The conclusion is that the problem of smelly waste is eliminated, a valuable ingredient is gained which releases corn and corn protein for other world uses, the cost per dozen eggs or pound of gain is reduced, and an easy-to-handle fertilizer product (5-3-1), organic in nature and readily usable is obtained. (Hazen-Iowa State)

0328 - C5

EFFECTS OF CHLORTETRACYCLINE FEEDING ON BOVINE RUMEN MICROORGANISMS,
Washington State Coll., Pullman. Dept. of Bacteriology.
R. E. Hungate, D. W. Fletcher, and I. A. Dyer.
Journal of Animal Science, Vol 14, 1955, p 997-1002. 1 fig, 3 tab, 7 ref.

Descriptors: *Ruminants, *Feeds, Laboratory tests, Fermentation, Inhibition, Methane bacteria, Microorganisms, Pollutant identification, Water pollution effects.
Identifiers: Manometric experiments, Chlortetracycline feeding.

Manometric experiments of short duration were employed to measure the total fermentation products of rumen contents from chlortetracycline-fed and control animals, both in the presence and absence of additional chlotetracycline. Inhibition by added antibiotic was greater in the control animals, indicating that calortetracycline feeding had altered the composition of the rumen microbial population. Methane production was diminished by the added chlortetracycline but this was probably a secondary result from inhibition in the production of the intermediates, hydrogen and formate. The potential for microbial activity in the rumen contents from chlortetracycline-fed steers was about the same as in the controls. The rumen micro-organisms appear to be somewhat more sensitive to chlortetracycline than to streptomycin. (Hazen-Iowa State)

0329 - D2, F5

DISPOSAL OF HATCHERY WASTES,
Harrold's Hatchery, Inc., Winterville, Ga.
Tom Harrold.
Poultry Digest, Vol. 30 (351), May 1971, p 250-251.

Descriptors: *Waste disposal, *Poultry, *Waste treatment, Incineration, Temperature, Disposal.
Identifiers: *Hatchery waste disposal.

A description is given in this text of a method of waste disposal which reduces waste to 5% of the original and produces a product desired by gardeners. This method is incineration. Five design criteria are given in considering incinerators for use in disposal of hatchery wastes. They are (1) burning area; (2) operating temperature; (3) temperature control; (4) refractory materials; (5) stack. Maintenance of an incinerator is minimal and the incinerator produces no odor and no smoke. The powdery ash, composed mainly of calcium and magnesium, produced is in demand by gardeners. (Hazen-Iowa State)

0330 - C4, D4, E2

CONFINED SWINE MANURE DISPOSAL,
Kansas Univ., Lawrence. Dept. of Civil Engineering.
Robert A. Bella.
Master of Science Thesis, 1968. 157 p, 37 fig, 47 ref. OWRR Project A-011-KAN (2).

Descriptors: *Farm wastes, *Pigs, Aerobic conditions, Oxygen requirements, Waste water treatment, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Waste disposal.
Identifiers: *Swine wastes, *Oxidation ditch, Rotor capacity.

The object was the evaluation of an oxidation ditch for the treatment of swine manure. The oxidation ditch was constructed as part of the foundation for each building. Slotted floors permitted the manure to discharge directly from the animal into the treatment unit. Data were collected at weekly intervals from September, 1966 to August, 1967. The data indicated that the oxidation ditch could treat swine manure without odor nuisances. These units were able to reduce the soluble BOD to less than 10 milligrams per liter with a total effluent BOD of about 1,200 milligrams per liter. The effluent also contained considerable salts in addition to the suspended solids. It was necessary that the treated effluent be discharged into cultivated fields rather than being discharged into the adjacent drainage ditch. A holding pond was used to store the discharge of the treated effluent prior to spreading on nearby fields. (Miner-Iowa State)

0331 - B1, D4

DISPOSAL OF DAIRY MANURE,
Massachusetts Univ., Amherst. Dept. of Agricultural Engineering.
Curtis A. Johnson.
Transactions of the American Society of Agricultural Engineers, Vol 8, 1965, p 110-112. 3 fig, 11 ref.

Descriptors: *Farm wastes, *Cattle, *Septic tank, Poultry, Fertilizers, Economics, Aesthetics, Efficiencies, Dusts, Evaluation, Value, Lagoons, Water pollution, Odor, Pumps, Methane, Anaerobic digestion, Aeration, Effluent, Recirculated water, Irrigation, Aerobic treatment, Waste water treatment.
Identifiers: *Scraper, *Dairy cattle, Manure production, Effectiveness, Push-button operation, Potential, Fly production, Appearance, Noise, Aerobic pond, Decomposition, Population equivalents, Agitation.

Heated septic tanks, adapted to recirculation of effluent, hold promise for efficient fluid handling of manure and other dairy wastes with minimum labor costs and reasonable structural costs. Effluent from a three chambered, heated septic is pumped to manure gutters behind specially designed stalls. The effluent provides enough pressure to force a scraper the length of the gutter, thus pushing the accumulated manure to the septic tank. General design criteria are given. An evaluation scale is developed for qualitative evaluation of various manure handling systems. (White-Iowa State)

0332 - B2

HOW WE HANDLE LIQUID MANURE,
Hoard's Dairyman, Vol 109, November 25, 1965, p 1254-1255, 1280-1281. 14 fig, 1 tab.

Descriptors: *Farm waste, *Cattle, *Storage tanks, Slurry, Costs, Volume, Age, Construction, Moisture content, Odor, Pumps, Electric power, Impellers, Nutrients, Waste water treatment.
Identifiers: *Dairy cattle, *Liquid manure system, Free stall housing, Agitation, Tank spreader, Fly breeding.

Five top dairymen are interviewed about their liquid manure handling systems. All incorporated storage tanks, and disposal on land with tank spreaders. Different types of agitation and pumping methods are explained. The systems ranged in cost from $3250 to $7800, or from $35 to $52 per cow. This included storage tank, agitation and pumping equipment, and tank spreaders. Several spent up to $6600 for concreting the barnyards. The tanks varied in capacity from 18,000 to 75,000 gallons, and were emptied as often as once a week to once every two months. The need for added moisture is discussed as well as fly and odor problems. Some disadvantages are given, the major one being the high capital investment. (White-Iowa State)

0333 - D4

AEROBIC DIGESTION (COMPOSTING) OF POULTRY MANURE,
A. Livshutz.
World's Poultry Science Journal, Vol 20, 1964, p 212-215. 1 fig.

Descriptors: *Farm wastes, *Poultry, *Aerobic treatment, Aeration, Plastics, Plastic pipes, Width, Depth, Length, Volume, Pressure, Moisture, Temperature, Aerobic bacteria, Oxygen, Odor, Hydrogen ion concentration, Moisture content, Compaction, Waste water treatment.
Identifiers: *Composting, *Windrow method, Plastic sheets, Pressure blower, Forced-air system, Decomposition, Fly breeding, Carbon-nitrogen ratio, Oxidizing atmosphere.

The article describes a windrow method of composting in which a pressure blower forces air through lateral 3/4 inch diameter pipes. The pipes have four rows of about 15 holes, each one to two mm. diameter. The windrow, up to 50 meters long and 3 meters wide, is covered with a plastic sheet. Nine advantages of the aeration system are given. The plastic covering may eliminate turning of windrows, by preventing the upper layers of the composting material from drying out. The carbon-nitrogen ratio should be around 25-30:1 with a pH of about 7. Optimum moisture should be about 50

per cent. After about two weeks of composting, depending on the material and climatic conditions, the manure is sterilized, odorless and dry and can be used profitably for agricultural purposes. (White-Iowa State)

0334 - D4

CHEMICAL AND BIOLOGICAL REACTIONS FROM LAGOONS USED FOR CATTLE,
Wisconsin Univ., Madison.
S. A. Witzel, Elizabeth McCoy, and Richard Lehner.
ASAE Paper No 64-417. Transactions of the American Society of Agricultural Engineers, Vol 8, p 449-451, 1965. 1 fig, 16 ref.

Descriptors: *Oxidation lagoons, *Biochemical oxygen demand, *Anaerobics, Algae, Bacteria, Water pollution sources, Odor, Farm waste, Sludge, Solid wastes, Decomposting organic matter, Lagoons, Cattle.
Identifiers: Organic nitrogen, Bacteriological study, Aerobicity.

An experimental lagoon to receive the wastes as liquid manure from six bulls was constructed. In an experimental barn the manure from the bulls was washed daily into two gutters 24 in. wide at the top. The gutters had a capacity of 2000 gallons. The gutters were flushed every seven days into a lagoon. The circular lagoon had a 60 ft diameter at the top, a 40 ft diameter at the bottom and was 5 ft deep. Liquid manure samples were taken from the barn gutter and from the lagoon manure liquid and sludge. BOD tests were conducted on all samples and the percent BOD reduction from gutter to lagoon was calculated. Other tests were made to determine percent total solids removal, organic nitrogen content, pH values, and temperature. Extensive tests were made and reported on bacteria content, both quantitative and qualitative. Five conclusions of the study are mentioned. (Parker-Iowa State)

0335 - B2, E1

EQUIPMENT FOR DISPOSAL OF AGRICULTURAL EFFLUENTS,
National Agricultural Advisory Service, London (England).
C. Culpin.
Chemistry and Industry, p 350-353, February 29, 1964. 3 ref.

Descriptors: *Farm wastes, *Disposal, Effluents, Slurries, Storage tanks, Silage, Distribution, Methane, Mixing, Distribution systems, Sprinkler irrigation, Pumps, Labor, Odor, Waste disposal, Waste water treatment.
Identifiers: Agitation, Vacuum pumping, Tanker.

Types and quantities of manure and other effluents are described, as well as systems and equipment for their disposal in Britain. Different storage methods and means of agitation or mixing are described. Four distribution systems are discussed. These include either some type of sprinkler irrigation or a tank wagon method. Labor requirements for both distribution methods, as well as future prospects are given. (White-Iowa State)

0336 - A6, A9, B2

DISPOSAL OF FARM EFFLUENT,
Ministry of Agriculture, Fisheries and Food, Norwich (England). Veterinary Investigation Center.
E. A. Gibson.
Agriculture, Vol 74, 1967, p 183-188.

Descriptors: *Slurries, *Farm wastes, *Salmonella, Cattle, Hogs, Infection, Incubation, Diseases, Gases, Hydrogen sulfide, Ammonia, Carriers, Waste water treatment, Waste disposal.
Identifiers: *Disease hazard, Anthrax, England, Johnes disease, Avian tuberculosis, Salmonella dublin, Salmonella typhimurium.

The possibility of spreading infection by the use of slurry manure disposal techniques is discussed. It is well known that many infections of farm live-stock are spread in their excreta. Little is known about the effects of such spread as slurry on the land, but under certain circumstances, the use of these systems could increase the disease hazard. Salmonella infection and Johnes disease are discussed in this respect, and anthrax and avian tuberculosis are mentioned more briefly. It is suggested that effluents thought to contain salmonella should not be put on the pasture or fodder crops that will be used for cattle or sheep within six months. The same precaution applies to Johnes disease, except that for cattle up to six months old, the period should be extended to twelve months. These figures may need to be revised as further knowledge and experience is gained. The non-infectious hazards to animal health include the liberation of toxic gases when slurry is agitated or emptied. (White-Iowa State)

0337 - B1, D1, E1, F1

A REVIEW OF POULTRY WASTE DISPOSAL POSSIBILITIES,
Ministry of Agriculture, Fisheries and Food, London (England).
C. T. Riley.
Water Pollution Control, Vol 67, No 6, p 627-631, 1968. 5 tab, 4 ref.

Descriptors: *Waste disposal, *Waste treatment, *Biochemical oxygen demand, *Costs, Waste identification, Drying, Land use, Aeration, Loading, Odor.
Identifiers: *Poultry waste disposal, *Bod/food intake relation, *Waste storage, *Chemical and physical properties (Waste), Heat drying, Nitrogen, Phosphorus, Potassium, Pasveer ditch, Bubble-gun installation, Processing stations (Poultry), Deep litter and broiler houses, Inedible by-products, Shock load.

Waste disposal problems in the poultry industry, contemporary poultry practice and related developments in agriculture are discussed, and trends considered. The main types of waste are analyzed; wastes from laying hens has higher NPK values than any other agricultural waste. A National Agricultural Advisory service (NAAS) survey emphasized the lack of knowledge, high cost of waste disposal to egg producers and social effects of the current tendency to increase livestock numbers and (due to transportation costs) to group production units near centers of consumption. Analysis is made of waste quantities and the chemical and physical properties of the waste. A reliable correlation appears to exist in BOD/food intake relationship. Settling difficulties in treatment are noted. The relationships between disposal practices and land uses are examined. The major problems arising from traditional methods of disposal are analyzed, especially the storage and heat drying phases. Traditional methods of sewage treatment no longer appear suitable for poultry wastes. The 'Pasveer ditch' or 'bubble-gun' type of installation may be more suitable; however, the high concentration of waste remains a problem. The treatment and disposal of wastes from deep litter and broiler houses is troublesome mainly if local accumulations become too large. This type of waste has the highest nitrogen content of all agricultural wastes. (D'Arezzo-Texas)

0338 - D4, E4

DIGESTION TESTS OF LIVESTOCK WASTES,
California Univ., Davis. Dept. of Agricultural Engineering.
Samuel A. Hart.
Journal of the Water Pollution Control Federation, Vol 35, No 6, June 1963, p 748-757. 7 fig, 2 tab, 11 ref.

Descriptors: *Farm wastes, *Poultry, *Cattle, *Sludge digestion, Stabilization, Hydrogen ion concentration, Alalinity, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Carbon, Organic matter, Sewage, Odor, Gases, Waste water treatment.
Identifiers: *Dairy cattle, Volatile acids, Digesters, Gas production.

A laboratory test on the digestion of chicken and dairy manures indicates the following: (1) Both chicken and dairy manure would be stabilized satisfactorily in high-rate digesters equipped with adequate sludge-mixing equipment. (2) Dairy manure, because of its high lignin content, will effect organic matter destruction of only 10-15 percent. (3) The destruction of volatile matter expected from digesting chicken manure closely approximates that of municipal sludge digestion. (4) Operational parameters of pH, alkalinity, volatile acids, and the effect of temperature follow those expected for municipal sludge digestion. (5) Although nitrogen levels of chicken manure are high, digestion does not cause loss of nitrogen, but rather, through destruction of organic matter, it is concentrated to 8 or 9 per cent in the digested sludge. (6) BOD and COD are best expressed in terms of O2/mg VS for the high solids content of manures and manure sludges. (7) COD on a mg O2/mg VS basis increases upon digestion since digestion is a reducing reaction. (8) In total, digestion appears to have merit for stabilizing chicken manure. Consideration would still have to be given to final disposition since digestion does not destroy the waste. (White-Iowa State)

0339 - B2

FLUSHING AWAY MANURE PROBLEMS,
Hog Farm Management, Minneapolis, Minn.
Cliff Johnson.
Hog Farm Management, Vol 8, No 1, p 23-25 and 68, January 1971. 7 fig.

Descriptors: *Recirculated water, *Disposal, Farm wastes, Reclaimed water, Lagoons, Hogs, Odor, Labor, Waste water treatment.
Identifiers: *Flushing gutters, Oxidation ditches, Siphon mechanism, Swine, Collection, Automatic dosing siphon.

The flushing gutter system being experimented with at Iowa State University is described. Two variations of the flushing technique, one utilizing a solenoid flushing mechanism and the other a siphon mechanism, have been studied. In the first case, water fills an overhead tank which trips the solenoid causing a plug to lift and thus discharging the tank's contents. For the siphon system, a tank is fitted with 2 1/2 in. N-shaped trap pipe underneath. As the tank fills with water, enough water pressure is built up to force the tank's contents down the pipe into the gutter. The water is discharged rapidly (150 gal. in 62 sec.) through the 2 1/2 in. pipe. Because of the water's force as it is flushed, no dung is left in the gutter after flushing. The gutter is flushed three times per day. Advantages of the system include (1) reduced ventilation requirements, (2) less odor, (3) better feed efficiency, (4) no gas problem, and (5) no labor involved in manure removal. (Christenbury-Iowa State)

0340 - E3, F1

FERTILIZATION OF ANNUAL RANGELAND WITH CHICKEN MANURE,
California Univ., Riverside. Dept. of Agronomy.
Cyrus M. McKell, Victor W. Brown, Robert H. Adolph, and Cameron Duncan.
Journal of Range Management, Vol 23, p 336-340, 1970. 2 fig, 6 tab, 4 ref.

Descriptors: *Poultry, *Grasslands, *Farm wastes, Fertilizers, Costs, Range management, Cost-benefit analysis, Crop response, Phosphorus, California, Proteins, Waste water treatment.

Identifiers: *Chicken manure, Palatability, Rangeland fertilizer.

Where annual rangelands are close to the source of supply, fertilization with chicken manure appears to hold considerable promise in improving the production of forage for grazing. Fertilized polts were ready to be used earlier in forage of a higher quality and palatability. Protein and phosphorus were significantly higher in forage from fertilized plots. Fertilizer value of chicken manure is equal to equivalent rates of commercial fertilizer. There appears to be a slower release of fertilizer elements from chicken manure than from inorganic fertilizer. Annual forage legumes do not appear to benefit initially from the application of chicken manure. In subsequent years following fertilization, the legumes appear to thrive on the increased level of available phosphorus. It was profitable for rangeland operators to fertilize with poultry manure provided they could get it for $3.10 to $4.35 per ton applied. An average of 1,600 pounds of extra feed was obtained for each ton of manure. (Christenbury-Iowa State)

0341 - A3

AGRICULTURE AND THE PREVENTION OF RIVER POLLUTION, AS EXPERIENCED IN THE WEST OF SCOTLAND,

Clyde River Purification Board (Scotland).
F. J. Little.
Journal Proceedings of the Institute of Sewage Purification, 1966, p 452-454. 1 tab, 7 ref.

Descriptors: *Farm wastes, *Water pollution sources, Effluents, Cattle, Poultry, Hogs, Sheep, Rivers, Silage, Biological treatment, Waste water treatment.
Identifiers: *Scotland, Dairy cattle, Silage liquor, Sheep dips, Remedial action, Extended aeration, Rivers (Scotland) Act 1951.

Different types of polluting effluents in Scotland are discussed, and what action has been taken to prevent river pollution. Agricultural effluents can be divided into three groups - animal, vegetable, and chemical, of which animal effluents pose the greatest problem. Dairy waste is the most prevalent effluent, while beef, sheep, hogs and poultry play a minor role. Biological treatment here is in the experimental stage. Silage liquor has presented a problem due to its high BOD. Chemical effluents result from the use of sheep dips, herbicides, fertilizers, bactericides, and dairy detergents. Problems arise from careless use of equipment rather than intentional discharges. The problems of disposal are complex and require the patience and understanding of both farmer and the general public. A discussion follows the paper. (White-Iowa State)

0342 - C5

IN VITRO DIGESTIBILITY OF CHEMICALLY-TREATED FECES,

Department of Agriculture, Beltsville, Md. Animal Science Research Div.
L. W. Smith, H. K. Goering, and C. H. Gordon.
Journal of Animal Science, Vol 31, No 6, p 1205-1209, December 1970. 4 tab, 16 ref.

Descriptors: *Digestion, *Chemical degradation, Farm wastes, Ruminants, Fermentation, Cellulose, Costs, Alkalis, Waste treatment.
Identifiers: *Chemically-treated feces, Cell wall, Microbial responses, Oxidants.

Chemical treatment is a means for enhancing the digestibility of the indigestible plant cell wall residues in ruminant feces. Enhanced digestibility was ascertained with detergent solubility methods and in vitro rumen fermentation were obtained through dried chemical degradation of meicellulose, cellulose, and lignin and also through increasing the accessibility of the remaining cell wall for ruminal microbial fermentation. Chemical treatment of indigestible alfalfa or sudax fecal cell walls resulted in greater than 90% digestion (chemical degradation and microbial digestion). This experiment was designed to point out some of the conditions required for maximum chemical hydrolysis and maximum cell wall utilization. Whether or not these conditions can be approximated in feeding trials remains to be demonstrated. (Christenbury-Iowa State)

0343 - A2, A9

BOVINE SALMONELLOSIS (S. TYHIMURIUM) IN A FEEDLOT OPERATION,

W. C. Oglesby.
Veterinary Medicine/Small Animal Clinician, Vol 59, p 172-174, February 1964. 4 ref.

Descriptors: *Salmonella, *Cattle, Antibiotics, Temperature, Animal diseases, Stagnant water, Mud, Waste treatment, Diseases, Public health, Water pollution effects.
Identifiers: *Feedlot, Diarrhea, Salmonella typhimurium, Necropsy, Medication, Nitrofurazone.

An epizootic of a severe respiratory-enteric syndrome appeared in a feedlot operation of 1,000 head of cattle. Salmonella typhimurium was isolated from the organs of 5 carcasses, 3 fecal specimens, and from mud in a waterhole from which the animals drank. Correction of hygienic conditions, electrolyte supplementation, sulfathiazole medication in the drinking water, and intravenous antibiotics gave only mediocre response. Individual dosing with a nitrofurazone preparation and addition of nitrofurazone to drinking water was successful in eradicating the disease. (White-Iowa State)

0344 - B2, B3, F1

THE COLLECTION OF MANURE FROM HOUSED LIVESTOCK,

West of Scotland Agricultural Coll., Glasgow (Scotland). Dept. of Farm Buildings.
R. J. Forsyth.
Journal and Proceedings of the Institution of Agricultural Engineers, Vol 21, p 129-133, 1965.

Descriptors: *Farm wastes, *Cattle, Water pollution control, Sludge, Storage capacity, Storage tanks, Waste dilution, Construction materials, Costs, Slurries, Sluice gates, Electric power costs, Rotors, Waste water treatment.
Identifiers: *Dairy cattle, *Oxidation ditch, Slatted floors.

The paper describes collection and handling methods for dairy manure in Scotland. Parlor systems are scarce because of their large bedding requirement. Slatted floors in conjunction with free housing systems has proven highly satisfactory. Different slat types are discussed and evaluated. Under slat tanks or channels are described as well as criteria for dilution, storage capacity, and sluice gates. The possibility of using the Pasveer oxidation ditch is introduced as a result of stringent pollution regulation. Design and costs for the oxidation ditch are presented. A discussion follows the paper. (White-Iowa State)

0345 - A3, A9

BOVINE SALMONELLOSIS ASSOCIATED WITH CONTAMINATED CREEK WATER AND HUMAN INFECTION,

Kansas State Univ., Manhatton. Coll. of Veterinary Medicine.
C. M. Hibbs, and V. D. Foltz.
Veterinary Medicine/Small Animal Clinician, Vol 59, p 1153-1155, November 1964. 6 ref.

Descriptors: *Sewage, *Salmonella, Cattle, Sewage bacteria, Water pollution effects, Streams, Infection, Public health, Diseases, Waste treatment.
Identifiers: Human infection, Nicropsy, Diarrhea, Salmonella typhimurium, Bacteriologic examination, Water samples.

A case of Salmonellosis in calves, which may have been associated with human infection, is discussed. Salmonella typhimurium was isolated from two calves, creek water and one human. Though the origin of the infection was not specifically determined, the findings indicated that untreated house sewage may have been the source. The seriousness of water pollution and some of its ramifications are evident. An education program on water pollution is recommended. (White-Iowa State)

0346 - D4

LAGOONS FOR LIVESTOCK MANURE,

California Univ., Davis.
Samuel A. Hart, and Marvin E. Turner.
Journal Water Pollution Control Federation, Vol 37, No 11, November 1965, p 1578-1596. 5 tab, 6 fig, 9 ref.

Descriptors: *Farm wastes, *Poultry, *Cattle, *Hogs, *Lagoons, Stabilization, Biochemical oxygen demand, Anaerobic conditions, Sewage, Aerobic conditions, Odors, Volume, Sludge, Nitrogen, Phosphorus, Potassium, Chemical oxygen demand, Ammonia, Physical characteristics, Chemical characteristics, Hydrogen ion concentration, Alkalinity, Scum, Color, Opacity, Earth-water interfaces, Infiltration, Anaerobic digestion, Waste water treatment.
Identifiers: *Loading rates, *Physical appearance, Surface area, Total solids, Volatile solids, Volatile acids, Fly activity, Crusting, Pilot lagoons, Materials balance, BOD reduction, Sludge seed.

The need for more closely controlled tests of a laboratory type concerning livestock manure lagoons prompted this study. Eight concrete ringed pilot lagoons four feet in diameter and seven feet were used in the experiment. The units were fed poultry, dairy and cattle manure during the two year test. Chemical and physical properties were monitored weekly and are presented in tabular form. Infiltration from the packed earth bottom was considerable. This hampered the accurate determinations needed for a materials balance. Appearance, odors, and fly activity were noted. A section tells how to use the knowledge gained from the experiment. It is felt that with proper construction, property loading rates, and proper operation, lagoons can be expected to be satisfactory. (White-Iowa State)

0347 - D4

AEROBIC PURIFICATION OF FARM WASTE,

Rijkszuivel Agrarische Afvalwater Dienst, Arnhem (Netherlands).
H. M. J. Scheltinga.
Journal Proceedings of the Institution of Sewage Purification, p 585-588, 1966. 1 fig, 4 tab, 11 ref.

Descriptors: *Farm wastes, *Hogs, *Biological treatment, Anaerobic digestion, Activated sludge, Rotors, Nitrogen, Biochemical oxygen demand, Chemical oxygen demand, Foaming, Nitrification, Costs, Effluent, Laboratory tests, Ammonia, Waste water treatment.
Identifiers: *Oxidation ditch, Loading rates, Retention time.

Model tests, laboratory investigations, and finally a full scale field experiment with oxidation ditches were carried out in Holland, where an effective and economical waste treatment system is being sought. A 50 per cent BOD reduction was obtained using anaerobic decomposition in the laboratory. Initial and final characteristics of the pig waste are given before and after treatment in the oxidation ditch. Foaming was excessive from the start. Nitrification played an important part in eliminating the ammonia. Total and expected operational costs are given. (White-Iowa State)

0348 — A8, B3
BIOLOGICAL FLY CONTROL IN DEEP PITS,
Poultry Digest, p. 25, January 1971.

Descriptors: *Poultry, *biological treatment, farm wastes, disposal.
Identifiers: *Fly control, fly breeding, deep pit.

Though fly control is one of the reasons for building deep pit poultry houses, some operators have had serious fly problems when houses were put into operation. Later, if the manure is not too wet, parasites and predators that are natural enemies of flies become established. "Flies were noticeably less of a problem in many deep pit cage houses this past year," observed 'Maine's Timely Topics' for November, 1970. "Flies have been controlled with sprays and/or baits. However, many deep pit cage house owners got by last summer with little or no spraying. In all cases, the houses were two, three or more years old." When it becomes necessary to remove manure, a partial cleanout is preferable. Leave behind some of the fly's natural enemies. (Christenbury-Iowa State).

0349 — B1, E2
MAXI-MIXING FOR MANURE DISPOSAL,
Poultry Digest, p. 12, January 1971.

Descriptors: *Disposal, farm wastes, poultry, pollution.
Identifiers: *Composting, Maxi-mixing.

When a Connecticut poultryman was confronted with a large quantity of manure and small acreage, he mixed soil into the manure with a bulldozer. The result was a composted mixture in a few months, according the Connecticut Poultry Notes. Maxi-mixing is the term used to describe this disposal system using a maximum amount of soil. Monitoring and further research are being conducted to establish limits before pollution and plant toxicity occur. Heavy application of animal manure to land can cause nitrate and nitrite levels in water high enough to be hazardous to humans and ruminants. (Christenbury-Iowa State)

0350 — A5, A8, B1, C5
SCHEDULE MANURE REMOVAL TO AVOID FLY BREEDING,
*California University, Riverside.
Robert H. Adolph.
Poultry Digest, p. 29, January 1971.

Descriptors: *Farm wastes, *poultry, California, anaerobic conditions, odors.
Identifiers: *Fly breeding.

Because January to June in California is the peak period for fly breeding, Dr. Andrew Deal, University of California, Riverside, advises against removal of manure from poultry houses during that time. You are much better protected from fly breeding buildup if the manure can be kept dry. Wet manure is conducive to fly breeding and the generation of putrid odors. (Christenbury-Iowa State).

0351 - B2
DAIRY SET-UP FOR 200 COWS,
Guy Faulkner.
Power Farming, p 38-39, Jan 1970. 6 fig.

Descriptors: *Farm wastes, Lagoons, Slurries, Cattle, Hogs, Silage, Cereal crops, Costs, Waste water treatment, *Oxidation lagoons.
Identifiers: *Dairy cattle, *Evaporative lagoon, Free stall housing, Milking parlor, Farrowing houses, Collecting yard.

The article describes the layout and features of a newly developed dairy operation for 200 cows. Features include three 120 feet long steel framed loafing barns and a 100,000 cu. ft. capacity evaporative lagoon. The solidified contents of the lagoon will be dug out by a contractor in summer. A 200 sow pig unit has also been established on this 500 acre Sussex farm. (White-Iowa State)

0352 - A2, B1, E1
DISPOSAL OF WASTES FROM SWINE FEEDING FLOORS TO MINIMIZE STREAM POLLUTION,
Maryland Univ., College Park. Dept. of Agricultural Engineering.
W. F. Schwiesow, H. L. Brodie, and H. J. Eby.
Completion Report, University of Maryland, Water Resources Research Center, January 1970. 11 p. OWRR Project A-004-MD (1).

Descriptors: *Farm wastes, *Water pollution sources, *Pigs, *Septic tanks, Digestion tanks, Sedimentation tanks, Soil disposal fields, *Waste disposal, Waste water treatment.
Identifiers: *Flushing gutters, Swine manure.

This research was to investigate the feasibility of a septic disposal system with an underground distribution system as a means of eliminating runoff from swine feeding floors into the surface waters. Installation provided for hydraulic cleaning of the feeding floor. Manure, water and uneaten feed was washed into gutters, one on each side of the house. Modifications included the addition of a 7,000 gallon tank, a 1,200 gallon tank and connecting 4 inch PVC pipe. Six hundred feet of perforated plastic drain lines were located near the tanks. It was soon evident that the large tank intended to serve as a septic tank was inadequate and performed primarily as a sedimentation tank. Data taken showed this tank was satisfactory for accumulating solid wastes for a period of about 5 weeks. Solids were removed by mechanical means. Tests on the tile distribution system showed that the capacity to dispose of the liquid effluent was more than needed. Proper operation should provide a satisfactory means of disposing of the liquid portion of the wastes without polluting the nearby river. (Miner-Iowa State)

0353 - C1, D4
OXIDATION DITCH TREATMENT OF SWINE WASTES, SUMMARY REPORT,
Illinois Univ., Urbana.
D. L. Day, D. D. Jones, J. C. Converse, A. H. Jensen, and E. L. Hansen.
American Society of Agricultural Engineers, Paper No. 69-924. 16 p, 1 tab, 9 fig, 24 ref. Bureau of Solid Waste Management Research Grant No. EC-00245-03, also Reg Res Proj NC-69.

Descriptors: *Farm wastes, *Waste water treatment, Hogs, Slurries, Odors, Livestock, Effluents, Mechanical equipment, Protozoae, Biochemical oxygen demand, Chemical oxygen demand, Farm lagoons, Sludge, Aerobic treatment, Biological treatment, Liquid wastes, Laboratory tests, Design criteria, *Oxidation lagoons.
Identifiers: Oxidation ditches, Pasveer oxidation ditch, Slotted floor, Livestock buildings, Ciliated protozoan, Swine, Oxygenation capacity, Loading rates, Field tests.

Swine wastes research for the three-year period beginning September 1, 1966 is summarized. Upon finding that swine manure could be aerobically treated, a modification of the Pasveer oxidation ditch was tested. The in-the-building oxidation ditch has proven itself in the field as capable not only of eliminating objectionable odors from manure pits but of reducing the BOD5 pollutional value of the waste by about 90 percent. The volatile solids can also be reduced by about 50 percent. Even so, the mixed liquor should not be discharged directly into a stream. There will, however, be surplus water and sludge to be disposed of, as with any other waste-treatment system. Operating the ditch with a constant liquid depth and a constant rotor immersion depth is recommended for operator convenience. This can be done by using an overflow. Having the mixed liquor overflow into an aerobic lagoon is also in keeping with operator convenience and low labor requirements. The lagoon can have a fluctuating depth, so that surplus water and sludge can be removed at a convenient time. The simplest method is by using irrigating equipment. (Christenbury-Iowa State)

0354 - A9
SALMONELLOSIS IN CATTLE,
Ministry of Agriculture, Fisheries and Food, Norwich (England). Veterinary Investigation Center.
E. A. Gibson.
Agriculture, Vol 73, 1966, p 213-216.

Descriptors: *Farm wastes, *Cattle, *Salmonella, Pathogenic bacteria, Infection, Bacteria, Carriers, Disinfection, Water treatment.
Identifiers: *Salmonella dublin, *Salmonella tyhimurium, Calves, Illness, England, Clinical signs, Vaccine, Prevention, Outbreaks.

The article describes the diagnosis, treatment, clinical signs, and prevention of salmonella in cattle. Though usually a disease causing calf losses it can affect adult cattle too. Under British conditions two main organisms are responsible. These are S. dublin which is essentially a pathogen of cattle, and S. typhimurium which seems able to infect all species of birds, animals, and man with equal facility. Recommendations are made for the disinfection and prevention of the disease. (White-Iowa State)

0355 - B1, C1, D4, F1
FARM WASTES,
Netherlands Government Agricultural Waste Water Inst., Arnhem.
H. M. J. Scheltinga.
Water Pollution Control, Vol 68, No 4, p 403-413, July-August, 1969. 3 fig, 2 tab, 5 ref.

Descriptors: *Farm wastes, *Activated sludge, *Aerobic treatment, Water pollution, Extended aeration, Fertilizers, Biochemical oxygen demand.
Identifiers: *Oxidation ditch.

Manure in modern automated animal houses is often collected by falling through slatted floors into a channel. The final waste is a slurry and has little value. Volume, dry matter, BOD, and total N values are listed for man, cow, calf, sheep, pig, and hen wastes. Anaerobic manure storage results in 50% BOD reduction. The usual disposal method is using a fertilizer, but there must be a demand within a reasonable distance. Volume reduction methods are: treat the slurry liquid portion separately; or dewater the slurry mechanically or thermally. Treatment by oxidation ditch is discussed. Average effluent figures, in mg/l, are: COD, 100-1000; BOD, 10-100; NH3, 5-50; NO2, 0-50; NO3, 10-200; pH, 6.5-8.5. Oxygen concentration is important; and OC: load ratio of 2 is suggested for design. There was a 40-50% NH3 and total N reduction when air was bubbled thru a pig waste, but no reduction occurred in a similar waste which has been poisoned with C (++). It was concluded that mechanical ammonia stripping does not eliminate nitrogen compounds. Oxidation ditch construction is discussed. Costs of alternative disposal methods such as transportation to farm land or artificial drying must be considered when deciding which to use on oxidation ditch. (Steiner-Texas)

0356 — B2, E2
FURROW MANURE DISPOSAL,
Rutgers University, Agricultural Engineering Department.
Charles H. Reed.
Poultry Digest, Vol. 24, 1965, p. 278, 1 fig.

Descriptors: *Farm wastes, *poultry, furrows, rates of application, disposal, chutes.

Identifiers: *Tank trailer, capacity, plow, solids content, plow furrow cover, auger agitator.

The author reports on a research project to explore the feasibility of disposing of poultry manure in plowed furrows. A 750 gallon tank trailer was equipped with an auger agitator operated by an engine, and a center rear spreader and chute. The chute was changed to the front so the operator could see and control the amount of poultry manure, at 22% solids, deposited in the bottom of a furrow. Further refinement resulted in pulling the trailer behind a single bottom mounted plow. This achieved the objective of depositing the manure in a previously plowed furrow - covering the manure and opening the next furrow in one operation. At present a scheme is being devised to mount the plow on the tank trailer. (White-Iowa State).

0357 - B1

MECHANICAL CLEANING OF COWSHEDS,

Agricultural Land Service, Leeds (England).
J. N. Addison.
Agriculture, Vol 77, No 11, November 1970, p 534-536.

Descriptors: *Farm wastes, Cattle, On-site data collection, Age, Costs, Specifications, Depth, Width, Length, Slopes, Ponding, Maintenance, Waste water treatment.
Identifiers: *Dairy cattle, *Mechanical cleaners, *England, Continuous type, Shuttle type, Cow sheds, Blades.

Twenty-one cowsheds on eighteen farms were surveyed to establish the extent to which mechanical channel cleaners had been installed, their age, condition, costs, and reasons for their installation in the first place. Problems with the mechanical cleaners are discussed as well as design specifications. The cost per cow of the shuttle type cleaner was found to be about 21 pounds and that of the continuous type 18 pounds. (White-Iowa State)

0358 - C2, C3, D1

TREATMENT OF FARM EFFLUENTS,

Water Pollution Research Lab., Stevenage (England).
A. B. Wheatland, and B. J. Borne.
Chemistry and Industry, February 29, 1964, p 357-362. 5 tab, 7 ref.

Descriptors: *Farm wastes, *Cattle, *Hogs, *Waste water treatment, Surface runoff, Volume, Water pollution, Biochemical oxygen demand, Cooling water, Carbon, Nitrogen, Nitrate, Effluents, Sewage, Filtration, Irrigation, Farm ponds, Silage, Organic matter, Biological treatment, Septic tanks.
Identifiers: *England, *Dairy cattle, Pollutional strength, Milking parlors, Permanganate, Recirculation, Land disposal, Soakaways, Chemical treatment.

Sources, volumes, and strength characteristics of farm effluents are discussed. A major portion deals with dairy and waste water effluents, coming from milking parlors and holding pens. Chemical and physical properties are listed in tabular form. Hog wastes and silage liquor are mentioned briefly as effluent sources. Treatment methods discussed include disposal on land, discharge to a sewer, biological treatment, septic tanks and chemical treatment. Disposal on land may be accomplished by use of tankers, soakaways, or irrigation. The use of storage ponds facilitates the latter. (White-Iowa State)

0359 - B2, D4, F1

WHIPPING THE MANURE PROBLEM,

Alan Linn.
Farm Quarterly, Winter 1966-1967, p 56-59, 115-116. 4 fig, 2 tab.

Descriptors: *Farm wastes, *Hogs, *Oxidation, *Aerobic bacteria, Labor, Odor, Fertilizer, Value, Organic matter, Carbon dioxide, Water, Nitrogen, Ammonia, Nitrites, Nitrates, Phosphorus, Potassium, Hydrogen sulfide, Methane, Anaerobic bacteria, Aeration, Design standards, Volume, depth, Foaming, Dispersion, Costs, Submergence, Biochemical oxygen demand, Oxygen, Temperature, Waste water treatment.
Identifiers: *Oxidation ditch, *Paddle wheels, Agitation, Circulation, Batch system, Continuous system, Paddle wheel diameter, Slatted floors.

The oxidation ditch is described as an important new breakthrough in manure handling. Advantages of the oxidation ditch include savings in labor, handling manure as a liquid, elemination of almost all odor, and the preservation and concentration of fertilizer nutrients. Basic design standards are given for the ditch and paddle wheel. If the ditch is managed on a continuous basis, 1 1/2 percent of the ditch volume can be added as manure daily. General management requirements and costs are included. The paddle wheel with a 1 1/2 to 3-hp motor costs about $600. The ditch walls can be incorporated into the building's foundation. Estimated power costs are about $1.00 per hog and $8.20 per 1000 pound dairy cow per year. Many changes in confined livestock production through use of the oxidation ditch are contemplated. (White-Iowa State)

0360 - C4, D4

THE BACTERIAL POPULATION OF AN INDOOR POULTRY LAGOON,

Louisiana State Univ., Baton Rouge. Agricultural Experiment Station; and Louisiana State Univ., Baton Rouge. Dept. of Microbiology; and Louisiana State Univ., Baton Rouge. Dept. of Agricultural Engineering; and Louisiana State Univ., Baton Rouge. Dept. of Poultry Science.
Leon J. Cabes, Jr., Arthur R. Colmer, Harold T. Barr, and Benjamin A. Tower.
Poultry Science, Vol 48, No 1, p 54-63, 1969. 2 fig, 3 tab, 17 ref.

Descriptors: *Farm wastes, *Poultry, *Oxidation lagoon, Microorganisms, E. coli, Aeration, Sampling, Coliforms, Bacteria, Pathogenic bacteria, Temperature, Hydrogen ion concentration, Biochemical oxygen demand, Aerobic bacteria, Waste water treatment.
Identifiers: *Laying house, *Bacterial counts, Enterococci, Suspended solids, Manometric studies.

The study was concerned, first, with the enumeration, isolation, and classification of the predominant bacterial flora of an indoor poultry waste stabilization lagoon, and secondly, with an evaluation of this flora to determine the organisms most active in the degradation process. The lagoon consisted of a pit 3 feet 6 inches deep x 13 feet wide x 88 feet long inside a laying house which measured 14 feet x 100 feet. The standard plate counts of aerobic organisms present in the waste water of the lagoon are presented in tabular form. Total solids, pH and BOD reduction data are also presented. The lagoon was aerated with 200 feet of perforated pipe which feed 4 cfm of air at 15 psi. It is felt that additional modifications might be instituted. (White-Iowa State)

0361 - E3

NUTRITIVE VALUE OF OXIDATION-DITCH RESIDUE,

Illinois Univ., Urbana.
B. G. Harmon, A. H. Jensen, and D. H. Baker.
Journal of Animal Science, Vol 29, No 1, p 136, July 1969.

Descriptors: *Nutrients, Farm waste, Feeds, Value, Aerobic treatment, Diets, Amino acids, Energy, Waste water treatment.
Identifiers: *Excreta, *Swine, Feed value, Oxidation-ditch, Rats.

Swine excreta suspended in water and adjutated to promote aerobic digestion was studied as a source of nutrients. In four growth trials 132 weanling rats were used to study the nutritive value of amino acids and energy contained in the oxidation-ditch residue (ODR). The digestible energy decreased linearly as ODR was added to the diet. (Christenbury-Iowa State)

0362 - C4

DISTRIBUTION OF BACTERIA IN FECES OF SWINE,

Missouri Univ., Columbia.
Gloria D. Rall, Arletta J. Wood, R. B. Wescott, and A. R. Dommert.
Applied Microbiology, Vol 20, No 5, p 789-792, Nov 1970. 3 tab, 2 fig, 12 ref. Public Health Service grants RR-00390 and RR-00285.

Descriptors: *Bacteria, *Distribution, Farm wastes, Patterns, Microorganisms, Pollutant identification.
Identifiers: *Fecal samples, *Swine, Frequency, Distribution.

A new technique is described for evaluating bacterial cell distribution in fecal samples. Spatial relationships of cells within an area rather than number of cells per unit volume or weight are measured by this technique. Measurements of cell distribution by this method indicated that bacteria occurred in freshly voided swine feces as pure, discrete colonies rather than as single cells distributed randomly or uniformly throught the sample. (Christenbury-Iowa State)

0363 - C2, C3, A5

ODOR TRANSPORT BY PARTICULATE MATTER IN HIGH DENSITY POULTRY HOUSES,

Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
William E. Burnett.
Poultry Science, Vol 48, No 1, p 182-185, 1969. 1 fig, 1 tab, 9 ref.

Descriptors: *Farm wastes, *Poultry, *Odor, Gas chromatography, Volumetric analysis, Volume, Filters, Nitrogen, Organoleptic properties, Ventilation, Pollutant identification, Air pollution, Pollution abatement.
Identifiers: *Particulate matter, Odor transport, Odor panel, Volatiles, Concentrations, Odoriferous components.

The report investigates the concentrations of airborne particulate matter in a high density poultry house and the role of particulate matter as an odor transport mechanism. Particulate matter collected by high volume samplings, of a commercial poultry house atmosphere revealed that the particulates had a 'chicken house' odor. Gas chromatographic analyses of the volatiles carried by the particulates revealed the presence of a number of individually odoriferous compounds. Large quantities of particulate matter are probably expelled from poultry houses by ventilation fans. Whether particulate matter plays a significant role in ambient odors from poultry houses should be investigated since the particulates represent a retentive source of odors. (White-Iowa State)

0364 - D2

LOSSES OF ENERGY AND NITROGEN ON DRYING POULTRY EXCRETA,

Queen's Univ., Belfast (Northern Ireland). Dept. of Agricultural Chemistry.
D. W. F. Shannon, and W. O. Brown.
Poultry Science, Vol 48, p 41-43, 1969. 1 tab, 3 ref.

Descriptors: *Farm wastes, *Poultry, Energy, Nitrogen, Drying, Freeze drying, Vacuum drying, Forced drying, Temperature, Waste treatment.
Identifiers: Kjeldahl nitrogen, Metabolizable energy, Dry matter.

Losses of energy and nitrogen were determined

from samples of fresh excreta differing in dry matter and nitrogen content. The samples were dried under the following conditions - feeze drying, vacuum drying at 40C and drying in forced-air ovens at 60C, 100C, and 120C. Nitrogen of the undried and dried excreta was determined by the conventional Kjeldahl method. The mean results of ten energy determinations (%) on fresh excreta samples A and B were 804, 753, 2.51 respectively. The energy losses are in agreement with other authors. From the results of the experiment, the drying temperature should be chosen depending on whether the energy or nitrogen content is more important. In the determination of metabolizable energy, then the method giving lower energy errors would be used. (White-Iowa State)

0365 - A1, F4

AGRICULTURE FACES NEW CHALLANGES IN CURRENT ENVIRONMENTAL CRISES,

Department of Agriculture, Washington, D.C. Science and Education.
Ned D. Bayley.
Water and Wastes Engineering, Vol 7, No 11, p F-14 - F-16, November 1970. 4 fig.

Descriptors: Farm wastes, Water, Water resources, Pesticides, Salinity, Sediments, Water pollution control, Fertilizers, Planning.
Identifiers: Soil spoiler.

The responsibility of agriculture in enhancing the quality of the environment is colossal. This is because agriculture, including forestry, involves more natural resources than any other segment of society. Wise planning in the use of land, water, chemicals, and waste disposal techniques must be demanded, and it must be done now. This paper outlines some of the problems and difficulties encountered in dealing with agricultural pollutants. (Christenbury-Iowa State)

0366 - B2, D4, E2

LIQUID HANDLING OF POULTRY MANURE,

Massachusetts Univ., Amherst. Dept. of Agricultural Engineering.
Curtis A. Johnson.
ASAE Paper No NA 64-501. Transactions of the American Society of Agricultural Engineers, Vol 8, p 124-126, 1965. 2 fig, 1 tab, 6 ref.

Descriptors: *Liquid waste, *Order, *Septic tanks, *Water reuse, Farm waste, Sludge disposal, Poultry, Ammonia, Disposal, Design criteria, Cost comparisons, Effluents, Waste water treatment.
Identifiers: *Recycling, Liquid-manure handling, Ammonia odor, Congdon system.

This article describes an integrated system concept for liquid manure handling of waste produced by laying hens in conventional commercial cage units. The bird droppings in this unit collect in 8 inch deep, 44 inch wide troughs formed on original floor with 4 inch thick concrete blocks. The lower end of each sloped trough is closed with a 2 inch x 6 inch board. These boards are removed to empty the troughs into a 24 inch by 24 inch trench running across the end of the building below floor level. This sloping trench empites into a 12 inch diameter plastic pipe which conveys the waste to an underground septic tank. From the third compartment of this three-compartment tank the effluent is pumped back into the laying house to hydraulically clean the troughs beneath the cages. The effluent becomes increasingly concentrated. The effluent is periodically pumped onto forest land and the sludge is 'batch' handled. This manure system provides: (1) Easy manure handling, (2) Few moving parts, (3) Little ammonia odor, (4) Low water usage, (5) Simple manure disposal, (6) Low-cost pit cleaning. (Parker-Iowa State)

0367 - C3, C5

NITROGEN AND AMINO ACIDS IN THE FECES OF YOUNG PIGS RECEIVING A PROTEIN-FREE DIET AND DIETS CONTAINING GRADED LEVELS OF SOYBEAN OIL MEAL OR CASEIN,

Guelph Univ. (Ontario). Dept. of Nutrition.
Kathleen H. Carlson, and H. S. Bayley.
Journal of Nutrition, Vol 100, No 11, p 1353-1361, 1970. 5 tab, 3 fig, 17 ref.

Descriptors: *Nitrogen, *Amino acids, *Proteins, *Diets, Farm wastes, Hogs, Water pollution sources.
Identifiers: Young pigs, Protein-free diets, Casein, Soybean oil meal.

Thirty-two piglets were weaned at 14 days of age and received a nutritionally complete diet; at 20 days of age they were allocated to either a protein-free diet, or diets containing 7, 14, or 21% protein from either soybean oil meal or casein. Feed consumed between 21 and 31 days of age was measured and the feces voided were collected. The n-butyl-N-trifluoroacetyl esters of the amino acids in hydrolysates of feed and feces were separated by gas-liquid chromatography. The amounts of fecal nitrogen and of each of the 13 amino acids of metabolic origin were calculated directly from the observations made on the protein-free diet and indirectly by regression analyses of the outputs of the piglets receiving the diets containing graded levels of protein. The metabolic fecal nitrogen excretion determined directly (111 mg. N.100 g. feed consumed) agreed more closely with other published values than the indirect estimates obtained by regressions. The direct values were used in calculating the corrected digestibilities of the nitrogen and of the amino acids in the two protein sources. The corrected digestibilities of the nitrogen and amino acids in the casein were very high (97 - 100%), but were lower for the soybean meal. There were significant differences in the corrected digestibilities of the individual amino acids in the soybean oil meal, which ranged from 82% for alanine to 93% for glutamic acid. The level of inclusion of casein did not influence the corrected digestibilities of the amino acids, but increasing the level of soybean oil meal in the diet caused a significant reduction in the corrected digestibilities of isoleucine, leucine and proline. (Christenbury-Iowa State)

0368 - B1, E1

AGRICULTURE WASTE RESEARCH NEEDS,

Cloisterdale Farms, Ephrata, Pa.
Glenn H. Herr.
Compost Science, Journal of Waste Recycling, Vol 11, No 5, Sept-Oct 1970, p 8-11. 4 fig.

Descriptors: *Farm waste, *Poultry, *Disposal, *Drying, Odor, Costs, Equipment, Aeration, Lagoons, Irrigation, Waste water treatment.
Identifiers: SHUD, Neighbors.

The author is responsible for disposal of 17,000 plus or minus tons of raw waste annually from a laying hen complex of 360,000 hens. Their problems incidental to poultry 'SHUD' were: first - volume accumulation of shud within houses, second - community relations - odor primarily; danger of soil and water pollution secondarily. Third - ultimate disposal, and, finally fourth - the unknown factor of the possibility of, or the effect of, gas toxicity to the chickens and humans. Some of their attempted and/or considered methods for disposal were the use of: (1) lagoons; (2) irrigation; (3) sewage treatment plant; (4) incineration; (5) burying; (6) hauling and spreading; future consideration: (7) semidrying; (8) possible dehydration - which might lead to: fertilizer products; re-feeding; or some other uses. Their conclusion was that liquid handling would not be the long range answer to their problems. They concluded that some method of dry or semi-dry procedure must develop as their solution and as an industry solution. Mr. Herr describes the system of drying the manure in place and the cost of disposal of the simi-dried (30%) SHUD. (Christenbury-Iowa State)

0369 - D4

ANAEROBIC DECOMPOSITION OF SWINE EXCREMENT,

Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
O. E. Cross, and Alvaro Duran.
Nebraska Agricultural Experiment Station Journal Paper No 2531. Transactions of the ASAE, Vol 13, No 3, May 1970, p 320-322. 11 fig, 7 ref.

Descriptors: *Farm wastes, Laboratory tests, *Anaerobic digestion, *Hogs, Anaerobic conditions, Temperature, Sludge, Biochemical oxygen demand, Hydrogen ion concentration, Waste water treatment.
Identifiers: Swine, Loading rates, Volatile solids, Detention times, Digesters.

This paper presents a laboratory analysis on the anaerobic digestion of swine excrement as affected by temperature and loading rate. The tests were run for 15 days. The experiments were conducted using ambient temperatures of 50, 70, and 90 F. at three loading rates. The loading rates were 3.2, 1.6, and 0.8 g. of volatile solids per liter of digester volume per day. Volatile-solids content was determined daily during a 15-day test period. Moisture content, total solids, fixed solids and pH were also determined daily. A 5-day BOD test was performed. None of the experiments reached equilibrium; however, it was possible to detect a tendency of the system to approach equilibrium or to approach failure. The results showed that for a load of 0.8 g. at all temperatures the system indicated success in the digestibility of the organic matter. At a load of 3.2 g. at 70 F and 50 F the system tended toward failure. (Christenbury-Iowa State)

0370 - C3, E3

EFFECT OF SOIL TEMPERATURE ON THE AVAILABILITY OF PHOSPHORUS IN ANIMAL MANURES,

California Univ., Davis.
J. L. Abbott, and J. C. Lingle.
Soil Science, Vol 105, No 3, p 145-152, 1968. 3 tab, 5 fig, 14 ref.

Descriptors: *Farm wastes, *Phosphorus, Water pollution effects, Nutrients, Organic matter, Nitrogen, Carbon dioxide, Soil temperature, Plant growth.
Identifiers: *Animal manure, Available phosphorus, Plant response.

Steer, dairy, sheep, and poultry manures, and alfalfa supplemented with monocalcium phosphate added to two slightly acid soils at the rate of 50 ppm. total P and supplied plant-available P to two successive crops - turnips and tomatoes. Dry-weight yield and total P in the tissues provided data for evaluating plant-available P in the manures. In the Sierra sandy loam at the medium soil temperature, uptake of P by turnips was greater from the sheep, poultry, and alfalfa plus PO4 treatments than from the dairy manure treatment. In the Gridley clay loam at 15 deg C. soil temperature, uptake of P by turnips was greater from the poultry manure treatment than from the other treatments. Soil temperature had no measurable effect on the availability of manurial P to tomatoes. At all soil temperatures, P-solubilizing processes, including mineralization of the organic P in both soils and amendments, appeared to contribute to the P absorbed by plants. These processes appeared to continue during the second cropping period, notably at the low (20 deg C.) soil temperature, after having been previously cropped for 5 weeks and incubated

for 3 weeks at 15 deg C. Manures yielded more available P in the Sierra than in the Gridley soil. From these data, the HOAc-soluble:nonsoluble P ratios of manures could not be said to have influenced the availability of manurial P to plants. On an equal dry-weight basis, the overall effectiveness of manures in supplying available P depended on their respective total P contents: poultrySsheepSsteer — dairy. (Christenbury-Iowa State)

0371 - B2, E2

THIN SPREADING OF SLURRIED MANURES,
California Univ., Davis. Dept. of Agricultural Engineering.
Samuel A. Hart.
Transactions of the American Society of Agricultural Engineers, Vol 7, 1964, p 22-28. 9 fig, 3 tab, 21 ref.

Descriptors: *Farm wastes, *Slurry, *Drying, Cattle, Hogs, Poultry, Moisture content, Viscosity, Pumps, Bulk density, Volume, Nitrogen, Odor, Organic matter, Carbon dioxide, Waste water treatment.
Identifiers: *Spreading, *Thin spreading, *Fluidization, Liquefaction, Solids per cent, Fly breeding, Slump, Layers, Layer thickness, Surface area.

The purpose was to determine how thick a layer of manure could be spread, day after day, layer upon layer, and still prevent fly breeding or other sanitation problems. Chicken and dairy manure was fluidized to 10 to 20 percent solids, and then spread in layers on two sets of six plots. The six plots in each series were dosed with increasing thicknesses of manure: from 1/25 to 1/4 inch for the chicken plots; 1/20 to 3/10 inch for the dairy plots. A specific plot received the same dose at each of the 47 applications. At a solids content of 85 percent, fly breeding was prevented. A significant amount of organic matter is lost during drying and storage, the loss being related to the moisture content of the plot. One-half of the nitrogen originally present in the manure is also lost. The land area needed for cumulative layering is not large - less than 200 sq. ft. per cow and 1 sq. ft. per chicken. Odors can and do occur in manure thin spreading, but can be minimized by layering of fresh manure only. (White-Iowa State)

0372 - A2, A4, C1, D1, E1

DRAINAGE AND POLLUTION FROM BEEF CATTLE FEEDLOTS,
Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
Raymond C. Loehr.
Journal of the Sanitary Engineering Division, ASCE, Vol 96, No SA6, p 1295-1309, 1970. 4 fig, 1 tab, 26 ref.

Descriptors: *Drainage, *Water pollution, *Cattle, Runoff, Groundwater, Nutrients, Biochemical oxygen demand, Rainfall, Chlorides, Nitrogen, Ammonia, Phosphates, Chemical oxygen demand, Acids, Water pollution sources, Water pollution effects, Bacteria, Retention, Waste disposal, Management, Water pollution control.
Identifiers: *Feedlots, Animal production, Cattle wastes, Volatile acids, Land application.

The specialization of the livestock production industry established the trend of confinement feeding and increasing animals per feeding operation. Uncontrolled waste discharges from these operations are a source of water pollution by excessive nutrients, microorganisms impairing recreation waters, impurities in groundwater, contaminants that complicate water treatment, and dissolved oxygen depletion causing fish kills. Runoff from concrete surfaced feedlots contains higher organic matter and nitrogen concentrations than runoff from unsurfaced. Groundwater contamination from nitrates is significant during and after the lot life. Absorption of ammonia volatilized from cattle feedlots can contribute to nitrogen enrichment of surface waters in their vicinity. In the midwest and southwest, retention ponds with controlled discharge and retention-evaporation ponds can provide satisfactory control and treatment. Approved facilities in Kansas include runoff diversion, retention ponds for all waste water and runoff contacting animal wastes and application of both liquid and solid wastes to agricultural land. Enclosed housing beef cattle production will minimize contamination of runoff and avoid runoff pollution problems. (Jones-Wisconsin)

0373 - A8

ARTHROPOD PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY DROPPINGS IN NORTHERN CALIFORNIA: PART I,
California Univ., Berkeley. Dept. of Entomology and Parasitology.
John H. Peck, and John R. Anderson.
Journal Medical Entomology, Vol 6, No 2, p 163-167, May 31, 1969. 4 tab, 19 ref.

Descriptors: *Poultry, *Diptera, Farm wastes, Biocontrol, Sampling, California, Seasonal, Mosture content, Animals, Mites.
Identifiers: *Arthropod predators, Fly control, Filth flies, Cohabitation, Poultry droppings, Predatory fauna, Coleoptera, Enumeration.

Arthropod predators occurring in manure at 2 Sonoma County, California, poultry ranches were identified and studied. Seasonal abundance and association with prey were determined for the following major predators: Macrocheles muscaedomesticae, Glyptholaspis confusa, Fuscuropoda sp., Carcinops pumilio, Margarinotus merdarius, Philonthus politus, P. sordidus, Staphylinus maxillosus villosus, Muscina stabulans, and Ophyra leucostoma. (White-Iowa State)

0374 - A8

ARTHROPOD PREDATORS OF IMMATURE DIPTERA DEVELOPING IN POULTRY DROPPINGS IN NORTHERN CALIFORNIA: PART II,
California Univ., Berkeley. Dept. of Entomology and Parasitology.
John H. Peck.
Journal Medical Entomology, Vol 6, No 2, p 168-171, May 31, 1969. 4 tab, 15 ref.

Descriptors: *Poultry, *Diptera, California, Seasonal, Predation, Mites, Mortality, Insect eggs, Larvae, Light, Farm wastes.
Identifiers: *Arthropod predators, Predation potential, Media cohabitation, Pupae, House fly eggs, Variance, Poultry droppings.

The feeding responses of 3 species of predaceous Staphylinidae and 2 species of predaceous Histeridae were studied by exposing them to eggs, larvae and pupae of Musca domestica and Fannia femoralis. Studies of age-of-prey specific predation by M. muscaedomesticae on immature M. domestica showed that most mortality was inflicted on eggs and first instar larvae. Predation rates were determined for the above and 6 other predaceous species; the following indices of predation potential were computed for the 5 most abundant predators: Fuscuropoda sp. (adults) - 3.5, Glyptholaspis confusa females - 4.4, Macrocheles muscaedomesticae females - 95.8, Carcinops pumilio (adults) - 97.0, and Ophyra leucostoma L3 - S226.4. The potential importance of the above predators is discussed with reference to their seasonal and media cohabitation with various prey species. (White-Iowa State)

0375 - A2

RURAL RUNOFF AS A FACTOR IN STREAM POLLUTION,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio. Cincinnati Water Research Lab.
R. B. Weidner, A. G. Christianson, S. R. Weibel, and G. G. Robeck.
Journal Water Pollution Control Federation, Vol 41, No 3, p 377-384, March 1969. 10 tab, 6 fig, 3 ref.

Descriptors: *Surface runoff, *Water pollution, Farm wastes, Storm runoff, Water quality, Acreage, Cultivated lands, Grasslands, Pastures, Forests, Urbanization, Land use, Nitrogen, Phosphorus, Soil erosion, Watersheds, Physical characteristics, Slopes, Fertilizers, Pesticides, Mulching, Flow measurement, Sampling, Flumes, Coliforms, Precipitation, Rainfall intensity, Time, Corn, Regression analysis, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: Soil characteristics, Measuring flume.

The results of this work indicate that rural runoff is a factor in stream pollution and that it must be considered when one evaluates the quality of any stream or receiving body of water. However, there also must be an awareness that there are some means available for reducing this pollutional load. This study showed that, despite an increase in the amount of fertilizers and manure applied under improved practices, there was a marked decrease in the amount of pollutional load that came from these watersheds as contrasted to the load from watersheds using prevailing practices. Runoff, soil loss, and microbial densities were considered. (White-Iowa State)

0376 - C4

EVALUATION OF SEVERAL METHODS OF ISOLATING SALMONELLA FROM POULTRY LITTER AND ANIMAL FEEDSTUFFS,
Massachusetts Univ. Amherst. Dept. of Veterinary and Animal Sciences.
C. F. Smyser, and G. H. Snoeyenbos.
Avian Diseases, Vol 13, No 1, p 134-141, 1969. 5 tab, 13 ref.

Descriptors: *Salmonella, *Poultry, Bacteria, Farm wastes, Microorganisms, By-products, Incubation, Sampling, Frequency.
Identifiers: *Poultry litter, *Feedstuffs, Enrichment broths, Selenite broth, Animal by-products, Feed mills, Rendering plants, Tetrathionate broth, Significant difference, Proteus.

A comparison of several different culture procedures for Salmonella isolations, using selenite-brilliant green-sulfapyridine (SBG sulfa) and tetrathionate brilliant green (TBG) as enrichments was made with 198 litter samples of which 161 were positive by one or more methods, and with 371 animal feedstuff samples of which 111 were positive by one or more methods. All enrichments were streak-plated after 48 hour incubation. SBG sulfa incubated at 43C was superior to SBG sulfa at 37C, and to TBG at 37C with or without pre-enrichment for the isolation of salmonellae from poultry litter and animal feedstuffs. Significantly more samples of animal feedstuffs yielded salmonellae from SBT sulfa at 43C than from the other two media. More salmonella colonies and fewer competing organisms were usually obtained on BG agar plated from SBG sulfa at 43C than from either SBG sulfa at 37C or TBG. SBG sulfa appeared to be a more favorable enrichment medium than TBG for isolating S. senftenberg; differences in the number of isolations among several other serotypes were too small for comparison. (White-Iowa State)

0377 - E2

EFFECTS OF ORGANIC MANURES ON SOILS AND CROPS,
Reading Univ. (England). Dept. of Agricultural Botany.
A. H. Bunting.

Proceedings Nutrition Society, Vol 24, No 1, p 29-38, 1965. 4 tab, 14 ref.

Descriptors: *Soils, *Crops, *Organic matter, Fertilizers, Farm wastes, Nitrogen, Phosphorus, Potassium, Crop production, Nutrients, Wheat, Potatoes, Sewage sludge, Calcium, Fertility, Temperature, Moisture content, Soil structure.
Identifiers: *Farmyard manure, *Organic manures, Mineral fertilizers, Sludge compost, Minor elements.

The paper reports on the effects organic manure, and especially farmyard manure, has on different soils and crops. The effects of organic manures on crops are often important, but they are largely associated with changes in the supply of nutrients. However, there is good evidence that on some special soils, they have special effects on crop growth. The paper then focuses on changes which take place in the soil as a result of organic matter addition. Moisture content and soil structure are most particularly affected. (White-Iowa State)

0378 - D4
TREATMENT OF LIVESTOCK WASTE -- A LABORATORY STUDY,
Missouri Univ., Columbia. Dept. of Sanitary Engineering; and Missouri Univ., Columbia. Dept. of Agricultural Engineering.
E. A. Jeffrey, W. C. Blackman, and Ralph Ricketts.
Transactions of the American Society of Agricultural Engineers, Vol 8, No 1, 1965, p 113-117, 126. 6 fig, 5 tab, 17 ref.

Descriptors: *Farm wastes, *Lagoons, *Anaerobic digestion, *Hogs, Aerobic treatment, Lagoons, Cattle, Sheep, Aeration, Sludge, Domestic wastes, Hydrogen ion concentration, Digestion tanks, Biochemical oxygen demand, Chemical oxygen demand, Waste dilution, Nitrification, Manometers, Design standards, Design criteria, Waste water treatment.
Identifiers: *Aerobic lagoon, Agitation, Volatile solids, Total solids, Beuch scale aerators, BOD/COD ratio, Detention time.

A study was made of the aerobic and anaerobic digestion characteristics of livestock wastes. The results obtained in the hog waste digestion studies are compared to design criteria for domestic sludge digestion units. Design loading conditions and water requirements are calculated for using an anaerobic lagoon for treating hog wastes. Design requirements for an aerobic lagoon are also indicated. It is concluded that disposal of hog wastes by use of aerobic lagoons is prohibitive because of the large requirements of both water and land area. The use of anaerobic lagoons is feasible, but it is accompanied by the problem of eventually having to dispose of the accumulated digested sludge. Future studies should be made on the operation of series lagoons. By using the first lagoon for settling and as an anaerobic lagoon, the area requirement of the second to serve as an aerobic lagoon would be greatly reduced, perhaps to the point of practicality. (White-Iowa State)

0379 - D3, E3
A REPORT ON THREE MANURE COMPOSTING PLANTS,
Public Health Service, San Francisco, Calif.
John S. Wiley.
Compost Science, Vol 5, Summer 1964, p 15-16. 3 fig.

Descriptors: *Farm wastes, Public health, Cattle, Poultry, Organic wastes, Aerobic conditions, Anaerobic conditions, Mositure content, Aeration, Odor, Pathogenic bacteria, Screens, Nitrogen, Ammonia.
Identifiers: *Composting, *Aerobic decomposition, Nuisance, Fly production, Windrow composting, Rotary drum composter, Soil conditioner.

The article describes three manure composting plants which process manure in a sanitary, economical manner and use the product as a soil conditioner. One plant treats a mixture of feedlot manure from 5500 steers and meat packing wastes in long windrows which are turned six times during the six week composting period. The other two plants treat poultry manure in rotary drum composters. Each of these two plants treats wastes from one million birds. The compost is sold as a humus plant food. The three plants are interesting attempts to process manures in a sanitary manner and to utilize the resulting product for the benefit of the soil. (White-Iowa State)

0380 - E2
TWO BILLION TONS OF - WHAT,
Department of Agriculture, Beltsville, Md. Livestock Engineering and Farm Structures Research Branch.
Harry J. Eby.
Compost Science, Vol 7, p 7-10, Autumn 1966. 2 fig.

Descriptors: *Farm wastes, *Volume, *Organic wastes, Domestic wastes, Cattle, Poultry, Nutrients, Value, Organic matter, Topsoil, Turf, Water pollution, Percolation, Fertilizers, Filters.
Identifiers: *Waste production, *Grass belts, *Composting, Population equivalent, Land disposal, Pollution control.

The author advocates managing our millions of tons of organic waste, both farm and municipal, in such a way that grass belts would be planted along the borders of streams and rivers. The organic wastes would be worked into these areas in large quantities to improve the quality of the soil. His proposal is based on three factors: (1) Soil with a high organic content holds more water than soils with little organic content. (2) Incorporating organic matter into a clay soil improves its percolation rate as well as its water-holding capacity. (3) Soil is a good bacterial filter. Thus the grass belts would act as a means of stream and river pollution control. The author feels that more research is needed to find components of manure which would have continuing industrial or commercial applications. Examples are given illustrating the magnitude of the animal waste disposal problem. (White-Iowa State)

0381 - D4
WASTES FROM PIG PRODUCTION UNITS,
Tay River Purification Board (Scotland); and North of Scotland Coll. of Agriculture, Aberdeen. Scottish Farm Buildings Investigation Unit.
R. A. Pontin, and S. H. Baxter.
Water Pollution Control, Vol 67, No 6, 1968, p 632-638. 4 tab, 4 fig, 11 ref.

Descriptors: *Farm wastes, *Hogs, *Activated sludge, Foaming, Freezing, Rotors, Effluent, Biochemical oxygen demand, Odor, Construction, Rubber, Linings, Recirculated water, Operations, Slurries, Sludge, Dissolved oxygen, Costs, Aeration, Water pollution, Public health, Lagoons, Anaerobic digestion, Filtration, Waste water treatment.
Identifiers: *Oxidation ditch, Slatted floor, Primary ditch, Secondary ditch, Suspended solids, Layout, Rubber sheeting, Continuous operation, Intermittent operation, Land disposal, Composting, Extended aeration.

Methods for the disposal or treatment of the increasing quantities of slurry from intensive pig production units are outlined. The possible application of the oxidation ditch for such treatment is discussed and the results of experiments of a commercial piggery are described. The authors conclude that the method offers the promise of an economic solution but that further research is urgently needed. (White-Iowa State)

0382 - C4
TYPE DISTRIBUTION OF COLIFORM BACTERIA IN THE FECES OF WARM-BLOODED ANIMALS,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
E. E. Geldreich, R. H. Bordner, C. B. Huff, H. F. Clark, and P. W. Kabler.
Journal Water Pollution Control Federation, Vol 34, No 3, March 1962, p 295-301. 4 tab, 24 ref.

Descriptors: *Coliforms, *Bacteria, *E. coli, *Farm wastes, Domestic wastes, *Temperature, Cattle, Hog, Sheep, Poultry, Membrane filters, Variability, Water pollution, Surface drainage.
Identifiers: Detection, Enumeration, IMViC, BALB, EC broth procedure, MPN test, Biochemical tests, Correlation.

This investigation examined the reactions of 4512 human, 2339 livestock, and 1896 poultry coliform strains isolated from 43 human, 32 livestock, and 28 poultry fecal samples. The EC procedure showed a 96.3 percent positive correlation and the BALB procedure a 95.3 percent correlation with the coliforms from fecal sources. These findings suggest that the presence of EC or BALB positive coliform strains in water or wastes indicate relatively recent fecal pollution. An occasional shift in percent positive correlation of the elevated temperature test for three human samples during a period of one to three years was noted. The biochemical tests comprising the IMViC typing classification are cumbersome and do not present as close a correlation with fecal origins of the coliform group as other procedures. In view of the excellant reliability of either the EC or BALB test for fecal coliform bacteria, and taking into account the saving in time and effort, the elevated temperature procedure seems to be the method of choice. (White-Iowa State)

0383 - F2
PORK PRODUCERS AND POLLUTION: LEGAL ASPECTS,
Missouri Univ., Columbia. Dept. of Agricultural Economics.
Donald P. Levi.
Paper delivered at the Annual Meeting of Missouri Pork Producers Association, January 16, 1970, Columbia, Missouri. Agricultural Economics Paper No. 1970-6. 15 p.

Descriptors: *Legal aspects, *Regulation, Farm wastes, Disposal, Missouri, Maintenance, Waste water treatment, Water pollution control.
Identifiers: *Pollution laws, *Lawsuits, Nuisance law, Liability, Stockmen, Law.

Pollution of water and air by feeding operations is becoming a very real problem. Whether this constitutes a nuisance is a question of fact and depends on the circumstances of each case. The relative interests of the parties involved will determine whether or not a given operation is closed down. Even if one is legally allowed to continue in business, the assessment of actual or punitive damages may make it unprofitable to do so. There is no one thing which farmers can do to guarantee that they be free from nuisance actions. Site selection, proper maintenance, zoning and licensing may help in some cases. (Christenbury-Iowa State)

0384 - A1, B1, F4
THE ECONOMICS OF CLEAN WATER: ANIMAL WASTES PROFILE.
Federal Water Pollution Control Administration, Washington, D.C.

For sale by Supt. of Documents, U. S. Govt. Printing Office, Washington, D. C. 20402. Price $1.00. March 1970. Vol 2, 85 p, 18 fig, 10 tab.

Descriptors: *Animal populations, *Farm wastes,

*Water pollution sources, *Water pollution control, *Cost analysis, Cattle, Sheep, Poultry, Hogs, Livestock.
Identifiers: *Animal wastes, *Clean water, *Feedlots, Swine, Milk cows, Stream pollution.

A comprehensive view is provided of the problem of farm-animal wastes in the United States in relationship to pollution of water bodies. A framework is established for estimating costs of animal wastes control to prevent water pollution. In many cases animal wastes have proved to be significant pollution sources that resulted in fish kills and extensive damage to the ecology of the streams. At the present time, however, there is general agreement that not all of the wastes need to be considered as sources of water pollution. Therefore, it would seem that entirely too much emphasis has been placed on the gross possible costs of controlling water pollution from animal wastes. A more realistic base for use in developing programs for water pollution abatement and control from animal wastes is a series of sub-elements that can be independently assessed to determine their pollution potential, applicable control measures, and total pollution control costs. Estimates are presented of the locations, by states, of populations of cattle, milk cows, swine, sheep, and poultry together with discussions of water pollution control practices, wastes discharge frequencies from feedlots, and climate effects.

0385 - A6, C5

AIR POLLUTANTS AFFECTING THE PERFORMANCE OF DOMESTIC ANIMALS - A LITERATURE REVIEW.
Agriculture Research Service, Washington, D.C.

For sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402 - Price $1.00. Agriculture Handbook No 380, Issued August 1970. 109 p, 666 ref.

Descriptors: *Domestic animals, *Air pollution effects, *Toxicity, Pollutant identification, Air pollution, Atmsophere, Smoke, Pollutants, Physiological Ecology, Legislation, Farm wastes, Laboratory studies, *Reviews, *Bibliographies, Water pollution effects.
Identifiers: Inhalation, Ingestion, Veterinary diagonosis, Esthetic effects, Automobile exhausts.

The results of a Literature Survey to determine the effects of air pollution on domestic animals is presented. The term 'domestic animals' as used in this report includes cattle, sheep, goats, swine, horses, chickens, turkeys, ducks, geese, pigeons, Japanese quail, dogs, cats, rabbits, and honey bees. Chapters 2, 3, and 4 on air pollution, smoke, and automobile exhausts provide a brief background on the generalities of these pollutants and their effects on domestic animals. Many of the specific air pollutants found in the air, smoke, and automobile exhausts are described in subsequent chapters, which contain a brief introduction of the air pollutant, the published results, a summary, and a bibliography. (Christenbury-Iowa State)

0386 - F4

INTRODUCTION: ISSUES IN FOOD PRODUCTION AND CLEAN WATER,
Agricultural Research Service, Beltsville, Md. Water Conservation Research Div.
Cecil H. Wadleigh, and Clarence S. Britt.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Introduction, p xix-xxvii. 1 tab, 3 fig, 4 ref.

Descriptors: *Farm wastes, *Environment, Cattle, Poultry, Hogs, Ammonia, Fertilizers, Nitrogen, Corn, Labor, Nutrients, Potassium, Biochemical oxygen demand, Runoff, Fishkill, Effluent, Pesticides, Coliforms, Nitrates, Eutrophication, Phosphorus, Oxygen, Fish, Conservation, Lagoons, Odor, Sprinkler irrigation, Water quality.
Identifiers: *Waste production, *Feedlots, Mechanization, Chicken litter.

The article introduces the subject matter and content of the book. A look is first taken at the increased consumption of meat in this country. From the total number of animals raised for slaughter, an idea is given of the amount and scope of the animal waste disposal problem. To raise this large number of animals the agricultural industry has relied on a variety of chemical fertilizers and pesticides to increase yields. Runoff from feedlots and agricultural lands has caused eutrophication and associated fish kills. However these are not the only nutrient sources. Conservation practices are needed to prevent water flowing through feedlots to run directly into a water course. As such secondary or even tertiary lagoons may be required. Recycling of wastes should be the optimum means of disposal. Sound conservation farming is needed to assure beneficial use of agricultural wastes and to effectively protect the quality of water in our streams and reservoirs. (White-Iowa State)

0387 - A2, A3, C2

POLLUTION BY SEDIMENT: SOURCES AND THE DETACHMENT AND TRANSPORT PROCESSES,
Iowa State Univ., Ames. Dept. of Agricultural Engineering; and Agricultural Research Service, Beltsville, Md. Water Conservation Research Div.
H. P. Johnson, and W. C. Moldenhauer.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 1, p 3-20. 2 tab, 2 fig, 59 ref.

Descriptors: *Water pollution, *Sediments, *Sediment transport, Bed load, Suspended load, Soil erosion, Gully erosion, Sheet erosion, Rill erosion, Sediment yield, Watersheds, Iowa, Losses, Regression analysis, Specific weight, Streams, Yield equations.
Identifiers: *Detachment, *Erosion equation, Universal Soil Loss Equation, Correlation coefficient, Sediment delivery ratio, Reservoir sedimentation.

The paper attempts to identify problems in the sediment pollution area, define the present understanding of the erosion and transport process, and to indicate research needs. Gross erosion from land, including both sheet and gully erosion, is discussed, and empirical methods of quantitative measurement are presented as well as research approaches. Primary sources of sediment yield information are reservoir sedimentation surveys and suspended load samplings. Finally a look is taken at sediment in transport and its two components suspended load and bed load. The science of erosion and sediment transport needs to advance considerably if it is to be sufficiently flexible for use in detailed planning. (White- Iowa State)

0388 - C2

CHEMISTRY OF SEDIMENT IN WATER,
Agricultural Research Service, Morris, Minn. Soil and Water Conservation Research Div; and Minnesota Agricultural Experiment Station, St. Paul.
R. F. Holt, R. H. Dowdy, and D. R. Timmons.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 2, p 21-34. 2 fig, 1 tab, 49 ref.

Descriptors: *Sediments, *Nitrogen, *Phosphorus, Chemistry, Water pollution, Clays, Mineralogy, Montmorillonite, Illite, Colloids, Clay minerals, Organic matter, Ions, Ion exchange, Cation exchange, Anion adsorption, Oxidation-reduction potential, Nitrification, Denitrification.
Identifiers: Preferential removal, Electrical charge, Surface area, Reduced layer, Surface oxidized layer.

Sediment can be considered a major pollutant of surface waters. However, its contribution to the dissolved chemicals in lakes and streams is largely unknown. The composition of sediment closely resembles the soil from which it is derived but is generally higher in silt, clay, and organic matter. Chemical reactions involving sediment are essentially the surface chemistry of their colloidal fractions which is a function of their surface area and electrical charge. As a result, reactions with sediment can be divided into interactions with charged ions and with neutral compounds. The chemistry of sediments in situ can be surmised from studies of submerged soils. Sediments carry relatively large amounts of total nitrogen and phosphorus into surface waters, but in both cases only a small proportion of this total is readily available to the biosystem. Sediments apparently have a high capacity to remove phosphate from solution, but without turbulence the release of phosphate from bottom sediments will not support algal growth at appreciable distances from the sediment. Available inorganic nutrients, particularly phosphorus, are rapidly taken up by the biosystem in natural waters. They eventually become a part of the organic fraction of the sediment and their release back to the waters is not well resolved. (White-Iowa State)

0389 - B1

LAND AND WATER MANAGEMENT FOR MINIMIZING SEDIMENT,
Iowa State Univ. Ames. Dept. of Agronomy.
Minoru Amemiya.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 3, p 35-45. 5 tab, 28 ref.

Descriptors: *Land management, *Water management, *Sediments, *Soil erosion, Sediment yield, Soil stabilization, Sediment transport, Energy dissipation, Soil properties, Slopes, Farm management, Infiltration, Storage capacity, Vegetation, Velocity, Flow, Mulching, Erosion control, Cultivation, Runoff, Strip cropping, Terracing, Contour farming.
Identifiers: Detachment, Universal Soil Loss Equation.

The most logical and direct approach to solving our agriculturally related sediment problem is the stabilization of the sediment source by controlling soil erosion through the use of proper land and water management practices. An understanding of the factors affecting soil erosion by water is required in order to effectively protect the soil. The Universal Soil Loss Equation provides a framework for discussing erosion control measures. A vegetative cover or surface mulch is one of the most effective means of controlling runoff and erosion, and is discussed in some detail. A natural result of this fact is the creation of tillage methods which leave a mulch or crop residue on the surface. Examples of their effectiveness in controlling soil erosion are given. Contour farming, strip-cropping and terracing are slope modification methods for erosion control. Slope modification measures combined with soil conserving tillage practices can be effective in reducing soil erosion from cropped land. However, to become widely accepted, such practices must fit efficient farming operations and must be economically feasible. (White-Iowa State)

0390 - A3, E2

SIGNIFICANCE OF PHOSPHORUS IN WATER SUPPLIES,
Southern Illinois Univ., Carbondale. Dept. of Botany.
Jacob Verduin.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 5, p 63-71. 1 fig, 4 tab, 12 ref.

Descriptors: *Phosphorus, *Nutrients, Water pollution, Fertilizers, Oxygen, Nitrogen, Sewage, Effluents, Phosphates, Carbon dioxide, Odor, Taste,

Eutrophication, Water sheds, Tennessee Valley Authority Project, Detergents, Farm wastes, Lagoons.
Identifiers: *Plant nutrients, N/P ratio, Enrichment.

The author gives data showing the marked increase in total phosphorus concentrations in our streams and lakes. Although there has been a large increase in agricultural fertilizer use, evidence suggests that approximately one-third of the phosphorus contributions may come from agricultural watersheds. In urban sewage effluents, detergents seem to contribute about three times more phosphate than is contributed by the organic matter in sewage. Consequently, detergents would appear to be the most significant single source of phosphates enriching our waters today. The author contends that animal and domestic wastes belong on the land as fertilizer and soil improvers rather than discharging nutrient rich lagoon and sewage plant effluents directly to streams. As such, agriculture has a primary role to play in the solution of the pollution problem. In the problem of removing concentrated nutrients from water, agricultural technology can make a major contribution in the application of the living root zone filter to the process of plant nutrient removal. (White-Iowa State)

0391 - A3, E2

BEHAVIOR OF SOIL AND FERTILIZER PHOSPHORUS IN RELATION TO WATER POLLUTION,
Iowa State Univ., Ames. Dept. of Agronomy.
C. A. Black.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 6, p 72-93. 10 fig, 1 tab, 57 ref.

Descriptors: *Phosphorus, *Soils, Water pollution, Phosphates, Fertilizers, Solubility, Organophosphorus compounds, Groundwater, Surface waters, Aqueous solutions, Saturation, Distribution, Adsorption.
Identifiers: *Orthophosphate, Plant residues, Concentrations, Biological cycle, Phosphorite, Langmuir equation, Reaction capacity.

The principal objective of this chapter is to present an account of selected aspects of the behavior of soil and fertilizer phosphorus as a basis for understanding how phosphorus from these sources may contribute to the phosphorus content of waters in the soil and leaving the soil. Chemical and geologic phosphorus cycles in the soil are traced. The reactions and distribution of fertilizer phosphorus in soil are described. The distribution of both inorganic and organic phosphorus is pointed out. (White-Iowa State)

0392 - A3, A4, C3, E2

SOURCES OF NITROGEN IN WATER SUPPLIES,
Geological Survey, Denver, Colo.
Marvin C. Goldberg.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 7, p 94-124. 4 fig, 8 tab, 72 ref.

Descriptors: *Nitrogen, *Nitrates, Groundwater, Ammonia, Precipitation, Sediments, Denitrification, Runoff, Ureas, Fertilizers, Drainage water, Irrigation, Return flow, Water supply, Livestock, Sewage, Infiltration, Industrial wastes, Algae, Ponds, Farm wastes.
Identifiers: *Surface waters, Geological sources, Mineralization, Nitrogen sources, Well water, Feedlots.

Water supplies can be categorized as surface waters or groundwaters. This paper examines representative studies of nitrate entrance to both types of water supplies, with summaries of some of the many laboratory and field studies described in the current literature. Some of the sources of nitrogen entrance to water supplies include atmospheric, geologic, rural and urban runoff, sewage, irrigation, animal wastes, and industrial wastes among many others. Sources of major importance to both surface and groundwater supplies are pointed out and field or laboratory studies are reported. (White-Iowa State)

0393 - C3, E2

CHEMISTRY OF NITROGEN IN SOILS,
Illinois Univ., Urbana. Dept. of Agronomy; and Missouri Univ., Columbia. Dept. of Agronomy.
F. J. Stevenson, and G. H. Wagner.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 8, p 125-141. 8 fig, 26 ref.

Descriptors: *Nitrogen, *Nitrates, *Ammonium compounds, Fertilizers, Inorganic compounds, Nitrites, Microorganisms, Climates, Nitrification, Denitrification, Leaching, Organic matter, Amino acids, Lignins, Chemistry, Soils.
Identifiers: *Fixation, Mineralization, Immobilization, Volatilization, Amines, Pyrimidine.

This review emphasizes the complex nature of soil nitrogen. Other than gaseous forms, the inorganic N consists primarily as NH4 (..) and NO3 (-). Part of the NH4 (..) is bound to colloidal surfaces and behaves according to classical reactions of exchange chemistry. Nitrate is free to move with the soil water and is the form of N which is of greatest concern from the standpoint of pollution of water supplies. Many soils contain appreciable amounts of NH4 (..) that cannot be utilized directly by plants and microorganisms; this NH4 (..) is held within the lattice structures of clay minerals. Less than one-half of the organic N in soils can be accounted for in known compounds (amino acids, amino sugars, purine and pyrimidine bases, etc.). The remainder may occur as part of the structures of humic and fulvic acids. Part of the N added to soils as fertilizers can be converted to organic forms by chemical reactions involving NH3 (..) and NO2 (-); this combined N is only slowly mineralized and may persist in soil for prolonged periods. Bacterial denitrification is an important factor regulating NO3 (-) levels in natural soil and may serve as a means of reducing the NO3 (-) content of groundwater when land is used for the disposal of nitrogenous wastes. (White-Iowa State)

0394 - A3, E1

FERTILIZER MANAGEMENT FOR POLLUTION CONTROL,
Minnesota Univ., St. Paul. Dept. of Soil Science.
W. P. Martin, W. E. Fenster, and L. D. Hanson.
Miscellaneous Publication Paper No 1360 of the University of Minnesota Agricultural Experiment Station, St. Paul. Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 9, p 142-158. 68 ref.

Descriptors: *Fertilizers, *Nitrogen, *Phosphorus, Nutrients, Phosphates, Soil erosion, Sedimentation, Sediments, Soils, Water supply, Eutrophication, Cultivation, Nitrates, Farm wastes, Wells, Water pollution, Nitrification, Irrigation, Denitrification.
Identifiers: *Pollution control, *Fertilizer use, Nutrient removal, Feedlots.

Nitrogen and phosphorus, as nutrient elements, are important to both land and aquatic plants, and normally reach water supplies via land runoff in the erosion debris. Fertilizer usages in the midcontinent area are rapidly increasing to maximize production and increase efficiency, and further increases are expected. Fertilizer phosphorus quickly converts to unavailable forms in mineral soils and the evidence indicates that one of the ways of reducing the level of soluble phosphorus in water would be to effect soil contact such as by filtration through the soil medium. Nitrogen fertilizer application rates should approximate crop needs, which for a given soil type and climatic zone are based on production potential estimates for the crops to be grown. Management recommendations refined through the years for maximizing production are not incompatible with the objective of reducing nutrient contamination of natural waters. Further research is needed on nutrient balances and reactions in soils to maintain supplies at levels needed for crop production. Water quality standards as established by the federal and state water pollution control groups should be compatible with the need for maintaining adequate nutrients for efficient crop production consistent with management programs designed to minimize losses to adjacent water supplies. (White-Iowa State)

0395 - A7

CHEMISTRY AND METABOLISM OF INSECTICIDES,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
Paul A. Dahm.
Journal Paper No. J-6509 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter II, p 167-182. 6 fig, 1 tab, 62 ref.

Descriptors: *Insecticides, *DDT, *Aldrin, Dieldrin, Insects, Carbamate pesticides, Insect control, Metabolism, Organophosphorus pesticides, Chlorinated hydrocarbon pesticides, Pesticide toxicity, Pesticide residues.
Identifiers: Toxaphene, Parathion, Malathion, Carbaryl, Metabolites, Arthropods.

Insecticides occur in the environment because of purposive applications for pest control and because of accidents and carelessness. The major problems with insecticides arise from the contamination of the environment and food and the development of resistant arthropod-pest populations. The persistence of insecticides in the atmosphere, water, soil, plants, animals, and microorganisms is being investigated. Alterations of insecticides occur under both metabolic and nonmetabolic conditions. Knowledge of the metabolism of insecticides is prerequisite to their development and use for insect control. Identification and toxicological assessment of the metabolic products should precede establishment of residue and other safety factors. More basically, metabolism studies of insecticides reveal intoxication and detoxication processes and how these relate to physiological effects and problems of resistance. With some insecticides, primary metabolic attack may form compounds whose toxicity approximately equals or is greater than the parent insecticide. Numerous nonmetabolic factors exert effects on the structure and persistence of insecticides. The solubilities of insecticides in soil and water are especially important in relation to their movement and persistence in the environment. (White-Iowa State)

0396 - A7

THE PESTICIDE BURDEN IN WATER AND ITS SIGNIFICANCE,
Federal Water Pollution Control Administration, Athens, Ga. Southeast Water Lab.
H. Page Nicholson.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 12, p 183-193. 3 tab, 32 ref.

Descriptors: *Pesticides, *DDT, Toxicity, Dieldrin, Chlorinated hydrocarbon pesticides, Aldrin, Endrin, Heptachlor, Runoff, Water pollution, Industrial wastes, Insecticides.
Identifiers: *Environmental contamination, Concentrations, Sources, Parathion, Pesticide pollution.

Sources of pesticide polluted water include runoff, industrial wastes, accidents and carelessness.

Graphic examples of each are given to gain perspective about the potential for pesticide involvement in water pollution. The significance of chlorinated hydrocarbon pesticides with respect to water pollution is shown. Concentrations in some lakes and streams has increased. A final section on control of pesticide pollution gives ideas and methods which should result in less water pollution by pesticides. (White-Iowa State)

0397 - A7, F5

HERBICIDE RESIDUES IN AGRICULTURAL WATER FROM CONTROL OF AQUATIC AND BANK WEEDS,

Agricultural Research Service, Denver, Colo. Crop Research Div; and Agricultural Research Service, Laramie, Wyo. Crops Research Div.
F. L. Timmons, P. A. Frank, and R. J. Demint.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 13, p 194-208. 4 tab, 31 ref.

Descriptors: *Herbicides, *2-4-D, *Aquatic weed control, Dalapon, 2-4-5-T, Alligator weed, Copper sulfate, Ponds, Pond weeds, Reservoirs, Irrigation canals, Sprinkler irrigation, Furrow irrigation, Drainage, Water hyacinth, Runoff.
Identifiers: *Herbicide dissipation, Drainage ditches, Submersed weeds, Amitrole, Silvex.

The effectiveness of herbicides and the economics involved in agricultural production have caused their extensive use for weed control in and adjacent to aquatic areas, especially on irrigation systems. Greater use of herbicides in and around agricultural waters may be expected. Maximum residues of herbicides used for weed control in farm ponds and reservoirs are low, ranging from a fraction of 1 ppm to several ppm. In most cases these levels are of short duration. The transport of herbicide residues in irrigation water prevents extensive exposure of any given irrigated area. The flowing water may at times carry residues to areas where their presence may be objectionable. While reduction in residue level varies with canal and herbicide, many residues are dissipated after a water flow of 10 to 15 miles. In most cases, the dissipation can be attributed to dilution in water or absorption by bottom mud. The concentrations of herbicides found in irrigation water are unlikely to cause injury in crops. Where residues were found in crops following irrigation with water containing herbicides, the levels were generally much lower than tolerances already established for the same or similar crops. (White-Iowa State)

0398 - A3, A7

PESTICIDES AND PEST MANAGEMENT FOR MAXIMUM PRODUCTION AND MINIMUM POLLUTION,

Iowa State Univ., Ames. Dept. of Zoology and Entomology.
Don C. Peters.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 14, p 209-223. 2 fig, 1 tab, 45 ref.

Descriptors: *Pesticides, *Pest control, Productivity, Water pollution, Climates, Insects, Control, Biocontrol, Cultural control, Chemcontrol, Mechanical control, Insecticides, Cotton, Timber management, Corn, Soybeans, Tobacco, Chlorinated hydrocarbon pesticides, 2-4-D, DDT.
Identifiers: *Pest management, Natural controls, Applied controls.

The author first discusses natural and applied controls which man utilizes in an effort to reduce losses caused by pests. Natural control can be subdivided into climatic, edaphic, and biotic aspects. Applied controls are biological, cultural, legal, or chemical practices. Examples of pest management in several areas of production are given. The role of agricultural pesticide use and clean water is pointed out. Suggestions are given, both legislative and practical, which can be used to reduce pesticide pollution of water. If the public demand for sophistication in pest control is to be achieved, more imaginative research support will have to be found. (White-Iowa State)

0399 - A2, A3

LIVESTOCK OPERATIONS AND FIELD-SPREAD MANURE AS SOURCES OF POLLUTANTS,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner, and T. L. Willrich.
In: Agricultural Practices and Water Quality, 1970, Iowa State University Press, p 231-240. 2 tab, 25 ref.

Descriptors: *Pollutants, *Confinement pens, Farm wastes, Biochemical oxygen demand, Chemical oxygen demand, Runoff, Liquid wastes, Groundwater, Lagoons, Water pollution sources, Water pollution, Waste water treatment.
Identifiers: *Pollution characteristics, Lagoon effluent, Feedlot runoff.

This paper deals with the pollution potential from animal wastes. The pollution characteristics of animal wastes and the surface water and groundwater pollution potentials are discussed. Runoff is a primary mode of transportation of the waste to the water supplies. This pollution can be minimized through proper management. (Christenbury-Iowa State)

0400 - C1, E2

MANURE DECOMPOSITION AND FATE OF BREAKDOWN PRODUCTS IN SOIL,

Department of Agriculture, Lincoln, Neb.; and Iowa State Univ., Ames.
T. M. McCalla, L. R. Frederick, and G. L. Palmer.
In: Agricultural Practices and Water Quality, 1970, Iowa State University Press, p 241-255. 2 fig, 11 tab, 38 ref.

Descriptors: Farm wastes, Disposal, Fertilizers, Aerobic conditions, Anaerobic conditions, Microorganisms, Storage, Water pollution sources, Waste water treatment.
Identifiers: Fertilizer value, Composition, Breakdown, Decomposition.

This paper discusses the composition of animal manure. Fresh manure contains from 30 to 80% water. The rest of the constituents in manure are inorganic and organic solids, liquids, and gases. Manure contains all the inorganic nutrients needed by plants. Roughly, 90% of the dry matter in manure is organic waste material from animal digestion of feeds. The microbial population of animal waste is composed mainly of bacteria, fungi, actinomycetes, and protozoa. Significant decomposition of manure may occur in the feedlot if allowed to remain there long enough. Further decomposition occurs when applied to the soil. Manure should be plowed under to minimize N loss. Huge quantities of animal waste applied to the land may result in accumulation of some organic and inorganic constituents in concentrations that may become toxic to plants, particularly under anaerobic decomposition conditions. (Christenbury-Iowa State)

0401 - D4

MANURE TRANSFORMATIONS AND FATE OF DECOMPOSITION PRODUCTS IN WATER,

Kansas Univ., Lawrence. Dept. of Civil Engineering.
Ross E. McKinney.
In: Agricultural Practices and Water Quality, 1970, Iowa State University Press, p 256-264. 15 ref.

Descriptors: *Anaerobic conditions, *Aerobic conditions, *Lagoons, Farm wastes, Odor, Aqueous solutions, Disposal, Microorganisms, Design criteria, Water pollution sources, Waste water treatment.
Identifiers: Oxidation ditch, Anaerobic lagoons, Aerated lagoons, Oxidation ponds.

With regard to aqueous treatment systems for animal manure, it is apparent that aqueous treatment systems are not desirable for animal waste except in special situations. The concentrated animal wastes are not normally mixed with water and can be handled best as solid wastes. Chicken houses have been designed to handle the waste as solids. However, confined hog houses have too much fluid manure for handling as solids. The oxidation ditch has proven satisfactory for handling hog waste. Treated hog manure must be returned to the soil for final disposal. The soil is the ultimate acceptor of all animal wastes. There is no reason that the oxidation ditch should not be satisfactory for treating cattle manure. The biological treatment will reduce only a small fraction of the total solids of the manure. This treatment destroys the obnoxious qualities and results in a material that is more satisfactory for disposal. (Christenbury-Iowa State)

0402 - A3, A9

DISEASE TRANSMISSION OF WATER-BORNE ORGANISMS OF ANIMAL ORIGIN,

Minnesota Univ., St. Paul. Dept. of Veterinary Microbiology and Public Health.
Stanley L. Diesch.
In: Agricultural Practices and Water Quality, 1970, Iowa State University Press, p 265-285. 93 ref.

Descriptors: *Diseases, *Animal diseases, *Animal pathology, *Human diseases, Farm wastes, Pathogenic bacteria, Pathogenic fungi, Pathology, Viruses, Water transfer, Human pathology, Parasitism, Water pollution sources.
Identifiers: Disease transmission, Rickettsia.

An effort is made to indicate the potential epidemiologic significance based on the variability of the resistant characteristics of various kinds of pathogenic organisms and their potential for water transmission. The historical implication of water and disease is briefly reviewed. The current problems of disease transmission related to water is discussed. To document water's role as a vehicle in disease transmission, information gathered from a literature review was used. Specific disease entities are grouped by classification based on etiology of the causative organisms. Infectious diseases of animals and man caused by bacteria, Rickettsia, viruses, fungi, and parasitic organisms are discussed. (Christenbury- Iowa State)

0403 - B1

ANIMAL WASTE MANAGEMENT TO MINIMIZE POLLUTION,

Minnesota Univ., Minneapolis. Dept. of Agricultural Engineering.
J. A. Moore.
In: Agricultural Practices and Water Quality, 1970, Iowa State University Press, p 286-297. 35 ref.

Descriptors: *Farm wastes, *Management, Aerobic conditions, Anaerobic conditions, Disposal, Tertiary treatment, Pollutants, Liquid wastes, Lagoons, Sedimentation, Trickling filters, Water pollution sources, Waste water treatment.
Identifiers: Flushing gutters, Composting, Aerated lagoons, Oxidation ponds, Slatted floors, Screening.

Management of animal waste can be broken down into four separate functions: collection, storage, treatment, and utilization or disposal. The options available for each of these functions are described. Collection is divided into two types: wet or dry. The remaining management functions depend on the collection type used. Three basic treatment processes developed by the Civil Service Engineers that apply to animal manure are described. These

are: Primary treatment, Secondary treatment, and Tertiary treatment. Almost all of the utilization and disposal of animal manures will be through land application. The disposal systems that have been proven are presented. These include liquid manure disposal as well as solid manure disposal.
(Christenbury-Iowa State)

0404 - A4, C3

MOVEMENT OF AGRICULTURAL POLLUTANTS WITH GROUNDWATER,
Geological Survey, Raleigh, N.C.
Harry E. LeGrand.
In: Agricultural Practices and Water Quality, Iowa State University Press, Ames, 1970, p 303-313. 2 fig, 18 ref.

Descriptors: *Path of pollutants, *Farm wastes, *Water pollution sources, *Groundwater, *Agricultural chemicals, Fertilizers, Pesticides, Nutrients, Soil water, Soils, Seepage, Soil chemistry, Absorption, Soil mechanics, Water quality, Soil properties, Water wells, Water table, Environmental effects, Water chemistry, Infiltration.
Identifiers: *Agricultural pollutants.

The volume of groundwater polluted by plant nutrients, animal wastes, and pesticides appears to be small. Numerous small polluted zones of water occur in the upper part of the zone of saturation. Sufficient safeguards are available to minimize groundwater pollution to the extent that good agricultural practices should not be deterred. The unsaturated zone above the water table attenuates almost all of the foreign bodies that are potential pollutants of the underlying groundwater. Chemical fertilizers, animal wastes, and pesticides vary greatly in their tendency to degrade in ground environments. The following favorable environmental factors tend to reduce the changes of pollution of water from wells and springs: (1) A deep water table, which (a) allows for sorption of pollutants on earth materials, (b) slows subsurface movement of pollutants, and (c) facilitates oxidation or other beneficial 'die-away' effects. (2) Sufficient clay in the path of pollutants so that retention or sorption of pollutants is favorable. (3) A gradient of the water table beneath a waste site away from nearby wells. (4) A great distance between wells and wastes. (Woodard-USGS)

0405 - A3

EFFECTS OF AGRICULTURAL POLLUTION ON EUTROPHICATION,
Wisconsin Univ., Madison. Dept. of Sanitary Engineering, and Wisconsin Univ., Madison. Dept. of Water Chemistry.
D. E. Armstrong, and G. A. Rohlich.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 23, p 314-330. 14 tab, 2 fig, 26 ref.

Descriptors: *Eutrophication, *Nitrogen, *Phosphorus, Nutrients, Algae, Nitrates, Surface runoff, Base flow, Percolation, Leaching, Drainage, Farm wastes, Soil management, groundwater, Wisconsin, Water supply.
Identifiers: *Agricultural drainage, Lake metabolism, Mobility, Particulate form, Feedlots, Nutrient sources.

The paper discusses nitrogen and phosphorus transport in agricultural drainage since these are the most important nturients involved in eutrophication. It is generally expected that inorganic nitrogen is transported mainly as nitrate by percolating water, although the amounts of ammonium and nitrate carried in runoff waters may be highly significant in terms of the receiving water. Similarly, the largest amount of phosphorus is likely transported in particulate form in runoff waters, but the amount of dissolved phosphorus in runoff water may be of equal or greater importance even though lower in quantity. The contribution of agricultural drainage to the nitrogen and phosphorus status of waters is next examined. The data presented suggest that agricultural land is an important contributor of nitrogen and phosphorus to water. About 60% of the nitrogen and 42% of the phosphorus were estimated to come from agricultural land. Nutrient budget estimations were based on data obtained on a small scale and extrapolated and thus have a low reliability. Nutrient sources are numerous and generalizations as to which source is the most important cannot be made. The contribution of agriculture should be reduced by improved and more efficient agricultural management practices. (White-Iowa State)

0406 - A3

EFFECTS OF AGRICULTURAL POLLUTANTS ON RECREATIONAL USES OF SURFACE WATERS,
Missouri Univ., Columbia. Dept. of Zoology; and Missouri Dept. of Conservation, Columbia.
Robert S. Campbell, and James R. Whitley.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 24, p 331-343. 3 tab, 1 fig, 43 ref.

Descriptors: *Pollutants, *Recreation, Lakes, Streams, Algae, Pesticides, DDT, Return flow, Sediments, Soil erosion, Fertilizers, Farm wastes, Fish, Fish eggs, Turbidity, Nutrients, Dissolved oxygen, Nitrogen, Phosphorus, Water Quality Act, Water quality.

Unquestionably many agricultural pollutants affect recreation through alteration of water quality and degradation of fish and aquatic life. The more serious polluting agents are eroded soil, agricultural fertilizers, animal wastes, and pesticides. While the problems relating to agricultural pollution are complex, and the solutions will not easily be attained, it seems reasonable that in many instances alternative procedures can be developed. Pollution control measures are available which will allow continuation of agricultural production and enhance and protect water quality and recreation. While these procedures may be costly to apply, the expenditure should be judged in light of its contribution toward the preservation of man's environment. Especially in the instance of pesticide use, protection of water quality may be requisite to protection of the health of man from unknown long-term effects of pesticides. Reduction and control of agricultural pollutants are essential to develop and maintain a high quality environment. Quality of life and quality of environment are synonymous.
(White-Iowa State)

0407 - A3

EFFECTS OF SURFACE RUNOFF ON THE FEASIBILITY OF MUNICIPAL ADVANCED WASTE TREATMENT,
Iowa State Univ., Ames. Dept. of Civil Engineering.
Robert E. Baumann, and Sheldon Kelman.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 25, p 344-362. 7 fig, 1 tab, 19 ref.

Descriptors: *Surface runoff, *Sewage treatment, Tertiary treatment, Biochemical oxygen demand, Industrial wastes, Farm wastes, Pollutants, Fertilizers, Nitrogen, Nitrates, Phosphorus, Phosphates, Algae, Eutrophication, Water quality, Rivers, Iowa, Corn, Discharge, Chlorophyll.
Identifiers: Industrial water pollution, Des Moines River, Packing plants.

The protection of the quality of water in Iowa streams requires that attention be directed at the various contributors of the significant pollutants. Attention is currently being directed at municipal and industrial wastes discharges, since these enter streams through a point source and are easily controlled. All such wastes must be given secondary treatment prior to discharge to Iowa's streams. As more stringent treatment requirements are demanded in the future, there is some question as to whether nutrient removals from municipal and industrial wastes will be sufficient to protect the stream. This study indicated that during periods of dry weather when light and turbidity conditions are favorable for phytoplankton growth, the principal source of the N and P required to support such growth is derived from municipal and industrial waste water discharges. Removal of N and P from such waste water discharges will help reduce phytoplankton growth. In periods of high stream flow, when turbidity levels are high enough to be unfavorable to phytoplankton growth, runoff from urban and rural lands and channel erosion are probably the principal contributors of N and P to the stream. Removal of N and P from municipal and industrial wastes during these periods will not reduce nutrient levels significantly. Under the latter conditions, tertiary treatment of municipal and industrial wastes will be of less benefit until runoff contributions of N and P are also controlled.
(White-Iowa State)

0408 - A3, F2

LEGAL ASPECTS,
Iowa Univ., Iowa City. Coll. of Law.
N. William Hines.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 26, p 365-376. 26 ref.

Descriptors: *Legal aspects, *Water pollution, Farm wastes, Pesticides, Sediments, Fertilizers, Riparian rights, DDT, Water quality, Regulation, Water Quality Act, Standards, Administrative agencies, Pesticide residues, Soil erosion, Silting.
Identifiers: *Point sources, Common law, Nuisance, Feedlots, Registration.

The force of the law has not been brought to bear on agriculture as it has on other major sources of water pollution. Agricultural pollution has thus far been ignored because it is less visible and more difficult to correct than are wastes from municipalities and industry. Currently only those types of agricultural pollution that are obvious and subject to direct control receive legal attention. As point sources are brought under control, agriculture's more subtle contributions to water pollution will attract regulatory concern. Public regulation of agricultural pollution will take two primary forms: (1) direct restrictions on the use of chemical inputs to agricultural production, and (2) regulation of land use patterns and practices. Examples of the first type of regulation are prohibitions or limitations on the use of certain chemical biocides, fertilizers, and other additives. Land use regulations seem very likely to be necessary to effect a meaningful reduction in soil erosion. The ideal construct might involve the employment of land-use controls by a comprehensive watershed management authority. If this does not come to pass, exercise of such powers by other local districts such as soil conservation districts, conservancy districts, or drainage districts would be feasible, as would granting similar powers to the local pollution control agency. (White-Iowa State)

0409 - F1

ECONOMIC ASPECTS,
Iowa State Univ., Ames. Dept. of Economics.
John F. Timmons.
Journal Paper No J-6469 of the Iowa Agricultural and Home Economics Experiment Station, Iowa State University, Ames, Iowa. Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 27, p 377-389. 9 ref.

Descriptors: *Water quality, *Economics, Management, Water quality control, Water resources, Costs, Benefits, Standards, Measurement, Water

Quality Act.
Identifiers: *Quality levels, *Water supplies quality, *Water demand quality, Least cost method, Externalities, Public intervention, Water quality management, Quality use.

The first step toward meeting water quality management relating to water use within agriculture is being taken through becoming aware of the importance of water quality problems. The need to recognize the quality heterogeneities of water from demand and supply orientations is evident. The importance of demand orientations and requirements is paramount in specifying quality standards which vary among uses, spatially and temporally. Supply qualities must be geared to qualities demanded by uses. Least-cost methods are necessary in meeting demand qualities. In assigning benefits and costs to water uses, the problems of externalities, measurement, and intervention are crucial. Economics with its legacy of methods, theory, and its corps of resource economists is a necessary part of the multidisciplinary approach in planning and in carrying out relevant research necessary for education, legislation, and administration of water quality management. (White-Iowa State)

0410 - F3

ALLIANCE FOR ACTION,
Federal Water Pollution Control Administration, Kansas City, Mo. Missouri Basin Region.
John M. Rademacher.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970, Chapter 28, p 390-396. 10 ref.

Descriptors: *Farm wastes, *Water pollution, Agriculture, Fishkills, Pesticides, Sediments, Runoff, Regulation, Zoning, Management, Waste treatment, Dissolved oxygen.
Identifiers: *Feedlots, *Technical base, *Inventory, Registration, Feedlot runoff, Animal waste management, Quantities, Runoff strength, Population equivalent.

The author chooses to look at animal wastes since this pollutant lends itself to more classical solutions than do other agricultural pollutants. He then pieces together the various interests involved with the animal waste problem. A technical base of information is required to establish effective controls. The development of an inventory noting animal production, concentration and location is an essential element of the technical base for the animal waste problem. Specific research and development needs must be delineated in accordance with the expected trends of the feedlot industry. Regulations are needed to ensure feedlot operators that measures they employ will guarantee a reasonable tenure of operation. Zoning regulations may be necessary and desirable. Mandatory registration should be an integral part of feedlot regulations. A sound animal waste management program encompasses prevention, reduction, treatment, and disposal of animal wastes. No one treatment process or system will be the solution for all animal production units. A variety of management and treatment systems will have to be developed. If it is the public who must bear the cost, then agriculture must have the courage to include waste treatment as a part of its production costs.
(White-Iowa State)

0411 - F4

ACCOMPLISHMENTS AND GOALS,
Federal Water Pollution Control Administration, Washington, D.C. Agricultural and Marine Pollution Control.
Harold Bernard.
Agricultural Practices and Water Quality, Iowa State University Press, Ames, Iowa, 1970. Chapter 29, p 397-407. 2 fig, 1 tab, 2 ref.

Descriptors: *Water pollution, *Water quality, *Standards, Environment, Research and development, Management, Water Quality Act, Nebraska, Water supply, Water utilization, Water sports, Pollution abatement, Biochemical oxygen demand, Sewage treatment, Farm wastes, Nutrients, Return flow, Expenditures.
Identifiers: *Federal Water Pollution Control Administration, Agricultural pollution.

The article gives information as to the scope and extent of FWPCA activities relating to the control of agricultural pollution. Over $4 million has been expended in 1969 and 1970 on research and demonstrations involving pollution abatement from pesticides, nutrient runoff, irrigation return flows and feedlot operations. An example of criteria for water quality standards is given. Recommendations from a recent task force of seven cognizant Federal agencies studying the agricultural pollution problem are given. Data is presented indicating the need for municipal, industrial and agricultural pollution control. New techniques and systems must be developed to increase the quantity of pollutants removed from these sources before it reaches our streams. (White-Iowa State)

0412 - E3

THE INFLUENCE OF ASHED POULTRY MANURE ON SOIL, SNAP BEANS, AND TOMATOES,
Pennsylvania State Univ., College Park. Agricultural Experiment Station.
Charles A. McClurg, Ernest L. Bergman, and Glenn O. Bressler.
Progress Report 312, April 1971, 9 p, 12 tab., 18 ref.

Descriptors: *Poultry, *Crop response, Farm wastes, *Waste treatment, Fertilizers, Soil analysis, Laboratory tests, Sampling.
Identifiers: *Ashed poultry manure, Waste reuse.

Four experiments were conducted to determine the growth of snap beans (phaseolus vulgaris L.) and tomatoes (lycopersicon esculentum mill) in a Hagerstown clay loam soil containing various proportions of ground dried and/or ashed poultry manure. Addition of ash significantly increased soil pH, available P, and milliequivalents and percent saturation of K, Mg, Ca in the soil. Germination of bean seed in pot culture was severely restricted by the amounts of ash and/or dried manure added to the soil due to excessive concentrations of soluble salts, however, pod yield increased with low levels of ash and dried manure. Leaf analyses indicated increased K and Mg and decreased Ca content when ash had been added to the soil. Addition of dried manure resulted in increased foliar content of P, K, Ca, Mg, Mn, Fe, and Al. There was no significant reduction of stand or yield when snap beans were grown under field conditions on soil to which 30t/acre ash had been added although maturity of pods appeared to be slightly delayed. Foliar analysis of beans grown in soil treated with ash showed significant increases of K, Mg, B, Na in leaves, while Ca and Mn decreased significantly. Application of ash to field soils at a rate of 120t/acre resulted in the death of all tomato transplants and no weed growth. With 60t/acre a 45 percent morality and consequent reduction of yield were observed. Ashed poultry manure can definitely be used in crop production but only in conjunction with a soil test. (Hazen-Iowa State)

0413 - E3

VALUE OF PROCESSED POULTRY WASTE AS A FEED FOR RUMINANTS,
Pennsylvania State Univ., University Park.
F. F. El-Sabban, J. W. Bratzler, T. A. Long, D. E. H. Frear, and R. F. Gentry.
Journal of Animals Science, Vol 31, 1970, p 107-111. 5 tab, 16 ref.

Descriptors: *Ruminants, *Poultry, *Digestion, *Diets, Farm wastes, *Waste treatment, Nitrogen, Animal metabolism, Livestock, Laboratory tests.
Identifiers: Waste processing, Waste utilization, Heat treated poultry waste.

Heat treated poultry waste was evaluated as a source of nitrogen for ruminant animals. Poultry waste was subjected to three different heat treatments to produce autoclaved (APW), cooked (CPW), and dried (DPW) products. In a sheep metabolism trial, wethers were fed semi-purified rations in which nitrogen was supplied by APW, CPW, or Soybean meal. Digestibility coefficients for dry matter and energy were not significantly different among rations, but that of protein was significantly higher for the ration containing soybean meal (control) than of the ration containing APW. Urinary energy was significantly higher for the control ration than for the rations containing APW or CPW. Fecal nitrogen was significantly lower for the control ration than for the rations containing poultry waste products, no other significant differences were found. Twenty-five angus steers, divided into four groups, were used in a 134-day feeding trial, steers were fed finishing rations in which all supplemental nitrogen was provided by soybean meal, APW, DPW, or urea. Rate of gain and feed rations in which supplemental protein was provided by soybean meal, APW or DPW. Rate of gain was significantly higher for steers fed a ration containing urea than those fed the ration containing DPW. Carcass characteristics and meat acceptability were not significantly different among steers fed the different rations. Chlorinated hydrocarbon compounds in backfat and liver arsenic were found in amounts less than 1 PPM. (Hazen-Iowa State)

0414 — A1, F4

THE POLLUTION POTENTIAL OF CATTLE FEEDING OPERATIONS,
Investigations Leader, Northern Plains Branch, Fort Collins, Colorado.
F. G. Viets.
Montana State University Symposium on Agriculturally Related Pollution, February 10, 1970, Bozeman, Montana, pp. 11-16, 1 tab., 3 ref.

Descriptors: *Farm wastes, confinement pens, cattle, feedlots, groundwaters, odors, ammonia, dust, nitrates, air pollution, phosphorus, microbial.

The concentration of a large number of cattle into a very small space has created our problems of offensive odors in the air, runoff capable of polluting streams and killing fish, percolation of water to the water table making it hazardous to drink, and mountains of manure. Per capita beef consumption in the United States has increased about 3.5% a year over the last 20 years. At present, about 16 million cattle are fed annually. The pollution from runoff is an enormous problem in humid areas. The writer feels that adequate and economical solutions are not in sight, and that the economics of pollution control may force the cattle feeding industry into drier areas, even if grain must be hauled from the wetter grain producing areas. Air pollution from cattle feedlots includes odors, dust, and ammonia. Of these, only dust is being controlled to any great extent. Dust can be controlled to some degree by sprinklers. As to deep percolation, very little is known. However, nitrates in groundwaters in Missouri have been attributed to corrals. Other instances where wells are located close to feedlots, the water from the wells are unsuitable for drinking. It cannot be said that feedlots are polluting the water table with nitrates; however, the water under feedlots had an offensive odor and was enriched in ammonium and soluble organic and phosphorus compounds. (Bandy - ISU).

0415 - A5, D2

TURNING WASTES INTO PROFITS,
Earl D. Anderson.
Farm Quarterly, Vol 25, No 6, Nov-Dec 1970, p 48-85. 1 fig.

Descriptors: *Waste treatment, *Drying, Poultry, Odor, Waste storage.

Identifiers: Waste drying pit, Odor control, *Waste reuse.

The manure drying pit is a new concept in on-farm conversion of wastes to salable products. In the pit, circulating fans subject droppings to a continuous flow of drying air at an average velocity of 500 feet per minute. Also, the accumulated droppings are stirred and exposed to the drying air by a winch-drawn spike-toot- harrow. Periodically, the droppings are removed by means of a hinged cleanout board attached to the harrow. The partically dried manure can be stored indefinitely without developing an odor and without taking up moisture from the surrounding air. Controlling odors in the house provides a better environment for the birds and the attendants. (Hazen-Iowa State)

0416 - A3, A9, C2, C4, E2

A STUDY OF SOME DISEASE HAZARDS WHICH COULD BE ASSOCIATED WITH THE SYSTEM OF APPLYING CATTLE SLURRY PASTURE,

Agricultural Research Council, Compton (England). Inst. for Research on Animal Diseases.
J. Deans Rankin, and R. J. Taylor.
The Veterinary Record, Vol 85, November 22, 1969, p 578-581. 3 tab, 7 ref.

Descriptors: *Farm wastes, *Soil-borne diseases, *Slurries, Dairy cows, Waste water disposal, Soil contamination, Water pollution sources, Public health, Pollutant identification.
Identifiers: Bacterial survival.

Physical and bacteriological examinations of 16 samples of cattle 'slurry' have been carried out. On three occasions potentially pathogenic bacteria were isolated, namely, one strain of Salmonella dublin and two strains of haemolytic Escherichia coli. Five strains of potentially pathogenic bacteria survived for 11 to 12 weeks in slurry, although none of them appeared to multiply. The system of slurry disposal on pasture and its implications are discussed. (Hazen-Iowa State)

0417 - A2, C3

ACCUMULATION OF PHOSPHATES IN WATER,

Agricultural Research Service, Morris, Minn. North Central Soil Conservation Research Center.
Robert F. Holt, Donald R. Timmons, and Joseph J. Latterell.
Journal of Agriculture and Food Chemistry, Vol 18, No 5, p 781-784, 1970. 1 tab, 37 ref.
Descriptors: *Phosphates, *Path of pollutants, *Eutrophication, *Leaching nutrients, Fertilizers, Precipitation (Atmospheric), Runoff, Animal wastes, Surface waters, Soil erosion, Nutrients, Algae, Lake Superior, Water Pollution sources, Minnesota, Washington, Connecticut.
Identifiers: Illinois River, St. Louis River, Black River (Minnesota), Lake Washington (Washington), Linsley Pond (Connecticut), Lake Zoar (Connecticut), Lake Minnetonka (Minnesota), Big Stone Lake (Minnesota), Lake Crystal (Minnesota).

Natural and agricultural sources of phosphorus to surface waters include percipitation, animal wastes, fertilizers, and land runoff. The actual contribution from these sources is shown to be quite low. However, the concentration of phosphorus required to support profuse algal blooms is so low that the limited amounts supplied are sufficient to exceed this requirement. Eroded soil delivers appreciable amounts of phosphorus to surface waters, but the soil materials capacity to sorb phosphorus results in little tendency for release of this source into the water. Bottom sediments appear to be a sink for dissolved orthophosphate that is supplied to surface waters. Leaching of vegetation can supply relatively large amounts of phosphorus to lakes and streams. Deep incorporation of phosphatic fertilizers materially reduces the concentration of phosphorus in runoff waters as compared to shallow incorporation. Phosphorus concentrations in several lakes and streams are shown. (McCann-Battelle)

0418 — C5, E3

ENRICHMENT OF CATTLE MANURE FOR FEED BY ANAEROBIC FERMENTATION,

Auburn University.
J. D. Moore, W. B. Anthony.
Journal of Animal Science, Vol. 30, 1970, pp. 324.

Descriptors: *Waste identification, Farm wastes, Cattle, Toxicity, Amino Acios, Feeds, Proteins, nitrogen.
Identifiers: *Organic Acid Synthesis, Toxicity trials.

It was determined that by fermenting cattle manure under anaerobic conditions organic acid synthesis occurred and the pH of the fresh manure dropped from 6.25 within 16-½ hours when incubated at 37°C. By adjusting pH with ammonia once every 24 hours for 3 days, the apparent crude protein level as determined by Kjeldahl Nitrogen analysis, increased from 16.99% to 43.26%. There was a net increase in amine acids greater than 20%. Organic acids (%DM) were acetic acid, 7.20; propionic acid 1:27; butyric acid, 1.34%, valeric acid, 0.11; and eactic acid, 16.83%. From palatability tests with lambs, rations containing either manure or ammonium lactate were equal. In toxicity trials using sheep, ammonium acetate was more toxic than urea. Dosages were made isonitrogenous with urea at the level of 0.88 urea/kg body weight. (Hazen - ISU).

0419 — A8, C5, D4, E3

DIGESTION OF POULTRY MANURE BY DIPTERA,

Colorado State University, Department of Avian Science, Fort Collins.
B. F. Miller, J. H. Shaw.
Poultry Science, Vol. 48, No. 5, pp. 1844-1845, 1969.

Descriptors: *Diptera, Farm wastes, Poultry, Waste treatment, Waste disposal.
Identifiers: *Musca domestic, Muscina Stabulans.

Five species of Diptera were tested for their ability to properly grow, develop, and reproduce in fresh poultry manure. **Musca domestica** and **Muscina stabulans** were the two species found to be the most promising. Musca, with its high biological potential, effectively reduces poultry manure to a more stable product. This species will develop from egg to pupa in five to six days at 37°C. The larvae may be harvested by spreading the manure thinly on a screen under an intense light source. Because they are photonegative they will crawl through the screen permitting collection below. If they are permitted to develop to the pupa stage, the pupa can be separated from the manure residue by flotation. These larvae removed about 80% of the organic matter from fresh poultry manure in five to six days. The moisture content was reduced from 75 to 50% simultaneously. About 25 to 30 grams of larvae was produced from each kilogram of fresh poultry manure. (Hazen - ISU).

0420 - C4

SOME EFFECTS OF ORGANIC WASTES ON AQUATIC INSECTS IN IMPOUNDED HABITATS,

Louisiana State Univ., Baton Rouge, Dept. of Entomology., and Louisiana State Univ., Baton Rouge. Dept. of Microbiology.
C. D. Steelman, and A. R. Colmer.
Annals of the Entomological Society of America, Vol 63, No 2, p 397-400, 1970. 3 tab, 4 ref.

Descriptors: *Water pollution effects, *Organic wastes, *Aquatic insects, Habitats, Impounded waters, Coliforms, Mosquitoes, Lagoons, Indicators, Livestock, Water pollution sources.
Identifiers: Swine, Lagoon studies, Culex pipiens quinquefasciatus, Escherichia coli, Escherichia freundii, Escherichia intermedia, Aerobacter aerogenes, Coptotomus, Hydrous triangularis, Chironomus plumosus, Chaoborus, Brachydeutera, Musca domestica, Psychoda, Hermetia illucens, Stratiomys, Eristalis aeneus, Tabanus, Odonata.

The relative effects of organic waste pollution on the aquatic insect fauna of a freshly dug livestock waste disposal lagoon was studied. Introduction of organic waste material from swine pens into impounded aquatic habitat caused suppression of certain insect species. Decreases in aquatic insect fauna paralleled the increase in the organic waste concentration determined by changes in the numbers of coliform bacteria. The southern house mosquito, Culex pipiens quinquefasciatus Say, began laying eggs in the lagoon when coliform counts approximated 7000 organisms per milliliter of lagoon water. Water suspensions of pure cultures of coliforms Escherichia coli, E freundii, and E intermedia were found to be more attractive as oviposition sites for C p quinquefasciatus than water suspensions of Aerobacter aerogenes or sterile water. The change in insect fauna in the new lagoon during the 2-1/2 years' study was considered to be directly related to the change in the organic waste pollution of the water. The data obtained indicate the possibility of using aquatic insects as biological indicators of water quality. (Jones-Wisconsin)

0421 - E3

EFFECTS OF MANURE APPLICATIONS AND MITE PREDATION ON CORN ROOTWORM POPULATIONS IN MINNESOTA,

Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
H. C. Chiang.
Journal of Economic Entomology, Vol 64, No 3, June 1970, p 934-936. 3 tab, 4 ref.

Descriptors: *Mites, *Disposal, *Predation, Farm wastes, Laboratory tests, Soil treatment, Soil analysis, Soil tests, Population, Corn (Field), Distribution patterns, Water pollution effects.
Identifiers: *Corn rootworms, *Predaceous mites, Manure application, Soil test plots.

Manure was applied in corn plots in 1967 at the rate of 50 tons per acre. The northern and western corn rootworms, Diabrotica longicornia (Say), and D. virgifera LeConte, populations in these plots were reduced to about half the level of those in the check plots. Quantitative observations of the predaceous arthropods in the manured and the check plots showed that the total populations of ground beetles and spiders were not changed because of the manure application. However, the populations of mites, both predaceous and non-predaceous, were 3 or more times as high in the manured as in the check plots. On the basis of the vertical distribution of these mites and of corn rootworms, it was concluded that the predaceous mites could be feeding on corn rootworms. The data suggested that predation by mites accounted for a 19.7% control of corn rootworms under natural field conditions and a 63.0% control when manure was applied in the field. (Hazen-Iowa State)

0422 - C2, C3, E3

PROTEIN AND ENERGY VALUE OF PEANUT HULL AND WOOD SHAVING POULTRY LITTERS,

Virginia Polytechnic Inst. and State Univ., Blacksburg.
Asok Nath Bhattacharya, and J. P. Fontenot.
Journal of Animal Science, Vol. 25, p 367-371, 1966, 5 tab, 20 ref.

Descriptors: *Feeds, *Peanuts, Diets, Animal metabolism, Digestion, *Farm wastes, Wood wastes, Proteins, Metabolism, Amino acids,

*Waste disposal.
Identifiers: Total digestible nutrient, Digestive coefficients, Hulls, Shavings, Litter, Chemical composition, Feeding trials.

Three digestion and metabolism trials were conducted with 10 yearling wethers to study the protein and energy value of autoclaved peanut hull and wood shaving broiler litters, when each was incorporated at levels of 25 and 50% in a corn-hay basal ration. Apparent digestibility of crude protein was not significantly different among rations. Crude fiber digestibility of the litter rations was higher ($P < .01$) than that of the control ration. Dry matter, NFE and energy digestibility were lower ($P < .01$) when the litter level in the ration was increased from 25 to 50%. (Hazen-Iowa State)

0423 - F4

2ND COMPENDIUM OF ANIMAL WASTE MANAGEMENT.
Federal Water Pollution Control Administration, Kansas City, Mo. Missouri Basin Region.

June 1969. 256 p, 59 tab, 33 fig, 80 ref.

Descriptors: *Farm wastes, Rainfall-runoff relationships, Legislation, *Water quality, Pollutant identification, Disposal, Runoff, Grants, Cattle, Land use, Fertilizers, Management, Economics, Nutrients, Storage, Pollution abatement, Eutrophication, Design data, Erosion.
Identifiers: Feedlot wastes, Pollution potential, Nitrate movement, FWPCA, Population equivalents, Processing, Feedlot size, Feedlot runoff, Basin-wide planning.

Twelve papers were presented at the meeting. Major emphasis was placed on cattle feedlot pollution potential. Various aspects of the pollution caused by animal waste were discussed. Sources of pollutants and effects on water quality were emphasized. History and characteristics of animal waste pollution were discussed. Methods for minimizing pollution and the economics of disposal were considered. (Christenbury-Iowa State)

0424 - A2, A4, F3

ANIMAL WASTE RUNOFF - A MAJOR WATER QUALITY CHALLENGE,
Federal Water Pollution Control Administration, Kansas City, Mo.
A. V. Resnik, and Rademacher.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No 1. 21 p, 26 ref.

Descriptors: *Runoff, Farm waste, Legal aspects, Eutrophication, Groundwater, Water quality, Biochemical oxygen demand, Pollutant identification, Water pollution control.
Identifiers: Feedlot runoff, Population equivalents, Pollution potential.

An overview is presented of the causes and effects of animal waste pollution on water quality. The extent of the problem as well as the effects on surface and ground waters are illustrated with research data. The present status of legislation in regulatory control of pollution is discussed. Measures to strengthen present regulations are proposed. (Christenbury-Iowa State)

0425 - A2, C5

ANIMAL WASTES--A MAJOR POLLUTION PROBLEM,
Iowa Univ., Iowa City. Dept. of Civil Engineering.
R. R. Dagne.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No 2. 14 p.

Descriptors: *Farm wastes, Biochemical oxygen demand, Chemical oxygen demand, Hogs, Cattle, Iowa, Runoff, Disposal, Management, Rainfall-runoff relationships, Retention, Water pollution control.
Identifiers: *Livestock wastes, *Characteristics, *Feedlots runoff, Population equivalents, Swine, Site selection, Trends, Animal stocking rates.

The water pollution potential of livestock wastes is discussed. The characteristics of animal wastes are discussed. The major source of water pollution from livestock is open feedlots. The control fundamentals that apply to open feedlots are discussed. Feeding facilities must be designed and operated not only to optimize meat production but also to minimize pollution. (Christenbury-Iowa State)

0426 - A2, A4, B1, F2

REGULATORY ASPECTS OF FEEDLOT WASTE MANAGEMENT,
Kansas State Dept. of Health, Topeka. Environmental Health Services.
M. W. Gray.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No 3. 38 p, 14 tab.

Descriptors: *Legal aspects, Public health, *Legislation, *Fishkill, *Rainfall-runoff relationships, Farm wastes, Aquatic life, Water supply, Recreation, Management, Biochemical oxygen demand, Dissolved oxygen, Regulation, Cattle, Odor, Retention, Kansas, Water pollution control, Water pollution effects.
Identifiers: *Waste characteristics, *Feedlot runoff, Pollution potential, SHUD, Health aspects, Nuisances, Pollution control, Retention ponds.

The legal and environmental implications of pollution from cattle feedlots is discussed. A table is included that summarizes the fish kills that have been attributed to feedlot runoff in Kansas. Chapter 28, Article 18, of the Kansas State Board of Health Regulations is included. The author discusses methods for minimizing pollution of surface and groundwater from feedlots. (Christenbury-Iowa State)

0427 - E2

MANAGEMENT OF ANIMAL FEEDLOT WASTES -- LAND SPREADING AS A DISPOSAL PROCESS,
Missouri Univ., Columbia. Water Resources Research Center.
G. E. Smith.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No 4. 8 p.

Descriptors: *Management, *Farm waste, *Disposal, *Land use, Cattle, Fertilizers, Costs nutrients, Waste disposal, Water pollution control.
Identifiers: Nutrient removal, Application rate.

Disposal of animal waste onto land is effective and can increase crop yields. Attention must be given to the condition of the waste and supplemental nutrients added to insure a balanced fertilizer program. Cost of land disposal may exceed returns in terms of crop response, however land disposal can minimize animal waste disposal costs. (Christenbury-Iowa State)

0428 - A2, F4

DESIGN FOR FEEDLOT WASTE MANAGEMENT - HISTORY AND CHARACTERISTICS,
Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
R. I. Lipper.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No 6. 9 p, 4 tab.

Descriptors: *Farm wastes, *Rainfall-runoff relations, *Pollution abatement, Biochemical oxygen demand, Runoff, Nutrients, Dissolved oxygen, Soil structure, Irrigation, Nitrogen, Detention reservoirs, Water pollution control.
Identifiers: *Feedlots, Pollution potential, Kjeldahl nitrogen.

The purpose is to illustrate the value of the cattle feeding industry to the state of Kansas; to relate its growth in the state to the emergence of a water pollution problem; and to make an attempt to describe the nature and magnitude of the problem in the best perspective that can be achieved at this time. Large-scale cattle feeding is a growth industry suited to Kansas resources and one that the state can ill afford to ignore. Efficient livestock production methods have given rise to water pollution problems. Pollutant concentration is approximately twice as great from a concrete lot as from an unsurfaced lot. Data is presented to evaluate the pollution potential of feedlot runoff. (Christenbury-Iowa State)

0429 - A2, A3, A4, B1, C3

CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION,
Missouri Univ., Columbia. Water Resources Research Center.
G. E. Smith.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No. 7, 16 p, 7 tab, 5 fig, 24 ref. PHS-FWPCA-USDI - WP00533.

Descriptors: *Eutrophication, Fertilizers, Farm wastes, Nutrients, Denitrification, Nitrification, Ammonification, Leaching, Erosion, Nitrogen, Runoff, Water pollution control, Groundwater, Septic tanks, Management.
Identifiers: *Methemoglobin, Nitrate movement, Feedlots, Residual accumulation, Soil cores.

Without chemical soil amendments the United States would be a food importing nation. Despite liberal fertilizer use, crops are removing more nitrogen and minerals than are being added in soil amendments. Many shallow wells in Missouri are contaminated with nitrates as a result of leaching from livestock feeding operations. The nitoate is not associated with losses from fertilized farm fields in most cases. There is little question that some of the nutrients applied in chemical fertilizers are moving into both surface and ground water; the percentage is thought to be relatively small. It is possible that nutrient losses may be less where good fertilization practices are followed than on unfertilized soils. (Iowa State)

0430 - A2, C1

CATTLE FEEDLOT WATER QUALITY HYDROLOGY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
T. E. Norton, and R. W. Hansen.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No. 8, 26 p, 14 fig, 2 tab, 13 ref.

Descriptors: *Rainfall-Runoff relationships, *Liquid wastes, *Biochemical oxygen demand, Farm wastes, Dissolved solids, Hydrogen ion concentration, Alkalinity, Equipment, Simulated rainfall, Hydrology, Hydrographs, Rainfall intensity, Overland flow, Design data, Conductivity, Model studies, Water pollution control.
Identifiers: *Feedlot wastes, Pollution potential, Feedlots, Prediction method, Procedure.

Runoff wastewater from cattle feedlots is considered; the overall objective was to determine if the hydrology characteristics could be correlated with the quality characteristics through a modification of the flat plate model of overland flow. The results of the correlation could then be used to predict the quantity and quality of the runoff from existing feedlots. The data demonstrated the fact that the prediction method proposed requires extrapolation of data beyond the observed values. Therefore, additional information obtained from

studies of runoff from full-scale feedlots would be advisable in determining the validity of this extrapolation. (Christenbury- ISU)

0431 - F4

MAJOR PROBLEMS OF WATER POLLUTION CREATED BY AGRICULTURAL PRACTICES,
Federal Water Pollution Control Administration, Kansas City, Mo.
Walter F. Robohn.
In: 2nd Conpendium of Animal Waste Management, June 1969, Paper No. 9, 16 p.

Descriptors: *Farm wastes, *Erosion, *Water pollution sources, *Pollution abatement, Runoff, Pollutants, Sediment, Livestock, Legal aspects, Legislation, Sugar beets, Farm lagoons, Fertilizers, Salts, Irrigation, Ground water, Pollution identification, Tailwater, Water pollution effects, Water quality control.
Identifiers: *Population equivalents, Feedlots, Slaughter, Processing.

This paper discusses the magnitude of the water pollution abatement problem facing agriculture. The major acitivity which is contributing to water pollution is discussed. Sediment derived from land erosion constitutes by far the greatest mass of all the waste material arising from agriculture. The fundamentals of pollution of interest to agriculture are discussed. The control of pollution from agricultural sources is severly handicapped by lack of knowledge. It will take the combined efforts of engineers, waste treatment plant operators, city officials, agricultural people and citizens in general to solve the great national problem of water pollution. (IowaState)

0432 - F1, F2

AGRICULTURE AS A SOURCE OF WATER POLLUTION,
Federal Water Pollution Control Administration, Charlottesville, Va. Middle Atlantic Region.
Eugene T. Jensen.
In: 2nd Conpendium of Animal Waste Management, June 1969, Paper No. 10, 11 p.

Descriptors: *Legislation, *Grants, Farm wastes, Nutrients, Sediment, Chemicals, Livestock, Water quality control, Pollution abatement, Federal Government, Disposal, Research and development.
Identifiers: *FWPCA, Basin-wide planning.

Various aspects of water pollution are discussed, including sources, types of pollutants, and methods of pollution abatement. The role that the Federal Water Pollution Control Administration plays in pollution control is discussed. Research grants and contracts are awarded to support basic and applied research projects relating to the causes control, and prevention of water pollution. The need for clean and usuable water demands that we build the cost of clean water into all our operations. (Iowa State)

0433 - A2, A3, B1

EFFECT OF AGRICULTURE ON WATER QUALITY,
Federal Water Pollution Control Administration, Evansville, Ind. Lower Ohio Basin Office.
T. R. Smith.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No. 11, 11 p, 9 ref.

Descriptors: Water quality control, *Nutrients, *Pesticides, Farm wastes, Silt, Erosion, Sedimentation, Runoff, Fertilizers, Nitrogen, Phosphorus, Algae, Livestock, Water pollution effects.
Identifiers: Feedlots, Wabash River Basin.

The main sources of agricultural associated water pollution in humid regions are: (1) silt from soil erosion; (2) fertilizers, mainly phosphorus and nitrogen compounds (3) pesticides; and (4) organic wastes from feedlots. In arid regions, irrigation return flows are a problem. This paper discusses the effect of each of these sources can have on water quality and suggests some preventative measures. It is necessary that agriculturalists plan to control pollutional effects on their activity. (Christenbury-ISU)

0434 - A2, B1, D2, E2

ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS,
Texas Tecnological Coll., Lubbock. Dept of Agricultural Economics.
T. R. Owens, and Wade L. Griffin.
In: 2nd Compendium of Animal Waste Management, June 1969, Paper No. 12, 62 p, 31 tab, 2 fig, 8 ref.

Descriptors: *Economic feasibility, Rainfall-runoff relationships, *Disposal, *Cost comparisons, Economics of Scalo, Farm wastes, Runoff, Design criteria, Legal aspects, Costs, Biochemical oxygen demand, Evaporation, Model studies, Hydrological data, Equipment, Detention reservoirs, Odor, Systems analysis, Groundwater, Seepage, *Water pollution control.
Identifiers: *Feedlot size, Playa lake disposal, Open field disposal, Overflows, Feedlot runoff.

The economic feasibility of various methods for controlling or disposing of feedlot runoff is determined. The various design criteria were applied to three different sizes of model feedlots: (1) 5000 head, (2) 10,000 head, and (3) 25,000 head. The approach to the problem of water pollution from feedlots used here involved control of runoff by establishing collection basins and subsequently discharging the runoff to one of two disposal areas or alternatively to hold the collected runoff until natural evaporation emptied the system. In general, evaporative discharge systems were considered inferior to their mechanical counterparts because of the lower degree of protection provided and the rather extensive land requirements for construction of the collection basin. (Iowa-State)

0435 - A1, F4

THE MOUNTING PROBLEM OF CATTLE FEEDLOT POLLUTION,
Frank G. Viets, Jr.
Agricultural Science Review, Vol 9, No 1, First Quarter 1971, p 1-8. 2 figs, 2 tab, 13 ref.

Descriptors: *Waste disposal, *Waste dumps, Farm wastes, Solid wastes, Air pollution, Runoff, Water pollution control.
Identifiers: *Feedlot pollution, Solid waste disposal, Soil pollution.

Steadily increasing demands for well-finished beef and the apparent profitability of large integrated feeding and slaughtering operations indicate that feed lots will grow larger and not smaller. Cattle feeding is moving from a small farm enterprise toward an agricultural industry. This results in a large concentration of wastes on a small area. Most large operators are making an effort to comply with water and air pollution regulations. Because stream and lake pollution from runoff is now prohibited, engineers are challenged to design facilities that minimize runoff or dispose of it economically and, hopefully, beneficially. Runoff control is much more difficult in humid climates than in drier ones. Underground water pollution appears to be mostly a local phenomenon. Most of the unsolved problems lie in the air pollution area. Offensive odor and their control still await thorough application of microbiological and chemical research. Manure can be disposed of and used as a resource if only a small portion of the land needed to produce the feed is available for manure disposal. Zoning appears to be one of the best solutions to the feedlot problem. (Hazen-Iowa State)

0436 - A6, C1, C2

POULTRY DUST: ORIGIN AND COMPOSITION,
Auburn Univ., Ala. Agricultural Experiment Station.
J. Koon, J. R. Howes, W. Grub. and C. A. Rollo.
Agricultural Engineering, Vol 44, No 11, November, 1963 p. 608-609. 4 fig.

Descriptors: *Dusts, *Farm wastes, Poultry, Environmental effects.
Identifiers: Environmental control, Dust composition.

Dust is a major problem in poultry environmental control as it impairs the operational efficiency of equipment to a degree that its use becomes impractical. A study was made to determine the composition of poultry dust and to establish the effects of temperature on the dust produced. Single comb H3W white Leghorn laying hens were exposed to constant temperatures of 50, 60, 70, 80, 90, 100F. Broiler tests were conducted using vantress male cross No. 50 arbor acres female Whiterock chicks. Qualitative and quantitative dust samples were obtained and tested. The dust from laying hens contained approximately 92% dry matter, of which 60% was crude protein. Fat analysis was 9%, cellulose 4%. The remainder of the dry matter was ash and hydrocarbons. The broiler dust was lower in fat and higher in protein. Birds raised on litter have a decline in dust production at 90F. Relative humidity for all environmental chambers was 60%. (Hazen-Iowa State)

0437 - C1

PROPERTIES OF FARM ANIMAL EXCRETA,
E. P. Taiganides, and T. E. Hazen.
ASAE Paper No. 64-315. Transactions of the american society of agricultural engineers, Vol. 9, p 374-376, 1966. 6 tab, 13 ref. Iowa Agricultural and Home Economics Experiment Station Project 1433.

Descriptors: *Farm wastes, *Physical properties, *Chemical properties, Biochemical oxygen demand, Chemical oxygen demand, Livestock, Disposal, Gases, Odor, Biodegradation, Fertilizers, Value, Nutrients, Pollutant identification.
Identifiers: Population equivalents, Handling.

Data on the most important of the physical, chemical, and biological properties of poultry swine and cattle excreta have been reported, analyzed and discussed as to their value in the design of manure treatment facilities. The distinction is made between sewage and manure. Feed influences the quantity of waste and its chemical composition. Little work has been done recently to determine the physical properties of animals wastes. The daily production of manure from farm animals varies considerably. The questions is raised if it pays to collect and use animals manures as fertilizer. The availability of manure handling devices and disposal problem of wastes indicates justification of application to soils. Poultry manure has highest fertilizer value, swine is next. The biochemical oxygen (BOD) test is used to determine pollutional strength of an organic waste in terms of the oxygen demand that the waste will exert on a water body if discharged into anatural watercourse in which aerobic conditions must be maintained. The chemical oxygen demand (COD) test is also used as an index of strength of waste. A comparison is made of BOD and COD production mean values for man, hens, swine, and cattle. There is a lack of information on the composition of the gases, and on the control of odors produced as a result of the uncontrolled biological degradation of manures. (Hazen-Iowa State)

0438 - B1

SOIL CHEMICAL CHANGES AND INFILTRATION RATE REDUCTION UNDER SEWAGE SPREADING,

Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
R. E. Thomas, W. A. Schwartz, and T. W. Bendixen.
Soil Science Society of America Proceedings, Vol 30, 1966, p 641-646. 11 fig, 3 tab, 18 ref.

Descriptors: *Infiltration, *Lysimeters, Waste water treatment, Waste water disposal, Permeation, Chemical oxygen demand, Anaerobic conditions, Biochemical oxygen demand, Aerobic conditions, Disposal, Laboratory tests.
Identifiers: *Soil-pore clogging, Applied sewage effects, Microbial activity, Infiltration rate.

Laboratory and field lysimeters were used to investigate the site and nature of soil-pore clogging under sewage spreading. The site of clogging was located by determining with a seepage meter the impedance profile at 0.5-cm depth intervals. Soil samples were analyzed for sulfide, iron, phosphate, total organic matter, polysaccharide and polyuronide to evaluate possible causative relationships. The infiltration rate loss exhibited three phases: Phase I, a slow reduction under aerobic conditions; Phase II, a rapid reduction under anaerobic conditions; and Phase III, a further gradual decline under anaerobic conditions. The primary site of clogging was the 0-1-cm depth of soil. Although sulfide was an indicator of anaerobic conditions it was not a primary cause of clogging. Accumulations of the other five measured constituents may contribute to clogging in both Phase I and Phase II. Organic matter was the only probable clogging agent to decline as the infiltration rate was partially recovered in a rest cycle. (Hazen-Iowa State)

0439 - C4, D4

THE DECOMPOSITION OF URIC ACID IN BUILT UP POULTRY LITTER,

Edinburgh Univ. (Scotland). School of Agriculture; and Edinburgh Univ. (Scotland). Dept. of Bacteriology.
Henrietta E. Schefferle.
Journal of Applied Bacteriology, Vol 28, No 3, 1965, p. 412-420. 1 tab, 6 ref.

Descriptors: *Farm wastes, *Decomposing organic matter, *Bacteria, Poultry, Aerobic bacteria, Nitrogen, Water pollution sources.
Identifiers: *Uric acid decomposition, Coryneform bacteria, Urease activity, Ammonia formation.

The decomposition of uric acid in built up poultry litter appears to be brought about almost exclusively by the action of aerobic bacteria. Organisms decomposing uric acid usually comprised about one quarter of the bacterial population. There were strains of coryne bacterium and less frequently strains of NOCARDIA, STREPTOMYCES, PSEUDOMONAS, ALCALIGENES, and ACHROMOBACTER. Uric acid was converted to ammonia by some of the organisms but only to urea by the majority. Hydrolysis of urea to ammonia could be brought about by strains of corynebacterium, Micrococcus, Alcaligines, Achromobacter, and cytophaga which had no action on uric acid. It is suggested that the ammoniacal smell and high alkalinity of built up poultry litter result largely from the decomposition of uric acid. The identity of the bacteria concerned is discussed. (Hazen-Iowa State)

0440 - F2

LEGAL ASPECTS PERTAINING TO ENVIRONMENTAL REGULATIONS IN PORK PRODUCTION,

Missouri Univ., Columbia. Dept. of Agricultural Economics.
Donald R. Levi.
American Pork Congress - Proceedings, Environmental Quality Workshop, Des Moines, Iowa, Mar 3, 1971, p 103-111.

Descriptors: *Farm wastes, *Legal aspects, Water pollution, Air pollution, Public rights, Regulation, Judicial decisions, Damages, Zoning, Permits, Maintenance, Water pollution control.
Identifiers: Public regulation, Private regulation, Nuisances, Legal principles, Lawsuits, Liability, Actual damages, Punitive damages, Site selection.

Public and private regulation of both air and water pollution is provided by pollution boards or commissions and through nuisance laws. Two lawsuits are discussed so that the legal principles involved might help determine what courses of action will help avoid such situations. In a nuisance law case the complaining party may ask for (1) an injunction, (2) damages (either actual or punitive), or (3) both an injunction and damages. The nuisances involved may be either public or private. A plaintiff may have a better chance if the rights of the public are being affected. Methods of avoiding lawsuits include the use of zoning, site selection, licensing, proper maintenance, adequate facilities, and being a 'good neighbor.' (White-Iowa State)

0441 - C3

METHODS OF SAMPLE PREPARATION FOR CHEMICAL DETERMINATION OF CHROMIC OXIDE IN BOVINE FECES,

Kentucky Univ., Lexington. Dept. of Animal Science.
P. R. Utley, N. W. Bradley, and J. A. Boling.
Journal of Dairy Science, Vol 54, No 7, p 1091-1093, July 1971. 1 tab, 11 ref.

Descriptors: *Animal waste, *Chromium, *Nutrient, Chemical analysis, Laboratory, Indicators, Diurnal, Digestion, Statistical method, Time series analysis, Diet.
Identifiers: *Corn-urea diet, Blender, Chromium oxide, Feces, Fecal recovery, Ground corn.

Fecal samples were prepared by four different methods to observe the variation and per cent recovery of added chromic oxide with each method. Variation was greatest in the samples dried and ground with a Wiley mill and those homogenized and analyzed wet. The standard errors of the samples dried and ground with a hand grinder and those homogenized and analyzed dry were lower than those of the other two groups of samples. The average per cent recovery ranged from a low of 98.8% (homogenized, analyzed wet) to a high of 100.2% (homogenized, analyzed dry). The variation in chromic oxide concentration tended to be greater in samples containing the highest per cent moisture at time of analysis. (Bundy-Iowa State)

0442 - A5, B2, F1

CAN LIME AND CHLORINE SUPPRESS ODORS IN LIQUID HOG MANURE,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
C. W. Hammond, D. L. Day, and E. L. Hansen.
Agricultural Engineering, Vol 49, No 6, p 340-343, June 1968. 4 fig, 8 tab.

Descriptors: *Lagoons, *Anaerobic bacteria, *Chlorination, *Hydrated lime, Sand filters, Moisture content, Biochemical oxidation demand, Chemical oxidation demand, Swine, Air circulation, Organic waste, Evaporation, Hydrogen ion concentration, Odor.
Identifiers: *Hog confinement building, Slatted floors, Experimental farm, Liquid hog manure.

Liquid manure collected in pits beneath self-cleaning slatted floors supports anaerobic bacteria that produce objectionable gases and odors in the hog confinement building. Studies were instituted to check the use of lime and chlorine for preventing the production of these odors. The studies indicated that hydrated lime reduced the production of hydrogen sulfide, but to a lesser extent than the chlorine. It did not prevent the liberation of ammonia. The hydrated lime required to maintain the desired pH would cost $0.62 per hog for 6 months at $2.20 per 100 lb. Chlorine treatment is an effective deterrent of ammonia, hydrogen sulfide, methane and carbon dioxide. The cost of adding enough chlorine to fill the chlorine demand is about $6.40 per hog for 6 months, based on a cost of $0.54 per gal. for the sodium hypochlorite. Chlorine and lime were also effective in controlling maggots and rodents in the building. Chlorine seemed most effective. Sand-bed filtering was also found effective in trapping solids and organic matter. Fewer than 5 per cent of the solids penetrated the sand to any significant depth, the largest portion being left on surface. (Brundy-Iowa State)

0443 - C4, D4

SULFUR BACTERIA IN RED LAGOONS,

Nebraska State Dept. of Health, Lincoln. Div. of Environmental Engineering.
O. Sletten, and R. H. Singer.
Journal Water Pollution Control Federation, Vol 43, No 10, October 1971, p 2118-2122. 27 ref.

Descriptors: *Lagoons, *Sulfur bacteria, *Pigments, Oxidation lagoons, Farm wastes, Aerobic conditions, Anaerobic digestion, Anaerobic bacteria, Waste water treatment.
Identifiers: Red pigmentation, Thiorhodaceae.

Widespread investigations demonstrate that various genera of photosynthetic sulfur bacteria of the family Thiorhodaceae are usually responsible for red pigmentation in anaerobic easte stabilization lagoons. A number of these genera display only slight differences in morphology. Further taxonomic study may reveal that such differences represent nothing more than environmental reactions of a single genus. From observations and experience relating to the photosynthetic sulfur bacteria, the authors concur with other investigators on the possible practical role of these organisms in anaerobic waste lagoons. If the organisms are not naturally present in the lagoon, it has been recommended that they be introduced into it by massive inoculation. Their practical value lies in their potential ability to destroy reduced sulfur compounds and eliminate or reduce offensive odors. (Parker-Iowa State)

0444 - A2, C4

PROLONGED SALMONELLA CONTAMINATION OF A RECREATIONAL LAKE BY RUNOFF WATERS,

Wisconsin Univ., Madison; Medical School. Wisconsin State Lab. Hygiene, Madison.
D. G. Claudon, D. I. Thompson, E. H. Christenson, G. W. Lawton, and E. C. Dick.
Applied Microbiology, May 1971, Vol 21, No 5, p 875-877. 2 tab, 11 ref.

Descriptors: *Salmonella, Water pollution sources, *Recreation facilities, Runoff, Lakes, Beaches, Sampling, Bacteria, Tributaries, Streams, Bayou, Sewage, Wisconsin.
Identifiers: *Lake Mendota, Contamination, Washwater, Moore swab, Madison (Wisc).

In the summer and fall of 1968 various Salmonella serotypes were isolated from a portion of Lake Mendota, the major recreational lake for Madison, Wisconsin. The apparent sources of these organisms were a residential storm sewer and a University of Wisconsin Experimental Farms' washwater drain. Salmonellae were isolated with regularity from a swimming beach located approximately 0.5 mile from these sources. (Parker-Iowa State)

0445 - A2, F4

EFFLUENT DISPOSAL,
Lactose Co. of New Zealand Ltd., Kapuni.
J. M. Wood.
New Zealand Journal of Dairy Technology, Vol 4, No 4, December 1969, p 238-242.

Descriptors: *Dairy industry, *Waste disposal, *Water pollution sources, Legislation, Administration, Organic wastes, Biochemical oxygen demand, Milk, Oxidation, Water pollution control, Water pollution, Water temperature, Dissolved oxygen.
Identifiers: *New Zealand, Water Pollution Act, Effluent, Disposal.

An increasing concern in the preservation of natural water resources, and their protection from pollution is appearing in New Zealand even though the problem has not reached serious proportions there. This author has reviewed the New Zealand legislation with respect to this problem, especially the Water and Soil Conservation Act of 1967. He also reviews some aspects of river pollution and its causes and effects. He finishes with a brief discussion of some effluent treatment and disposal methods, with particular reference to the dairy industry. (Parker-Iowa State)

0446 - E1, F3

BASIC POINTS TO CONSIDER IN MANURE DISPOSAL PROBLEMS,
Richard D. Chumney.
Poultry Digest, December 1970, p 608.

Descriptors: *Farm wastes, *Poultry, *Waste disposal, Regulation, Costs, Environmental effects, Technology.
Identifiers: Recycling.

The greatest deterrent to future progress of the U.S. poultry industry is the lack of technological and managerial know-how for proper and efficient disposal of poultry waste. In approaching the problem the following points should be considered: (1) Regulatory enforcement should not exceed the present 'state of the art.' (2) The cost of waste disposal must be included as a regular cost of doing business. (3) New techniques for the recycling of poultry waste into the soil and as feed supplements is the best long range approach. (4) Every precaution must be taken to protect our total environment as we dispose of poultry waste. (Parker-Iowa State)

0447 - F4

LIVESTOCK WASTES,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner.
Journal Water Pollution Control Federation, Vol 43, No 6, June 1971, p 991-998. 60 ref.

Descriptors: *Farm wastes, *Waste disposal, *Reviews, Waste treatment, Publications, Gases, Odors, Soil disposal fields, Aerobic treatment, Aeration, *Reviews, Bibliographies.
Identifiers: *Livestock wastes, *Literature review, Feedlot runoff.

This is a review of the literature on research in the area of livestock waste management and its influence on water quality. Discussions include waste treatment systems, waste characteristics, manure handling systems, gases and odors, application of wastes to cropland and cattle feedlot wastes. A short review of sixty references in this area is given. (Parker-Iowa State)

0448 - D4, E4

INDIAN UTILIZES NOVEL MANURE DISPOSAL SYSTEM,
Patel Poultry Farm, Boroda (India).
Jawahar D. Patel.
Poultry Digest, Vol 26, p 100-101, 1967.

Descriptors: *Farm wastes, *Methane, *Gases, *Anaerobic digestion, Fertilizers, Odor, Temperature, Disposal, Poultry, Fuels.
Identifiers: India, Working details.

An anaerobic digester that converts poultry manure into useful methane gas is being utilized in India. Poultry manure gives 1.5 to 2.0 cu. ft. of gas per pound in a short period of digestion and at a temperature of 35 degrees C. 35.3 cu. ft. of methane is equivalent to 2.2 kilowatt-hours of electrical energy. The digested manure is a valuable fertilizer because it supplies not only nutrients such as nitrogen, phosphorus, potash, iron, copper, cobalt, maganese, calcium, magnesium, etc., in a well-balanced proportion, but also most valuable humus to plants for successful crop production. (Christenbury-Iowa State)

0449 - F1, F4

WASTES FROM THE POULTRY INDUSTRY,
National Agricultural Advisory Service, Guildford (England).
C. T. Riley.
Agriculture, Vol 75, No 8, p 374-376, Aug 1968.

Descriptors: *Poultry, Reclamation, Waste disposal, Nitrogen, Fertilizer, Protein, Moisture.
Identifiers: *Refeeding wastes, Cage layers, Broilers, Deep litter, Recycling.

Some waste materials normally produced by the poultry industry are defined and their relative importance is indicated. The increasing volume of wastes produced and the economics of utilizing these poultry wastes are discussed. (Dorland-Iowa State)

0450 - A3, A4, C3

NITRATE AND SALT IN SOILS AND GROUND WATERS FROM LAND DISPOSAL OF DAIRY MANURE,
D. C. Adriano, P. F. Pratt, and S. E. Bishop.
Soil Science Society American Proceedings, Vol. 35, 1971. p. 759-762, 3 fig, 3 tab, 14 ref.

Descriptors: *Farm wastes, *Water pollution sources, Groundwater, Salinity, Leaching, Nitrogen, Ammonia, Irrigation, Pastures, Lagoon, Application rate.
Identifiers: *Dairy wastes, Chino-Corona Basin, Feedlots, Well waters.

The NO3 - contents of soils and ground waters underneath lands used for disposal of manures from dairies in the Chino-Corona Basin were determined. Soil and water samples were taken from 15 holes drilled to the top of water table in sites representing corrals, irrigated croplands, and pastures used as disposal areas. Considerable amounts of NO3- and salt were found in soil profiles underneath the disposal areas, although the magnitude was not as high as in profiles under corrals. Average NO3- -N concentrations in waters sampled from water tables were 26, 57, 45, and 74 ppm for control (undisturbed), corral, cropland, and pasture sites, respectively, exceeding the PHS recommended limit of 10 ppm NO3- -N for safe drinking water. Domestic well waters pumped from deeper aquifers averaged 6 ppm of NO- -N. Contributions of NO3- -N to ground waters, as indicated by deep soil samples, on a per unit area basis, tended to be: corralSpastureScropland. Existing conditions in the study area need some modifications if acceptable quality of the ground waters is to be maintained. (Bundy-Iowa State)

0451 - A9, C4, D4

REDUCTION OF SALMONELLA IN COMPOST IN A HOG-FATTENING FARM OXIDATION VAT,
E. H. Kampelmacher, and L. M. Jansen.
Journal Water Pollution Control Federation, Vol 43, No 7, July 1971, p 1541-1545. 4 fig, 3 tab, 3 ref.

Descriptors: *Farm wastes, *Oxidation ponds, Fertilizer, Swine, Aerobic, Aeration, Bacteria, Effluent, *Salmonella, Samples, Confinement pens, *Waste water treatment.
Identifiers: Oxidation vats, Bacteria count, Hog-fattening farm, Aerobic flora.

In recent years the number of large hog-fattening farms, where frequently thousands of animals are fattened, has increased greatly. On these farms, the disposal of urine and feces, which in such large quantities can no longer be used for fertilization, constitutes a serious problem. In order to deal with it by means of purification, oxidation vats have been constructed and oxidation ditches dug on these farms. A description is given of experiments carried out with a small experimental oxidation vat suitable for 160 hogs and installed on a hog-fattening farm in Wageningen by the Institute Landbouw en Bedrijfsgebouwen. The study was performed to determine whether bacteriological reduction in general and elimination of Salmonella in particular occur. The reduction of Salmonella in composts in an experimental oxidation vat on a hog-fattening farm was shown to be approximately 100-fold. As long as the excretion of Salmonella in the feces of the hogs remain low, only small numbers of Salmonella bacteria will be sluiced out with the effluent, thus, the possibility of human and/or animal infection in surface water may be regarded as very slight. As soon as either the number of hogs or the number of excreted bacteria, or both, increases, the plant can no longer adequately reduce the number of salmonellae to the extent that the effluent can be sluiced out into open water without the danger of human or animal infection. Therefore, it is recommended that adequate chlorination of the effluent of such plants be considered. (Bundy-Iowa State)

0452 - A4, C3

GROUNDWATER CONTAMINATION,
Guelph Univ. (Ontario). Dept. of Soil Science.
Robert W. Gillham, and L. R. Webber.
Water and Pollution Control, Vol 106, No 5, p 54-57, May 1968. 5 fig, 1 tab, 11 ref.

Descriptors: *Groundwater, *Piezometry, *Water table, *Surface-groundwater relationships, *Water pollution sources, Infiltration, Wastes, Hydraulic conductivity, Subsurface drainage, Transmissivity, Head loss, Darcys law, Time lag, Nitrogen compounds, Nitrates, Discharge measurement, Discharge (Water), On-site data collections, Underflow.
Identifiers: *Hydraulic potential, Canada.

All inorganic salts of N are very soluble in water and N in the nitrate form is particularly hazardous for both humans and livestock. Barnyards and feedlots may be prime sources of inorganic N in groundwater. A piezometric network was installed radially throughout a barnyard for determination of groundwater discharge out of the barnyard so that it could be correlated with the changes in the N concentration of the water as it passed beneath the barnyard. The active head of water in a given piezometer was measured at different times. Its basic time lag, together with the geometry of the piezometer, could be used to calculate hydraulic conductivities from a large number of sites. These were then used to construct a map of isopotential lines indicating changes in hydraulic potential with distance. A simplifying assumption was that hydraulic potential did not vary vertically in the water table to bedrock. Together with N measurements at various depths to bedrock, the results showed that the barnyard contributed 0.00189 lb N/hr to the groundwater, or about 17.5 lb N/yr. This was considered surprisingly low, since the manure of a single cow could produce 74 lb N/yr. (Casey-Arizona)

0453 - A3, F3

PLANT NUTRIENTS AND WATER QUALITY,
C. R. Frink.
Agricultural Science Review, Vol 9, No 2, Second Quarter 1971, p 11-25. 4 tab, 3 fig, 34 ref.

Descriptors: *Cycling nutrients, Water quality control, Fertilizers, *Nutrients, Watersheds (Basins), *Farm wastes, Surface runoff, Subsurface runoff, Systems analysis, Farm wastes, Nitrogen, Nitrates, Agricultural chemicals, Fertilizers, Phosphorus, Water pollution sources.
Identifiers: *Plant nutrients, Political units, Farming systems.

Nutrient yields to waterways were examined in three ways: direct measurements in watersheds, analysis of farming systems, and calculations for political subdivisions. Direct measurements in watersheds have shown, for example, that agricultural runoff supplied significant quantities of nitrogen in the Potomac River Basin but was not an important source of phosphorus. Farming systems analysis was proposed to avoid the cost of a national water monitoring network. Such things as various methods of fertilizer application were considered. And the possibility of sewage effluent to a soil-crop filter rather than dilution in streams. The calculations of nutrient sources for political units should help us establish priorities in the expensive process of providing clean water. We ought to direct our efforts towards minimizing nutrient yields from all significant sources, and ask how much stopping the yields will cost society. The author suggests that we abandon our preoccupation with obtaining the maximum yield per acre and consider instead a system analysis of agricultural practices that will maximize all benefits to society. (Parker-Iowa State)

0454 - A1, F2, F3

SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION,
Oregon State Univ., Corvallis. Air Resources Center.
Robert M. Alexander.
Oregon Water Resources Research Institute, Corvallis, March 1971. 49 p, 31 ref. OWRR Project A-999-ORE (8).

Descriptors: *Social aspects, *Resource allocation, *Pollution abatement, *Industrial wastes, Environmental sanitation, Cost-benefit analysis, Marketing, Economics, Feasibility studies, Diseconomies of scale, Social values, Social change, Social needs, Pollutants, Water pollution, Air pollution, Pesticide toxicity, Radiation, Radioactivity effects, Waste disposal, Pollution abatement, Judicial decisions, Administrative agencies, Regulation, Permits.

The social aspects of environmental pollution resulting from scientific and technological changes in industry are examined. Specific side effects studied include air and water pollution, pesticide toxicity, and ionizing radiation. These are considered from several economic and political viewpoints. Social goals are broken down to determine the degree of pollution abatement possible in view of the costs involved. The extent to which society is willing to bear the cost of controlling industrial pollution, and who will bear these expenditures is analyzed. The article examines the market mechanism, side effects, and external costs, concentrating upon the market mechanism and its role in allocating resources. Alternatives are suggested for dealing with the side effects of pollution: (1) the establishment and protection of rights by private negotiation, (2) adversary proceedings, measures to strengthen judicial proceedings, and courts as a political force in fostering environmental quality; (3) regulation by licensing and permit issuance; and (4) incentive programs based upon payments or charges. The article concludes with a reassessment of key social issues in relation to a reordering of priorities so as to favor environmental quality. (Rees-Florida)

0455 - E1, F4

ANIMAL WASTE DISPOSAL BECOMES A MORE DIFFICULT PROBLEM,
Illinois Univ., Urbana. Dairy Science.
S. L. Spahr.
Illinois Research, Vol 12, No 4, p 4-5, Fall 1970.

Descriptors: *Disposal, *Odor, Farm wastes, Runoff, Illinois, Equipment, Farm lagoons, Gases, Water pollution control, Storage pits, Waste treatment.
Identifiers: Feedlot runoff, Oxidation ditch, Pollution potential, Uses, Research needs.

Many of the current systems of animal waste disposal may create serious health and pollution problems. Little knowledge is available to solve many of the problems facing the livestock producers. Current technology and future research needs for waste disposal are discussed. (Christenbury-Iowa State)

0456 - A5, B1

TRY TO KEEP ODORS UNDER CONTROL,
J. L. Skinner.
Poultry Digest, March 1971. p 116.

Descriptors: *Odor, Farm wastes, Poultry, Livestock, Management, Disposal, Public rights, *Waste treatment.
Identifiers: *Odor control, Public relations.

Four suggestions are given for managing conditions related to odor problems: (1) Reduce spillage and overflow from watering systems. (2) Make sure that manure removal systems actually remove manure and do not leave unnecessary accumulations in corners, adjacent to winch and drive mechanisms, and around discharge elevators. (3) Use only manure transport vehicles that do not spill or leak on roadways. (4) Avoid field spreading manure near residences, close to roads, late in the afternoon of still days or on weekends. (Hazen-Iowa)

0457 - B2, D4, E2

DISPOSAL OF LIQUID WASTES FROM PARLORS AND MILKHOUSES,
Pennsylvania Agricultural Experiment Station, University Park.
N. H. Wooding.
Special Circular 154 (1971), 12 p, 2 tab.

Descriptors: *Farm wastes, *Aerobic treatment, *Sprinkler irrigation, Solid wastes, Effluents, Treatment facilities, Lagoons, Milk, Irrigation systems, Permits, Pennsylvania, Legislation, Septic tanks, Liquid wastes, *Dairy industry, Cattle, *Waste water treatment, *Waste water disposal.
Identifiers: *Dairy cattle, Milking parlor wastes, Pennsylvania Clean Streams Law.

The problem of disposing of liquid wastes from dairy operations is becoming increasingly important in the light of current legislation. The Pennsylvania Clean Streams Law and its effect upon this disposal are discussed. The Clean Streams Law requires a waste water disposal permit for any facility that will discharge into surface or underground waters, create a danger of polluting these waters, or may be necessary for effective regulation of the facility even though it does not have a direct discharge. One of the major problems of a dairy operation is the disposal of milking parlor liquid wastes. One method of treatment is the use of aerobic lagoons, anaerobic lagoons being unacceptable due to the production of odors. Solid wastes and milk should be excluded to prevent overloading the system. The wastewater from the lagoon can be disposed of with a sprinkler-irrigation system. (Dorland-Iowa State)

0458 - D4, E2

USE OF SOIL TO TREAT ANAEROBIC LAGOON EFFLUENT: DESIGN AND OPERATION OF A FIELD DISPOSAL SYSTEM,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
Dale H. Vanderholm, and Craig E. Beer.
Transactions of the American Society of Agricultural Engineers, Vol 13, No 5, p 562-564, Sept-Oct 1970. 1 tab, 2 fig, 17 ref. OWRR Project A-021-IA (3).

Descriptors: *Farm wastes, *Disposal, *Anaerobic digestion, *Irrigation systems, Runoff, Farm lagoon, Livestock, Pollutants, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Odor, Storage capacity.
Identifiers: *Land requirements, Livestock wastes.

The study was initiated to investigate the pertinent variables involved and evaluate the performance of an irrigation system for the disposal of livestock waste. It was desired to determine irrigation rates, frequencies, and quantities that would result in satisfactory renovation of the lagoon effluent with no detrimental effects. The results indicate, that for waste-water irrigation, the tabulated rates for clear water are too high and should be reduced, possibly 30 to 50 percent. The average COD removal was 97 percent. Smaller applications made more frequently were the most efficient for COD reduction. 80 percent of the nitrogen is removed. 99 percent of the phosphates were removed. This method of waste disposal appears feasible. The results of the study indicate an optimum level for the observed soil and climatic conditions of about 2 in. of lagoon effluent per week during the growing season. (Christenbury-Iowa State)

0459 - B2, E2

LIQUID MANURE FOR MIDWEST SWINE PRODUCTION,
Illinois Univ., Urbana. Dept. of Agricultural Engineering. Liquid Manure for Midwest Swine Production,
D. G. Jedele.
Transactions of ASAE, Vol 2, No 1, 1959, p 9-10. 6 fig.

Descriptors: *Farm waste, *Swine, Septic tank, Sewage lagoons, Liquid waste, Irrigation, Confinement pens, Animal disease, Liquid wastes, Waste disposal.
Identifiers: *Tank wagon, *Spreaders, Storage tank, Material handling, Hand scraping.

With the trend of raising swine in confinement, renewed interest in liquid manure disposal is being created. The primary method used by Illinois swine producers is the collection of liquid manure in storage tanks, and then the disposal by tank wagon on crop land. The finishing floors are normally on slopes varying from 1/4 inch per foot to one inch per foot. The methods of cleaning floors range from hand scraping followed by water rinsing to high pressure water rinsing only. For hand scraping combined with rinsing about 1/4 gal. of water per hog is required. For high pressure rinsing about 1/2 gal. of water per hog is required. For computing capacities for storage tanks, a minimum of 2 gal. per hog per day is suggested. Up to this time most spreading equipment is homemade. The spreader used ranged from 6 ft. to 20 ft. spread per swath. (Bundy-Iowa State)

0460 - B3

EFFECT OF TYPE OF HOUSING AND LITTER ON PRODUCTION OF BROILERS,
Georgia Univ., Athens. Dept. of Poultry Science.
M. G. McCartney.

Poultry Science, Vol 50, No 4, p 1200-1202, July 1971. 2 tab, 8 ref.

Descriptors: *Air ventilation, *Consumptive use, *Efficiency, Disease, Chicken, Air contamination.
Identifiers: *Mortality, Enclosed housing, Open housing, White Plymouth Rock, Reused litter, Windowless type housing, Marck disease, Leukosis.

There has been considerable interest in the use of windowless-type houses for the production of broilers in the South. It is of general agreement that houses with fan ventilation are superior to the conventional house with respect to growth, feed conversion, mortality and condemnation of broilers to market age. The results of tests run to verify the hypothesis indicated that there were no real differences in the performance of broilers grown in open or enclosed housing or on new or old litter. Therefore, under the conditions of this study it is not possible to justify the cost of providing insulated, fan-ventilated housing for broilers. Also, since the type of litter did not affect condemnation, it is similarly not justified to recommend the use of new litter between successful lots of broilers from the standpoint of mortality or condemnations. (Bundy-Iowa State)

0461 - B3

FUMIGATION AND REUSE OF BROILER LITTER,

Hawaii Univ., Honolulu. Dept. of Animal Science.
E. Ross, and A. Y. Miyahara.
Poultry Science, Vol 50, No 4, p 1096-1100, July 1971. 4 tab, 12 ref

Descriptors: *Bacteria, Poultry, Disease, Feeds, Bactericide, Microorganisms.
Identifiers: *Methyl bromide, *Mortality rate, Reused litter, Coccidia, Concentration, Weight gain, Sterilized poultry litter, Broilers, Soil, Fumigant, Build up litter.

The scarcity of conventional litter material in some parts of the country is an increasing concern to broiler producers. The effect of methyl bromide fumigation of reused litter on chicken growth, feed conversion and mortality was investigated as a possible solution. To test these effects 6 trials on commercial broiler chicks were made. In 6 trials, commercial broiler chicks were reared on fresh wood shavings litter, reused wood shavings litter and reused wood shavings litter that had been fumigant with 1-10 kg. of methyl bromide/20.5 m.2 of litter. Increasing levels of fumigant reduced the bacterial count in the litter without achieving sterilization and without otherwise affecting weight gains, feed conversion or mortality. (Bundy-Iowa State)

0462 - C1, C5

NUTRIENT DIGESTIBILITY USING FECAL COLLECTION APPARATUS AND INDICATOR METHOD FOR STEERS FED AD LIBITUM,

Kentucky Univ., Lexington.
P. A. Phar, N. W. Bradley, C. O. Little, L. V. Cundiff, and J. A. Boling.
Journal of Animal Science, Vol 33, No 3, p 695-697, September 1971. 4 tab, 12 ref.

Descriptors: *Digestion, *Nutrients, Analytical techniques, Animal waste, Confinement pens, Cattle.
Identifiers: *Chromic oxide indicator, *Fecal collection apparatus, Pelleted ration, Ad libitum, Feed trial, Crude protein, Crude fiber, Ether extract, Gross energy coefficient, Steer.

Six 2-year-old steers weighing an average of 453 kg were randomly assigned to a cross-over design to study the effects of fecal collection apparatus on the apparent digestibility of nutrients when a complete, pelleted ration was fed ad libitum and to compare total collection versus chromic oxide indicator coefficients. Chromic oxide was mixed with the ration prior to pelleting at the rate of 0.5%. Fecal samples were taken twice during a 24-hr. period and composited at the end of the 6-day collection period for each steer. Sampling times representing each 2-hr. interval were randomly assigned to days. Average daily feed intake was not significantly affected by fecal collection apparatus. There was no significant difference in crude protein, crude fiber, ether extract, N.F.E. or gross energy coefficients calculated by the conventional and indicator methods; however, there was a significantly (PA.01) lower dry matter coefficient when calculated by indicator method. When the indicator method of estimating digestibility was used to compare the effect of collection apparatus versus no apparatus on digestibility of nutrients, the N.F.E. digestibility was significantly (PA.05) lower in the steers without the fecal collection apparatus. Coefficients of digestibility for dry matter, crude protein, crude fiber, ether extract and gross energy were not significantly (PS.05) affected by fecal collection apparatus. (Bundy-Iowa State)

0463 - C3, E3

CHEMICAL COMPOSITION OF POULTRY MANURE.

Poultry Digest, p 439-441, September 1971. 4 tab.

Descriptors: *Chemical waste, *Crop response, Essential nutrients, Chemical analysis, Poultry, Organic acids, Rates of application, Nutrients.
Identifiers: *Broiler houses, *Micronutrients, *Laying house, Wasted feed.

The value of poultry manure as a crop fertilizer has been measured primarily in terms of nitrogen, phosphorus, and potassium. Very little consideration has been given to the micronutrients content. There are substantial amounts of calcium, magnesium, and sulfur. The micronutrients includes manganese, iron, boron, copper, zinc, and molybdenum. The mean calcium and magnesium contents of broiler manure were 1.97 and 0.37%, respectively, which were less than for hen manure with calcium content of 3.42% and magnesium of 0.52%. With present knowledge of the requirements of most crop plants for micronutrients indicates that, except in cases of extreme deficiency, application of three to five tons per acre of broiler or hen manure annually would maintain and adequate supply of these elements. (Bundy-Iowa State)

0464 - C1

EXTRACTION OF BILE ACIDS FROM RAT FECES CONTAINING CHOLESTYRAMINE,

Mead Johnson Research Center, Evansville, Ind. Dept. of Nutritional Research.
J. D. Manes, and D. L. Schneider.
Journal of Lipid Research, Vol 12, No 3, p 376-377, 1971.

Descriptors: *Gas chromatography, *Rodents, Chemical analysis, Laboratory animals, Laboratory tests, Methodology, Test procedures, Analytic techniques.
Identifiers: *Bile acids, Gas-liquid chromatography, OV-21.

The fecal extraction procedure described by Evrard and Janssen was inadequate for the complete extraction of conjugated bile acids from feces containing the bile acid sequestrant, cholestyramine. As judged by gas-liquid chromatographic analysis, substitution of 0.5 n HCl in absolute ethanol for glacial acetic acid allowed for complete recovery (98-104%) of three different conjugated bile salts in the presence of the resin. (Parker-Iowa State)

0465 - A1, C3, C5

FEED ADDITIVE RESIDUES IN POULTRY MANURE,

Agricultural Research Service, Beltsville, Md.
C. C. Calvert.
Poultry Digest, August 1971, p 396-398.

Descriptors: *Poultry, *Feeds, *Additives, Arsenic compounds, Animal diseases, Farm wastes, Antibiotics, Environmental effects.
Identifiers: *Feed additives, Residues, Growth stimulants.

At this stage, very little is known as to the potential hazard to the environment represented by commonly used feed additives. The amount of residues excreted and the composition of that residue of such additives as antibiotics, arsenicals, nitrofurans and others are discussed. Studies are cited giving the present state of knowledge on these residues and their pollutional effects on the environment. (Parker-Iowa State)

0466 - A4, C4

INFILTRATION RATES AND GROUNDWATER QUALITY BENEATH CATTLE FEEDLOTS, TEXAS HIGH PLAINS,

Texas Tech Univ., Lubbock. Dept. of Geoscience.
William D. Miller.
Environmental Protection Agency-Water Quality Office, Water Pollution Control Research Series Report, January 1971. 55 p, 26 fig, 11 tab, 6 ref. EPA Program 16060 EGS 01/71.

Descriptors: *Nitrates, *Groundwater, Water quality, *Infiltration, Soils, Drainage, Seepage, Runoff, Water pollution sources, Path of pollutants, Water analysis.
Identifiers: *Ogallala formation, *Core chemistry, Permeability, *Texas High Plains, Geologic environment, *Feedlot runoff.

Detailed field and laboratory studies of five feedlots were conducted to determine field seepage rates and distributive geometry of infiltrated runoff. Practical field seepage rates at these sites ranged from 2 to 20 feet/year. Dispersal rates of ions in the groundwater zone varied from 45 to 400 feet/year. Nitrogen (NO3, NO2, NH4, Org-N) and common chemical parameters (Ca, Mg, Na, K, Cl, SO4, TDS, pH, and conductance) were determined in cores and groundwater samples; based on groundwater analyses from 80 Texas High Plains feedlots, rates of concentration of NO3-N and Cl in groundwater beneath feedlots range from 0.07 to 0.4 p.p.m. per year, and average 0.17 p.p.m. per year. Laboratory determined constant head vertical permeability of cores from 22 feedlot sites revealed a range in values of .01 to .000001 cm/sec for Ogallala sediments, .0001 to 10 to the minus 7th power cm/sec for near-surface material of floodplains and feedpen-runoff surfaces, and values of .000001 to 10 to the minus 8th power cm/sec for playa clay. Factors related to runoff-infiltration were correlated with groundwater quality, and it was determined that local surficial material and regional soils patterns are closely related to quality of groundwater beneath feedlots. Direct correlation of water quality does not exist with feedpen-runoff slope, cattle load, and surface-area ratios of drainage basin to collection system.

0467 - A5, C3

IDENTIFICATION OF FEEDLOT ODORS,

California Univ., Riverside. Statewide Air Pollution Research Center.
J. Fosnaugh, and E. R. Stephens.
Statewide Air Pollution Research Center (final report), Grant No U100531-02, p 1-24, April 30, 1969. 3 fig, 2 ref.

Descriptors: *Chromatography, Ionization, Laboratory tests, *Odors, Chemical analysis, *Farm waste, Organic compounds, Cattle, *Pollutant identification.

Identifiers: *Feedlot odors, Field analyzing technique, Ambient concentration, Ionization detector, Trimethylamine, Amines.

The proximity of cattle feedlots to suburban housing has created local air pollution problems which in some instances have forced feedlots to cease operation or to move. The principal objective of this project was to identify the odorant compounds and to develop methods for their detection and measurement. Several pieces of evidence point to the light weight amines as the principal offenders. In particular, trimethylamine has an odor threshold below 1 ppb and can be detected in feedlot air at concentrations above this. Other amines, ammonia, and perhaps other compounds may also contribute to the odor. Of the several analytical methods tested gas chromatography and paper chromatography showed the most promise. Neither was developed into routine use. (Bundy-Iowa State)

0468 - A6, B1

EFFECT OF VENTILATION ON THE GAS CONCENTRATION IN A PART-SLATTED PIGGERY,

North of Scotland Coll. of Agriculture, Aberdeen. Scottish Farm Buildings Investigation Unit.
A. M. Robertson, and H. Galbraith.
Farm Building Research and Development Studies, May 1971. 9 fig, 3 tab, 21 ref.

Descriptors: *Gases, *Hogs, *Ventilation, Effects, *Carbon dioxide, *Ammonia, *Hydrogen sulfide, Air circulation, Waste storage, Storage tanks, Environmental effects, Temperature, Toxicity, Animal physiology.
Identifiers: *Gas concentration, Slotted floor, Manure, Swine.

The concentrations of carbon dioxide, ammonia, oxygen, and hydrogen sulfide were recorded over the dung channel of a slatted floored house for growing/finishing pigs. Data was collected at ventilation rates varying from 0.262 m cu/h kg to 1.234 m cu/h kg live weight and during emptying of the channel. At summer ventilation rates concentrations of 7.6 ppm H2S, 9.1 ppm NH3 and 600 ppm CO2 were recorded. Concentration of toxic gases increased with volume of manure in the channel and depended on the ventilation rate. At winter rates concentrations in excess of 20 ppm H2S were recorded. (Parker-Iowa State)

0469 - A5, C3

WHY DOES IT SMELL SO BAD,

Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
Clyde L. Barth.
Paper presented at the 1970 Annual Meeting American Society of Agricultural Engineers, ASAE 70-416. 22 p, 5 fig, 1 tab, 65 ref.

Descriptors: *Odor, Farm wastes, Pollutants, Strength, Temperature, Instrumentation, Measurement.
Identifiers: *Smell, Olfactory mechanism, Perception, Theories, Literature, Odor quality, Stimuli.

Researchers must learn more about manure odor production and control. Many unanswered problems face the farmer now. A review of pertinent literature clarifies the present status of the knowledge of odor perception, and creates an awareness of the pitfalls to be avoided in planning, conducting and analyzing odor related research. (Christenbury-Iowa State)

0470 - A5, D2

CONTROLLING ODORS FROM CATTLE FEED LOTS AND MANURE DEHYDRATION OPERATIONS,

Memphis Cattle Feeders, Inc., Millington, Tenn.
Robert Moorman, Jr.
Air Pollution Control Association Journal, Vol 15, 1965, p 34-35.

Descriptors: *Farm wastes, *Odors, Legal aspects, Dehydration, Spraying, Disposal, Management.
Identifiers: *Feedlots, Public relations.

This paper discusses various methods of odor control for cattle feed lots. The human and physical conditions that exist which allow and cause odor problems to arise and become a community source of trouble are discussed. These include a negative attitude and a lack of understanding on the part of the parties concerned. The odor problems can be alleviated through cooperation and sincere effort. The use of dehydration units have been only partially successful. Public relations between feed lot and the community are very important. (Christenbury-Iowa State)

0471 - B1, D2

ACCELERATION OF NATURAL DRYING OF POULTRY MANURE THROUGH MECHANICAL AGITATION,

California Univ., Davis.
James A. Moore, and Samuel A. Hart.
Unpublished paper. Presented Pacific Coast Region American Society of Agricultural Engineers, 1968. Paper No PC 68-121. 2 fig, 2 ref.

Descriptors: *Farm wastes, *Sublimation, Drying, Moisture content, Till, Winter, Freeze drying, Freezing, Equipment.
Identifiers: Relative humidity, Tiller drying, Natural drying.

Wet manure rather quickly becomes objectionally odorous. One solution to the manure problem would be an economical and efficient means of reducing the moisture content. The concept of sublimation was evaluated as a means of natural drying of poultry manure. The use of a mechanical agitator was incorporated into the system. The drying phenomenon that allows clothes to dry in winter weather would not work with manure. The tiller-drying to accelerate natural drying of manure in summer was very effective. (Christenbury-Iowa State)

0472 - A5, B2, C1

A YEAR IN THE LIFE OF A SLURRY COMPOUND,

J. M. Kindell.
Agriculture, Vol 78, No 6, p 268-269, June 1971.

Descriptors: *Farm waste, Cattle, Surface runoff, Slope, Economic feasibility, Waste storage, Storage capacity, Porosity, Odor, Waste disposal.
Identifiers: *Dairy cattle, Slurry compound, Slurry disposal, Feed ration.

To eliminate the difficulty of spreading the slurry compound from a dairy farm in northern Chilterns, a storage tank to hold the full winter's storage of slurry was built. The system was built for an operation of sixty Friesian milkers. The storage area, 90 ft. long and 66 ft. wide, was excavated to an average depth of 2 ft. which produced sufficient flinty clay material to form the side and end walls. The excavated clay was used to built a bank around the area which would hold the slurry to a depth of about 3 to 4 ft. The disposal system was reasonably cheap to install, operate, and maintain and it avoided the daily or weekly chore of manure disposal in the winter. No smell, fly or other nuisance arose during the period of storage in the compound. On emptying, the smell, although powerful, was of limited duration. The amount of percolation into the subsoil appeared to be negligible on account of the clay-based subsoil forming the floor of the compound. In calculating the storage capacity of the slurry compound, it seems prudent to be on the generous side. Half a cubic yard per cow per week for the winter housing period is a useful guide. (Bundy-Iowa State)

0473 - F5

BOD OF CAPTIVE WILD ANIMAL WASTES,

Tulane Univ., New Orleans, La. Dept. of Civil Engineering.
F. W. Macdonald, and H. R. Davis.
Water and Sewage Works, Vol 113, February 1966, p 64-67. 2 tab, 2 ref.

Descriptors: *Biochemical oxygen demand, Animals, Animal wastes (Wildlife).
Identifiers: *Wild animals, *Zoo, Total solids, Captive animals, Primates.

The findings of an analysis of the animal waste from a zoo are reported. The total solids and the BOD per pound of animal are reported. The results of this study may well serve as a guide in the design of plants for the disposal of wild animal wastes. (Christenbury-Iowa State)

0474 - B1, C2, C3, C5

PROPERTIES AND PUMPING CHARACTERISTICS OF HOG WASTES,

E. P. Taiganides, T. E. Hazen, E. R. Baumann, and H. P. Johnson.
Transactions of the American Society of Agricultural Engineers, Vol 7, p 123-124, 127, 129, 1964. 3 fig, 1 tab.

Descriptors: *Farm wastes, *Hogs, *Properties, *Pump testing, Solid wastes, Performance, Pumping, Efficiencies, Biochemical oxygen demand, Waste identification.
Identifiers: *Waste properties, *Characteristics, Volatile solids.

Hog wastes from a confinement hog production unit were analyzed for daily quantity and physical and chemical properties. The pumping characteristics of the untreated hog wastes were determined with a diaphragm pump and a 6-inch auger. The quantity and quality of the manure are affected primarily by the size of the hogs, the type and quantity of the feed intake, the quantity of the water intake and the air temperature. The daily quantity of manure removed varies with the time of year. The average total solids content of the manure was 18.5 percent and 15.6 percent during the hot and cold months of the year respectively. The total nitrogen of the manure was 7 percent of the total dry matter. Results of the auger pumping test showed that manure can be pumped with greater efficiency and less power consumption than water. With the diaphragm pump the maximum pumping capacity for water is obtained at a higher pump speed than for manure under similar conditions of operation. The results of the pumping tests were presented graphically. (Parker-Iowa State)

0475 - E3

LIQUID DIGESTED SEWAGE SLUDGE GIVES FIELD CROPS NECESSARY NUTRIENTS,

O. C. Braids, M. Sobhan-Ardakani, and J. A. E. Molina.
Illinois Research, Vol 12, No 3, Summer 1970, p 6-7. 3 tab, 1 fig.

Descriptors: Sludge, Sludge disposal, *Sewage sludge, *Nutrients, Nitrates, Analysis, *Field crops, Crop production, Soil analysis, Leaching, Corn, Sorghum, Lysimeters.
Identifiers: Digested sludge, Heavy metals, Reed canary grass, Drain water.

Irrigation of cropland with digested sludge is seen as a way of recycling the elements and reducing ultimate disposal costs. To learn more about this subject, a study utilizing an existing lysimeter facility was conducted. A digested sludge having a solids

content of 2 to 4 percent by weight was obtained from a sewage treatment plant. A 1-inch application of sludge on an acre contains about 330 pounds of nitrogen, 180 pounds of phosphorus and 40 pounds of potassium. Corn, Reed canary grass, and grain sorghums were grown with two levels of sludge irrigation; 10 inches in 1968 and 7 inches in 1969. This level, without exception, produced yields as good as, or better than, those obtained with water irrigation and relatively high levels of commercial fertilizer. In this test crop and leaf analysis were made as well as soil analysis. The drain water was also analyzed. One problem noted was the increased concentration of nitrate-nitrogen found in the water from the sludge-treated plots. The nitrogen content of digested sludge appears to be the first limiting factor to loading rate. (Parker-Iowa State)

0476 - C4

THE MICROFLORA OF SOUTHERN OHIO POULTRY LITTER,

J. Lovett, J. W. Messer, and B. Read, Jr.

Poultry Science, Vol 50, No 3, May 1971, p 746-751. 7 tab, 17 ref.

Descriptors: *Farm wastes, *Poultry, *Microorganisms, Ohio, Chemical analysis, Analytical techniques, Salmonella, Cultures, Coliforms, E. coli, Molds, Fungi, Plants, *Waste identification.
Identifiers: *Microflora, Total count, Poultry litter.

Poultry litter from four Southern Ohio farms was analyzed; the microflora was enumerated, and the fungal population was classified to genera. At each farm, litter was taken from several areas within the poultry house. Composite litter samples were ground in a Wiley mill. Three media and two incubation methods were evaluated before deciding on the total count procedure. TSA consistently yielded greater counts than either PCA or STCM. Litter pH and total bacterial and fungal counts increased with litter usage to about one month, then declined slightly and remained constant thereafter. Coliform and Escherichia coli were constant throughout the sampling period for all litter. After one week of litter use, approximately 10 per cent of the total microbial population was found to consist of coliform. Twelve fungal genera were identified from poultry feeds. A wider variety of mold genera was isolated from litter. (Parker-Iowa State)

0477 - C4, D4, E4

BIOLOGICAL CONVERSION OF ANIMAL WASTES TO NUTRIENTS,

Colorado State Univ., Fort Collins. Dept. of Avian Science.
B. F. Miller.
Final report, May 1971. 69 p, 9 fig, 10 tab, 36 ref, append. Project no. HGW-PHS Solid Wastes Research Grant EC-00262-02.

Descriptors: *Farm wastes, *Lagoons, *Chemical analysis, Crop response, Anaerobic bacteria, Odor, Amino acid, Poultry, Cattle, Larvae, Incubation, Organic matter, Soil structure, Economics, Nutrients.
Identifiers: *Feed analysis, Automated manure handling, Caged laying, Crop yield, Plant nutrients.

Fly eggs were placed in fresh poultry manure under different temperature (22 to 38C) and relative humidity (19 to 80%) conditions to determine the hatchability of fly eggs, growth of larvae, production of pupae and physical changes in the poultry manure. Moisture loss from the manure was recorded daily. The inoculation rates varied from 2 g. to 5 g. fly eggs per 4000 g. of fresh poultry manure. Fly eggs and larvae were also placed under caged laying hens for the catabolism of the manure as it was voided. Optimum yield of dry pupae was obtained with a combination of 3 g. fly eggs in 4000 g. of fresh poultry manure at 27C and relative humidity of 41%. Moisture in the manure was reduced from 78.5 to 55.0%. When relative humidity was increased from 38 to 70% the yield of pupae at 34 to 38C was significantly (PA0.01) increased. The combination of 2 g. eggs per 4000 g. of fresh manure produced significantly (PA0.01) heavier larvae. Hatchability of fly eggs in fresh poultry manure varied from 50.5 to 87.0%. In comparison to fresh poultry manure, the manure residue had less odor, contained less moisture and was granular in texture. The fly larvae developed well under the caged layers, reducing freshly voided manure to granular material within a few hours. (Bundy-Iowa State)

0478 - D4

LABORATORY STUDIES OF AEROBIC STABILIZATION OF SWINE WASTE,

Minnesota Dept. of Health, Glenwood; Illinois Univ., Urbana. Dept. of Agricultural Engineering.
R. L. Irgens, and D. L. Day.
Journal of Agricultural Engineering Research Vol 11, No 1, p 1-10, 1966. 6 fig, 7 tab, 11 ref.

Descriptors: *Farmwastes, *Swine, Aerobic treatment, Waste disposal, Chlorination, Waste treatment, Oxygenation, Oxidation lagoons.
Identifiers: Aerobic stabilization, Swine waste treatment, Aeration of wastes.

Pig waste was allowed to accumulate in a pit beneath a slattered floor swine finishing building for one week or one month. Samples of this waste were brought to the laboratory for analysis and aerobic stabilization. It was concluded that adding raw waste continusouly to the aeration unit gave the best results. The treated effluent had a BOD of 10 to 15 p.p.m. and contained only a trace of ammonia. Treatment by the aerobic process made the swine waste virtually odorless and stable. About 6 ft. 3 of liquid was required to dilute the waste from 150 lb. pig at the beginning of the aerobic process and 2500 ft. 3 of air was needed per pound of BOD. However, the more efficient oxygenation obtained with an aeration rotor in an oxidation ditch might reduce the latter value considerably. It was estimated that 36 KWh might be required per pig per year for operation of the aeration rotor of an oxidation ditch chlorination of diluted swine waste eliminated a certain degree of odor and improved flocculation and dewatering of the solids. The COD of the chlorinated and filtered waste was reduced 72%. Chlorinated compounds of various types may have similar effects. (Hazen-Iowa State)

0479 - A6, B1

THE INFLUENCE OF GRADED LEVELS OF ATMOSPHERIC AMMONIA ON CHICKENS,

Nottingham Univ. (England). School of Agriculture.
D. R. Charles, and C. G. Payne.
British Poultry Science, Vol 7, p 177-187, 189-198, 1966. 16 tab, 32 ref.

Descriptors: *Farm wastes, *Environmental effects, *Air pollution, *Air pollution effects, Growth, Rates, Respiration, Performance, Productivity, Ventilation, Air circulation, Poultry, Ammonia, Eggs.
Identifiers: *Ammonia toxicity, *Food consumption, Ammonia concentrations, Respiration rates, Food conversion efficiency.

A detailed description is given of studies done on the effects of air pollution on white leghorn chickens. The studies were done in two parts, one on broilers and replacement chickens and the second on laying hens. One hundred parts per million by volume of ammonia caused reductions in the respiration rates of adult hens between 7 and 24 percent. Broiler chickens from 28 days of age tended to eat less food than those reared in ammonia free atmospheres. At 100 p.p.m. of ammonia their growth rate was significantly reduced. Replacement laying pullets raised in ammonia containing atmospheres from 11-18 weeks of age had reduced food intake than those in ammonia free atmospheres. Pullets raised in atmospheres with high ammonia concentrations matured up to two weeks later than those in atmospheres free of ammonia. Atmospheres of 105 p.p.m. of ammonia significantly reduced egg production after 10 weeks exposure. No effects were observed on egg quality. Voluntary food intake was reduced and live-weight gain was lower in ammoniated atmospheres. High protein, vitamin, and mineral diet prevented the onset of any deleterious effects of ammonia on egg production, even though food consumption fell to 75 g./bird/day at 29 C., 43% humidity and 104 p.p.m. of ammonia when a low energy diet was fed to hens in high ammoniated atmospheres. Their production deteriorated rapidly. (Hazen-Iowa State)

0480 - C1, F5

CAGE AND KENNEL WASTE WATER,

National Institutes of Health, Bethesda, Md. Div of Research Services.
N. A. Jaworski, and J. L. S. Hickey.
This was reported as 'NIH Detergent for Mechanical Washing of Laboratory Glassware and Animal Cages' Sanitary Engineering Branch Project 136 (1955). Journal Water Pollution Control Federation, Vol 34, No 1, p. 40-43, Jan, 1962. 1 fig, 5 tab, 2 ref.

Descriptors: *Waste water disposal, *Biochemical oxygen demand, Waste water, Water analysis, Animal wastes (Wildlife), Waste identification, Waste dilution, Waste water treatment, Laboratory animals.
Identifiers: *Waste water production, Total solids, Volatile solids, Composite samples, Cage cleaning wastes, Kennel.

The National Institutes of Health is planning a laboratory-animal colony in an unsewered area. The waste water from the colony will require treatment on the site. The waste water from cage cleaning and kennel cleaning is expected to represent a large percentage of the total sewage of the colony. A study of the volume and character of the waste water of a similar animal colony to the one porposed was made. Mechanical washers are used to clean the cages. Each washer contains a 1,000-gallon recirculating wash water tank and a 500-gallon, recirculating, rinse water tank. Excess water overflows to the sewers. Samples of the overflow were collected at 30-minute intervals. These samples were composited in proportion to the quantity of waste water from each machine. The BOD IN THE OVERFLOW WAS LESS THAN THAT IN THE WASTE WATER DRAINED FROM THE TANKS. The PH was 11.0 and the temperature was 140 to 160F of the waste water. The BOD, total solids, and volatile solids of the waste water from hosing of the pens was approximately three times per unit volume as that found in domestic sewage. The waste water has a sharp, unpleasnat odor, which might constitute a problem when it is treated in a population area. (Hazen-Iowa State)

0481 - E2, E3, F5

RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE,

Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
Herman Bouwer.
Journal of Soil and Water Conservation, Vol 23, 1968, p. 164-168, 2 fig, 1 tab, 22 ref.

Descriptors: *Irrigation, *Water reuse, *Waste disposal, Sewage effluents, Water quality control.
Identifiers: *Waste water renovation, Land disposal.

This article discusses the use of land or soil to dispose of and treat domestic, industrial, and agricultural sewage and wastes. Several projects are mentioned where this is being done on an experimental or trial basis. The major objectives may

be sludge removal, groundwater renewal, irrigation or a combination of the three. The soil purifies the waste. Nutrients are also supplied to plants if the amount of effluent applied is not excessive. The economics of land disposal is also discussed. A more detailed description is given of the Flushing Meadows Project near Phoenix, Arizona. (Parker-ISU)

0482 - A2, A4, C5

THE EFFECT OF FARM WASTES ON THE POLLUTION OF NATURAL WATERS,

Wisconsin Univ., Madison; and Marathon County Center, Wausau, Wis.

S. A. Witzel, N. E. Minshall, E. McCoy, R. J. Olsen, and K. T. Crabtree.

Paper No. 69-428 presented at the 1969 Annual Meeting, American Society of Agricultural Engineers at Purdue University, W. Lafayette, Indiana. June 22-25, 1969. 24 p, 2 fig, 4 tab, 14 ref. Project No. OWRR B-004-WIS (12).

Descriptors: *Farm wastes, *Groundwater, *Nutrients, *Water pollution, Nitrates, Nitrites, Potassium, Phosphorus, Wells, Supplemental irrigation, Fertilizers, Fishkill, Eutrophication.
Identifiers: *Groundwater pollution, Well contamination, Algal growth, Deoxygenation.

Natural surface waters are subject to enrichment with the plant nutrients N, P, and K, and subsurface waters are often subject to pollution with nitrate and nitrite nitrogen. A study was begun in 1963 to determine the sources and amounts of plant nutrient losses from agricultural operations and to locate any health hazards that may result from the disposal of farm animal wastes. Nutrient losses in the base flow of southwestern Wisconsin streams during the period of high winter runoff totaled only 25% as much N and K and 10% as much P as in the surface runoff. Heavy manure applications in the vicinity of farm buildings or large feedlot operations can result in dangerously high nitrate concentrations in farm wells. Heavy supplemental irrigation combined with heavy nitrogen fertilizer application may result in an increase in the nitrates in ground water. Heavy annual applications of manure and/or fertilizer to large land masses which allow more than 13.5 lb. per acre of nitrogen to pass beyond the root zone could raise the groundwater to the toxic level of nitrates, assuming that all the nitrogen reaches the groundwater and that the aquifer is static. (Dorland-Iowa State)

0483 - B1, F4

HOW CAN PORK PRODUCERS COMPLY WITH ENVIRONMENTAL QUALITY STANDARDS,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.

J. Ronald Miner.

American Pork Congress-Proceedings, Environmental Quality Workshop, Des Moines, Iowa, Mar 3, 1971. p 98-102.

Descriptors: *Farm wastes, *Hogs, *Environment, *Pollution abatement, Water quality, Standards, Water pollution, Air pollution, Odor, Confinement pens, Organic matter, Nutrients, Nitrogen, Phosphorus, Eutrophication, Algae, Pathogenic bacteria, Effluent, Irrigation, Storage, Waste disposal.
Identifiers: *Environmental quality, Air contaminant, Stream quality, Waste management, Manure collection, Manure transport.

To prevent water and air pollution while maintaining environmental quality is a complex problem. It becomes more complicated by trying to design waste management systems which contribute materially to our effectiveness as pork producers with pollution control as a side benefit. A swine manure management system might include a collection device, a manure transport system, some means of manure storage and/or treatment, and finally, a manure or effluent disposal system. In some cases more than one of these components may be included in a single component. Giving initial consideration to the disposal scheme will help determine decisions to be made concerning the other aspects of the system. There is much remaining to be learned relative to the control and measurement of odors. Various odor levels can be achieved by the judicious selection of manure handling techniques. (White-Iowa State)

0484 - A3, C4

RELATIONSHIPS OF SALMONELLAE TO FECAL COLIFORMS IN BOTTOM SEDIMENTS,

Environmental Protection Agency, Cincinnati, Ohio. Div. of Water Hygiene.

D. J. VanDonsel, and E. E. Geldreich.

Water Research, Vol 5, No 11, p 1079-1087, November 1971. 3 fig, 3 tab, 21 ref.

Descriptors: *Indicators, *Salmonella, *Sediment-water interfaces; Coliforms, Sampling, Mud-water interfaces, Water quality, Sediments, Pathogenic bacteria, Streptococcus, Domestic wastes, Farm wastes, E. coli, *Bottom sediments.
Identifiers: *Bottom sampler, Resuspension, Bacterial concentration.

The use of bottom sampling in water quality investigations is presently limited; however, the mud may serve as a concentrated and stable index of the quality of the overlying water. Salmonellae can be isolated from bottom sediments with far greater frequency than directly from the overlying water. Salmonellae were isolated from 19 percent of the mud samples when fecal coliform density in the overlying water was between 1 and 200 per 100 ml; from 50 percent between 201 and 2000; and from 80 percent over 2000. Fecal coliform to fecal streptococcus ratios of the overlying waters indicated that most of the isolated salmonellae originated in domestic sewage, but there were some positive samples with low ratios, which suggests that their salmonellae came from livestock or wildlife. Mud-water interfaces are not static systems, sludge banks can shift to a new position in response to currents, storms, and dredging operations. The consequent recirculation of older pollutants poses new problems in water quality which must be considered. (Dorland-Iowa State)

0485 - E3, F2

POULTRY LITTER AS CATTLE FEED,

Missouri Univ., Columbia. Dept. of Animal Husbandry.

Melvin Bradley, and Walter Russell.

Feedstuffs, Vol 37, No 8, p 59-60, February 20, 1965.

Descriptors: Farm wastes, Legal aspects, Feeds, Missouri, Poultry, Hazards, Efficiencies.
Identifiers: Broiler litter, Bloat, Rate of gain.

This article reviews the literature on feeding of poultry litter to beef cattle, discussing hazards and legal implications and giving recommendations if litter is used as a feed. Research is reviewed from Texas, Arkansas, Georgia and Virginia. (Christenbury-Iowa State)

0486 - B1

FARM ANIMAL-WASTE MANAGEMENT.

Iowa State Univ., Ames. Dept. of Agricultural Engineering.

Miner, J Ronald (Ed). North Central Regional Publication 206, Special Report 67, May 1971. 44 p, 34 tab, 85 ref.

Descriptors: *Farm wastes, *Disposal, Waste water treatment, *Management, Hydroponics, Incineration, Pollutants, Diseases, Design criteria, Anaerobic digestion, Aerobic treatment, Aerobic bacteria, Zoonoses, Anaerobic bacteria, Farm lagoons, Chemical properties, Physical properties, Pathogenic bacteria, Environmental effects.
Identifiers: Composting, Oxidation ditches, Ruminant digestion, Nonruminant digestion, Disease transmission, Feedlot-runoff.

Current practices, technology, knowledge, and research results are summarized as related to the management and disposal or use of farm animal wastes in the 13 states of the North Central Region and other cooperating states. Among alternative systems of management and treatments described, attention is given to relative effectiveness in eliminating or minimizing detrimental environmental and ecological consequences. Detailed information is included on the biology and biochemistry of waste treatments; characteristics of animal wastes, including biological, physical, and chemical properties; aerobic, anaerobic, and combined treatments of animal wastes; composting, incineration, dehydration, and hydroponics; and actual and potential productive utilization of animal wastes. Needs for additional research are suggested. (Christenbury-Iowa State)

0487 - A3, D4

NITRATE REMOVAL FROM AGRICULTURAL WASTE WATER,

Federal Water Pollution Control Administration, Fresno, Calif.; and California Dept. of Water Resources, Fresno.

Percy P. St. Amant, and Louis A. Beck.

In: Water Quality Management Problems in Arid Regions, Water Pollution Control Research Series, 13030 DYY, 6/69, Oct 1970, USDI, Federal Water Quality Administration, p 1-8. 1 tab, 1 fig.

Descriptors: *Return flow, *Nitrates, Water pollution, Desalination, Algae, Denitrification, California, Filters, Particle size, Anaerobic conditions, Waste water treatment.
Identifiers: *Nitrate removal, Algae stripping, Pond denitrification, Filter denitrification, Methanol, Bacterial denitrification, San Joaquin Valley.

The problem of disposing of irrigation waste water from the San Joaquin Valley of California is a very large one. The most serious potential pollutant is nitrogen in the nitrate form. A waste water treatment center at Firebaugh, California has organized and is carrying out research in the areas of desalination, algae stripping, and bacterial denitrification. Algae stripping simply involves growing a crop of algae to remove nitrogen from the water, and then harvesting the algae. Various markets have been proposed for the use of algae. Two methods of bacterial denitrification being explored are pond denitrification, and filter denitrification. The three denitrification methods are compared as to land requirements and project costs. Each is nearly the same in cost - around $10 per acre foot, however the algae stripping method requires much more land. (White-Iowa State)

0488 - A1, F5

THE EFFECTS OF SALINITY STANDARDS ON IRRIGATED AGRICULTURE IN THE COLORADO RIVER BASIN,

Federal Water Pollution Control Administration, Boulder. Colorado River - Bonneville Basins Office.

Gary N. Dietrich, and L. Russell Freeman.

In: Water Quality Management Problems in Arid Regions, Water Pollution Control Research Series, 13030 DYY, 6/69, Oct 1970, USDI, Federal Water Quality Administration, p 9-15.

Descriptors: *Salinity, *Water quality, *Standards, Colorado River, *Irrigation, Evapotranspiration,

Desalination, Flow augmentation, Consumptive use, Water pollution effects.
Identifiers: *Salinity criteria, Irrigation cycle, Salinity-source abatement.

This paper discusses salinity criteria for the Colorado River Basin. The problem faced in water quality management in the Colorado River Basin is one of improving existing mineral quality, or at least, minimizing future salinity increases. Consumptive use of water in crop production complicates developing salinity criteria for the Colorado River Basin. There are only two direct approaches to implementing salinity criteria: the regulation of consumptive water uses and the desalination of waters whose salinity has been concentrated by consumptive use. Three salinity control approaches which do not necessarily depend on the establishment of criteria are: the abatement of salinity at selected sources including natural sources, the augmentation of river flows, and the desalination of water for use.
(White-Iowa State)

0489 - E3, F4

WATER QUALITY REQUIREMENTS AND REUSE OF WASTE WATER EFFLUENTS,
Federal Water Pollution Control Administration, Washington, D.C.
Stanley J. Dea.
In: Water Quality Management Problems in Arid Regions, Water Pollution Control Research Series, 13030 DYY, 6/69, Oct 1970, USDI, Federal Water Quality Administration, p 37-44. 1 tab.

Descriptors: *Water quality, *Waste water treatment, *Water reuse, Effluent, Waste water, Water Quality Act, Beneficial use, Water supply, Biological treatment, Sewage effluents, Filters, Activated sludge, Tertiary treatment.
Identifiers: *Nutrient removal.

From the overall view of potential water supply shortages in the United States, advanced waste treatment has the greatest promise at locations where the municipal waste water is presently discharged into the ocean or other sinks, and is lost for reuse. An advanced waste treatment facility for turning waste discharges into potable water is described for New York City. The most urgent needs in sewage treatment technology include modifications of 'conventional' processes and advanced or tertiary treatment. Advanced treatment for the removal of nutrients, organics, and inorganics can be accomplished for about 26-30 cents/1000 gallons compared to 11 cents/1000 gallons for secondary treatment. However, the reclaimed waste water from advanced treatment has economic utility and value for reuse.
(White-Iowa State)

0490 - A3, F5

SALINITY CONTROL IN RETURN FLOW FROM IRRIGATED AREAS - A DEMONSTRATION PROJECT,
Colorado State Univ., Fort Collins. Natural Resources Center.
Norman A. Evans.
In: Water Quality Management Problems in Arid Regions, Water Pollution Control Research Series, 13030 DYY, 6/69, Oct 1970, USDI, Federal Water Quality Administration, p 45-55. 7 fig.

Descriptors: *Salinity, *Return flow, *Irrigation, Colorado River, Salt balance, Canal seepage, Deep percolation, Evapotranspiration, Electrical conductance, Base flow.
Identifiers: Salt load.

The purpose of this paper was to summarize a demonstration project which has been initiated in the Grand Valley area of Colorado for the purpose of showing that saline agricultural return flows are controllable and that if improvements in water management practices are applied, the salt load returning to the river will be reduced. A discussion is given on the mechanics of return flow. Six irrigation companies, a power company, and a drainage district combined resources to form a corporation for the purpose of conducting the demonstration and study. The first step was a before treatment inventory of water and salt budget in the demonstration area. Canal seepage losses have been measured and a plan for lining certain sections is being formulated. Many water flow measurements are being made. Evapotranspiration estimates will be made. Groundwater flow will be calculated from hydraulic gradient and permeability data. Self-monitoring the Colorado River will afford the final evidence of positive benefit from reduction in canal seepage. The reduced canal seepage should reduce by 1/2 the volume of return flow, and affect a significant reduction in salt load.
(White-Iowa State)

0491 - A3, A5

WATER QUALITY CONTROL PROBLEMS IN INLAND SINKS,
Federal Water Pollution Control Administration, Alameda, Calif. California/Nevada Basins.
Richard C. Bain, Jr., and John T. Marlar.
In: Water Quality Management Problems in Arid Regions, Water Pollution Control Research Series, 13030 DYY, 6/69, Oct 1970, USDI, Federal Water Quality Administration, p 57-77. 8 fig, 2 tab, 10 ref.

Descriptors: *Water quality, *Salinity, *Sinks, Eutrophication, Fish, Dissolved oxygen, Temperature, Nutrients, Evaporation, Water level fluctuations, Nevada, California.
Identifiers: Pyramid Lake (Nev), Salton Sea (Calif), Total dissolved solids, Surface area.

The problems of Pyramid Lake, Nevada, and Salton Sea, California, are similar in many ways and are common to other inland sinks. Salinity increases and water level fluctuations attributable to water and salt inflows and evaporation losses may be controlled or abated through river basin and water quality management schemes. Pyramid Lake water levels and the rate of salinity increases can be controlled by increasing the water supply to the Lake. Salton Sea salinity and water level problems can be better controlled by salt extraction, lower irrigation efficiencies in nearby agricultural areas, bulkheading on developed parts of the shore, and possible future evaporation pond operation. Eutrophication symptoms, advanced in the Salton Sea and emerging in Pyramid Lake, are less easily manipulated. Natural forces of deposition and consumption of organic matter within these waters will tend to limit nutrient buildup; however trapping and predation effects alone will not eliminate algal blooms. Control of eutrophication must begin with control or elimination of major nutrient sources. It is clear that unless water quality control measures are taken, both bodies of water will eventually become aqueous deserts. Local, State and Federal efforts are underway to preserve or enhance the water quality and associated uses of these two inland sinks. (White-Iowa State)

0492 - D2, E3, F1

DISTILLATION OF WASTE WATERS: A WATER RESOURCE FOR ARID REGIONS,
Federal Water Pollution Control Administration, Washington, D.C. Office of Research and Development.
Allen Cywin, George Rey, Stanley Dea, and Harold Bernard.
In: Water Quality Management Problems in Arid Regions, Water Pollution Control Research Series, 13030 DYY, 6/69, Oct 1970, USDI, Federal Water Quality Administration, p 85-94. 14 ref, 2 fig, 1 tab.

Descriptors: *Distillation, *Waste water treatment, Effluent, Potable water, Water reuse, Water quality, Brackish water, Sewage treatment, Costs, Waste dilution, Demineralization, Water resources.
Identifiers: *Blowdown ratio, Salt removal, Mineral content, Total dissolved solids.

The authors propose distillation of municipal waste water for the production of low mineral content water for industrial purposes, particularly for those industries which require such water in large quantities. Distillation has previously been limited in arid regions to applications using saline waters as a feedwater supply. The use of waste water may very possibly result in less costly distilled water. A part of the waste water renovation costs can be attributed to pollution control. Dilution of tertiary-treated effluents with a lower mineral content municipal water can also produce a product water of acceptable mineral content. The lower concentrations of sulfate and total dissolved solids in waste water effluents is also advantageous. Total treatment costs for the processes involved are given.
(White-Iowa State)

0493 - A2, B1, C3

NUTRIENTS IN EFFLUENTS FROM ANIMAL PRODUCTION AREAS,
Missouri Univ., Columbia. Dept. of Agricultural Engineering; and North Carolina State Univ., Raleigh.
Jackie W. D. Robbins, George J. Kriz, and David H. Howells.
Paper presented at 1971 Mid-Central Meeting American Society Agricultural Engineers, Paper No MC-71-102. 20 p, 5 fig, 4 tab, 10 ref.

Descriptors: *Farm wastes, *Nutrients, *Coliforms, *Runoff, Management, Phosphate, Nitrogen, Biochemical oxygen demand, Bacteria, Farm lagoons, Pollutants, Disposal, Hogs, Poultry, Cattle, Waste water treatment.
Identifiers: Total coliform, Fecal coliform, Swine, Total Organic Carbon (TOC).

Twelve typical agricultural areas representing three types of animal waste management techniques--land spreading including pasture and drylot units, lagooning and direct discharge into streams--were studied to determine the amounts of and factors governing stream enrichment from swine, dairy, poultry and beef production operations. (Christenbury-Iowa State)

0494 - A6, B1

A MODEL STUDY TO DETERMINE THE EFFECTS OF VENTILATION SYSTEMS UPON NH3 CONCENTRATIONS IN SWINE CONFINEMENT HOUSING,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering; and Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
C. N. Ifeadi, and J. A. DeShazer.
Paper presented 1971 Mid-Central Meeting American Society of Agricultural Engineers, Paper No MC-71-103. 9 p, 1 fig, 1 tab, 2 ref.

Descriptors: *Model studies, *Odors, *Ventilation, *Ammonia, Laboratory tests, Physical models, Structural models, Hogs, Air circulation, Statistical models, Farm wastes, Waste water treatment.
Identifiers: Slotted floors, Airflow rates, Inlet systems, Exhaust systems.

A plexiglass model 1/12 the size of an existing swine building was used to determine the effect of various ventilation systems upon the NH3 concentration in the model. From this investigation, it was found that as more air exhausted below the floor the concentration of NH3 above the floor decreased. Also the inlet settings influenced the concentration of NH3 above the floor. (Christenbury-Iowa State)

0495 - A3, F2

CONTAMINATION OF SURFACE WATERS FROM PLOWED-IN FEEDLOT MANURE,
Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
R. I. Lipper, H. L. Manges, and Eugene Goering.
Paper presented at the 1971 Mid-Central Meeting

American Society of Agricultural Engineers, Paper No MC-71-803. 4 p.

Descriptors: *Farm wastes, *Disposal, Confinement pens, Pollutants, Runoff, Chemical oxygen demand, Water pollution sources.
Identifiers: *Feedlot manure, Plowed-in.

When a four-inch layer of beef feedlot manure was completely covered with 2 to 3 inches of soil in small test plots, no organic contamination of water on the soil surface resulted when plots were well drained. Under conditions simulating standing water on tight soil, COD of the water was very high. (Christenbury-Iowa State)

0496 - B2, C3, D4

DESORPTION OF AMMONIA FROM ANAEROBIC LAGOON,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. K. Koelliker, and J. R. Miner.
Journal Paper No J-6873 of Iowa Agricultural and Home Economics Experiment Station, Ames. Paper presented 1971 Mid-Central Meeting, American Society Agricultural Engineers, Paper No MC-71-804. 21 p, 6 fig, 2 tab, 9 ref. USDI Public Law 88-379, HEW EC 00283-02.

Descriptors: *Farm wastes, *Anaerobic digestion, Farm lagoons, Biodegradation, Ammonia, Hogs, Disposal, Temperature, Hydrogen ion concentration, Nitrogen cycle, Nitrogen compounds, Laboratory tests, *Mass transfer, *Waste water treatment.
Identifiers: *Anaerobic lagoons, *Nitrogen balance, Ammonia desorption, Nitrogen transformations, Swine.

The loss of ammonia from an anaerobic manure lagoon has been monitored by measurement of ammonia concentrations in air surrounding the lagoon and by a nitrogen balance for the same lagoon from Nov. 1969 - Oct. 1970. Theoretical considerations of desorption and data from the lagoon indicate that the nitrogen loss to the air can be predicted. An anaerobic lagoon may well be a nitrogen sink if no liquid must be removed from it. The rate of ammonia desorption from a lagoon surface is accelerated by increasing alkaline pH, higher temperatures, and increasing wind velocities. (Christenbury-Iowa State)

0497 - D1

DEHYDRATION OF ANIMAL WASTES,
Agricultural Research Service, Columbia, Mo. Transportation and Facilities Research Div.
Herman F. Mayes.
Paper presented at the 1971 Mid-Central Meeting American Society of Agricultural Engineers, Paper No MC-71-805. 15 p, 2 fig, 4 ref.

Descriptors: *Farm wastes, *Fertilizers, *Dehydration, Disposal, Livestock, Economics, Marketing, Economic feasibility, Operating, Storage, Operating costs, Operation and maintenance, Costs, Waste treatment.
Identifiers: Dehydrator design.

Four large terminal livestock markets have been dehydrating cattle and sheep manure since the early 1950's. The dehydrated manure is being merchandised as a specialty fertilizer. The design features of these dehydrators, the operating problems and some typical operating costs are reviewed. These markets have shown that animal wastes can be dehydrated and marketed. While a profit may not have been realized from the sale of this dehydrated manure, it may have been the cheapest method of disposal. (Christenbury-Iowa State)

0498 - A2, B1, F1

WATER POLLUTION CONTROL IN CATTLE FEEDLOTS,
Robert S. Kerr Water Research Center, Ada, Okla.
J. L. Witherow, and M. R. Scalf.
Mimeo, September 1970, 2 fig. EPA Program 13040---09/70.

Descriptors: *Farm wastes, *Water pollution sources, Cattle, Surface runoff, Waste disposal, Waste water disposal, Waste water treatment, Feed lots, Livestock, Confinement pens, Management.

The nature and cause of water pollution from cattle feedlots is briefly described. Current waste management alternatives are dependent upon the rational for land disposal. Two major research projects are described on irrigation with rainfall runoff from the feedpen and on rates of manure disposal on crop lands. Unconventional waste management alternatives involve production process change, reuse of waste through pyrolysis, or refeeding and redesign of the production facilities. (EPA abstract)

0499 - C1, D4

MANURE LAGOONS.....DESIGN CRITERIA AND MANAGEMENT,
Maryland Univ., College Park. Dept. of Agricultural Engineering.
Harry J. Eby.
ASAE Paper No 61-935. Agricultural Engineering Journal, Vol 43, p 698-701, 714-715, Dec 1962. 6 fig, 1 tab, 19 ref.

Descriptors: *Farm lagoons, *Design criteria, Water temperature, Sewage treatment, Aerobic bacteria, Aquatic plants, Anaerobic bacteria, Algae, Biochemical oxygen demand, Oxidation lagoons, Sludge, Photosynthetic oxygen, Farm wastes, Waste water treatment.
Identifiers: *Site selection, Loading.

Criteria to be considered when designing a lagoon for treatment of wastes produced by animals in confinement is discussed. It mentions situations where lagoons would not be feasible. Seven criteria for site selection are given. The physical, chemical and biological factors discussed include temperature, light, specific gravity, mixing, nutritional effects, pH effects, toxic effects, and interrelationship of biological species. Also mentioned is the algal-bacterial relationship. Design factors for size and volume are given. The article concludes with management problems encountered such as floating debris, overloading, intermittent loading, aquatic weeds and sludge build-up. (Parker-Iowa State)

0500 - A5, D4

ANAEROBIC LAGOONS: CONSIDERATIONS IN DESIGN AND APPLICATION,
Cornell Univ., Ithaca, N.Y.
Raymond C. Loehr.
Transactions of the American Society of Agricultural Engineers, Vol 11, p 320-322 and 330, 1968. 2 fig, 4 tab, 14 ref.

Descriptors: *Farm lagoons, *Anaerobic digestion, *Design, *Solids, Anaerobic conditions, Farm wastes, Temperature, Gases, Biochemical oxygen demand, Waste water treatment.
Identifiers: *Solids removal, Loading, Gas production, effluent quality.

Design and application of anaerobic lagoons for treatment of wastes from farm animals in confinement is described. The purpose for anaerobic lagoons is given in relation to aerobic lagoons and other treatment systems. The article proceeds to discuss size requirements, loading restrictions and mixing, both natural and mechanical as required. Quantities and quality of gas production are discussed as well as temperature relationships to gas production and other operating conditions. A short analysis of effluent quality is presented. Solids removal is discussed in some length. The article concludes by mentioning some difficulties such as potent effluent, warm temperature requirements and odors due to biochemical imbalance. (Parker-Iowa State)

0501 - A8, D4

INVESTIGATIONS ON FLY CONTROL BY COMPOSTING POULTRY MANURES,
Orange County Health Department, Santa Ana, Calif.
Roy E. Eastwood, Jimmy M. Kade, Robert B. Schoenburg, and Harold W. Brydon.
Journal of Economic Entomology, Vol 60, No 1, p 88-98, Feb 1967. 7 fig, 7 tab, 5 ref.

Descriptors: *Farm wastes, *Poultry, Aerobic conditions, Temperature, Degradation, Decomposing organic matter, Aeration, Mixing, Larvae, Bulk density, Volume, Moisture content, Nitrogen.
Identifiers: *Composting, Fly problems, Fly pupae, Windrows.

Windrow composting of poultry manure was investigated during several months of the year. Results obtained indicated that manure does not have to be ground prior to composting. Bulking and drying materials are not required in composting poultry manure. Fly larvae were reduced in numbers during the composting process so that they would not create a fly problem. Poultry manure once composted is not suitable as an oviposition site for adult flies and the subsequent development of larvae. A twice-weekly turning schedule with a manure spreader is desirable to help prevent fly larvae from pupating and emerging by bringing them into contact with the hot interior of the pile. (White-Iowa State)

0502 - B2, C3

MANURE PRODUCTION BY BROILERS,
Maine Univ., Orono. Dept. of Animal Science.
R. W. Gerry.
Poultry Science, Vol 47, p 339-340, 1968. 2 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, Feeds, Moisture content, Calcium, Phosphorus, Proteins.
Identifiers: *Manure production, Poultry litter, Broilers, Dry droppings, Wood shavings, Crude protein.

A test was conducted in which White Mountain x White Rock cross broiler were reared to 53 days of age and fed a modified New England College Conference starting ration. Actual production of dry matter which did not include the bedding or the moisture in the litter was 867 kilograms per 1000 males, 658 kilograms per 1000 females, and 748 kilograms per 1000 mixed sexes. The average amount of manure (litter) removed at the end of the test period was 1602 kilograms per 1000 birds. This litter included an average of about 500 kilograms of wood shavings per 1000 birds and analyzed 23 percent moisture. During the test period there was a marked increase in crude protein, calcium and phosphorus content of the litter. (White-Iowa State)

0503 - C4

THE MICROBIOLOGY OF BUILT UP POULTRY LITTER,
Edinburgh Univ. (Scotland). Dept. of Bacteriology.
Henrietta Schefferle.
Journal Applied Bacteriology, Vol 28, No 3, p 403-411, 1965. 5 tab, 7 ref.

Descriptors: *Microbiology, *Bacteria, Farm wastes, Poultry, Odor, Fungi, Aerobic conditions, Laboratory tests, Alkalinity, Enteric bacteria, Lac-

tobacillus, Hydrogen ion concentration, Temperature, Moisture content.
Identifiers: Litter, Coryneform bacteria, Enterococci.

The numbers of viable bacteria in built up poultry litter were found to be 10 to the 10th power - 10 to the 11th power/g fresh weight and appeared to be little affected by factors such as age, temperature, moisture content and pH. Counts for unused litter and poultry droppings were lower. In built up litter of high alkalinity coryneform bacteria were predominant; micrococci occurred sporadically and small numbers of nocardias, streptomycetes, aerobic spore formers and streptococci were encountered. A variety of Gram negative bacteria also occurred, the numbers of which appeared to be controlled by alkalinity; they were less abundant in litters where the pH and buffering capacity were high. Strongly alkaline conditions also tended to lower the fungal counts but had no effect on the count of enterococci. (Christenbury-Iowa State)

0504 - D2, F1

COST OF DEHYDRATING POULTRY MANURE.

Poultry Digest, p 143, Mar 1971.

Descriptors: *Farm wastes, *Dehydration, *Costs, Poultry, Equipment, Fertilizers, *Waste treatment.
Identifiers: Shelf life.

Conventional dehydrating equipment is available for drying poultry manure. However, the cost of the processed manure is likely to exceed $20 per ton. A two-stage drying process has been developed that brings the cost down to $7.60 per ton for a product with 10% moisture. The final product is a fine powder, free of offensive odors, has shelf life and it has the qualities required for sale as an organic fertilizer. It contains 4 to 5% nitrogen, 3% phosphoric acid, and 2.5% potash. (Christenbury-Iowa State)

0505 - B1, C5

CONFINEMENT REARING OF TURKEYS,
Amerine National Corp., Oakdale, Calif. Hastings Div.
Douglas C. Ferebee.
Poultry Digest, p 110-112, Mar 1971. 2 fig.

Descriptors: *Ventilation, *Management, *Confinement pens, Farm wastes, Equipment, Hazards, Poultry, Water pollution control.
Identifiers: *Psychrometric chart, Overventilation, Turkeys.

Some management functions that can lead to maximizing returns from turkey production are discussed. To get the most out of any ventilation system, whether it is positive or negative pressure, knowledge of psychrometrics by the person doing the ventilating is essential. It is possible to overventilate a total confinement house or to underventilate it. Much can be gained from having thermostats located outside where outdoor conditions can be used to provide a better environment inside. Good, not necessarily new, in-house equipment is vital for optimum results from confinement production. (Christenbury-Iowa State)

0506 - A2, C2

CATTLE FEEDLOT RUNOFF - ITS NATURE AND VARIATION,
Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
J. R. Miner, R. I. Lipper, L. R. Fina, and J. W. Funk.
Journal Water Pollution Control Federation, Vol 38, p 1582-1591, 1966. 8 fig, 11 tab, 12 ref.

Descriptors: *Farm wastes, *Runoff, *Bacteria, Cattle, Simulated rainfall, Hydrographs, Chemical oxygen demand, Biochemical oxygen demand, Nitrogen, Temperature, Pollutants, Water pollution sources.
Identifiers: Kjeldahl nitrogen, Feedlot runoff, Suspended solids, Chemical quality, Most probable number.

Runoff from cattle feedlots is a high-strength organic waste produced during and immediately after rainfall. These studies indicated that greatest pollutant concentrations are obtained during warm weather, during periods of low rainfall intensity, and when the manure has been made soluble by soaking with water. Correlations were developed to predict runoff oxygen demand and nitrogen content based on these factors. In addition, the following points were demonstrated: (1) Feedlot runoff is a source of high concentrations of bacteria normally considered as indices of sanitary quality, and (2) runoff from a concrete-surfaced lot was more heavily polluted than that from a nonsurfaced lot under similar conditions. (Christenbury-Iowa State)

0507 - E1, F4

ANIMAL WASTES,
Guelph Univ. (Ontario). Dept. of Soil Science.
L. R. Webber.
Journal of Soil and Water Conservation. Vol 26, No 2, p 47-50, Mar-Apr 1971. 21 ref.

Descriptors: *Farm wastes, *Disposal, Pollutants, Pollution abatement, Groundwater, Farm lagoons, Treatment, Anaerobic digestion, Aerobic treatment, Management, Water pollution sources.
Identifiers: Contamination, Feedlots, Waste removal, Composting.

Some waste management problems resulting from high-density confinement of livestock are discussed. Treatment and disposal of the waste material causes the most troublesome problems. There are many systems in use, with anaerobic or aerobic lagoon treatment more common. Man has always used land as the ultimate disposal medium for many kinds of waste. Agriculture finds itself in the challenging position of being able to use or dispose of vast quantities of animal wastes without polluting the water, soil, or air. (Christenbury-Iowa State)

0508 - A5, A6, C3

AIR POLLUTION FROM ANIMAL WASTES,
Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
William E. Burnett.
Environmental Science and Technology, Vol 3, No 8, p 744-749, Aug 1969. 6 fig, 2 tab, 21 ref. N.Y. State Dept. of Health C-1101 USDA, ARS 12-14-100-9092 (44).

Descriptors: *Farm wastes, *Pollutant identification, *Odor, Air pollution, Gas chromatography, Organic compounds, Organic acids, Aromatic compounds, Poultry, Laboratory tests.
Identifiers: *Malodor, *Odorous compounds, *Odor identification, Liquid poultry manure.

A combination of gas chromatographic and organoleptic techniques was used to determine the chemical compounds responsible for the offensive odor of accumulated liquid poultry manure. The volatile odorous substances were trapped and concentrated in short sections of gas chromatographic columns held at -78C., separated by gas chromatography and identified by the correspondence between relative retention time and the odors of the peaks for the unknowns and authentic compounds. Mercaptans, sulfides, and diketones were identified. Volatile organic acids and the nitrogen heterocycles, indole and skatole, were also identified, using direct injections of liquid manure supernatant and standard gas chromatographic techniques. The sulfur compounds, organic acids, and skatole were implicated as important malodorous components involved in air pollution. The prevention of the formation of the malodorous substances was suggested as the best means of control of air pollution from animal wastes. (Hazen-Iowa State)

0509 - C3

THE METAL COMPLEXING CAPACITY AND THE NATURE OF THE CHELATING LIGANDS OF WATER EXTRACT OF POULTRY LITTER,
Georgia, Univ., Athens. Dept. of Agronomy.
K. H. Tan, R. A. Leonard, A. R. Bertrand, and S. R. Wilkinson.
Georgia Agr. Exp. Sta. Journal Series Paper No. 760. Soil Science Society of American Proceedings, Vol 35, No 2, p 265-269, Mar 1971. 3 fig, 1 tab, 23 ref.

Descriptors: *Farm wastes, *Organic matter, *Organic wastes, *Infrared radiation, Chelation, Analytical techniques, Chemical reactions, Laboratory tests.
Identifiers: *Poultry litter, *Infrared identification, Infrared analysis, Organic waste products, Complexing agents, Chelating ligands.

The metal complexing capacity and the nature of the chelating legands of organic matter extracted from broiled house litter were studied by ion-exchange equilibrium and dissolution methods and infrared to exhibit a significant chelating effect on the equations Cu2.., 2n2.., Mg2.., and Al3... The amount of organic matter complexed by one mole of metal and the stability of metal complexes increased with increasing pH in the cases of Cu-, Mg-, and Al- complexes. Infrared analysis revealed spectograms of the ligands similar to those obtained by polysaccharides. Functional group frequency vibration comparisons ar 3,500, 3,200, 1,650, and 1,400 cm-1 showed that the formation of stable metal complexes involved carboxye electrovalent linkages and probably hydroxyl and/or amino coordinate linkages. (Hazen-Iowa State)

0510 - C1, D1, E1

CATTLE, SWINE AND CHICKEN MANURE CHALLENGES WASTE DISPOSAL METHODS,
Connecticut Univ., Storrs.
R. Laak.
Water and Sewage Works, Vol 117, No 4, p 134-138, April 1970. 8 tab, 30 ref.

Descriptors: *Agriculture, *Cattle, Waste water (Pollution), Costs, Nitrogen, Phosphorous, Potash, Fertilizers, Disposal, Pollution, Livestock, *Hogs, Poultry, Nitrogen compounds, Phosphorus compounds, *Farm wastes.
Identifiers: Chicken, Feedlots.

In the United States today approximately 0.66 billion lbs per day of manure must be extensively treated or destroyed. The trends in agriculture indicate that more livestock will be confined in the future, the concentration of the wastes increased, and the volume of manure per animal slowly reduced. Extensive data was collected and is presented giving the general characteristics of feces and urine of cattle, swine, and poultry as well as the quantitative consumption of feed, nitrogen, phosphorous, and potash. The manure characteristics are said to be changing and therefore the treatment process principles must also be changed. Costs and land requirements are given for manure disposal and an extensive outline enumerates the large variety of available disposal methods along with each one's particular drawback. The average cost of manure separation and final disposal must be a fraction of $3 to $40 per ton. (Hancuff-Texas)

0511 - C1, C5, E3

ANIMAL WASTE REUSE--NUTRITIVE VALUE AND POTENTIAL PROBLEMS FROM FEED ADDITIVES--A REVIEW.

Agricultural Research Service, Beltsville, Md. Animal Science Research.

ARS 44-244, Feb 1971. 56 p, 3 tab, 184 ref.

Descriptors: *Farm wastes, *Additives, *Feeds, Ruminants, Poultry, Cattle, Diets, Hazards, Hogs, Biodegradation, Pathogenic bacteria, Larvicides, Pest control, Organophosphorus, Nutrients.
Identifiers: *Literature review, *Residues, Swine, Hormones, Antibiotics, Disease control, Growth adjuvants, Excretion data, Registration, Non-nutritive.

This is a report of literature on the nutritional value of animal wastes and the potential problems that may occur when compounds other than nutrients are added to animal feed. The non-nutritive feed additives discussed are as follows: Pellet binders, flavoring agents, enzymes; Antibiotics, arsenicals, nitrofurans, (low level feeding); Antifungals, larvicides; Broad-spectrum, absorbable antibiotics (high level therapeutic use); Chemicals used to potentiate curative properties of antibiotics; Coccidiostats, worming drugs, antioxidants; Carotenoid sources, hormones; Reserpine, aspirin, and tranquilizing drugs. (White-Iowa State)

0512 - C5

FECAL RESIDUES FROM FEED ADDITIVES--POULTRY,
Agricultural Research Service, Beltsville, Md. Animal Science Research.
C. C. Calvert.
In: Animal Waste Reuse--Nutritive Value and Potential Problems from Feed Additives--A Review. ARS 44-224, p 14-19, Feb 1971.

Descriptors: *Additives, *Feeds, *Poultry, Farm wastes, Pollutants, Diets, Hazards, Water pollution.
Identifiers: Antibiotics, Arsenicals, Nitrofurans, Growth adjuvants, Soil pollution.

To keep pace with the increased demand for eggs and poultry meat, the feed manufacturers and producers have used more and more feed additives. There is a concern with what these additives may contribute to air, soil, and water pollution after they have performed whatever function they may have in the animal body. The nonnutritive feed additives commonly found in poultry feed are discussed. These include pellet binders, flavoring agents, enzymes, antibiotics, arsenicals, and nitrofurans; antifungal agents, coccidiostats and worming drugs, antioxidants, carotenoid sources, hormones, reserpine, aspirin and tranquilizing drugs are being added to poultry feeds. (See also (Christenbury-Iowa State)

0513 - C3, C5

FECAL RESIDUES FROM FEED ADDITIVES--SWINE,
Agricultural Research Service, Beltsville, Md. Animal Science Research.
L. T. Frobish.
In: Animal Waste Reuse--Nutritive Value and Potential Problems from Feed Additives--A Review. ARS 44-224, p 19-27, Feb 1971.

Descriptors: *Additives, *Hogs, *Feeds, Farm wastes, Hazards, Pollutants, Growth rates, Diets.
Identifiers: Swine, Diethylstilbestrol.

This paper discusses the major feed additives associated with swine production. They are: antibiotics, arsenicals, copper, nitrofurans, sulfonamides and hormones. Many compounds have been used for the treatment of specific diseases in swine but when incorporated into the diet at low levels may have growth promoting properties. There is little available information on the metabolites of antibiotic degradation, their excretion, and possible distribution in the soil and finally into plants. Arsanilic acid is the most common arsenical compound used in swine diets. There is very limited data on excretion of many of the additives and their subsequent effect on the environment. (Christenbury-Iowa State)

0514 - C3, C5

FECAL RESIDUES FROM HORMONES AND ANTIBIOTICS--BEEF CATTLE,
Agricultural Research Service, Beltsville, Md. Animal Science Research.
D. A. Dinius.
In: Animal Waste Reuse--Nutritive Value and Potential Problems from Feed Additives--A Review. ARS 44-224, p 27-32, Feb 1971.

Descriptors: Farm wastes, Cattle, Feeds, Diets, Degradation (Decomposition), Biodegradation.
Identifiers: *Hormones, *Antibiotics, Disease control, Concentrations, Implant, Excretion data.

The interest in hormones excreted by animals which may be recycled through plants and back to man or animals is with the natural and synthetic estrogens, androgens, and progestins. This discussion deals only with these. Other hormones, such as follicle stimulating hormone and luteinizing hormone, may be present in animal excreta but they occur in small concentrations and are readily biodegradable; thus, they are of little ecological concern. Certain antibiotics are frequently added to the high-grain ratios commonly fed to finishing beef cattle. A review summarizing some of the research that has been conducted with these antibiotics, particularly in reference to the potential for recycling through feedstuffs is presented. Plants will not absorb from the soil measurable quantities of the antibiotics commonly fed to cattle. (Christenbury-Iowa State)

0515 - A8, C5

FECAL RESIDUES FROM LARVICIDES--POULTRY AND CATTLE,
Agricultural Research Service, Beltsville, Md. Animal Science Research.
R. W. Miller.
Also in Bulletin of the Entomological Society of America as Larvicides for Fly Control - A Review, by R. W. Miller, Vol 16, No 3, p 154-158, Sept 1970. In: Animal Waste Reuse--Nutritive Value and Potential Problems from Feed Additives--A Review. ARS 44-224, p 33-41, Feb 1971. 2 tab.

Descriptors: *Farm wastes, *Larvicides, Larvae, Pathogenic bacteria, Boron, Organophosphorus, Pesticides, Cattle, Poultry, Feeds, Pesticide residues, Pest control.
Identifiers: Fly larvae, Feed additives, Residues, Fly control, Animal manures, Registration.

One of the best methods for control of flies is through the use of larvicides, applied either directly to the manure, or as a feed additive. Research was conducted as early as 1928 on feed additives to make the feces unfavorable for the development of horn fly larvae. In 1954, organophosphorus insecticides began receiving a great deal of attention as possible feed-additive larvicides for the control of flies around both poultry and cattle operations. Although a great deal of research has been conducted on find suitable feed-additive larvicides for fly control around poultry and cattle manure, no insecticides are registered for commercial feed-additive use with poultry and only one has a registration for use with lactating dairy cattle. Three insecticides have registrations for feed-additive use with beef cattle. (Christenbury- Iowa State)

0516 - F4

PROCEEDINGS OF FARM ANIMAL WASTE AND BY-PRODUCT MANAGEMENT CONFERENCE.
Wisconsin Univ., Madison.
University Extension, The University of Wisconsin, November 6-7, 1969. 129 p.

Descriptors: *Farm wastes, *Cattle, *Hogs, *Poultry, *Environment, Social aspects, Economic, Political aspects, Psychological aspects, Air pollution, Water pollution, Soil contamination.
Identifiers: *Management conference.

This conference was held for technical and administrative staff of local, state, regional and federal agencies; for industries and for private citizens who are concerned about or have a responsibility related to the proper management of wastes from farm animal enterprises in Wisconsin. It was an introductory meeting at which the dimensions of the problems were examined, research was reviewed, some alternative manure handling methods were highlighted, public agency roles were outlined and two existing local programs were described. Small group discussions explored future program and research needs. (White-Iowa State)

0517 - C1

QUANTITIES AND CHARACTERISTICS OF FARM-ANIMAL WASTES,
Public Health Service, Chicago, Ill. Bureau of Solid Waste Management.
Ralph J. Black, and William Q. Kehr.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, November 6-7, 1969, p 17-21. 3 tab, 6 ref.

Descriptors: *Farm wastes, *Water pollution, Population, Pollution abatement, Confinement pens, California, Solid wastes, Dissolved oxygen, Water quality, Hogs, Cattle, Poultry, Nutrients, Sewage sludge.
Identifiers: Meat consumption, Livestock production, Population equivalent, Land disposal.

The paper points out that an increased population will require much more beef and poultry, thus increasing the agricultural waste problem. Confinement feeding is firmly established, and, while the number of feeding operations is expected to decline, the total production will be increased. The importance of agricultural wastes is brought out in a table showing quantities of solid wastes generated in California. This is magnified by population equivalent data which states that animal wastes were equivalent in pollutional affect to 10 times that of the nation's population. Data is presented on quantities produced and the nutrient value of animal wastes. It is economically unfeasible to utilize this waste for its fertilizer value. The quantity of animal wastes will increase, as will the management problems associated with its handling, treatment and disposal. (White-Iowa State)

0518 - A3, A9

HEALTH PROBLEMS,
Wisconsin Univ., Madison. Dept. of Bacteriology.
Elizabeth McCoy.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, November 6-7, 1969, p 22-24.

Descriptors: *Public health, *Farm wastes, *Bacteria, Water pollution, Soil contamination, Coliforms, E. Coli, Streptococcus, Soil, Loam, Rates of application, Sampling, Cores, Adsorption, Percolation.
Identifiers: *Enterocci, Miami silt loam, Die-off.

Animal wastes contain enormous amounts of pollution bacteria. If it finds its way to surface or well waters the water would be reported as 'contaminated.' Bacterial counts made on fresh feces gave the following values: Coliform, 100,000 - 1,000,000/gm.; Enterococci, 1,000,000 - 10,000,000/gm. Experiments were done to trace pollution bacteria in manure applied to soil. Five gallon pails (with bottoms cut out) were set to

about three-fourths of their depth in a field of Miami silt loam. Applications of a manure/water slurry were made in 15, 30, and 80 tons per acre amounts. Both types of bacteria were adsorbed with S98..% removal by 14 inches. The soil acts as a very efficient filter. (White- Iowa State)

0519 - A5, A10

AESTHETICS AND ODORS,
Wisconsin Dept. of Natural Resources, Madison.
Douglas Evans.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, November 6-7, 1969, p 25-26.

Descriptors: *Farm wastes, *Odors, Aesthetics, Anaerobic conditions, Hydrogen sulfide.
Identifiers: *Odor threshold, Public nuisance, Odor panel, Odor measurement.

The difficulty of evaluating the offensiveness of odors is their subjective nature. Odors from farm animal wastes, particularly anaerobically generated are, in general, offensive, but the substances involved and the thresholds of detection are little known. Typical odor thresholds are given when determined by a trained panel. A method is outlined for eliminating panel members insensitive to odors. More needs to be known about the type, quantity and odor threshold of the various compounds involved in farm animal wastes. From this better methods of treating, storing, handling and disposing of wastes may be developed which will reduce or eliminate the odor problem.
(White-Iowa State)

0520 - A1, B1

DEAD ANIMALS AND HOW THEY CONTRIBUTE TO POLLUTION OF THE ENVIRONMENT,
Department of Agriculture, Madison, Wis.
A. A. Erdmann.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, November 6-7, 1969, p 27-29.

Descriptors: Transportation, Costs, Livestock, Legislation, Water pollution, Environment, Wisconsin.
Identifiers: *Dead animal disposal, *Rendering plants, Slaughter plant scraps, Carcasses.

The article describes why dead animals are fast becoming a pollution problem. Where once rendering plants paid to pick up dead animals they now charge livestock owners a fee for pick-up and disposal of livestock losses. The number of dead animals being sent to rendering plants has decreased by about 50%. Some legislation concerning the problem is encouraging. The author expects the problem of dead animal disposal to increase in the future. The problems of the rendering plant industry, such as added labor costs, collection costs, and, perhaps most important, the inferior product resulting from such operations, will probably make it necessary to use a different method of disposal of dead animals than is now followed.
(White-Iowa State)

0521 - A3, C3

WATER QUALITY PROBLEMS,
Wisconsin Dept. of Natural Resources, Madison.
F. H. Schraufnagel.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 30-32 November 6-7, 1969. 7 ref.

Descriptors: *Water quality, *Farm wastes, Water pollution sources, Fishkill, Fish, Dissolved oxygen, Nutrients, Nitrogen, Nitrates, Phosphorus, Eutrophication, Base flow, Ammonia, Coliforms, Cattle, Wisconsin.
Identifiers: *Land disposal, Concentrations, Feedlots.

Probably the biggest concern in Wisconsin about pollution from farm animal wastes is because of their nutrients. Nitrogen and phosphorus are the two significant nutrients causing eutrophication in lakes and streams. Land disposal is usually an effective way to prevent pollution except when wastes are applied to frozen ground. Data from the nutrient content of base flows generally indicates that percolation through the ground eliminates most of the phosphorus and nitrogen. The potential for pollution from animal wastes is very great. The likelihood of pollution from cattle will increase with manure fluidization and water carriage systems. The maintenance of water quality depends on research and development of techniques to control the problem. (White- Iowa State)

0522 - F4

FUTURE TRENDS IN LIVESTOCK PRODUCTION,
Wisconsin Univ., Madison. Coll. of Agriculture.
Robert W. Bray.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 33-35, November 6-7, 1969.

Descriptors: *Farm wastes, *Livestock, Cattle, Poultry, Hogs, Automation, Confinement pens, Odors, Waste disposal.
Identifiers: *Livestock numbers, Dairy cattle, Beef cattle, Feedlots, Horses, Waste management.

The author summarizes the article by saying that (1) livestock numbers will increase in the future and (2) the most economical management systems for all classes of livestock will result in larger numbers and more confinement in each livestock enterprise. Thus, the solid waste management or disposal problems associated with livestock production in Wisconsin will become more complex. The author gives his ideas as to what changes in production can be expected for dairy, beef, swine, poultry, and other operations.
(White-Iowa State)

0523 - A1, B1, F4

WHAT AND WHERE ARE THE CRITICAL SITUATIONS WITH FARM ANIMAL WASTES AND BY-PRODUCTS IN WISCONSIN,
Wisconsin Univ., Madison.
M. T. Beatty, J. E. Kerrigan, and W. K. Porter.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 36-57, November 6-7, 1969. 4 tab, 12 fig.

Descriptors: *Farm wastes, *Wisconsin, *Spatial distribution, Environment, Soils, Surface waters, Groundwater, Land resources, Livestock, Cattle, Hogs, Poultry, Population, Geology, Hydrology, Precipitation, Standards, Water quality, Nitrogen, Nitrates, Odor, Watersheds, Bedrock.
Identifiers: *By-products, Earth resources, Soil associations, Critical situations.

Where and to what extent various kinds of critical situations develop, depends on the interaction of several components of the waste production and management system. These include: the kinds and amounts of wastes and by-products produced; the spatial distribution of the sources; the proximity to people; the physical environment- characteristics of the soils, the landscape, the surface water and groundwater systems, and; the uses and demands on water and land resources. Numerous tables and charts point up the importance of these components. Seven critical situations, the problems and locations involved, are then explained. They include livestock concentrations near urban areas, large livestock concentrations, livestock in watersheds with lakes, and livestock concentrations on shallow soils over previous bedrock as well as others. (White-Iowa State)

0524 - B1

CONSIDERATIONS IN SELECTING DAIRY MANURE DISPOSAL SYSTEMS,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
O. I. Berge, E. G. Bruns, T. J. Brevik, and L. A. Brooks.
In: Proceedings of the Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 58-69, November 6-7, 1969. 10 tab, 1 fig, 1 ref.

Descriptors: *Farm wastes, *Cattle, Labor, Odor, Investment, Storage, Storage tanks, Annual costs, Value, Nitrogen, Phosphorus, Potassium, Urine, Equipment, Wisconsin.
Identifiers: *Dairy cattle, *Manure disposal systems, Hauling, Stacking, Manure handling.

Different methods of handling dairy manure and disposing of it are discussed. Advantages and disadvantages are listed. The three basic systems include daily hauling, stacking, and liquid manure storage. Investment and annual costs are compared for the three systems under similar stanchion and free stall housing operations. Dairy manure is valued at $1.40/ton for its nutrient content. Various types of handling equipment are discussed as well as a few disposal methods. (White- Iowa State)

0525 - D4

ENGINEERING RESEARCH ON FARM ANIMAL MANURE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
Clyde Barth.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 70-79, November 6-7, 1969. 2 tab, 6 ref.

Descriptors: *Farm wastes, *Biological treatment, Disposal, Livestock, Anaerobic digestion, Waste storage, Lagoons, Aerobic treatment, Waste dilution, Temperature, Rotors, Irrigation, Odor, Gases.
Identifiers: *Waste management, Waste characteristics, Anaerobic lagoon, Aerobic lagoon, Oxidation ditch, Composting, BOD removal, Land application, Coprophagy, Chemical treatment, Solid-manure waste.

The article reviews different treatment and disposal methods which are currently being used or investigated. Anaerobic and aerobic lagoons are used but are limited by temperature and odor problems. The oxidation ditch can be used for swine but its use is uncertain for wastes from other livestock. Composting, though effective, lacks a market for its finished product. Land application continues to be the most widely used type of livestock waste disposal. Irrigation and plow-furrow-cover applications are a modification of land disposal. Chemical treatment, dehydration, incineration, and coprophagy are being studied, but no conclusions have been drawn. Odor and gas production are problems not well understood and difficult to control. Solid manure, because of the lack of problems associated with its handling, deserves serious consideration in any animal waste handling situation.
(White-Iowa State)

0526 - F4

NATION-WIDE RESEARCH ON ANIMAL WASTE DISPOSAL,
Federal Water Pollution Control Administration, Chicago, Ill. Lake Michigan Basin Office.
Jacob O. Dumelle.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Ex-

tension, University of Wisconsin, p 80-81, November 6-7, 1969.

Descriptors: *Farm wastes, *Research and development, Grants, Algae, Air pollution, Water pollution, Soil contamination, Nutrients.
Identifiers: *FWPCA, Activated algae, Feedlots, Oxidation ditch.

The article gives brief descriptions of research projects which the Federal Water Pollution Control Administration is helping to fund. One such project under way in California is trying to determine the practicability of producing and harvesting algae to remove nutrients from agricultural drainage waters. Other projects involve cattle feedlot runoff, and dairy waste waters. Besides research on treatment methods, some projects are trying to find out how much nutrient runs off, and how much gets into water. (White-Iowa State)

0527 - A1

WATER RESOURCES CENTER RESEARCH ON ANIMAL WASTES AND WATER QUALITY,
Wisconsin Univ., Madison. Water Resources Center.
J. E. Kerrigan.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 82-85, November 6-7, 1969.

Descriptors: *Farm wastes, *Water quality, Eutrophication, Research and development, Wisconsin, Legislation, Water resources, Environment, Resources.
Identifiers: *Water Resources Center, Water research.

The function and goals of the University of Wisconsin's Water Resources Center are pointed out. The Center got its start from faculty committees formed to study groundwater and subsequently lakes and streams. It was then assigned state responsibility by the legislature for the coordination and administration of an interagency water resources research and data collection program. Lists of objectives and functions of the Water Resources Center are given. If Wisconsin is to have a well balanced research program for water quality management, it is necessary to direct the limited available financial support to researchers with specially developed talents to solve specific problems that merit consideration. A generous amount of effort must be expended to identify the real problems. (White-Iowa State)

0528 - F4

THERE'S HOPE AHEAD,
Wisconsin Univ., Madison. Dept. of Poultry Science.
John Skinner.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 86-90, November 6-7, 1969.

Descriptors: *Farm wastes, *Odor, Land use, Population, Management, Poultry, Foods, Agriculture.
Identifiers: Manure handling, Public relations, Goals, Land use planning.

Examples are cited of problems which have been turned into profitable industries; this can also be done with animal wastes. The increasing urban population will demand that animal wastes and their associated odors be disposed of at least cost to the meat consuming public. We must first dedicate ourselves to finding answers to the animal waste disposal problem. We must have full realization and appreciation of the cause, extent and consequences of the problem by all concerned. Better land use planning is needed as well as progressive regulations and laws. Better public relations must be created for all of agriculture and agriculturally related industries. Emphasis is placed on realizing the consequences of what we are doing today. The author proposes a goal of 'rendering inoffensive those parts of animal waste and by-products which are disagreeable to the public in general.' (White-Iowa State)

0529 - F3

INTRODUCTION TO FEDERAL, STATE AND LOCAL ACTION PROGRAMS TO SOLVE ANIMAL WASTE DISPOSAL PROBLEMS,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
Douglas A. Yanggen.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 91, November 6-7, 1969.

Descriptors: *Farm wastes, Water pollution, Agriculture, Environment, Government supports, Cost sharing, Education, Regulation.
Identifiers: *Government programs, Technical assistance, Subsidy.

An introduction is given for following articles on governmental programs which include technical assistance, cost sharing, regulation and education at federal, state and local levels. Those included illustrate the various techniques for influencing private decision making. (White-Iowa State)

0530 - B1, F2

THE ROLE OF THE FEDERAL WATER POLLUTION CONTROL ADMINISTRATION IN FARM ANIMAL WASTE AND THE BY-PRODUCT MANAGEMENT,
Federal Water Pollution Control Administration, Chicago, Ill. Great Lakes Region.
Frank E. Hall.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 92-95, November 6-7, 1969.

Descriptors: *Farm wastes, *Water pollution, Research and development, Federal government, Disposal, Grants, Water pollution control, Lake Erie, Water quality, Standards, Legislation.
Identifiers: *FWPCA, Animal waste disposal, Agricultural practices, Feedlots, Enforcement actions, Water quality standards.

A discussion is presented stating how the programs of the Federal Water Pollution Control Administration relate to farm animal wastes and by-product management. Examples are given of government and in-house research activities. Mention is given of those FWPCA supported activities that relate directly to the control of pollution from farm animals. These include pollution surveillance and water quality monitoring among others. The author feels that the most significant recent accomplishment in water pollution control is the establishment of water quality standards. (White-Iowa State)

0531 - A3, B1

TECHNICAL ASSISTANCE AVAILABLE FROM THE SOIL CONSERVATION SERVICE,
Soil Conservation Service, Madison, Wis.
Jack Densmore.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 96-97, November 6-7, 1969.

Descriptors: *Farm wastes, *Soil conservation, Surface runoff, Diversion, Grassed waterways, Terracing, Waste storage.
Identifiers: *Technical assistance, Soil Conservation Service, Farm waste disposal, Feedlot.

Situations in which technical assistance from the Soil Conservation Service (SCS) might be useful for reducing pollution from farm wastes are listed. Although the list is not all inclusive it gives an idea of assistance that can be obtained. An inventory and analysis of existing and potential areas where farm waste disposal may be a problem is needed. Technical assistance is available from the SCS to help on farm waste disposal problems, under the following limitations: (1) where the solutions involve techniques of soil and water conservation; (2) with the priorities established from time to time by local soil and water conservation district supervisors; and, (3) within the limitations of available man-power. (White-Iowa State)

0532 - B1, F1

COST-SHARING UNDER THE AGRICULTURAL CONSERVATION PROGRAM,
Agricultural Stabilization and Conservation Service, Madison, Wis.
Kenneth H. Hoover.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 98-100, November 6-7, 1969.

Descriptors: *Farm wastes, *Cost sharing, Pollution abatement, Soil conservation, Water conservation, Sedimentation.
Identifiers: ASCS, *Agriculture Conservation Program.

Practices and objectives of the Agricultural Conservation Program (ACP) have been broadened to include pollution abatement, provided such practices also result in soil and/or water conservation. The Agricultural Stabilization and Conservation Service (ASCS) manages program funds of the ACP. A list of components that ought to be included in pollution abatement cost-sharing practices is given. Most practices receive cost-sharing at 80% of cost. Farmer acceptance and financial contribution are needed to accomplish the stated objectives. (White-Iowa State)

0533 - F2

THE REGULATORY ROLE OF THE DEPARTMENT OF NATURAL RESOURCES,
Wisconsin Dept. of Natural Resources, Madison. Div. of Environmental Protection.
Thomas G. Frangos.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 101-104, November 6-7, 1969.

Descriptors: *Farm wastes, *Legislation, Water pollution, Pollution abatement, Wisconsin, Water quality, Regulation, Industrial wastes.
Identifiers: *Department of Natural Resources, Feedlots.

Statutes which point out the authority for Wisconsin water pollution abatement are cited. Other statutes are aimed at prevention and enforcement of sporadic discharges into streams. Based on these statutes, it is clear that the Wisconsin Department of Natural Resources has adequate authority to implement a program of pollution abatement aimed at any source of pollution. Difficulties in implementation include tradition, procedures, and lack of staff and funds. Any solution to the complex animal waste problem will involve a mix of programs, combining regulation, research, education, financial assistance, voluntary actions by landowners and possibly even tolerance on the part of the non-farm population. (White-Iowa State)

0534 - A1, A3

COLUMBIA COUNTY PROGRAM,

Columbia County Office, Portage, Wis.
Joe Tuss.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 105-107, November 6-7, 1969.

Descriptors: *Farm wastes, *Nitrates, Water pollution, Air pollution, Odor, Pollution abatement, Zoning, Wells, Wisconsin.
Identifiers: Feedlots, Livestock concentration.

The Columbia County Extension Service was charged with formulating a 15 man farmer committee to study the present situation in view of pending proposed requirements of animal and agricultural waste disposal. It will make recommendations for preventing agricultural pollution in current problem areas and in expanding agricultural enterprises. A joint program by Columbia County Health Services, Zoning Administration and the University Extension formulated a project to sample well water for nitrates. Over 800 wells have been sampled. Forty-three percent of the high nitrate problem is on farms with high concentration of livestock. The public's demand for clean air, water and environment can be met by programs which involve the items of concern mentioned as well as others. (White-Iowa State)

0535 - A3
WHAT ARE THE PROBLEMS IN WALWORTH COUNTY,
Walworth County Zoning and Sanitation Office, Elkhorn, Wis.
James Johnson.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 108-110, November 6-7, 1969.

Descriptors: *Farm wastes, *Water pollution, *Zoning, Pollution abatement, Eutrophication, Nutrients, Water resources, Land use, Lakes, Urbanization, Education, Erosion control, Land development, Regulation, Wisconsin.
Identifiers: Problem areas, Soil capabilities, Feedlots, Regional Plan.

Increased urbanization resulting in land use conflicts is the overall problem in Walworth County, Wisconsin. As a result, the water resources are deteriorating at an alarming rate. Eutrophication, erosion and nutrient pollution are the major causes. The Regional Plan, properly implemented will regulate growth in such a way as to prevent many problems before they occur. The Walworth County Sanitary Ordinance was a pioneering effort in pollution control which regulated urban growth through the use of soil surveys. The Ordinance will implement zoning by defining 'County Conservation Standards'; which are all of the recommended conservation practices of the Soil Conservation Service. Much can be accomplished with local regulations, but education is essential to sell the program. (White-Iowa State)

0536 - F3
ROLE OF UNIVERSITY EXTENSION,
Wisconsin Univ., Madison. Div. of Economic and Environmental Development.
Gale Vandeberg.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 111-113, November 6-7, 1969.

Descriptors: *Farm wastes, *Environment, Education, Universities, Research and development, Regulation, Water pollution, Wisconsin.
Identifiers: *University Extension, Adult education.

The challenge to Extension lies in the broad and continuous education of the public so that a pleasing and healthful environment may be maintained. The University Extension combined with the technical, financial and regulatory resources of other state and federal agencies has the resources to reduce the animal waste management problem. The University Extension staff has the responsibility to help various groups and the public to understand the problems and the alternatives; to help people who need to organize for action to do so; and to help groups and individuals to know what they can do, how to do it, and what resources are at their disposal. (White- Iowa)

0537 - F4
WHERE DO WE GO FROM HERE,
Wisconsin Univ., Madison. Dept. of Meat and Animal Science.
Richard H. Vilstrup.
In: Proceedings of Farm Animal Waste and By-Product Management Conference, University Extension, University of Wisconsin, p 114-115, November 6-7, 1969.

Descriptors: *Farm wastes, *Environment, Wisconsin, Technology, Education, Research and development, Regulation, Legislation.
Identifiers: Waste management, Waste utilization.

The author attempts to briefly summarize the ideas and presentations made at the conference. He points out that the waste management problem has many dimensions, including environmental, social, economic, physical, political and psychological. There is an increasing concern for the quality of environment in Wisconsin. As such, research and education are needed in many areas. Five specific recommendations for continued emphasis in the waste management area are made. Recommendations are also made for educational development. (White-Iowa State)

0538 - A2, B1, C1, C5, E1
CHARACTERISTICS OF WASTES FROM SOUTHWESTERN CATTLE FEEDLOTS.
Texas Tech Univ., Lubbock. Water Resources Center.
Environmental Protection Agency, Water Pollution Control Research Series, January 1971. 87 p, 23 fig, 23 tab, 72 ref, 1 append. EPA Program 13040 DEM 01/71.

Descriptors: *Runoff, *Livestock, Quality control, Analysis, Cattle, Confinement pens, Feed lots, *Farm wastes, Southwest U.S., *Agricultural runoff, Solid wastes, Irrigation, Texas, Water reuse.
Identifiers: *Quality of runoff, *Lubbock (Tex).

Research was conducted on experimental feedlots in Lubbock, Texas, to determine the characteristics of wastes from Southwestern cattle feedlots. The feedlots were generally operated in a manner conforming to normal commercial practice in the area. They were provided with collection pits that allowed the quantity of runoff to be measured accurately. Samples of runoff were collected routinely both during rainstorms and from the collection pits. Manure samples were also collected routinely for analysis. The quantity of runoff per unit area of concrete-surfaced lots is substantially greater than the quantity per unit area of dirt-surfaced lots. Concentrations of pollutants in concrete-lot runoff are substantially higher than corresponding concentrations in runoff from dirt-surfaced lots. The quantity of solid waste derived from cattle fed an all-concentrate ration is less than half as great as the quantity derived from cattle fed a 12 percent roughage ration. Additional studies showed that all solid waste derived from cattle feeding operations are readily compostible, although the rate of composting is influenced to some extent by the type of ration, moisture content of the waste on the feedlot floor, and other factors. Agronomic studies indicate that runoff can be used for irrigation of crops, but extreme caution is required in the application of runoff to crops to prevent damage to them. (Dorland-Iowa State)

0539 - A2, B1, F2
PROCEEDINGS OF ANIMAL WASTE MANAGEMENT CONFERENCE.
Federal Water Pollution Control Administration, Kansas City, Mo.

Kansas City, Department of the Interior, February 1969. 40 p.

Descriptors: *Farm wastes, *Cattle, *Water pollution control.
Identifiers: *Feedlot pollution control, *State status reports, Animal production, Model feedlot regulation, Animal waste management.

An objective of the conference was to review the problem, as it exists today, of animal waste management. Information was given on how to conduct a state inventory of feedlots. A report was given on the Kansas animal waste control program. Control devices for animal feedlot runoff were discussed. The results of some feedlot pollution control research in Colorado and Nebraska was given. Status reports of 9 state pollution control programs were given, as well as model feedlot regulation design. (White-Iowa State)

0540 - F4
INDUSTRY AND THE ENVIRONMENT FEEDLOT WASTE MANAGEMENT,
Texas State Legislature, Austin.
W. Clayton.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February, 1969. p 5-7.

Descriptors: *Farm wastes, *Cattle, *Regulation, Pollution abatement, Ecosystems, Waste disposal, *Feed lots.

In assessing the significance of the various threats to our water and air resources, two items should be kept in mind: (1) no one can come to the environmental table with clean hands, and (2) a disproportionate emphasis placed on one segment of the problem may result in other areas going unnoticed. Animal waste in general and feedlot waste in particular pose significant environmental problems in the areas of (1) fish and other aquatic life and recreational uses, (2) potable water supplies and (3) land usage and esthetics. These environmental challenges can best be overcome by means of an effective and active alliance between the feeding industry and the responsible regulatory agency. (Schmitt-Iowa State)

0541 - F4
FEEDLOT POLLUTION SLIDE SHOW,
Federal Water Pollution Control Administration, Kansas City, Mo. Missouri Basin Region.
R. S. Jessee.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February 1969. p 7-8.

Descriptors: *Farm wastes, *Runoff, *Fish-kill, Irrigation, Farm lagoons, Odor, Cattle, *Feed lots, Water pollution sources, Water pollution control, Iowa, Nebraska, Missouri River Basin.
Identifiers: Flies.

A major source of pollution in the Missouri Basin is agricultural waste from feedlots. There are over 46,000 feedlots in Iowa and over 24,000 in Nebraska. Over 4 million cattle were on feed last year in Iowa. The wastes generated by 100 cows are equivalent to 8 to 18 hundred people. Feedlot pollution too often occurs as a slug load washed into the stream after moderate or heavy rains.

Twenty-eight slides show extreme examples of water pollution from feedlots. They include slides taken at the John Redmond Reservoir, where over a half million fish were killed from cattle runoff. Several slides of manure in feedlots depict conditions before and after heavy rains. Also shown is a feedlot with a diversion terrace, a large lagoon, a secondary lagoon, and cropland irrigation; thus the nutrient cycle is completed.
(Schmitt-Iowa State)

0542 - F4

ANIMAL WASTE POLLUTION - OVERVIEW OF THE PROBLEM,
Federal Water Pollution Control Administration, Kansas City, Mo. Missouri Basin Region.
J. M. Rademacher.
In: Proceedings of Animal Waste Management Conferences, Kansas City, Missouri, February 1969. p 7-9, 4 ref.

Descriptors: *Farm wastes, *Groundwater, Cattle, Fish kill, Animal population, Runoff, Confinement pens, Waste treatment, Wells, *Feed lots, Missouri River Basin, Water pollution sources.
Identifiers: Population equivalents.

The volume of animal wastes produced in the United States is about ten times that produced by the human population. Two billion tons of livestock wastes are produced annually in the U.S.A. This amount of waste production is equivalent to that of a human population of 1.9 billion. There is evidence that animal wastes are a major source of water quality degradation. Feedlot runoff contaminates water supplies, destroys fish and aquatic life in streams, and generally degrades water quality. These wastes also have an effect on ground water, of 6000 water samples analyzed in Missouri, forty-two percent contained more than 5 parts per million nitrate as nitrogen. Public recognition and open discussions constitute a major step toward the solution to this major problem.
(Dorland-Iowa State)

0543 - F3

INDUSTRY'S ROLE IN FEEDLOT POLLUTION CONTROL,
C. B. Joseph.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February 1969. p 9-10.

Descriptors: *Farm wastes, *Cattle, *Waste disposal, Runoff, Groundwater, Animal populations, Kansas, Economics, *Feed lots, Water pollution control, Water pollution sources, Industrial wastes.
Identifiers: Industrial expansion, Beef consumption.

In Kansas cattle in feedlots with over 1000-head capacity have increased in excess of 700% and are producing over half the state's total beef production. In 1956, of the 182,000 head produced, only 30,000 head were produced in commercial feedlots with a capacity in excess of 1000 head; however, by 1969, the total production had risen to 766,000 head of which 486,000 were produced in feedlots with over 1000-head capacity. With this rapid increase in both the size and number of large feedlots, the problems of pollution control have become more pressing. Sites for new feedlots must be chosen more carefully with respect to terrain features and tax write-off incentives need to be extended to feedlot owners to cover the cost of adequate control and disposal facilities.
(Dorland-Iowa State)

0544 - F1, F3

HOW TO CONDUCT A STATE INVENTORY,
Minnesota Pollution Control Agency, Minneapolis.
J. P. Badalich.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February 1969. p 11-12.

Descriptors: *Farm wastes, *Cattle, *Investigations, Runoff, Legislation, Minnesota, Waste disposal, Confinement pens, Financing, Permits, Topography, *Feed lots.
Identifiers: Inventory, Questionnaires.

The most important aspect of any feedlot inventory is the financing necessary to undertake such a project. Every government agency and private association is under a limited budget and the object of any study must be justified. Minnesota has 19,900 feedlots which makes personal investigations impractical and necessitate a canvas by mail. Some preliminary screening can be done by questionnaire which could be sent to households in rural areas. These questionnaires would not be applications for a permit, but would supply information on whether investigation for a permit would be necessary. These questionnaires would primarily determine the size of the operation, its location and topographical features, and the type of waste handling and disposal systems. Investigators could be sent where it was necessary and determine conformity to regulations and permits issued.
(Dorland-Iowa State)

0545 - F2

HOW TO CONDUCT A STATE INVENTORY,
Colorado Dept. of Health, Denver. Water Pollution Control Commission.
F. J. Rozich.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February 1969. p 12-14.

Descriptors: *Farm wastes, *Cattle, *Investigations, Runoff, Legislation, Colorado, Waste disposal, Confinement pens, Financing, *Feed lots.
Identifiers: Inventory.

With the passage of the Colorado Water Quality Act of 1966, the Colorado State Agency gained jurisdiction over wastes discharged by feedlots in the state. The first task was gathering more specific information, such as ownership, acreage involved in the various feedlots, the number of animals fed, and the location of the facility. To carry out the inventory an engineering technician was employed for field surveys. The Milk, Food, and Drug Section and local health units were asked to complete a similar inventory as part of their routine inspections of dairy cattle facilities. Where a possibility of water pollution was indicated, district engineers were asked to follow up and discuss this matter with the owner of the facility.
(Dorland-Iowa State)

0546 - F2

THE KANSAS ANIMAL WASTE CONTROL PROGRAM,
Kansas State Dept. of Health, Topeka. Environmental Health Services.
J. L. Mayes.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February 1969. p 15-17, 1 append.

Descriptors: *Farm wastes, *Legislation, *Water quality control, Cattle, Investigations, Runoff, Kansas, Waste disposal, Permits, Fish kill, Odor, Retention, *Feed lots, Water pollution control.
Identifiers: Flies, Slug flow.

With the increasing size and number of cattle feedlots, the public has been aroused on the problems of odor and fly production. This concern was brought to the attention of the Kansas Department of Health where the concern shifted to water quality in 1959 when fish kills began occurring downstream from a few feedlots. Field investigation of water pollution episodes revealed that the 'slug' flow of animal waste runoff can seriously pollute receiving streams. These investigations allowed the design of a control program which will yield significant results. These regulations require containment and control by irrigation practices of all runoff from animal feedlot installations, with the minimum retention of three inches of surface runoff. A copy of these regulations is included.
(Dorland-Iowa State)

0547 - A3, B1, D1

CONTROL DEVICES FOR ANIMAL FEEDLOT RUNOFF,
Nebraska State Dept. of Health, Lincoln. Water Pollution Control Council.
T. O'Brien, and T. A. Filipi.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, February 1969. p 18-19, 1 fig, 1 ref.

Descriptors: *Farm wastes, *Waste treatment, Confinement pens, Cattle, Aerobic treatment, Runoff, Farm lagoons, Irrigation, Waste disposal, Waste storage, *Waste water treatment, *Feed lots.
Identifiers: Anaerobic lagoons, Detention ponds.

The confinement feeding of livestock animals in large numbers has produced one of the most perplexing and complex problems ever faced by engineers, planners, and developers, not to mention the livestock feeder himself. The problem includes solid waste disposal, stream pollution, and air pollution. Basically, it involves the controlling of wastes from the animals in the confined feeding operations. Several types of control facilities are possible, detention ponds, anaerobic lagoons, aerobic lagoons, and oxidation ditches. A detention pond is intended to hold surface runoff from the feeding area and has the disadvantage of collecting large amounts of water which must be disposed of within a few days. Anaerobic lagoons work best when wastes are added at a constant rate which is difficult to maintain in a cattle feedlot. An aerobic system appears to be the most satisfactory with wastes scraped into hydraulically flushing gutters and emptied into variable aeration lagoons for treatment. (Dor land-Iowa State)

0548 - A1, F4

RESEARCH ON ABATEMENT OF POLLUTION AND MANAGEMENT OF ORGANIC WASTES FROM CATTLE FEEDLOTS IN NORTHEASTERN COLORADO AND EASTERN NEBRASKA,
Agricultural Research Service, Fort Collins, Colo. Soil and Water Conservation Research Div.
C. E. Evans.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 20-22, February 1969. 5 ref.

Descriptors: *Farm wastes, *Cattle, *Nitrates, Biochemical oxygen demand, Confinement pens, Runoff, Coliforms, Ammonia, Odor, Absorption, *Groundwater contamination, Water pollution sources, *Pollution abatement, *Organic wastes.
Identifiers: *Feed lots.

Livestock in the United States produce over 1 billion cubic yards of wastes per year. About three-fourths of our beef cattle are finished in feedlots. Some of these feedlots carry as many as 50,000 head, which presents a waste disposal problem similar to a city of 600,000 people. Rains are very efficient at picking up this material from feedlots, resulting in introduction of material with a high BOD into streams. Research was conducted to determine ground water pollution. Feedlots had the highest nitrate levels, but irrigated land probably contributes more total nitrate due to much larger acreage in irrigated land. There was a rapid die-off of the coliform population in feedlot soils, indicating little danger of ground water contamination by coliforms. Ammonia losses in the air

result in odor and increased ammonia absorption by water surfaces around the feedlot.
(Dorland-Iowa State)

0549 - F4

THE UNIVERSITIES' ROLE IN FEEDLOT POLLUTION CONTROL,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 23-24, February 1969.

Descriptors: *Farm wastes, *Runoff, *Universities, Confinement pens, Cattle, *Pollution abatement, Research and development, *Feed lots.

Until feedlot runoff control is achieved in a manner acceptable to the livestock producer, regulatory agencies and the general public, the universities must play an active role. One of the principal contributions of universities toward solving the feedlot pollution problem is to guide and stimulate students through specific courses in livestock wastes combined with the basic principles of other scientific disciplines, such as civil and agricultural engineering, microbiology, chemistry, agronomy, and others. Extension education can be one effective method of alerting feedlot operators to the problems of feedlot runoff and bringing to them the currently available means of controlling or abating these problems. It also allows for feedback from feedlot operators to the university. A well-designed research project should, (1) be of interest to one or more researcher, (2) be compatible with available facilities, (3) stimulate growth on the part of the scientist and allow him to provide training to students, and (4) have some source of funding available. The roles of research centers and student training centers have been mutually beneficial. A university can interact with society through consultation of its staff with various individuals and agencies. Such interactions are possible because of the universities' reputation as an unbiased source of objective recommendations.
(Schmitt-Iowa State)

0550 - F3

HOW TO GAIN PUBLIC SUPPORT,
Kansas City Star, Mo.
R. Turnbull.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 24-25, February, 1969.

Descriptors: *Farm wastes, *Runoff, Pollution abatement, Cattle, *Feed lots.

On the pollution subject there are two extremes, one group would stop doing anything that might in any way pollute streams, such as use of commercial fertilizer; while the other extreme insists they will continue to do as they please. Between these extremes are those people, both cattlemen and the general public, who will be reasonable if they are given the facts. The facts in the situation of feedlot runoff pollution consist mainly of numbers. Although not so at one time, we now have so many cattle and other livestock in feedlots that we have a problem. We must realize the number of cattle on feed has doubled since 1950. These numbers as simply as anything define the problem, and are understandable to the public. When they do understand this, they will be better prepared to give public support for whatever is needed to solve the problem. (Schmitt-Iowa State)

0551 - F2, F3

MINNESOTA FEEDLOT POLLUTION CONTROL PROGRAM -- STATUS REPORT,
Minnesota Pollution Control Agency, Minneapolis.
J. P. Badalich.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 25-26, February 1969.

Descriptors: *Farm wastes, *Legislation, Administrative agencies, Legal aspects, *Regulation, *Minnesota, *Feed lots.

Following the Big Stone Lake study, a joint venture by the Governors of Minnesota and South Dakota, interest was generated in regulations regarding feedlot controls for the state as a whole. The Minnesota Pollution Control Agency is charged under statute for the control of all wastes. A 'preliminary draft' of regulations was published which caused criticism from many feeders and various organizations. These reports and comments should precipitate regulations that will be reasonable and desirable. We then go through the statutory procedure of public hearings, where we hope to get the reactions of the people in industry as well as the public at large. The next step is for the assistant attorney general to come up with the findings of fact, conclusions, and order. The Agency will then promulgate the standards, have them published, and issued. Following this we will set up specific rules, regulations and procedures, and then go into an inventory type procedure. Any regulation or standard proposed to the public or any industrial or municipal group must be reasonable, feasible, and practicable.
(Schmitt-Iowa State)

0552 - F2, F3

STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM IN SOUTH DAKOTA,
South Dakota State Dept. of Health, Pierre. Water Pollution Control Section.
B. Barker.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 26, February, 1969.

Descriptors: *Farm wastes, *Regulation, *Administrative agencies, *South Dakota, Legislation, Pollution abatement, *Feed lots.

A provision for promulgation of regulations to control wastes associated with confined feeding of livestock was included in the Plan of Implementation of the 'Water Quality Standards for the Surface Waters of South Dakota.' The standards were adopted by the South Dakota Committee on Water Pollution on April 20, 1967 and by the Secretary of the U.S. Dept. of the Interior on August 7, 1967. In January, 1967, an Advisory Committee on the Committee on Water Pollution and the State Department of Health was formed to provide technical assistance in developing regulations. Proposed regulations were discussed at a public meeting in Pierre on December 9, 1968. The Committee on Water Pollution will review feedlot waste disposal information presented at the December meeting and will prepare a regulation for the purpose of holding public hearings. We are working with the South Dakota Water Resources Institute and Civil Engineering staff at South Dakota State University in developing a study on the effects of feedlot wastes on our surface waters. Plans include an education program to keep the industry informed of proposals and obtain feedback from the agricultural community. (Schmitt-Iowa State)

0553 - F3

STATUS REPORT OF MONTANA'S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS,
Montana State Dept. of Health, Helena. Water Pollution Control Section.
D. Willems.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 27, February, 1969.

Descriptors: *Farm wastes, *Regulations, *Montana, Administrative agencies, Legislation, Pollution abatement, *Feed lots.

Montana does not have feedlot regulations but at this time is developing regulations. Most complaints on feedlots are because of nuisance conditions, thus, control of both air pollution and water pollution seems essential. Development of a permit system for feedlots, similar to the present system for municipal and industrial waste discharges is hoped for. The main concern at this time is to have adequate control of new feedlots and the prediction is that there will be many in the state before too long. It looks as though much time could be spent on controls for existing feedlots with very little accomplishment.
(Schmitt-Iowa State)

0554 - F3

MISSOURI'S ANIMAL WASTE MANAGEMENT,
Missouri Water Pollution Board, Jefferson City.
B. Crockett.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 27, February 1969.

Descriptors: *Farm wastes, *Regulation, *Missouri, Administrative agencies, Waste disposal, Pollution abatement, Cattle.

The Missouri Water Pollution Board believes the agricultural pollution in Missouri can be controlled through a program of education at this time. The Board is cooperating with the University of Missouri Extension Service and the Federal and State Departments of Agriculture to educate the farming public for the control of agricultural pollution. In May, 1968, the University of Missouri Extension Service completed a revised agricultural inventory for the Board on the stream basins of Missouri. This study, to be updated every three years, includes land use data, fertilizer and pesticide usage data, as well as animal and poultry production data for each basin. The Missouri Water Pollution Board does not plan to request legislation pertaining to the registration of feeders and, and/or confiners at this time. (Schmitt- Iowa State).

0555 - F4

STATUS REPORT - KANSAS FEEDLOT POLLUTION CONTROL PROGRAM - EXTEMPORANEOUS REMARKS,
Kansas State Dept. of Health, Topeka. Environmental Health Services.
M. W. Gray.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 28, February, 1969.

Descriptors: *Farm wastes, *Regulation, *Kansas, Administrative agencies, Fertilization, Cattle, *Feed lots, Waste disposal.

As a result of research undertaken approximately five years ago at Kansas State University and the University of Kansas, it was concluded that the activated sludge type of treatment of wastes from animal feedlot operations is not feasible from an economic standpoint. Retention ponds and the use of retained wastes for agricultural purposes was the key to our solution in Kansas. Although final authority for pollution control rests with the Department of Health, our problems are approached with the livestock sanitary commissioner's office, the agricultural extension service, the county agent, the consulting engineer, and the feeder. We are not seriously concerned from the standpoint of ground water pollution by way of the feedlot surface or from retention facilities. We are more concerned with the solid waste material, the manures that are cleaned from the feedlot surface and reapplied to agricultural land. The amount of nutrients

that can be applied per acre is directly proportional to that which will be removed with the crop grown. We strive for cooperation and understanding from the animal feeding community, as this is essential to our program. (Schmitt- Iowa State)

0556 - F2, F3

STATUS REPORT - NEBRASKA FEEDLOT POLLUTION CONTROL PROGRAM,
Nebraska Water Pollution Control Council, Lincoln.
T. A. Filipi.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 29, February, 1969.

Descriptors: *Farm wastes, *Regulation, *Nebraska, Fertilization, Administrative agencies, Runoff, Cattle, *Feed lots.

Water Quality Standards have been adopted and are well-known to all persons in the state of Nebraska. Municipalities and industries have taken care of their responsibilities and other polluters must follow in the program. The problem of pollution from the industry of agriculture, specifically feedlots, was brought to the attention of the Nebraska Water Pollution Control Council by persons living downstream from the feedlots. They brought in evidence such as samples of water and photographs which clearly convinced the Council that serious pollution does occur and corrective steps must be taken. A Feedlot Operators Committee was formed and assigned to prepare rules and regulations relating to the registration of feedlots. A voluntary survey regarding the size and location of feedlots received better than 80% compliance. The next assignment of the committee is development of solutions within the economic possibility of the industry. Research is carried on by the University of Nebraska Extension Division working with the United States Dept. of Agriculture. The greatest problem that confronts Nebraska Water Pollution Control Council is that of answering questions of persons intending to set up feedlot operations, since we have no guidelines for Nebraska conditions. (Schmitt-Iowa State)

0557 - F3

STATUS OF NORTH DAKOTA'S PROGRAM TO CONTROL POLLUTION FROM ANIMAL FEEDLOTS,
North Dakota State Dept. of Health, Bismarck. Div. of Water Supply and Pollution Control.
N. L. Peterson.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 30, February, 1969.

Descriptors: *Farm wastes, *Regulations, *Administrative agencies, *North Dakota, Runoff, Cattle, *Feed lots.

Shortly after the state's new Water Pollution Control Board took office on July 1, 1967, they requested the State Department of Health to present to them as much information as possible on pollution from agricultural areas and, if possible, draft a proposed preliminary set of rules and regulations. The first draft was presented in October, 1967 and used Kansas proposed regulations as a guideline. An Advisory Committee on Feedlot Wastes was then established. It was composed of Health Department personnel, representatives of the Board, and representatives of the various cattle raising and feedlot operators associations. This Committee was to review and comment on proposed regulations, discuss them with their constituents, obtain comments, and recommend changes. The Advisory Committee failed to obtain many comments on the third draft of the proposed rules and regulations and decided to withhold any further action until a report on the Animal Waste Management Conference in Kansas City on February 20, 1969 could be obtained. Due to the number of variable factors involved in feedlot operation, the actual extent of pollution is difficult to establish. Thus, there is a need for much additional research into the problem of feedlot pollution. Ultimately, rules and regulations will probably be adopted. (Schmitt-Iowa State)

0558 - F3

COLORADO'S STATEMENT, STATUS, PLANS, AND NEEDS FOR A COMPREHENSIVE FEEDLOT POLLUTION CONTROL PROGRAM,
Colorado State Dept. of Public Health, Denver. Pollution Control Div.
F. J. Rozich.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 30-31, February 1969.

Descriptors: *Farm wastes, *Regulations, *Colorado, Cattle, Legislation, Administrative agencies, Runoff, *Feed lots.

The extent of the problem of pollution attributable to feedlot wastes is being determined not only by the inventory being conducted, but also through stream studies. After public hearings and much discussion pro and con, the Colorado Water Pollution Control Commission adopted 'Rules for the Control of Water Pollution from Livestock Confinement Facilities' on April 10, 1968. Where it is determined, through field inventory and subsequent inspections, that a pollution problem does or can exist, the feeder will be asked to comply with the adopted rules. A Cease and Desist Order will be issued and an injunction sought if the feedlot operator fails to comply within a reasonable time. All types of animals corralled or tethered, including recreational horses, are included in the rules. The pace of advancement of a pollution control program is governed largely by the amount of monies and personnel available for such a project. (Schmitt-Iowa State)

0559 - F3

FEEDLOT POLLUTION CONTROL IN IOWA,
Iowa State Dept. of Health, Des Moines. Environmental Engineering Service.
R. J. Schliekelman.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 31-32, February, 1969.

Descriptors: *Farm wastes, *Regulation, *Iowa, Cattle, Legislation, Administrative agencies, Runoff, *Feed lots, Water pollution control.

A study committee comprised of three Iowa Water Pollution Control Commission members, two agricultural engineers and the extension veterinarian from Iowa State University was formed in November, 1966 to study the feedlot waste problem and make recommendations for corrective measures. During 1967 a permanent Agricultural Advisory Committee was appointed by the WATER Pollution Control Commission to formulate tentative criteria for a permit system and tentative standards for design of feedlot runoff control systems. Four public hearings were held in April, 1968 as a part of the procedure for establishing regulations. The 'Proposed Cattle Feedlot Waste Water Disposal Regulations' defined a feedlot and described conditions under which a permit for waste disposal is required. Accompanying tentative 'Requirements for Water Pollution Control Facilities' described satisfactory facilities for handling the feedlot runoff waste. The rules and regulations were adopted by the Commission in 1968 and referred to the Legislative Departmental Rules Review Committee for final approval. Objections were voiced and the rules were disapproved. The Committee did recommend and volunteered assistance in sponsoring legislation to permit a registration procedure. Demonstration grants have been requested from the FWPCA to build model facilities, which it is felt, would do more to prevent pollution from feedlots than any other item not already undertaken. (Schmitt-Iowa State)

0560 - B1, F4

ANIMAL WASTE MANAGEMENT QUESTIONS AND ANSWERS,
Federal Water Pollution Control Administration, Kansas City, Mo. Missouri Basin Region.
A. V. Resnik.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 33-34, February, 1969.

Descriptors: *Farm wastes, *Runoff, *Confinement pens, Regulation, Water pollution control.

In the initial phase of confinement livestock feeding, feedlots were, by design, situated where the rains would scour the waste materials from the lots, preferably into nearby draws and streams. We know now that the highly concentrated organic waste cannot and must not be discharged without treatment into streams. The exact contribution and the total effect of animal wastes on the water quality of the Missouri River Basin is not known. Prevention and control cannot wait while all the data are collected and assembled. Feedlot runoff pollution could be greatly reduced with a minimum expenditure by utilizing known information. Regulations are necessary to insure the feedlot operator that the measure he is taking will guarantee a reasonable tenure of operation. Uniformity which concurrently allows for flexibility must be built into the regulations, since there is no one model or control device that will substantially alleviate animal waste pollution. Possible control methods include, (1) zoning of entire watersheds for livestock production, (2) government built 'first generation' plants of new concept and design, (3) development of supplemental range feeding programs, and (4) composting a mixture of manure and municipal garbage for use on a 'greenbelt' separating the city from the animals. (Iowa State)

0561 - F3

INVENTORY AND ASSESSMENT OF THE PROBLEM OF POLLUTION FROM FEEDLOT WASTES,
North Dakota State Dept. of Health, Bismarck. Div. of Water Supply and Pollution Control.
N. L. Peterson.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 34-35, February, 1969.

Descriptors: *Farm wastes, *Runoff, Confinement pens, Cattle, Pollution abatement, Regulations, *Feed lots.

Feedlot wastes differ from municipal and industrial wastes in that they are not confined nor do they have predictable flows. The wastes from feedlots generally reach the stream only during periods of runoff. The first step toward assessment of the pollution problem might be to determine areas of the state where most feedlots are concentrated and what major or minor river basins have the highest potential of being polluted at times of feedlot runoff. The next step might be to develop an inventory of feedlots including data on location, topography, number of cattle, and other characteristics of the lot operation and management. Methods of obtaining inventory information might be through permits, County Extension Offices, farm associations, and perhaps through individual personal contact. A state water pollution control agency, adding pertinent weather data to this information, should be in a position to access the pollution potential, both individually and for each river basin. Certainly much can be accomplished if the state water pollution control agency makes a sin-

cere offer of assistance and advice to individual feedlot operators. Rules should be drawn up for the purpose of assisting the state agency and the feedlot operator to solve a mutual problem. (Schmitt-Iowa State)

0562 - F3

ASSESSING THE PROBLEM OF FEEDLOT POLLUTION,
Missouri Univ., Columbia. Dept. of Agricultural Economics.
C. G. McNabb.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 35-36, February, 1969.

Descriptors: *Farm wastes, *Runoff, Confinement pens, Cattle, Pollution abatement, Legislation, *Feed lots.

Cattle feedlots have been receiving an increasing amount of attention from pollution conscious people because of their growing number and size, they can be seen and smelled, and our affluent society is becoming more concerned with esthetic values. Action is demanded and we must progress using the best information available while trying to secure additional data. A partial list of useful data might include (1) quantity and capacity, (2) number of impoundments to catch runoff, (3) how the solids and liquids are handled, (4) the slope and length of slope, and (5) the soil type. Eventually the data should help us determine what effect feedlots have on the water quality of a basin. One method of developing an inventory is to legislate a permit requirement. A more desirable method is to voluntarily work with livestock organizations to gather information and set guidelines for pollution abatement. However, at the present time much uncertainty exists on the type of pollution abatement facilities that are effective and feasible. An information-education program is needed to create an awareness of the pollution problem by the livestock people. Awareness should precipitate more cooperation with agencies involved as well as initiate voluntary abatement programs. (Schmitt-Iowa State)

0563 - F2, F3

A RECOMMENDED PROCEDURE FOR DEVELOPING A MODEL FEEDLOT REGULATION,
South Dakota School of Mines and Technology, Rapid City.
F. L. Matthew.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 37-38, February, 1969.

Descriptors: *Farm wastes, *Runoff, *Regulation, Pollution abatement, Cattle, Legislation, Confinement pens, *Feed lots, *Model studies.

In the development of a feedlot regulation, other alternatives should first be considered and the need for a regulation firmly established. Next it is necessary to establish general and specific objectives for the proposed regulation. After establishing objectives, restraints should be considered. Budget and staff limitations will normally be the most important restraints on the implementation program. The last step is to establish evaluation criteria which should include: (1) preventive or corrective nature, (2) clear information about the feedlot operators obligations, (3) enforceability within staff budget restraints, (4) provisions for appeal, (5) avoidance of discrimination, (6) control of both new and existing facilities, (7) control of construction and operation, (8) provisions covering ultimate disposal of wastes, (9) provisions for periodic updating, (10) compatibility with existing Federal, state and local laws, (11) definitions of pollution and pollution parameters, and (12) establishment of effluent quality standards and specification of sampling procedures. When these steps have been taken and necessary public information programs are underway, the development of the feedlot regulation and implementation program plans can proceed. (Schmitt-Iowa State)

0564 - F4

RESEARCH NEEDS IN CATTLE FEEDLOT WASTE CONTROL,
Kansas State Univ., Manhattan. Dept. of Civil Engineering.
L. A. Schmid.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 38-39, February, 1969.

Descriptors: *Farm wastes, *Research and development, By-products, Pollution abatement, *Feed lots.

Although research priorities cannot be neatly separated since most of the categories are interrelated, certain areas should receive increased research emphasis. Characterization of wastes should be included in studies wherever possible. The sanitary engineer's fundamental knowledge of biological waste treatment and other processes is sufficient that he can design a process, biological or otherwise, based on a knowledge of the waste characteristics. Biological treatment in a liquid system of the manure scraped from a feedlot should not warrant a high degree of priority, since most of the biodegradable solids have already decomposed depending on the age of the manure and the conditions involved. Return to the land appears to be the most favored method of disposal. We know very little of the effect of the heavy loading anticipated from large feedlot operation, but somewhere there must be a balance between rate of waste disposal, land destruction, and crop production while satisfying the primary goal of pollution control of both surface and ground water. The next priority deals with either management practice or processes that reduce the solid or liquid waste that comes from the lot. Reuse of wastes as feed material and other by-product recovery schemes may require attention in the future. (Schmitt-Iowa State)

0565 - B1, F4

RESEARCH AND DEVELOPMENT VIEWS OF ANIMAL WASTE MANAGEMENT,
Federal Water Pollution Control Administration, Washington, D.C. Div. of Applied Science and Technology.
H. Bernard.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 40, February, 1969.

Descriptors: *Farm wastes, *Waste treatment, Cattle, Pollution abatement, Administrative agencies, Research and development, Water pollution control.

The problem of the waste from animal feeding must be considered not only as a pollution abatement problem, but rather as an animal feeding or an animal management problem in which waste management is considered as an integral part of the overall problem of making a profit from your investment. The prime consideration is to maximize profit taking into account the additional cost of waste management. This could even mean changing the feed to decrease the amount of wastes produced or the quality to make it easier to handle the waste products. The Office of Research and Development of the FWPCA is anxious to demonstrate new or improved techniques for handling and treating animal wastes that reduce the pollutional load to receiving streams or ground water. Participation with industry can include up to 70% of the total cost. The nation as a whole desires pollution abatement to become an integral part of our economy and expects a definite improvement in our environment. (Iowa State)

0566 - F3

DEVELOPING AN ANIMAL WASTE MANAGEMENT ACTION PROGRAM,
Missouri Univ., Columbia. Agricultural Extension Div.
S. H. Bodenhamer.
In: Proceedings of Animal Waste Management Conference, Kansas City, Missouri, p 40, February, 1969.

Descriptors: *Farm wastes, *Regulation, *Legislation, Pollution abatement, Water pollution control.

Many dynamic forces will affect the implementation of a desired animal waste management program. Before attempting to initiate change, any social system should (1) define the situation to be changed, (2) describe the desired situation, (3) list what needs to be done to accomplish the desired, and (4) describe the resources available and those that are needed. A listing of the different audiences or interest groups can be helpful in preparing a message for them. Each audience will need to see how the change will help them satisfy their own needs for goods, services, and attitudes. Decide on what method is to be used to reach each audience, as change is best brought about through good communications and cooperation. Methods may be influenced by the size of the audience and their state of adoption. Those to affect or be affected by animal waste management programs must be involved in deciding what should be the program. Cooperation is positively correlated with the degree of involvement the parties to be affected are involved in shaping the proposed action. (Schmitt-Iowa State)

0567 - A9, C4

BACTERIAL AND FUNGAL FLORA OF SEAGULL DROPPINGS IN JERSEY,
Jersey General Hospital, St. Helier (England).
J. Cragg, and Y. M. Clayton.
Journal of Clinical Pathology, Vol 24, No 4, p 317-319, 1971. 12 ref.

Descriptors: *Animal wastes (Wildlife), *Bacteria, *Fungi, Waste identification, E. coli, Streptococcus, Yeasts, Salmonella, Shigella, Seashores, Sampling, Laboratory tests, Gulls.
Identifiers: *Seagull, Mycology, Jersey.

In Jersey 166 fresh and 122 dried seagull droppings were obtained and studied locally and in London for the presence of bacteria and fungi of potentially pathogenic nature. There were no salmonella or shigella bacteria isolated from the two groups but there was a high proportion of Candida albicans obtained from the fresh material (21.7%) and only 1.6% from the dry faeces. Cryptococcus neoformans and Histoplasma capsulatum were not found in either the dry or fresh droppings. The normal bacterial and fungal flora of the seagull was established and it is considered that the C. albicans in fresh gull droppings would not materially increase albicans infections in man. (Bundy-Iowa State)

0568 - B1, F5

DEAD BIRD DISPOSAL BY RENDERING,
California Univ., Riverside.
W. C. Fairbank, and E. L. Bramhall.
Poultry Digest, Vol 30, No 358, p 600-601, December 1971.

Descriptors: *Farm waste, *Chickens, *Waste disposal, *By-products, Artificial use.
Identifiers: Rendering.

The reduction of dead poultry, and poultry viscera, feathers, cockerels, and unmarketable eggs to salable by-products is probably the most nearly perfect disposal method for these wastes. Rendering is a recycling process. Meat, bone, and feather meal are used in formulation of livestock and pet foods. The rendered 'yellow grease' is

used mainly by feed, soap, and chemical industries. Usually no payment is made to the poultry supplier, but receptacles with tight-fitting lids are supplied. Whole carcasses are cooked and fed uniformly to a tapered screw oil expeller or press. Dead whole poultry yield 50% recovery, 25% of which is grease and 75% meal. The value of meal (about 58% crude protein and 4% crude fats) is approximately four cents per pound. The value of feed grade yellow grease is about seven cents per pound. Restaurant grease, butcher shop trimmings, and small animals can be blended to provide sufficient volumes for continuous use of the rendering plant cookers. A layer population of several million hens is necessary to supply adequate mortalities if there is no other source of compatible waste. (Schmitt-Iowa State)

0569 - C3, D1, E1

ENZYMATIC EVALUATION OF PROCESSES FOR IMPROVING AGRICULTURAL WASTES FOR RUMINANT FEEDS,

Agricultural Research Service, Albany, Calif.
Jack Guggolz, R. M. Saunders, G. O. Kohler, and T. J. Klopfenstein.
Journal of Animal Science, Vol 33, No 1, p 167-170, July 1971. 4 fig, 1 tab, 14 ref.

Descriptors: *Farm waste, *Enzymes, *Biochemistry, *Digestion, *Biodegradation, *Ruminants, Cattle, Sheep, Degradation, Refuse, Cellulose, TDN, Alfalfa, Forages, Lignin.
Identifiers: *Onozuka SS, *Agricultural residues, Roughage, Hemicellulose, Reed canary grass, Smooth bromegrass, Tall Fescue.

Agricultural residue high in cellulose and hemicellulose are a potentially valuable source of energy to ruminant animals, but low digestibility of the carbohydrates make some type of chemical or physical modification necessary. A procedure has been developed enabling one to correlate 'in vivo' digestion of residues with 'in vitro' dry matter disappearance. The procedure involves digestion of the crop residue or forage with a crude cellulose enzyme followed by protease digestion. 'Onozuka' SS was found to be the most active cellulose and was added at a rate of 750 milligrams per gram of residue, and incubated at 40C for 72 hours. At the end of incubation a series of procedures was followed to separate and weigh the remaining residue. Onne hundred minus the percent residue was called 'total solubles after enzymes' (TSAE). The correlation coefficient between enzymatic and 'in vivo' results for alfalfa, reed canary grass, smooth bromegrass, and tall fescue were 0.997, 0.876, 0.998, and 0.999 respectively. The procedure appears to predict dry matter digestibility with sufficient precision to be of use to laboratories with no access to donor ruminant animals. (Schmitt-Iowa State)

0570 - A7, A8, C4

MANURE MITES AND THEIR ROLE IN FLY CONTROL,

Kentucky Univ., Lexington. Dept. of Entomology.
J. G. Rodriguez, Pritam, Singh, and Bob Taylor.
Journal of Medical Entomology, Vol 7, No 3, p 335-341, 1970. 2 fig, 4 tab, 30 ref. Public Health Service No CC 00207.

Descriptors: *Farm wastes, *Insect control, *Mites, Cattle, Poultry, Larvae, Oviposition, Insecticides, Diazinon, Insect eggs, *Waste treatment, Toxicity.
Identifiers: *Flies.

Glyptholaspis confusa (Foa) and Macrocheles muscaedomesticae (Scopoli) generally attain their highest populations in stock piles of cattle manure in the fall and early spring. Their food during the fly-free season consists mainly of nematodes. In poultry houses populations of M. muscaedomesticae start building up in manure in the summer. Fuscuropoda vegetans (DeGeer) attains high populations in early summer and continues to build up as the season progresses until late fall. Acarine control of the house fly in a poultry house under semi-field conditions ranged from 86 to 99%, depending in the mites involved. Fourteen chemicals were tested in the laboratory for toxicity to newly-hatched maggots of the house fly and the adult, M. muscaedomesticae. Diazinon, ronnel, Bayer 38156, malathion and dimethoate were relatively toxic to the house fly maggot and relatively non-toxic to the mite. Sugar-based baits were used against the adult flies in the integrated control program with promising results. (Parker-Iowa State)

0571 - A3, B1, E3

EFFECT OF METHOD OF MANURE HANDLING ON CROP YIELDS, NUTRIENT RECOVERY AND RUNOFF LOSSES,

Wisconsin Univ., Madison. Dept. of Agricultural Engineering; and Wisconsin Univ., Madison. Dept. of Soils.
R. R. Hensler, R. J. Olsen, S. A. Witzel, O. J. Attoe, and W. H. Paulson.
Transactions of the American Society of Agricultural Engineers, Vol 13, No 6, p 726-731, November-December 1970. 10 tab, 26 ref. OWRR-14-01-0001-858.

Descriptors: *Farm wastes, *Crop production, *Application methods, Runoff, Nutrients, Greenhouses, Waste disposal, Chemical analysis, Fertility, Soil chemical properties.
Identifiers: *Nutrient recovery, Anaerobic liquid manure, Aerobic liquid manure.

A study was made of the effect of type of manure, method of handling, amount of bedding, drying treatment, and rate of application on the fertilizing value of cattle manure for corn and hay and on runoff losses. Dairy and beef cattle manure was applied as fresh, fermented, aerobic liquid and anaerobic liquid, both in greenhouse conditions and in actual field tests. Tests were run to determine nutrient loss before application and nutrient recovery by plants and runoff losses after application. Results showed increased corn dry matter in all cases of manure application with poorer results shown by the aerobic liquid than the other three. Allowing manure to dry for one week before incorporation usually gave lower yields and lower recovery values for N, P, and K. Total dry-matter yields of corn were not greatly affected by increasing amounts of bedding up to 8 percent, but at the 16 percent rate, yields were usually much lower. (Parker-Iowa State)

0572 - A9, C4, E3, F2

AN ASSESSMENT OF SOME PUBLIC HEALTH PROBLEMS RESULTING FROM FEEDING POULTRY LITTER TO ANIMALS. MICROBIOLOGICAL AND CHEMICAL PARAMETERS,

Food and Drug Administration, Cincinnati, Ohio. Div. of Microbiology.
James W. Messer, Joseph Lovett, Gopala K. Murthy, Albert J. Wehby, and Mary L. Schafer.
Poultry Science, Vol 50, No 3, p 874-881, May 1971. 3 tab, 14 ref.

Descriptors: *Farm wastes, *Poultry, *Disposal, *Feeds, *Public health, Cattle, Hogs, Sheep, Pesticide residues, Microbiology, Health, Diseases, Salmonellae, Sewage, Bacteria, Arsenic compounds.
Identifiers: Food and Drug Administration, Medicinals, Ultraviolet-light-activated substances.

Feeding studies on the utilization of poultry litter as a feed additive for ruminants have demonstrated satisfactory animal nutrition, thus, opening many questions of public health significance. This study examined the heat resistance of salmonellae and Arizona pathogens; whether heat treatment of poultry litter would provide an effective barrier against disease transmission; and determined the levels of some medicinals, pesticides, and ultraviolet light activated compounds in poultry litter. Results showed that a heat process for the elimination of salmonellae and Arizona sp. may be feasible, since they are not highly resistant to heat. E. Coli being less resistant to moint heat than salmonellae, were eliminated as an indicator of the efficiency of the heating process. With the exception of arsenic, the concentration of pesticides and medicinals present in the litters assayed in this study were low. On the basis of the highest observed values in litter, beef cattle and dairy cattle fed 30% of their diet as litter would receive approximately 46.0 mg of arsenic, 19.0 milligrams of uric acid, 16.0 milligrams of nitrofurazone, 15.0 milligrams of furazolidone, and 1.4 milligrams of ultraviolet-activatable substances per day. The possibility of higher levels and the unknown effect of continuous exposure to low levels suggests the present ban on the interstate shipment of poultry litter for animal feed is warranted. (Schmitt-Iowa State)

0573 - A5, D2

METHODS OF REMOVING SETTLEABLE SOLIDS FROM OUTDOOR BEEF CATTLE FEEDLOT RUNOFF,

Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
C. B. Gilbertson, T. M. McCalla, J. R. Ellis, and W. R. Woods.
Transactions of American Society of Agricultural Engineering, Vol. 14, No. 5, September-October 1971. p 899-905, 19 fig, 2 tab, 11 ref.

Descriptors: *Farm wastes, Runoff, Cattle, *Settling basins, Waste disposal, *Feed lots, *Waste water treatment.
Identifiers: *Liquid storage, Continuous flow, Batch system, *Feedlot runoff.

Two experimental systems were installed to study removal of settleable solids from runoff. One method, termed the 'batch' system, consisted of a primary settling basin and a secondary basin. All runoff from a given storm event was trapped within the primary settling basin and detained to allow the heavier solids to settle to the bottom of the basin. The supernate was pumped from the primary basin into the secondary basin for longer detention times. The other concept was termed 'continuous flow.' Runoff resulting from a storm moved continuously through a series of porous dams. The porous dams reduced the velocity of flow sufficiently to allow the heavier particles to remain in the settling channel while the liquids flowed by gravity to a liquid storage pond. Results of the 1-1/2 year study are: (1) The concentration of chemicals and solids in runoff was highly variable for rainfall-runoff events; (2) Rainfall runoff transported about 1.6 tons of solids per acre-inch, while winter runoff transported about 10 tons per acre-inch; (3) The batch system removed settleable solids efficiently; however, the system maintenance had considerable disadvantages; (4) The continuous flow concept may be readily adapted to many of the feedlots experiencing runoff problems; (5) Settling of solids presents more of a problem during cold weather. (Bundy-Iowa State)

0574 - D4

OXIDATION DITCH IN A CONFINEMENT BEEF BUILDING,

Illinois Univ., Urbana. Dept. of Animal Science; and Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. D. Jones, D. L. Day, and U. S. Garrigus.
Transaction of the ASAE, Vol. 14, No. 5, Sept.-Oct 1971. p 825-827, 6 fig, 2 tab, 1 ref.

Descriptors: *Farm wastes, *Confinement pens, *Oxidation lagoons, Aerobic bacteria, Costs, Cat-

tle, *Waste water treatment, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Beef cattle wastes.

Disposing of beef cattle wastes with an in-the-building oxidation ditch is being studied by the Departments of Animal Science and Agricultural Engineering in an experimental beef-confinement facility at the University of Illinois Beef Farm. Waste from cattle consuming rations of high-roughage and high-concentrate was studied during a four month test period from March through June, 1969. Field trials indicated that the in-the-building oxidation ditch is a satisfactory method of treating beef cattle waste. Loading rates of 55 cm ft of oxidation ditch per 800 pound fattening calf and 80 cu ft per cow and calf were used. The 5-day mixed-liquor biochemical oxygen demand values were less than 1,000 mg per liter and the supernatant BOD5s were usually less than 200 mg per liter. The chemical oxygen demand values were extremely high (up to 55,000 mg per liter) due to the high cellulose ration fed to the first group of animals. There was some evidence that biological activity was influenced by cold climates. Assuming a daily BOD5 production of 1.3 pound per 1000 pound beef feeder and a power cost of 2 cents per KWH, the aeration rotor operating cost would be about 2.5 cents per 1,000 pound animal per day. This would be about 1 cent per pound of gain. (Schmitt-Iowa State)

0575 - A5, B1, D1, E1

POULTRY WASTE HANDLING SYSTEMS,
Cornell Univ., Ithaca, N. Y. Dept. of Poultry Science.
C. E. Ostrander.
Poultry Digest, November 1971, p 529-532.

Descriptors: *Farm waste, *Odors, Drying, Aerobic, Anaerobic, Poultry, Oxidation lagoons, Design, Effluents, Waste water disposal, Fertilizer, Hydraulic structures, Waste management.
Identifiers: Storage capacity, Plow-down application, Laying cages, Deep pits.

The problems of waste management have become increasingly important primarily because of increasing in flock size, concentration of birds and population migration to the country. There are several waste handling systems, none of which is adaptable to all situations. Some of the more popular types of waste handling systems are: (1) deep pits which are capable of handling at least 6 to 9 months storage, (2) hydraulic systems with aerated lagoon, and (3) oxidation ditches. Spreading of slurry taken from the storage pits also creates problems, if not handled properly. If liquid spreaders are used, the spreaders should be enclosed to reduce odors on public roads and on other property. In the spreading of manure by the use of plow-down application method, the material is poured into the furrow followed up by plowing. The soil being a very good filter, reduces the odors. Regardless of the practice followed in handling waste products, care should be taken to avoid a poor image in the community. (Bundy-Iowa State)

0576 - A5, A6, C3

CHEMICAL OXYGEN DEMAND OF GASEOUS AIR CONTAMINANTS,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
J. D. Frus, T. E. Hazen, and J. R. Miner.
Transactions of the ASAE, Vol. 14, No. 5, 1971. p 837-840, 5 fig, 6 tab, 8 ref.

Descriptors: *Farm wastes, *Odors, *Chemical oxygen demand, Air pollution, Ammonia, Confinement pens, Analytical techniques, *Oxygen demand.
Identifiers: *Organic gases.

In an attempt to quantify the atmosphere of a confinement swine building according to odors, the chemical oxygen demand analysis was modified and used to analyze the atmosphere within the building. Air was pulled through a 0.8 micron filter to 3 culture tubes containing equal parts of 0.025 N $K_2Cr_2O_7$ and concentrated H_2SO_4. The volume of air was measured with a wet-test meter. It was concluded that (1) the COD technique can be used as a quantitative measure of the organic gases present, (2) the air COD values can be correlated with noticeable differences in odor level as detected by the human nose, (3) the air COD technique detected different gases when the pH of the manure was above 7.0 than when it was below 7.0, (4) the air COD value rises sharply when the ventilation is turned off and drops sharply when it is turned on again, (5) the air COD values are lowest when the pH of the manure in the pits is in the 6.8 to 7.2 range. The effect of absorbent temperature on the air COD values and the sensitivity of the COD technique to individual organic gases need further exploration. (Schmitt-Iowa State)

0577 - D2

BLOCK DRYING OF CHICKEN MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
Compost Science, Vol 11, No 3, 1 tab, 1970. p 28-29, 3 fig, 3 ref.

Descriptors: *Farm wastes, *Drying, *Poultry, Moisture content, Odor, Nitrogen, *Waste treatment.
Identifiers: Block drying.

Blocks of chicken manure were air dried to form a storable product with minimum odor. Reductions in weight, volume, nitrogen, and viable organisms were obtained during the drying period and following storage period. Due to moisture loss during drying, the blocks experience a weight reduction to 29 percent of the initial weight. Shrinkage can result in a volume reduction of approximately 50 percent. The reduction in viable organisms over a 3-3/4 period is substantial but a large number of organisms still exist. Nitrogen is lost during the drying and storage period. (Bundy-Iowa State)

0578 - B1, E1, D1, F4

COLLECTION AND DISPOSAL OF FARM WASTES,
Ministry of Agriculture (Northern Ireland).
J. S. V. McAllister.
Water Pollution Control, Vol 69, No 4, p 425-429, 1970. 6 tab, 5 ref.

Descriptors: *Farm wastes, *Slurries, Sewage, Aeration, Incineration, Biochemical oxygen demand, Farm lagoons, Water pollution, Nitrogen, Ammonia, Methane, Hydrogen sulphide, Phosphorous, Waste water disposal, Waste water treatment.

Identifiers: *Pig slurries, *Poultry droppings, *Cattle excreta, Silage.

Improved farming techniques, suburban development, and a wider realization of the necessity to control pollution of the atmosphere and water supplies have increased the problem of farm waste collection and disposal. Generally, in Europe farm wastes are collected in the form of a slurry but disposing of this slurry is a problem. The use of this slurry as a manure has certain drawbacks and alternative methods of disposal such as drying, incineration, aeration treatment, or synthesis of feeding stuffs are explored. (Ellis-Texas)

0579 - A5, D4, E1

OXIDATION DITCHES CAN ELIMINATE ODORS, MANURE HANDLING AND POLLUTION,
John Russell.
Farm Journal, Vol 94, No 8, p H-10, H-15, August 1970.

Descriptors: *Farm wastes, *Hogs, *Waste treatment, Activated sludge, Odors, Aeration.
Identifiers: *Oxidation ditch, *Hog confinement, Odor control, Smart Pork Farm, Lawrence (Kans).

The use of oxidation ditches is described in a swine confinement system for 5000 head annually near Lawrence, Kansas. Thousand head finishing buildings have two oxidation ditches each with 4 rotors or wheels in each ditch. Organic matter removal is in excess of 90 percent. Operating costs approximate one dollar per head. Effluent is discharged to holding ponds for evaporation thereby eliminating all manure hauling. (Miner-Iowa State)

0580 - B2

ENGINEERING PRINCIPLES IN HANDLING LIQUID MATERIALS,
Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
C. M. Hansen.
Agricultural Engineering, Vol 39, p 546-551, Sept 1958. 13 fig, 1 tab, 8 ref.

Descriptors: *Farm wastes, *Fertilizers, *Pumps, Hydraulic equipment, Liquid wastes, Liquids, Pesticides, Spraying, Herbicides, Hogs, Nematocides, Measurement, Centrifugal pump, Farm equipment, Cattle.
Identifiers: *Dairy cattle, Anhydrous ammonia, Rotameter, Aqua ammonia, Liquid feeds, Helical rotor pump.

Various methods of handling liquid fertilizer, liquid feeds, pesticides, nematocides, and liquid manure are discussed with special emphasis given to the type of pumps recommended for each. Anhydrous ammonia is usually transferred by a bleeding system or a vapor-return system. It is commonly applied to the soil by employment of the pressure differential system. Aqua ammonia is transferred by centrifugal pumps as are many herbicides. Pesticides are recently being applied with air-blast pumps which use both air and water as a carrier of the pesticide. A most successful hydraulic pump for handling soil fumigants has the nylon roller impeller. This pump needs to be flushed with Kerosene or Stoddard solvent. The helical rotor pump with a rubber or synthetic rubber stator is a new pump for handling liquid manure in the semisolid form. By pumping semisolids, a Missouri farmer is able to weekly flush the wastes from a 350-hog installation with only 2,500 gallons of water. Dairy cow wastes are also a semisolid, as 56% of the 12-15 gallons per day water consumption is excreted in the feces while only 13% is excreted in the urine. (Schmitt-Iowa State)

0581 - E2

BROILER LITTER ON WELSH COAL TIPS,
Colin White.
Agriculture. Vol 77, No 2, February 1970, p 49-51.

Descriptors: *Poultry, Farm wastes, *Coal mine wastes, *Land reclamation, Perennial ryegrass, Vegetation establishment, Germination.
Identifiers: *Broiler litter, Field trials, South Wales.

In South Wales large areas of land occur as gigantic coal spoil tips. Interested local authorities are increasingly concerned that disused tips should be landscaped. Presently, however, up to five years may elapse before this land is considered suitable for return to agricultural use. The National poultry laying flock produces 2,000,000 tons of fresh manure per annum. This poultry manure has values that may fit it well for use on derelick land. Tests

and trials were arranged to see if poultry manure could ameliorate the harsh conditions presented in trying to establish grass on coal tips. Hen battery slurry was first considered and used in the first germination test. Italian ryegrass seed was mixed with the slurry and applied to tip material. Germination was only about 50%. Next the grass seed was placed on the tip material and then covered by broiler litter. No loss in germination was found with this second method. Field tests were then made using this technique. The results were satisfactory. Further trials and observations are being conducted on tips and restored opencast sites. (Parker-Iowa State)

0582 - A6, B1, F1

CRITERIA NEEDED TO DESIGN ANIMAL QUARTERS FOR COMFORT AND PRODUCTIVITY,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
T. E. Hazen.
Journal of Animal Science, Vol 32, No 3, p 584-589, 1971. 20 ref.

Descriptors: *Design criteria, Farm wastes, Research needs, Air pollution effects, Farm management, Confinement pens, Investment economics, Temperature control.
Identifiers: Animal quarters, Air purity.

Several reasons account for the shortages in livestock housing design. The most frequent reason is either the added construction or operating cost necessary to obtain something better. Very little is known about the chemical and biological environment systems and the quantitative effects they may have on animal comfort and productivity. In this respect, manure management is now under intensive study because fecal and urinary wastes appear to contribute most to the formation of undesirable conditions. Reasonably adequate data are now available on the treatment and disposal of wastes, but acceptable systems are lacking for separating the manure safely and efficiently from the animal and surroundings. (Bundy-Iowa State)

0583 - A5, A6, C3, D3

AIR POLLUTION FROM AGRICULTURE,

Nebraska Univ., Lincoln. Coll. of Agriculture.
L. F. Elliot, and T. M. McCalla.
Proceedings, Exploring Nebraska's Pollution Problems, symposium article No 31275; Journal Series, Nebraska Agricultural Experiment Station, April 22, 1971. p 1-6, 29 ref.

Descriptors: *Farm wastes, *Air pollution, *Dusts, *Odor, Aesthetics, Erosion control, Land management, Weed control, Pesticide drift, Dust storms, Wind erosion, Pollen, Smoke.
Identifiers: *Allergens, *Fatty-acids, Aerosol drift, Ragweed pollen, Stubble mulching.

The major atmospheric pollutants from agriculture are dust, allergens, odors, pesticides, and smoke. The reduction of these pollutants through improved management practices can be demonstrated. Dust can be controlled by proper cropping systems and management. Allergens can be decreased by weed control. If the surface of animal wastes is maintained aerobically, little or no odor will exist. Problems in reducing odor production in animal confinement units are discussed along with known odor causing chemicals present in these units. However, the control of odors by chemicals are usually of short duration and the chemicals are prohibitively expensive. (Dorland-Iowa State)

0584 - F2

STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT,

Agricultural Research Service, Beltsville, Md. Agricultural Engineering Research Div.
W. F. Schwiesow.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management September 28-30, 1971, The Airlie House, Warrenton, Virginia, p. 19-25, 1 tab.

Descriptors: *Farm wastes, Runoff, Water Quality Act, Regulation, Odor, Permits, Water pollution, *Feedlots.

Uniformity of livestock feedlot design and management regulations is desirable so feedlot operators in one state do not have an advantage over operations in another state. Information is being made available to governmental authorities and other interested people in an endeavor to assist in obtaining a degree of uniformity. Interest in the quality of environment has led to many requests for information on state regulations pertaining to livestock feedlots. A summary of the material received may be categorized as follows: (1) regulations concerning feedlot construction, (2) control through other existing regulations, such as water quality standards or public health requirements, (3) no specific regulations that are considered applicable. Definitions for feedlots vary from state to state. Some states define a feedlot as any livestock confinement area where vegetation suitable for livestock consumption does not grow. Other states specify a minimum number confined at any one time. In most states, a penalty is charged for violation of regulations. Penalties range from $10 to as high as $1,000 fine. All 50 states have water quality standards which have been wholly or partly approved by the federal government. Recently passed legislation on air quality standards will cause the development of additional regulation for feedlot construction and management.

0585 - B1, C4

BOD POSES PROBLEMS FOR POULTRY GROWERS AND PROCESSORS,

Griffith (Llewellyn B.), Falls Church, Va.
C. C. Griffith.
Water and Sewage Works, Vol 117, No 1, p IIW/9-IW/14, Jan-Feb 1970. 1 fig, 3 tab.

Descriptors: *Farm waste, Poultry, Biochemical oxidation demand, Organic matter.
Identifiers: *Poultry processing plant, Broilers, Live weight, Blood waste.

The BOD from poultry processing plants and parameters by which it can be estimated with meaningful accuracy are necessary when designing facilities. Graphs plotted from the data consistently produce a curve whose slope is upward as the size of the bird processed is increased. The BOD load cannot be expressed accurately in terms of production units of either head count or gross live-weight unless the average live-weight per bird processed is considered. The available data is not considered to be sufficiently comprehensive to permit precise calculation of BOD loads imposed by the larger birds of today, but it is adequate to raise a warning flag which should alert those involved to the probability that treatment plants designed according to the old criteria may be underdesigned by a factor of two where 4 lb. birds are being, or soon will be, processed. (Bundy-Iowa State)

0586 - A2, B1

CATTLE FEEDLOTS AND ALTERNATIVES FOR WASTE MANAGEMENT,

Environmental Protection Agency, Portland, Oreg. Water Quality Office.
C. E. Veirs.
Oregon State University, Water Resources Research Institute, Seminar, WR 014.71, July 1971, p 65-76. 9 ref.

Descriptors: *Livestock wastes, *Water quality control, *Confinement pens, Manure lagoons, Settling basins, Land management, Fertilizers, Storm run-off, Nitrates, Groundwater, Incineration, Waste water treatment, Coliforms, Cattle, Sheep, Hogs, Design criteria, Pacific Northwest.

Daily waste production of domestic animals is 10 times the waste production of the human population of the U.S. Per capita beef consumption has risen 34% from 1950 to 1960, while meat consumption overall has risen 15%. To meet the demand, the number of beef cattle in the U.S. has gone from 85 million head in 1945 to 108 million head in 1965, a 27% increase. Prior to the advent of large feedlots, wastes were returned to the land to aid in feed production, but many feed lots have concentrated so many animals that there is not enough land nearby upon which to spread the wastes. Waste treatment facilities are now becoming necessary to these operations. The most common are oxidation lagoons and ditches, although incineration and composting are simulating considerable interest. Sight selection guidelines, design criteria, and waste management suggestions are presented. The development of new techniques and the utilization of known conservation practices can and should be combined to achieve water quality control as well as soil and water conservation. (Lowry-Texas)

0587 - A5, D1

HYDROGEN SULFIDE AND METHYL MERCAPTANS REMOVALS WITH SOIL COLUMNS,

Washington Univ., Seattle. Dept. of Civil Engineering.
D. A. Carlson, and R. C. Gumerman.
Proceedings of the 21st Prudue Industrial Waste Conference, Extension Series 121, 1966. p 172-191, 14 fig, 3 tab, 8 ref.

Descriptors: *Degradation, *Hydrogen sulfide, Soil bacteria, Soil types, Odor, Sulfur bacteria, Pseudomonas, Anaerobic conditions, Loam, Sands, Clays, *Waste treatment.
Identifiers: *Methyl mercaptan, *Soil filters, Elution water, Sulfuric acid.

Recently, the soil siltration principle has been introduced and successfully applied to odors emanating from sewage. On this basis, a soil filtration system was chosen to experimentally remove hydrogen sulfide and methyl mercaptan from air. Soil columns 3-1/2 feet long were used over a period of six to eight weeks. On concentrations of 15 mg/l hydrogen sulfide and 775 mg/l methyl mercaptan, efficiencies approached 100%. Different types of soil were used with artificially enriched fertile loam soil being superior in degradative ability to clay, sand, and sandy loam soils. No optimum soil depth could be established, since bacterial population was still increasing at the end of the test period. It appears that a depth of 3.5 feet is near the maximum necessary. The effect of gas settling of the mercaptan gas upon entering the soil columns was negligible. A back pressure of 1.5 inches of water existed in a moist fertile loam soil at a flow rate of 0.35 cfm. (Dorland-Iowa State)

0588 - D4

EFFECT OF TEMPERATURE ON AEROBIC DECOMPOSITION OF DAIRY CATTLE MANURE,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
J. C. Nye, A. C. Dale, and D. E. Bloodgood.
Transactions of the ASAE. Vol 14, No 3, p 545-48, May-June, 1971. 8 fig, 3 tab, 7 ref.

Descriptors: *Farm wastes, *Aerobic treatment, *Waste disposal, *Livestock wastes, Ruminants, Sewage disposal, Oxidation, Cattle.
Identifiers: Phenyl pyruvic acid.

Temperature has an effect on the aerobic biodegradation of ruminant fecal wastes, which are

about 25% lignin and protein, and 25% undigested feed and bacterial cells. A manure mixture of 2 parts feces and 1 part urine was fed into five decomposition chambers at a rate of 90 grams per 6 liters per day. After 28 days, batch feeding replaced daily feeding in the chambers which ranged in temperature from 35 to 75F. On the 74th day the entire contents of the chambers were dried. When semi-continuous feeding was stopped, the solids concentration of the supernatant decreased to a minimum of 4000 mg/l in the warmest chamber. As this minimum was reached the pH dropped from 7.8 to 5.7 in seven days. This may have been caused by the formation of phenyl pyruvic acid as lignin was transformed to humos. In an aerobic system with a detention period of 74 days at temperatures above 65F, a reduction in volatile solids of 70 percent can be attained. In the same type of system at 48F, only 45% reduction of volatile solids is attainable. A definite change in the rate of decomposition of volatile solids and COD seems to occur between 48F and 56F. (Schmitt-Iowa State)

0589 - A6, C3

VOLATILIZATION OF NITROGEN-CONTAINING COMPOUNDS FROM BEEF CATTLE AREAS,

Nebraska Univ., Lincoln. Agricultural Experiment Station.
L. F. Elliott, G. E. Schuman, and F. G. Viets.
Soil Science Society American Proceedings, Vol 35, p 752-755, 1971. 4 fig, 10 ref.

Descriptors: *Farm waste, *Ammonia, Fertilizer, Pasture, Crop response, Land use, Dust, Cattle.
Identifiers: *Acid trap, *Cattle feedlot, Distillable-nitrogen, Temperature-dependent, Aliphatic amines, Corn stubble.

The release of NH3 plus steam-distillable organic N compounds to the atmosphere from a small beef feedlot and a pasture was measured. Acid traps placed next to the feedlot and 0.8 km from the feedlot averaged 148 and 16 kg/ha per yr NH3 plus steam-distillable organic N compounds, respectively. The same traps averaged 21 and 3.3 kg/ha per yr, respectively, or organic N compounds that were not recovered by the 3 min steam distillation procedure. Feedlot disturbances, such as manure mounding, increased volatilization of N compounds. Ammonia plus steam-distillable organic N compounds trapped near a cattle pasture and cropland averaged 15 and 11 kg/ha per yr, respectively. Organic N compounds not recoverable by the 3-min steam distillation were very low in the areas. Normally, steam distillation values represent only NH3; however, in this case, other N-containing compounds were distilled over and titrated as NH3. (Bundy-Iowa State)

0590 - B1, D1, E1

THE MISSOURI APPROACH TO ANIMAL WASTE MANAGEMENT,

Missouri Univ., Columbia. Dept. of Agricultural Engineering.
R. M. George, M. R. Peterson, C. G. McNabb, J. W. Robbins, and G. B. Garner.
Missouri Water Pollution Board and Extension Division, University of Missouri - Columbia, MP232/71/1M, p1-65. 21 tab.

Descriptors: *Farm waste, *Lagoon, *Design standards, Aeration, Filtration, Oxidation, Waste disposal, Irrigation, Design, Sprinkler irrigation, Farm management, Swine, Cattle, Anaerobic bacteria, Soil disposal fields.
Identifiers: *Soil-plant filter, System management, Solid manure.

Livestock producers have asked for guidelines on animal waste management that will be feasible and enduring. With these facts in mind, staff engineers of the Water Pollution Board held a series of meetings with staff members of the Extension Division and Department of Agricultural Engineering of the University of Missouri-Columbia, to develop guidelines for disposal of waste from confinement feeding operations. The information and design guidelines are intended primarily for the use of personnel in agencies concerned with animal waste management systems, including detailed information on the components; that is, settling basin and a detention basin. Lagoon systems were outlined giving component parts and sizing with some cost estimates. Guidelines were also given for final waste disposal, including tankwagons and irrigation from pits and lagoons. The effects of these systems on the surroundings were also discussed. (Bundy-Iowa State)

0591 — A2, A3, F4

AGRICULTURAL POLLUTION OF THE GREAT LAKES BASIN,

Deputy Minister, Ontario, Department of Agriculture and Food.
Allen Cywin, David Ward.
Agriculutral Pollution of the Great Lakes Basin, Environmental Protection Agency Water Quality Office, combined Report by Canada and the United States 13020, July, 1971. p. 1178, 4 fig. 50 tab, 22 ref.

Descriptors: *Farm Waste, runoff, nutrients, pesticides, herbicides, chemicals, Fertilizers, eutrophication, Waste disposal, chloride, nitrogen, phosphorus.
Identifiers: *Great Lake Basin, Canada, United States.

This report is intended to be a State-of-the-Art document concerning abatement of pollution of the Great Lakes Basin, as specifically influenced by agricultural and related sources. It was compiled by technical personnel, from appropriate fields in universities and governmental departments in Canada and the United States. Primarily it relates to the identification of the impact of agricultural and related activities on the pollution of the Great Lakes Basin. The major constituents of these non-point sources of pollution which were studied included: 1) runoff and release of nutrients, pesticides, and herbicides and degradation by-products as a consequence of the application of agricultural chemicals; 2) runoff of pollutants from animal and poultry production operations and from associated animal waste management structures and lands used for ultimate disposal; 3) sedimentation resulting from current land use practices, including land influenced by agricultural activities and by local, state and federal activities on public lands, highways and parks. Also under study was the scope of current planning, advisory and regulatory functions of the United States and Canadian Governments. The findings of some of the basic research conducted to date by both Nations, and the substance of the programs is one of motivating development of more comprehensively effective and universally applicable methodology for the management of wastes from agricultural and related activities, and the amelioration of the invaluable water resources throughout the Great Lakes Basin. (Bundy - ISU).

0592 - A3, A9, C3, F3

PLANT NUTRIENTS AND ANIMAL WASTE DISPOSAL,

Connecticut Agricultural Experiment Station, New Haven.
Charles R. Frink.
Connecticut Agricultural Experiment Station Circular 237, May 1970. 10 p, 1 tab, 1 fig, 13 ref.

Descriptors: *Farm wastes, *Waste disposal, *Environmental effects, *Public health, *Nutrients, *Connecticut, Sewage treatment, Fertilizers, Nitrogen, Dairy industry, Phosphorus.
Identifiers: *Plant nutrients.

Plant nutrients released to the aquatic environment permit the growth of abundant weeds and algae and complicate present efforts to provide clean water for Connecticut citizens. These nutrient sources include domestic sewage, animal wastes, fertilizers used on both farm and lawns, and nitrogen oxides from high temperature combustion. Although the economic return from the plant nutrients in farm manure is marginal at best, we can no longer afford the consequences of regarding manure simply as waste to be disposed. Continuing efforts should be made to keep adequate land area in crops. Methods of assessing the human health hazard from the disposal of farm wastes should be examined. Research on methods for storage and handling farm manure should be continued, with the ultimate aim at storage and distribution system so that manure is applied to growing crops and not to bare or frozen soil. Research should be continued on new agronomic practices to improve the uptake by the crop of the nutients in the applied manure. (Parker-Iowa State)

0593 - F1, F4

ANIMAL WASTE MANAGEMENT.

Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971. The Airlie House, Warrenton, Virginia, 205 p.

Descriptors: *Farm wastes, Legislation, Cattle, Lagoons, Oxidation lagoons, Waste disposal, *Water pollution sources.
Identifiers: *State legislation, Animal waste management.

This proceeding represents a record of the first meeting that was ever co-sponsored by the U.S. Department of Agriculture, Environmental Protection Agency, Council of State Governments, National Association of State Universities and Land Grant Colleges, and National Association of State Departments of Agriculture. The purpose: to focus on a problem with which they all have an interest and responsibility. There is no doubt of the public concern in a cleaner environment, including clean streams and waterways. At the same time, food requirements increase with the growing population and this has resulted in heavier concentration of livestock and poultry production which are contributing to the pollution of our streams. Thus it is the animal waste management becomes a matter of public concern. Under such circumstances the farmer and rancher who raise livestock and poultry are subjected to both Federal and State laws and regulations. This symposium provided an opportunity for these different interest groups to meet together and share experiences, knowledge, and concerns and hopefully to come up with recommendations that will help assure attainment of our environmental objectives. (Bundy-Iowa State)

0594 - F3

IMPROVED CONTROL OF ANIMAL WASTES,

Department of Agriculture, Washington, D.C.
J. P. Campbell.
In: Animal Waste Management Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p. 7-9.

Descriptors: *Farm wastes, Permits, Local governments, Regulation, Odor, Water pollution, Fertilizers.
Identifiers: *State laws.

The management of animal waste requires immediate attention. Animal wastes in this country are one of the significant sources of waste in our agricultural industrial-commercial-domestic complex. Fortunately, most of the waste is disposed on the land and does not constitute an environmental pollution threat. The problem stems from increased demand for meat and the modern farming techniques. Eighty to 90 percent of swine, poultry, and broilers are raised in concentrated areas. Where this production is in close proximity to urban, recreational, and other areas heavily used by

people, problems of odors, insects, rodents, and dust can arise. Stream pollution can be a problem even in more remote areas. A successful attack on the problem of animal wastes requires cooperation among USDA, the Environmental Protection Agency, State and local agencies, and private enterprises. The prevention of agricultural pollution must be based on atechnology that has been thoroughly tested and proved as (1) economically feasible for producers, (2) safe with reference to the quality of products, and (3) protective of the public's rights to a clean environment.
(Bundy-Iowa State)

0595 - A1, F3

ANIMAL WASTE MANAGEMENT AND THE ENVIRONMENT,
Environmental Protection Agency, Washington, D.C. Office of Categorical Programs.
D. D. Dominick.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p. 11-14.

Descriptors: *Farms wastes, Odor, Local governments, Regulation, Water pollution, Feed lots, Legislation, Water Quality Act.

In a report to the President in 1969, entitled 'Control of Agriculture - Related Pollution,' prepared by the Department of Agriculture and the Office of Science and Technology, it was indicated that animal wastes resulting from confined livestock feeding operations created one of the country's three main agricultural pollution problems. The other two pollution problems related to agriculture are caused by irrigation return flows and sediment-laden runoff. These feedlot pollution problems could have been minimized if care had been taken in locating the feedlot. Most states have long-standing public health and nuisance laws that, theoretically, govern livestock and poultry operations with regard to flies and other disease vectors, odors, and dust. However, these statutes do not address the whole spectrum of air, water, and land pollution caused by feedlots. The Environmental Protection Agency has recently set up a Rural Wastes Section in the Office of Water Programs. This section is devoted to agricultural pollution problems, and will be addressing the overall problems of animal wastes. It will be developing guidelines for control, such as determining how much treatment is necessary, and will be providing direction in training and research.
(Bundy-Iowa State)

0596 - F2

SUMMARY OF EXISTING STATE LAWS,
National Association of State Departments of Agriculture, Washington, D.C.
W. S. Cath.
In: Animal Waste Management; Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House. Warrenton, Virginia, p. 17-18.

Descriptors: *Farm wastes, Runoff, Regulation, Pollution, State governments, *Feedlots.

Registration of new feedlots is a part of published regulations. In some states existing feedlots are required to register within a specified time. In other states, existing feedlots are not notified of pollution potential and someone calls this to the attention of the pollution control authority. When this occurs, the control authority requires the operator to register the feedlot and to provide the necessary information. In some states feedlots would not have to register because of the size limitation but can registerif they prefer to do so. A state has responded to the animal waste runoff problem in one of the three following manners: either, developed regulations concerning feedlots construction, have control through other existing regulations such as water quality standards or public health requirements, or no specific regulations are considered applicable at this time.
(Bundy-Iowa State)

0597 - B1, F2

STATE REGULATIONS PERTAINING TO LIVESTOCK FEEDLOT DESIGN AND MANAGEMENT,
Agricultural Research Service, Beltsville, Md. Agricultural Engineering Research Div.
W. F. Schwiesow.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management September 28-30, 1971, The Airlie House, Warrenton, Virginia, p. 19-25, 1 tab.

Descriptors: *Farm wastes, Runoff, Water Quality Act, Regulation, Odor, Permits, Water pollution, *Feedlots.

Uniformity of livestock feedlot design and management regulations is desirable so feedlot operators in one state do not have an advantage over operations in another state. Information is being made available to governmental authorities and other interested people in an endeavor to assist in obtaining a degree of uniformity. Interest in the quality of environment has led to many requests for information on state regulations pertaining to livestock feedlots. A summary of the material received may be categorized as follows: (1) regulations concerning feedlot construction, (2) control through other existing regulations, such as water quality standards or public health requirements, (3) no specific regulations that are considered applicable. Definitions for feedlots vary from state to state. Some states define a feedlot as any livestock confinement area where vegetation suitable for livestock consumption does not grow. Other states specify a minimum number confined at any one time. In most states, a penalty is charged for violation of regulations. Penalties range from $10 to as high as $1,000 fine. All 50 states have water quality standards which have been wholly or partly approved by the federal government. Recently passed legislation on air quality standards will cause the development of additional regulation for feedlot construction and management.

0598 - F2, F3

MODEL STATE STATUTE FOR ANIMAL WASTE CONTROL,
Council of State Governments, Washington, D.C.
R. D. Conrad.
Council of State Governments, Washington, D.C.

Descriptors: *Regulation, *Legal aspects, *Farm wastes, *Standards, Confinement pens, Permits, State governments, Civil law, Effluents, Water quality control, Inspection, *Feedlots.
Identifiers: Effluent standards.

A model state statute for animal waste control is presented in an attempt to develop an effective legislative control. Operations which are in compliance with the statute are presumed not to constitute a nuisance. The statute establishes minimum animal numbers in confinement for an operation to be subject to the permit programs. It also establishes that permits shall be needed for the operation and construction of a livestock operation with more than the minimum animal numbers. The statute designates how a permit may be revoked, allowing the operator an opportunity for a hearing. The state legislation should provide protection to those in compliance from harassing legal action and provide stability in administration.
(Dorland-Iowa State)

0599 - F2

THE MINNESOTA SCENE LIVESTOCK FEEDLOT, WASTE CONTROL, PROGRESS - PROBLEMS,
Minnesota Dept. of Agriculture, St. Paul.
R. M. Dennistoun.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia. p 33-35.

Descriptors: *Farm wastes, Regulation, Permits, Livestock, *Minnesota, Feed lots.
Identifiers: Minnesota Pollution Control Agency, Permit applications.

Regulations for the control of waste from livestock feedlots, poultry lots, and other animal lots were developed and officially adopted in April, 1971 by the Minnesota Pollution Control Agency. These regulations were developed to comply with the specific policy and purpose of the State of Minnesota in regard to solid waste control as set forth be Minnesota Statutes. The Agency has prepared 'Permit Application' forms which are to be completed by each operator who plans to 'CONSTRUCT' AND/OR 'OPERATE' A LIVESTOCK FEEDLOT, POULTRY LOT OR OTHER ANIMAL LOT. The application includes those existing feedlots that are 'noncomforming' lots, which means that they do not meet the standards or criteria of some solid waste regulations.
(Bundy-Iowa State)

0600 - F2

STATE OF OKLAHOMA ACTIVITIES IN ANIMAL WASTE MANAGEMENT,
Oklahoma Board of Agriculture, Oklahoma City.
B. R. Gowdy.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p. 37-39.

Descriptors: *Farms wastes, Waste disposal, Regulation, Permits, Feedlots, Livestock, *Oklahoma, *Water pollution control.
Identifiers: *Feed Yard Act, Oklahoma, Board of Agriculture.

The Oklahoma Legislature, in 1969, recognized the potential problem of animal waste disposal and enacted a 'Feed Yards Act,' with administrative responsibility in the State Board of Agriculture. A 'feed yard' was defined as an area where more than 250 head of livestock were being fed for slaughter and in which there was no growing vegetation intended for livestock feed. The law requires the feed yard operator to (1) provide adequate control of pests, (2) provide reasonable methods for the disposal of animal excrement, (3) provide adequate drainage from the feed yard premise of surface waters falling upon the area occupied by the feed yard so as not to pollute any stream, lake, river or creek, (4) provide adequate veterinarian services to detect, control, and prevent the spread of livestock diseases, (5) have available for use at all necessary times, mechanical means of scraping, cleaning, and grading feeding yard prmises, (6) provide weather-resistant aprons adjacent to all permanently affixed feed bunks, water tanks and feeding devices, and (7) conduct feed yard operations in conformity with established practices of the industry as approved by regulations adopted by the Board.
(Bundy-Iowa State)

0601 - F3

PROPOSED ANIMAL WASTE POLLUTION CONTROL LEGISLATION IN NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Inst. of Government.
M. S. Heath, Jr.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Manage-

ment, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 41-43.

Descriptors: *Farm wastes, Regulation, Permits, Waste disposal, Feed lots.
Identifiers: Proposals.

North Carolina is considering legislation on the subject of animal waste control and management. During the recently concluded 1971 legislative session, a bill proposing a survey and planning process leading to administrative controls was considered but not approved. North Carolina, within the past year, has developed three separate proposals involving legislation on animal waste management and control. The first proposal, a draft bill cast in the familiar form contemplating regulation through permits for all animal or poultry producing units, never was formally introduced for legislative consideration. The second proposal, retaining the general rule-making power of the original draft but substituting a survey and planning phase for permit requirements, was introduced very late in the 1971 legislative session and died in committee. The third proposal, contemplating a study of animal waste management and control by the legislature's interim study commission, was adopted. (Bundy-Iowa State)

0602 - F2

STATE OF VIRGINIA ACTIVITIES IN ANIMAL WASTE MANAGEMENT,
Virginia State Water Control Board, Richmond.
L. G. Lawson.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 45-47.

Descriptors: *Farm wastes, Runoff, Waste disposal, Livestock, Feed lots, Legislation, *Virginia.
Identifiers: Point source discharge.

The Virginia State Water Control Law, first enacted in 1946, was amended by the 1968 and 1970 general assemblies to broaden and strengthen the authority of the Water Control Board. The Board's powers to regulate municipal and industrial waste discharge are well defined and the law specifically spells out procedures for certification of such discharge. The Virginia pollution control law can be summarized as follows: (1) The present state water control law applies primarily to point source discharge. (2) Standards have been approved pertaining to non-discharging lagoons, and the procedures for issuing these types of certificates are well-defined. (3) The present state law does not adequately apply to diffuse sources of pollution. (4) Legal procedures involving animal waste have proved workable in the past. (5) There has been excellent cooperation from the other agencies in the state that are involved with animal waste. (Bundy-Iowa State)

0603 - B1, F4

EFFLUENT DISCHARGE GUIDELINES AND ANIMAL WASTE MANAGEMENT TECHNOLOGY,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
H. Bernard, J. Denit, and D. Anderson.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971. The Airlie House, Warrenton, Virginia, p 69-83, 7 fig, 7 tab, 10 ref.

Descriptors: *Farm wastes, *Pollution abatement, *Treatment, Confinement pens, Aeration, Aerobic treatment, Biological treatment, Digestion tanks, Disposal, Farm lagoons, Organic loading, Soil disposal fields, Runoff, Feed lots, Oxidation lagoons.
Identifiers: *Zero discharge, Bio-filter.

We have arrived at the 'age of the feedlot.' More animals are housed, more feed consumed, and more meat produced in any given restricted locale than ever before. In addition to the consumable products, feedlots now produce upwards of 1.5 billion tons of raw manure annually. Environmental impact notwithstanding, under these situations the physical problem of merely keeping the pens, barns, or houses even reasonably clean can be overwhelming. The Environmental Protection Agency research effort is being directed at developing and demonstrating an array of waste management procedures which effectively 'close the loop' against waste discharges. Essentially the effort is to provide farmers with the ability to apply the concept of 'Zero-Discharge' of waste flows. Several possible solutions are presented, a 'spray-runoff' concept, an oxidation ditch, and the 'barriered landscape water renovation system.'

0604 - B1, F4

STATUS OF DAIRY CATTLE WASTE TREATMENT AND MANAGEMENT RESEARCH,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia. p 85-95, 6 tab, 3 fig.

Descriptors: *Farm wastes, *Dairy industry, *Runoff, Environmental sanitation, Liquid wastes, Fertilization, Odors.
Identifiers: *Field spreading.

Dairy-cow herds are proportionately small, averaging about 30 to 40 cows per farm. Although the trend in size is upward, the rate of increase is quite low, and it appears an average herd size of 70 to 80 cows may be reached about 1990. Dairyman have generally done a good job of returning their wastes to the soil. Sanitarians and other health officers that visit grade A dairys have probably had some influence. Liquid handling is now being readily accepted and adapted to the dairy operation, but handling the manure as a semi-solid is still the preferred way. Typically farm acreages are more than 1/2 acre per dairy cow, thus sufficient land is available for adsorption and utilization of the wastes produced without polluting the soil, water or air. Runoff from outside feeding floors appears to be the most difficult problem confronting dairymen. Lagoons are the most satisfactory method of intercepting such runoff, but the excess supernatant must be irrigated onto land and not permitted to overflow into water resources. Aeration can be used to control odors emanating from lagoons. (Schmitt-Iowa State)

0605 - A3, A4, F3

CATTLE FEEDLOT POLLUTION,
F. G. Viets.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 97-105, 2 tab, 13 ref.

Descriptors: *Farm wastes, *Confinement pens, *Runoff, Groundwater, Fertility, Soil properties.
Identifiers: *Land spreading, Zoning.

Per capita beef consumption in the United States has increased 3.5% per year for the last 20 years. This coupled with the apparent profitability of large integrated feeding and slaughtering operations indicate that feedlots will grow larger and not smaller. We have never experienced such a concentration of wastes on so small an area as some of our high density feedlots. Because stream and lake pollution from runoff is now prohibited, engineers are challenged to design facilities that minimize runoff or dispose of it economically and, hopefully, beneficially. The solution to the problem is to return the solid waste to the land in sufficient amounts for near maximum production of crops without waste of the animal feces resource. Underground water pollution appears to be a mostly local phenomenon. Widespread contamination of aquifers does not appear probable. Most of the unsolved problems lie in the air pollution area. The significance of increased levels of ammonia in the air to surrounding crops and lakes needs further study. Only about one tenth of the land needed to produce foodstuffs for cattle is needed for productive waste disposal. Zoning appears to be one of the best solutions to the feedlot problem. Such zoning should include provision for adequate land for manure and runoff disposal.
(Schmitt-Iowa State)

0606 - A1, F4

POULTRY WASTE MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
R. C. Loehr.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971. The Airlie House, Warrenton, Virginia. p 107-110.

Descriptors: *Farm wastes, *Poultry, *Waste storage, Eutrophication, Drying, Odors.
Identifiers: *Field spreading.

In most areas of the United States, if an egg producer does not have anywhere from 15 to 30 thousand birds under his control, he is not a major egg producer. The major egg producers usually have production complexes around three hundred thousand birds. In the general commercial house of today, the wastes are defecated through the cages to pits below the cages. Anaerobic conditions occur in the pits and when the wastes are spread, odors are released. All alternatives in storing wastes include either aeration or drying combined with land disposal. It is extremely unlikely that the quality of aeration systems can be made such that the resultant effluent can go directly into any body of water. The place to put agricultural wastes is back on the land. The problem of nutrient control is another factor which requires concern when investigating alternative approaches for agricultural waste management. In the case of nitrogen removal, ammonia released to the atmosphere is not the best approach because of the environmental problem that can result when it comes down. This demonstrates the need to determine overall rather than piecemeal solutions.
(Schmitt-Iowa State)

0607 - A1, F4

SWINE WASTE MANAGEMENT,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
A. J. Muehling.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971. The Airlie House, Warrenton, Virginia. p 111-119, 7 fig, 2 tab, 9 ref.

Descriptors: *Farm wastes, *Waste disposal, Farm lagoons, Waste storage, *Runoff, Irrigation practices, Confinement pens.
Identifiers: *Field spreading, Pasture and recycling.

In the 10 Corn Belt states where over 80% of the hogs were sold in 1964, the number of farms selling hogs declined 27% from 1959 to 1964, but the number of hogs sold increased 6%. The adoption of slatted floors has done much to influence the trend toward confinement by reducing or almost eliminating handcleaning and making it possible to pump and handle the wastes with mechanical equipment. The confinement operator has all the wastes confined, so he only needs to adapt a suitable method of disposal to avoid pollution. Due to high nutrient strength as well as high BOD con-

centration, it appears swine wastes must be returned to the soil. Due to dispersion, hogs on pasture have a low water pollution potential unless they have access to a stream. Swine production systems using solid floors and bedding has high pollution potential if part of the floor is uncovered. The major problems with spreading liquid manure from storage pits are the odors immediately after spreading and danger from runoff if spread on rolling land or frozen ground. Lagoons seldom purify liquids so that they may be released into a natural watercourse. Strong odors are associated with anaerobic lagoons. Although oxidation ditches are virtually odorless, the effluent is not purified to pollution control standards. Hydraulic manure removal minimizes odors but some type of recycling system is normally required. Dehydration, incineration, and composting are not feasible at this time. (Schmitt-Iowa State)

0608 - E1

RECYCLING OF ANIMAL WASTES,
Agricultural Research Service, Beltsville, Md. Agricultural Engineering Research Div.
R. G. Yeck, and P. E. Schleusener.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971. The Airlie House, Warrenton, Virginia, p 121-127, 2 fig, 3 tab, 18 ref.

Descriptors: *Farm wastes, *Reuse, Fertilization, Nutrition, Phosphorus, Nitrogen.
Identifiers: *Recycling.

With much concern over upsetting the earth's delicate ecological balance, we seek the ideal of having all earthly activities fit into one mammoth recycling system. The present system of animal production is inefficient as it fails to take advantage of the feed value left in waste and the wastes are considered an environmental contaminant. Land recycling is currently the best available practice and will probably continue as a prime method for recycle for several years. Some recycling processes have feed as their only product, some produce nonfeed by-products such as methane gas, industrial chemicals, or water. The actual feed value of a specific animal waste is dependent on the waste used, the species to which it is fed, and the process used. The total protein output for any process will, of course, be limited by the nitrogen that was initially in the animal waste. Other constituents of value in animal waste include calcium, phosphorus, starch, and structural polysaccharides. Addition of sodium hydroxide or sodium peroxide increases the digestability of wastes significantly. Ensiling mixtures of manure and grasses seems to have much potential as a refeeding process. Lagooning, hydroponics, insect culture, earthworm culture, fish culture, algae production, yeast production, and single cell protein culture are other processes that might prove to be acceptable economical recycling processes. (Schmitt-Iowa State)

0609 - F2, F3

REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES,
Food and Drug Administration, Rockville, Md. Bureau of Veterinary Medicine.
J. C. Taylor.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia. p 129-131. 4 ref.

Descriptors: *Farm wastes, *Reuse, *Regulation, Legal aspects, Inter-agency cooperation.
Identifiers: *Refeeding, Poultry litter.

The current Food, Drug, and Cosmetic Act of 1938 prohibits interstate commerce in adulterated or misbranded foods and drugs. On September 2, 1967 the Food and Drug Administration published Section 359, which is a formal statement of policy under subchapter A, Title 21 of the Code of Federal Regulation. This section states that the FDA has not sanctioned and does not sanction the use of poultry litter as a feedstuff for animals although it has been recoded to Subpart B of Part 135, Section 135.104. This policy statement is considered to be a general statement applying to all waste products proposed as a component of the diet of animals. The reasons given are that wastes may be expected to contain drugs and antibiotics or their metabolites and that disease organisms may be transmitted through the wastes. The Bureau of Veterinary Medicine has received authorization to contact representatives of the Environmental Protection Agency, the U.S. Dept. of Agriculture, the National Institutes of Health, and the Association of American Feed Control officials in an attempt to better coordinate the efforts of agencies concerned with recycling wastes. The three basic catagories of information desired on waste products submitted to the FDA for review are (1) establishing nutritive value, (2) determining safety to animals and (3) determining food from these animals is safe for man.
(Schmitt-Iowa State)

0610 - A2, A3, A4, F1

WATER POLLUTION AND THE FARMER,
Congress, Washington, D.C.; and House, Washington, D.C.
F. Schwengel.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 133-135.

Descriptors: *Farm wastes, *Runoff, *Government finance, Costs, Waste disposal, Pesticides.
Identifiers: Financial return.

The definition of pollution might be 'An unfavorable alteration of our surroundings manifested by a degradation of the physical, chemical, and biological characteristics of the associated land, water and air.' Agriculture is concerned with at least four major sources of water pollution: sediment, animal wastes, nutrient runoff from fertilizer use, and pollution from pesticides. There are at least two primary reasons that farm and non-farm industries have neglected certain aspects of waste disposal. First, control measures demand an added investment without a commensurate financial return, and second, changing production practices have made it more difficult to dispose of wastes. Despite the magnitude of agricultural pollution, funding by Congress continues at a modestly inadequate rate. Only a little more than $100 million a year will be spent on watershed development projects during the next few years, whereas a funding rate of $500 million annually is needed to accomplish the objectives of minimizing agricultural run-off, silting, and other sources of pollution. If we do not address ourselves to the agricultural pollution problem, we will not achieve our objectives. (Schmitt-Iowa State)

0611 - A1, B1, F4

U.S.D.A. TECHNICAL AND FINANCIAL ASSISTANCE PROGRAMS,
Department of Agricultural, Washington, D.C. Science and Education.
T. C. Byerly.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 139-141.

Descriptors: *Farm wastes, *Administrative agencies, *Government supports, Water resources development.
Identifiers: *Agricultural Research Service, Cooperative State Research Service, Economic Research Service, Soil Conservation Service.

Three research agencies of the Department of Agriculture provide technical and financial assistance. These include the Agricultural Research Service, the Cooperative State Research Service, and the Economic Research Service. The Soil and Water Conservation Research Division of the Agricultural Research Service is responsible for such things as air pollution and water pollution by feedlots. The engineering group of this division is constantly seeking new structures that can contain, divert, or reduce pollution. The animal husbandry group looks into the possibility of recycling waste as feed. The Cooperative State Research Service administers about a million dollars worth of funds annually throughout the states on pollution control research. The containment, diversion, reduction, and utilitization of waste are areas of concern. The Economic Research Service is responsible for evaluation of alternate methods of waste management and the evaluation of the economics of scale, organization of feedlot enterprises, and the efficiency of feedlot production. Agencies that provide the bulk of technical assistance as well as some financial assistance include the Soil Conservation Service, the Farmers Home Administration, the Farmer's Cooperative Service, the Agricultural Research Service, and the Extension Service. The Soil Conservation Service has information available for all problems in the area of structure design. The Extension Service is a very good information delivery system as it is present in every county. (Schmitt-Iowa State)

0612 - A1, B1, F1

PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO FARMERS FOR ANIMAL WASTE DISPOSAL SYSTEMS,
Farm Credit Administration, Washington, D.C.
G. L. Swackhamer.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 143-145.

Descriptors: *Farm wastes, *Credit, *Loans, Financing, Economic feasibility, Pollution abatement.
Identifiers: *Farm Credit System, Federal Land Bank, Production Credit Association, Banks for Cooperatives.

The Cooperative Farm Credit System is a privately owned and managed system of credit services to farmers, ranchers, and their cooperatives. It is comprised of Federal Land Banks, Production Credit Associations, and Banks for Cooperatives. The funds used by the System are obtained from the sale of bonds and debentures to private investors through a Fiscal Agency, and is regulated by the Farm Credit Administration, an independent agency. It appears desirable that some guidelines for decisions involving pollution control facilities be established, since the amount of credit required to finance animal waste systems is sizable and varies widely, and frequently, credit-worthy farmers have encountered difficulty in financing waste systems. Farm Credit banks have concluded that cooperatives have more waste management problems than individuals, relocation is often the method of resolving pollution problems, expenditures for waste disposal systems frequently lead to cost overruns; both lenders and borrowers are frequently ignorant of current laws and regulations, no single method of handling animal wastes is best in all cases, and amounts for pollution control are often intertwined with total credit requests and may not receive adequate attention. Reconciliation of social benefit-cost issues with private investment-production decisions is producing new considerations for both lenders and borrowers. (Schmitt-Iowa State)

0613 - A1, B1, F1

TECHNICAL AND FINANCIAL ASSISTANCE

FOR THE CONTROL OF ANIMAL WASTES,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
K. M. Mackenthun.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia. p 147-149.

Descriptors: *Farm wastes, *Administrative agencies, *Government supports, Water resources development, Federal Water Pollution Control Act.
Identifiers: Solid Wastes Disposal Act.

In confined animal feeding, manure becomes a liability for both the operator and the public, as it is a repository for diseases and pests and it is a catastrophic polluter when it reaches a waterway. Runoff from cattle feedlots can be toxic to aquatic life, remove needed oxygen from the water, and supply food for the development of nuisance biological pests. The Environmental Protection Agency has a number of grants for research and demonstration and technical assistance activities that are applicable to the control of animal feedlot wastes. Grants are authorized under Section 6 (b) of the Federal Water Pollution Control Act with the prime objective to develop by the late 1970's techniques for the complete elimination of point-source wastes, as well as to develop and demonstrate technology for the renovation of wastewaters for reuse. Technical assistance is available in the Office of Water Programs' Division of Technical Support and in comparable support groups within the ten regions of the Environmental Protection Agency. Both the Solid Waste Disposal Act and the Federal Water Pollution Control Act provide grants to assist state, interstate, municipal and inter-municipal agencies and organizations in development of plans and programs for solid waste and water pollution control. Regional EPA Administration should be contacted for Agency assistance. (Schmitt-Iowa State)

0614 - B1, F1

SMALL BUSINESS ADMINISTRATION PROGRAMS TO PROVIDE FINANCIAL AND TECHNICAL ASSISTANCE TO SMALL FIRMS IN SOLVING PROBLEMS RELATIVE TO ANIMAL WASTE DISPOSAL,
Small Business Administration, Washington, D.C. Office of Financial Assistance.
A. E. Armstrong.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia. p 151-152.

Descriptors: *Farm wastes, *Administrative agencies, *Government supports, Water resources development, Pollution abatement.
Identifiers: *Small Business Administration.

It is the policy of the Small Business Administration to make, participate in, or guarantee loans to small firms for any worthy business purpose, which includes waste disposal of any kind. Consideration is given to increasing loan amounts requested to provide for acquisition and installation costs of waste disposal or waste treatment facilities with the same approach being permitted in respect to air and solid waste pollution. It is possible for the SMA to launch new business operations such as those in the processing or recycling waste field, but they are very difficult to handle. If an existing business wishes to purchase or install recycling or reprocessing equipment this would be treated as normal business expansion. Since SBA is a lending agency, it is concerned with credit criteria or requirements. As any other lender, it is interested in the character of its borrowers and in repayment ability, management ability, capitalization, and collateral. For lending purposes a business qualifies as a small business, generally, if it retails less than $1 million annually. The classification of a manufacturing concern is based on the number of employees and can range from less than 250 to less than 1,500 depending upon the industry. SBA is not empowered to make any type loan or guarantee to agricultural enterprises, being limited in its activities to commercial operations. (Schmitt-Iowa State)

0615 - B1, F1

FINANCIAL ASSISTANCE FOR THE CONSTRUCTION AND IMPROVEMENT OF IRRIGATION SYSTEMS,
New Mexico State Government, Santa Fe. Office of State Engineer.
J. C. Yates.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia. p 153-155.

Descriptors: *Farm wastes, *Administrative agencies, *Government supports, Water resources development, Pollution abatement.
Identifiers: *Community ditches, Soil Conservation Service, Agricultural Stabilization and Conservation Service, Four Corners Regional Commission.

Funds for programs relating to water supplies for irrigation, and projects for the construction and improvement of irrigation systems are from a trust fund account established by the Congress of the United States (Act of Congress 30 Stat. 484) in 1898 to the Territory of New Mexico. For that portion of the Southwest that was acquired by the United States from Mexico, the community ditch is an institution peculiar to the native people, and the customs governing community ditches are written into law. Through the cooperation of the Agricultural Stabilization and Conservation Service, the Soil Conservation Service, the Four Corners Regional Commission, and local ditch organizations, nearly all ditches have been improved through concrete ditch lining, plastic and concrete pipelines and appurtenances for the distribution of water, works for flood protection of irrigation structures, construction of diversion dams, ditch headings and sluiceways, and improvement of impoundment dams. In addition to grants and loans to community ditches, the Interstate Stream Commission has loaned to irrigation and conservation districts about $1.8 million for lining ditches, leveling land, and undertaken similar conservation practices. The success of the cooperative irrigation systems improvement program may encourage others to seek acceptable Federal-State-Local programs for animal waste management. (Schmitt-Iowa State)

0616 - A3, B1, F3

THE LAKE MENDOTA WATERSHED PROJECT,
Wisconsin Univ., Madison.
D. G. Last.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971. The Airlie House, Warrenton, Virginia. p 163-167, 1 ref.

Descriptors: *Farm wastes, *Administrative agencies, *Waste storage, Government supports, Pollution abatement.
Identifiers: *Agricultural Stabilization and Conservation Service, Soil Conservation Service, Rural Environmental Assistance Program, Lake Mendota.

In 1966, the Lake Mendota Problems Committee prepared a report entitled, 'Report on the Nutrient Sources of Lake Mendota.' Evidence was presented showing 30% of the phosphorus which entered the lake stemmed from runoff from agricultural land on which manure had been spread. Potential for this type of runoff was particularly high during the winter when snow cover or frost made the soil impermeable. It was decided lake improvement could be accomplished by recommending methods for handling animal wastes that decrease water pollution. Through the cooperation of the Agricultural Stabilization and Conservation Service, the Soil Conservation Service, and the University of Wisconsin Extension office, storage strhetures were built on a cost-sharing basis for those livestock facilities needing them. Despite the voluntary basis for this project, it is felt the Rural Environmental Assistant Program's stated goal: 'To improve the quality of life for all people by preventing or abating environmental pollution; providing the maximum public benefit; and conserving the land and related natural resources,' has been accomplished. (Schmitt-Iowa State)

0617 - A1, B1, F4

THE ROLE OF EXTENSION IN POLLUTION ABATEMENT IN VIRGINIA,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Cooperative Extension Service.
R. L. Wesley.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 169-171.

Descriptors: *Farm wastes, *Poultry, *Administrative agencies, Lagoons, Anaerobic digestion, Waste treatment, Water reuse, *Virginia.

Cooperative Extension Service at Virginia Polytechnic Institute and State University is quite heavily involved in assisting the poultry industry in Virginia with pollution abatement. Areas of assistance with top priority include the design, construction, and operation of waste disposal systems for poultry processing and rendering plants, and conduction of on-campus short courses at VPI and SU on pollution abatement. Poultry processing waste is a suitable substrate for biological degradation by both aerobic and anaerobic bacteria. The effluent from processing plants contains the proper bacterial flora so that when subjected to adequate liquid-solid separation procedures, 80% to 95% BOD removal can be achieved with the use of a series of oxidation ponds or lagoons. A grease and grit trap, an anaerobic digester, an aerobic polishing lagoon, and/or a mechanical aerator are the necessary ingredients for reliable disposal. If human sewage is also involved, final effluent chlorination is sometimes required. Temperature and depth of the lagoon are two critical factors for effective decomposition. At 10, 20, and 30 degrees Centigrade, 32, 89, and 96 percent of the solids have been removed. Predominant bacteria that will appear in a lagoon are temperature dependent as evidenced by the various colors produced as the temperature changes occur. Additional processes will need to be added to the design in order for the treated effluent to be recycled. (Schmitt-Iowa State)

0618 - B1, F3

COMMUNICATION IS THE KEY TO SUCCESSFUL ACTION,
E. W. McMunn.
In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 173-176.

Descriptors: *Farm wastes, *Communication, *Technology, Waste disposal, Pollution abatement, Political aspects, Education.

Developing new technology is important; but knowledge is of little value until it is put to use. And it will never be used unless it reaches the minds of those who need to know. We spend rela-

tively little time studying how to communicate in an effective manner. Non-farm people are increasingly calling the tune where our vital interests are concerned, due to population shifts. These people no longer understand agriculture and many couldn't care less. Our job is to build understanding with non-farm people. Since the whole store of knowledge is incomprehensible, we must choose a few basic ideas and concentrate on these. Questions we must decide include, (1) What, really, is the message we wish to tell. (2) Why do we want to tell it. (3) Who do we want to reach. (4) Who should do the telling. (5) What 'vehicles' must be employed to transport our message. Something similar to a task force needs to make these decisions where people with a common interest unite to tell a story. This task force must represent a wide range of interests, be aware of human nature in planning communication strategy, plan communications programs on the basis of meaning to the people we're trying to reach, have a relevant message and then deliver it in terms the audience will understand. Certainly, the most important single element must be a communications plan. (Schmitt-Iowa State)

0619 - F4

REPORTS AND RECOMMENDATIONS OF WORKING GROUPS.

In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 179-185.

Descriptors: *Farm wastes, *Administrative agencies, *Government supports, Economic feasibility, Pollution abatement.
Identifiers: Extension Service.

Six different subject categories were discussed by various working groups of the National Symposium on Animal Waste Management. Recommendations have been made for each subject category and are as follows: (1) Information Programs - A national agricultural-related pollution problem inventory should be funded and carried out through existing agencies; create a national data inventory bank on waste management research; establish a task force to develop a system for providing animal waste management information to farmers and to the public. (2) Education and Training Program - The Extension Service should receive additional resources and be more concerned with public affairs; formal education should be emphasized both in the private sector and in government agencies. (3) Technical Assistance - An advisory committee with some legal status should be established to advise legislators; livestock and poultry producers should form a common group to represent their interests. (4) Financial Assistance - Tax credits should be allowed for pollution abatement measures; relocation assistance should be available; cost-share programs should be expanded. (5) Research and Development - On-farm field research should be increased and supported financially. (6) Legislation and Regulation - Flexibility should be maintained; An ad hoc animal waste coordinating committee should be appointed in each state to improve cooperation among all groups and develop well-defined goals. (Schmitt- Iowa State)

0620 - F3

RECOMMENDATIONS OF NATIONAL MILK PRODUCERS FEDERATION.

In: Animal Waste Management: Proceedings of National Symposium on Animal Waste Management, September 28-30, 1971, The Airlie House, Warrenton, Virginia, p 187-188.

Descriptors: *Farm wastes, *Administrative agencies, *Government supports, Pollution abatement, Waste disposal, *Milk, *Dairy industry.
Identifiers: *Rural Environmental Assistance Program.

The regulation of individual livestock operations should be based on individual adherence to regional waste management guidelines. Regional guidelines should serve as national standards to be enforced at the state level through an appropriate state certification program. The development of regional guidelines should be predicated on the principle that an overall conservation plan is essential for the individual farm or ranch enterprise embarking on a pollution prevention program. It is essential that animal waste management guidelines become a part of a systematic approach to develop an overall conservation plan because of the interrelationship of waste utilization, recycling, or disposal, with overall farm operations, available soils and appropriate vegetation. Each waste management system must be tailored to the needs of individual owners or operators within the capability of soils and plant cover at the site. A contract arrangement between USDA and individuals is most effective in assisting farmers to comply with regional guidelines. An additional $200 million per year over current REAP funding should be appropriated for expenses of a program of research, financial and technical assistance to agricultural waste and pollution producing enterprises. (Schmitt-Iowa State)

0621 - D2, E3, F1

POULTRY POLLUTION: RESEARCH RESULTS,

Michigan State Univ., East Lansing. Agricultural Experiment Station.
C. C. Sheppard.
Research Report 152 Farm Science, C.C. Sheppard, editor. 64 p. November, 1971.

Descriptors: *Farm wastes, *Odor, *Poultry, Nutrients, Diets, Fertilizer, *Waste disposal, Analysis.
Identifiers: *Dried Poultry waste, Air ventilation, Supplemental protein, Feed efficiency.

The drying and feeding of poultry waste was reviewed as to the economic value, nutrient value, and the effects on animals fed dried poultry manure. The topics include: (1) economics of dried poultry waste as a feed ingredient or a fertilizer, (2) feeding dehydrated poultry waste to dairy cows, (3) the relationship of drying temperature to total crude protein in dried poultry waste, (4) drying of poultry manure in a cage-layer house, (5) dried poultry waste as a protein source for feedlot cattle. (6) the metabolizeable energy value of dried poultry waste, and (7) the effects of continually recycling dehydrated poultry waste on the performance of SCWL laying hens. A table presents results of analyses of samples of dried poultry waste. (Bundy-Iowa State)

0622 - C3, C5, E3

EARLY EXPERIMENTS AT MICHIGAN STATE UNIVERSITY INVOLVING THE USE OF CHICKEN MANURE,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
H. C. Zindel.
In: Poultry Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science. November 1971. p 2-3.

Descriptors: *Farm wastes, *Poultry, Nutrients, Antibiotics, Diets, *Waste disposal.
Identifiers: Fresh chicken droppings, Oven dried.

The original poultry science research at Michigan State University involving the use of poultry excreta as a feed ingredient was performed in 1954. Drs. David Libby and P. J. Schaible used poultry manure in research involving antibiotics. They reported that under clean battery conditions, no response was obtained from the drug in the feed. However, when contaminated manure was in the ration, the furazotidone exhibited a pronounced growth response. In 1959, W. K. Warden and P. J. Schaible conducted a series of experiments in which fresh chick droppings were fed to chicks daily in the presence and absence of antibiotics. When fecal matter was fed to chicks, growth rate was depressed below that of the controls, but this depression was not statistically significant. In 1961, J. D. Yates reported that fresh hen feces added to the feed of chicks and poults depressed growth, except in some groups which received a high level of antibiotics. Heated (100 Deg C) fresh hen feces improved the growth rate of chicks which received no antibiotics and turkey poults which received Virgeniamycin in the ration. (Bundy-Iowa State)

0623 - E3, F1

ECONOMICS OF DRIED POULTRY WASTE (DPW) AS A FEED INGREDIENT OR A FERTILIZER,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
H. C. Zindel, and C. J. Flegal.
In: Poultry Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science, November, 1971. p 4-7.

Descriptors: *Farm wastes, *Odor, Drying, Poultry, Fertilizer, *Waste disposal.
Identifiers: *Hens, Tractor and spreader, Dried poultry waste, Recycling.

Several laying hen trials have been conducted using dried poultry waste (DPW) in the diet. If 12.5% or 25% DPW of the total ration were substituted for the same amount of corn on a pound for pound basis, basing the cost of corn at $60 per ton and DPW at $20 per ton, a direct saving of either $5.00 or $10.00 per ton can be realized, respectively. Translating this into savings per dozen eggs, a one cent per dozen eggs savings would be accomplished for 12.5% DPW and a two cents per dozen eggs savings on 25% DPW. Manure disposal via the conventional method of spreading on crop land versus that of drying provides some interesting facts and figures. A flock of 100,000 layers provides 4,563 tons of manure per year (at the rate of .25 lb./bird/day) or 12.5 tons daily. If one assumed it takes 2 days or 16 hr. to clean the house (s) each month (4 week period) and deliver the wet manure to the field for spreading with a tractor and spreader, or deliver to a dryer site for processing, the following facts apply: wet manure value for fertilizer: $2.39 ton; cost of spreading wet manure: $11.96 tons. Difference of $9.57 /ton is the loss to spread on the land. (Bundy-Iowa State)

0624 - E3

FEEDING DEHYDRATED POULTRY WASTE TO DAIRY COWS,

Michigan State Univ., East Lansing. Dept. of Dairy Science.
J. W. Thomas, and H. C. Zindel.
In: Poulty Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science, November, 1971. p 8-11, 2 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, Cattle, Drying, Amino acids, Nitrogen, Protein, *Waste disposal.
Identifiers: Laying hens, Dairy cattle, Dehydrated poultry waste, Milk quality.

Investigators have found that several classes of livestock could derive energy and nitrogen from various animal manures. The digestive system of the ruminant can convert various non-protein-nitrogen sources into amino acids that are useful to the animal. Of the nitrogen in poultry manure, 25 to 75% may be in various non-protein-nitrogen forms. This non-protein-nitrogen in poultry

manure may slowly hydrolyze in the rumen and form a very good source of N for ruminants. Dehydrated caged layer feces was fed to milking dairy cows to determine if it could serve as a nitrogen energy source. Consumption of the grain mixture containing 30% dehydrated poultry waste (DPW) was as great as that of cows fed normal grain mixtures after the cows became accustomed to the material. The flavor of the milk from DPW fed cows was scored normal. Dehydrated caged layer feces was successfully used to furnish a portion of the dietary protein and energy in the diet of milking cows. Thus, products similar to that used here could replace 15 to 20% of the dietary protein of ruminants. (Bundy-Iowa State)

0625 - C3, D2

THE RELATIONSHIP OF DRYING TEMPERATURE TO TOTAL CRUDE PROTEIN IN DRIED POULTRY WASTE,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. C. Sheppard, C. J. Flegal, D. Dorn, and J. L. Dale.

In: Poultry Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science, November, 1971. p 12-16, 1 fig, 2 tab, 3 ref.

Descriptors: *Farm wastes, *Drying, Protein, Poultry, Feces, *Waste disposal.
Identifiers: Dried poultry waste, Commercial dryer.

Benne from Michigan State University reported laboratory analysis of 77 samples of poultry feces. Fourteen of these were analyzed as a wet product (as received from a poultry house) and 63 had been dried in a commercial dryer, prior to the analysis. The extreme variations in total protein on a dry weight basis of the wet and dried samples are given. The relationship between the temperature at which the feces was dried and the resulting total protein content of the dried poultry waste was investigated. The regression analysis of the data shows there tends to be an inverse relationship between the heat and the resulting total protein. The correlation of drying temperature to the resulting total protein approaches significance. The calculated coefficient was -0.284; -0.288 would indicate significance at the P = .05 level. (Bundy-Iowa State)

0626 - A5, A6, B1, D2

DRYING OF POULTRY MANURE IN A CAGE--LAYER HOUSE,

Michigan State Univ., East Lansing, Dept. of Agricultural Engineering.
M. L. Esmay, and C. C. Sheppard.

In: Poultry Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science, November, 1971. p 17-27, 2 fig, 3 tab.

Descriptors: *Farm wastes, *Odor, *Poultry, *Drying, Environment, Air pollution, *Waste disposal.
Identifiers: Partial drying, Cage-laying house, Air ventilation.

Odor control is important for today's poultry enterprises. Partial drying of the poultry excreta within a few hours after deposit is one way to minimize odor production and thus air pollution. This investigation deals with the means and related economics of partially drying fecal matter in the poultry house with supplemental electrical energy. Over 2000 Btu of electrical energy were required to evaporate each additional pound of water from the fecal matter accumulated over the energized dropping pit panels. This is less than 50% efficient use of electrical energy applied to the floor panels below the cages. The cost was about one cent per additional pound of water evaporated from the droppings, (1 kwh equals .3420 Btu/hr and each kwh costs between 1.5 to 2.0 cents). Removing additional water from the droppings during winter months may not be worth the cost, unless the undesirable threshold is imminent and dwellings are near by. During hot weather conditions, removing part of the fecal matter moisture immediately after depositcould be critical in controlling odors. High temperatures accelerate odor production; and hot weather vaporization with energized panels could be much more efficient in utilizing electrical heat. (Bundy-Iowa State)

0627 - E3

DRIED POULTRY WASTE AS A PROTEIN SOURCE FOR FEEDLOT CATTLE,

Michigan State Univ., East Lansing. Dept. of Animal Husbandry.
H. F. Bucholtz, H. E. Henderson, C. J. Flegal, and H. C. Zindel.

In: Poultry Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science, November, 1971. p 28-31, 2 tab.

Descriptors: *Farm waste, *Poultry, Drying, *Cattle, Nutrient, Protein, *Waste disposal, Efficiency.
Identifiers: Dried poultry waste, Feedlot cattle, Supplemental protein, Feed efficiency.

Waste disposal in animal agriculture has become not only a management problem, but also an environmental pollution concern to people associated with the animal industries. The poultry industry tried to dry poultry waste to abate the waste disposal problem. Due to the high protein content of fresh poultry waste (as high as 50% CP), research was conducted using dried poultry waste (DPW) as a protein supplement for chickens and cattle. However, data on recycling DPW through cattle is limited. The value of DPW as a supplemental protein source for feedlot cattle was determined. The source of protein had a large and highly significant effect on average daily gain. Average daily gain for the soy supplemented group (3.35 lb) was significantly greater than the group supplemented with DPW (2.75 lb), 1/2 DPW - 1/2 urea (3.03 lb). However, this was not significantly greater than the urea supplemented group (3.10 lb). No significant differences in average daily gain occurred between the groups supplemented with urea, 1/2 DPW - 1/2 soy or 1/2 DPW - 1/2 urea. Steers refused to consume the DPW portion of ration. (Bundy-Iowa State)

0628 - C3, E3

THE METABOLIZEABLE ENERGY VALUE OF DRIED POULTRY WASTE,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
D. Polin, S. Varghese, M. Neff, M. Gomez, and C. J. Flegal.

In: Poultry Pollution: Michigan Agricultural Experiment Station, Research Results, Research Report 152 Farm Science, November 1971. p 32-44, 1 fig, 5 tab, 15 ref.

Descriptors: *Farm wastes, Drying, *Dehydration, Poultry, Nutrients, Nitrogen, Diets, *Waste disposal.
Identifiers: *Dried poultry waste, *Metabolizeable energy.

Metabolizeable energy (M.E.) values of 0.35 and 1.35 kcal/g (159 and 614 kcal/lb) of material were found for cellulose and a dried poultry waste (DPW) sample, respectively, when fed to laying hens. The materials were analyzed for M.E. by replacing corn in a practical type layer ration at levels of 8 and 16%. The calories returned to the diet by either DPW or cellulose were determined and compared on the basis of slope ratios to the expected loss caused by the removal of corn. Cellulose at both levels depressed protein, as well as calcium and phosphorus utilization. Protein utilization was not affected by DPW and neither DPW nor cellulose had any effect on the utilization of fat, which averaged almost 90% with all test diets. (Bundy-Iowa State)

0629 - B1, E3

THE EFFECTS OF CONTINUALLY RECYCLING DEHYDRATED POULTRY WASTES (DPW) ON THE PERFORMANCE OF SCWL LAYING HENS -- A PRELIMINARY REPORT,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. J. Flegal, and D. A. Dorn.

In: Poultry Pollution: Research Results, Michigan Agricultural Experiment Station, Research Report 152 Farm Science, p 45-48, November 1971. 3 tab, 2 ref.

Descriptors: *Farm wastes, Poultry, Drying, Nutrients, Diets, *Dehydration, *Waste disposal.
Identifiers: *Dried poultry waste, Dehydrated feces.

An ultimate goal in poultry production is a closed circuit system in which the only by-product of the system is meat or eggs. The following experiment was conducted to test the concept or recycling the feces within a closed system of egg production for an extended period. Five hundred and eighty-eight commercially grown 20-week-old started pullets were fed diets containing 0, 12.5%, and 25.0% DPW for about 7 mo. The DPW diets were continually recycled, i.e., feed feces dehydrated and placed back in the diets and fed to the same birds in a closed system concept. At the completion of fourteen cycles, the proximate analysis of the DPW from each of the experimental rations was quite similar. There was a trend toward a slight accumulation of calcium and phosphorus. Egg production for the birds fed the control diet and the diet containing 12.5% DPW were similar. Daily feed consumption of the birds fed the control diet and the diet containing 12.5% DPW was similar, but those birds fed the diet containing 25% DPW ate 11.3 g more feed per bird per day than those fed the control diet. (Bundy-Iowa State)

0630 — C2, C3, E3

A COMPILATION OF SOME SAMPLES OF DRIED POULTRY WASTE ANALYZED BY DR. E. J. BENNE,

Michigan State University, Biochemistry Dept., East Lansing, Michigan.
E. J. Benne.

Poultry Pollution: Research Results, Research Report 152 Farm Science, Michigan State University Agricultural Experiment Station, East Lansing, Michigan, November, 1971. pp. 49-63, 1 tab.

Descriptors: *Farm Waste, *Analysis, Poultry, Protein, Dehydration, Moisture content, Calcium, Phosphorus.
Identifiers: *Dried Poultry Waste.

The author compiled data collected from samples of dried poultry waste. A laboratory analysis of 77 samples of poultry feces including 14 samples analyzed as a wet product and 63 had been dried in a commercial dryer. The article consists of the one thale with percents of moisture, protein, PDWB, CA, P, Crude F, EE and NPN. (Bundy - ISU).

0631 - A5, A6, C3, D1

ODORS, GASES AND PARTICULATE MATTER FROM HIGH DENSITY POULTRY MANAGEMENT SYSTEMS AS THEY RELATE TO AIR POLLUTION,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel, D. C. Ludington, A. G. Hashimoto, W. E. Burnett, and N. C. Dondero.

Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, April 15, 1969. 106 p, 29 fig, 16 tab, 73 ref.

Descriptors: *Farm wastes, *Poultry, *Odor, *Gases, Ammonia, Hydrogen sulfide, Gas chromatography, Carbon dioxide, Moisture content, Organic compounds, *Air pollution.
Identifiers: *Particulate matter, Soil columns, Odor panel, Soil filtration, *Odor control.

The technological changes which have taken place in livestock production in the last few years to provide economical meat, eggs, and milk have resulted in the concentration of animals under conditions of high density for greater efficiency. This change of management practice has created problems in both waste disposal and the control of odors from these wastes. These odors are particularly obnoxious when either the animal enterprise or the land for disposal of manure is adjacent to urban or resort developments. Results of a two year research project dealing with the detection and control of air pollution from high density poultry management systems are summarized. It covers such subjects as the determination of the chemical nature of the odor of poultry manure; the quantitative determination of odors and gases from poultry manure; the role of particulate matter in air pollution; and odor control methods such as soil filtration, water scrubbing, and chemical treatment. (Bundy-Iowa State)

0632 - A5, C3

THE QUALITATIVE DETERMINATION OF THE ODOR QUALITY OF CHICKEN MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
W. E. Burnett.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as They Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 2-17, April 15, 1969. 6 fig, 2 tab, 18 ref.

Descriptors: *Farm wastes, *Odor, *Poultry, Gas chromatography, Nitrogen, Ammonia, Hydrogen sulfide, Organic compounds, *Air pollution.
Identifiers: Odor panel, Organoleptic techniques, Liquid poultry manure, Odorous organic compounds.

A combination of gas chromatographic and organoleptic techniques was used to determine the chemical compounds responsible for the offensive odor of accumulated liquid poultry manure. In addition to the odorous gases, ammonia and hydrogen sulfide, a number of odorous organic compounds were identified, including the C2 to C5 organic acids, indole, skatole, diketones, mercaptans, and sulfides. Of these, organoleptic tests indicate that the organic acids, mercaptans, and sulfides were important malodorous components. Skatole was also implicated as an important malodorous component, due to its characteristic strong, fecal odor. Amines evidently play an important role in the odor as well.
(Bundy-Iowa State)

0633 - A5, B1, C3

THE QUANTITATIVE DETERMINATION OF THE ODOR STRENGTH OF CHICKEN MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel, and W. E. Burnett.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as They Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 18-39, April 15, 1969. 5 fig, 3 tab, 12 ref.

Descriptors: *Farm wastes, *Odor, Waste dilution, Poultry, Ammonia, Moisture content, *Air pollution.
Identifiers: *Vapor dilution, *Liquid dilution, Manure strength, Cage-laying hens, Olfactory threshold test, Fresh manure.

Strength is a characteristic of an odor that can be measured. In contrast to characteristics such as quality and occurrence which rely only on individual opinion, strength allows associating a number with an odor. The method of liquid dilution and the method of vapor dilution have been investigated. Odor strength of animal manures can be measured on a laboratory basis by the liquid dilution and the vapor dilution methods. The vapor dilution method looks at the odors arising from the manure while the liquid dilution method is concerned with the odors in the manure or the odor potential of the manure. Odor was found to have a higher strength from mixed manure than from unmixed manure. Odors arising from diluted or 'liquid' manure have an odor strength comparable with the odors arising from undiluted manure. However, the quality of the odor from 'liquid' manure is very offensive compared with the ammonia-like odor from undiluted manure. Reduction in the moisture content of manure reduces the odor strength and the odor offensiveness. The odor strength for fresh manure by liquid dilution is a dilution of the order 1000. This value can increase to as high as 35,000 depending on conditions. Odor strength measurements by vapor dilution are only valuable for comparison purposes, since odor production flow rates are unknown values. (Bundy-Iowa State)

0634 - A6, C3

ANALYSES OF GASES ENCOUNTERED IN A COMMERCIAL POULTRY HOUSE,
Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
W. E. Burnett.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as They Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 40-46, April 15, 1969. 1 tab, 30 ref.

Descriptors: *Farm wastes, *Poultry, Ammonia, Carbon dioxide, Hydrogen sulfide, Organic compounds, Odor, Air pollution, Sufur dioxide, Humidity, Temperature, *Air pollution.
Identifiers: Chemical detection.

Little is known about the concentration of gases in poultry houses. Past research has centered mainly on the ammonia and carbon dioxide levels in poultry confinement housing. Ammonia concentrations as high as 100 ppm have been found in some commercial poultry houses under the conditions of reduced ventilation and reuse of litter. Some factors which are believed to affect the concentration of gases in poultry buildings are temperature, humidity, ventilation, bird population and the manure management system, as well as frequency of waste removal. A number of existing techniques for the measurement of industrial air pollution are applicable to the analysis of gases encountered in commercial poultry houses. The wet chemical (absorption) method of gas detection was used to determine the concentrations of aliphatic aldehydes, hydrogen sulfide, sulfur dioxide and ammonia in a commercial poultry house with fluid waste handling. The average gas concentrations in ppm were 0.032, 6.98, 0.0036, and 1.13 for aliphatic aldehydes, hydrogen sulfide, sulfur dioxide, and ammonia respectively. None of the gas concentrations were above the maximum allowable concentration (MAC) for humans, but the level of H2S was well above its odor threshold of 0.13 ppm. As the concentrations of gases showed considerable variation from sampling to sampling, more work is needed to correlate gas concentrations with such factors as temperature, ventilation rate and manure management system.
(Bundy-Iowa State)

0635 - A5, A6, C3

GASES AND ODORS FROM UNDILUTED AND DILUTED CHICKEN MANURE,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
D. C. Ludington, A. T. Sobel, and A. G. Hashimoto.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as They Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 47-64, April 15, 1969. 10 fig, 5 ref.

Descriptors: Farm wastes, Poultry, Odor, Carbon dioxide, Methane, Ammonia, Hydrogen sulfide, Waste dilution, *Air pollution.
Identifiers: Odor strength.

The odors and gases produced by and released from chicken manure stored and handled in the undiluted and diluted state have been observed to be considerably different. This difference was most obvious when the stored manure was being moved or agitated. More cases of air pollution attributed to egg producing poultry farms have been reported since the diluted system of storage and handling was put into practice. The release of some of the gases and odors from stored chicken manure under the undiluted and diluted state was investigated. Significant differences occurred between the odor and gas production and release by undiluted and diluted chicken manure. Carbon dioxide release from the undiluted manure was slightly greater than the release from diluted manure. The difference may not be significant. The undiluted system released significantly greater quantities of NH3 than the diluted system. Chicken manure stored in a diluted state produced significantly more H2S and NH3 than manure stored in an undiluted state. The release of H2S from the diluted system was about twice that released from the undiluted manure. Both releases were well below threshold. The odor released from the diluted manure, while the manure was quiescent, was in general, more obnoxious than that from the undiluted manure. When the manure was agitated at the end of the tests, the difference was much more pronounced. (Bundy-Iowa State)

0636 - A5, A6, C3

PARTICULATE MATTER,
Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
W. E. Burnett.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as they Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 65-70, April 15, 1969. 1 tab, 10 ref.

Descriptors: *Farm wastes, *Odor, *Poultry, Gas chromatography, Circulation, *Air pollution.
Identifiers: Odor panel, *Particulate matter, Filter pads, Poultry dust.

Modern commercial high density poultry houses contain high concentrations of airborne particulate matter. Concentrations as high as 1.16 mg per cubic foot of air have been reported. Regarding quantities of particulates produced, amounts as high as 1 lb/day/1000 birds have been reported. The particulate matter consists of fecal matter, feed, feathers, and epidermal fragments, litter, and dust brought into the poultry house by the ventilation system. Particulate matter collected by high volume samplings of a commercial poultry house atmosphere revealed that the particulates carried a 'chicken house' odor. Gas chromatographic analyses of the volatiles carried by the particulates revealed the presence of individually odoriferous compounds. Large quantities of par-

ticulate matter are probably expelled from poultry houses by ventilation fans. Whether particulate matter plays a significant role in ambient odors from poultry houses should be investigated further since the particulates represent a retentive source of odors. (Bundy-Iowa State)

0637 - A5, C3, D2

SOIL FILTRATION TO REMOVE ODORS,
Cornell Univ., Ithaca, N.Y. Dept. of Food Science.
W. E. Burnett, and N. C. Dondero.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as They Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 71-86, April 15, 1969. 3 fig, 8 tab, 14 ref.

Descriptors: *Farm wastes, Odor, Organic compounds, Poultry, Soil, Ammonia, Hydrogen sulfide, Filtration, *Waste treatment, *Air pollution.
Identifiers: *Soil filtration, Soil columns, Liquid dilution method, Odor panel, *Odor control.

Modern, high-density poultry operations in which there are accumulations of manure cause nuisances in populated areas because of the foul odors discharged to the atmosphere by forced ventilation. The feasibility of removing poultry odors from ventilation air by soil filtration was investigated. The soil column effectively removed manure odors. Odors were removed by only 6 inches of soil under the conditions of test. The ability of the soil to remove ammonia decreased markedly as the soil dried. Soil columns remove ammonia as long as the soil remains moist. Ammonia breaks through those columns when dry. The manured soil removed more ammonia than the untreated soil. (Bundy-Iowa State)

0638 - A5, B1, D1, D3, E1

ODOR CONTROLS BY CHEMICAL TREATMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Food Sciences.
W. E. Burnett, and B. Gormel.
In: Odors, Gases and Particulate Matter from High Density Poultry Management Systems as They Relate to Air Pollution. Final Report, New York State Dept. of Health, Division of Air Resources, Ithaca, New York, p 87-97, April 15, 1969. 5 fig, 1 tab, 12 ref.

Descriptors: *Farm wastes, *Odor, Poultry, Ammonia, Hydrogen sulfide, Carbon dioxide, *Waste treatment, *Air pollution.
Identifiers: *Chemical treatment, Mechanical control, *Odor control.

The various methods of odor control include elimination by mechanical, physical, or chemical means, and modification, usually by chemical means. Chemical means was reviewed in an attempt to eliminate or modify poultry manure odors. The emphasis is on abatement of odor from liquid management systems. Offensive manure odors can be effectively masked by the use of an effective masking agent dispersed in Mosquito Larvae Oil in liquid poultry manure pits. Mosquito Larvae Oil appears to do an effective job in dispersing the masking agent over the surface of the liquid manure. Applications of 5 ml and 10 ml of making agent to the tanks of liquid manure were considered to be impractical because of the relatively short time these additions were effective in masking the odors, especially after the proportion of manure solids increased in the water.
(Bundy-Iowa State)

0639 - A4, B2, C5, E2

USING SOIL FILTRATION TO REDUCE POLLUTION POTENTIAL OF LAGOON EFFLUENT ENTERING GROUND WATER SYSTEM,
Iowa State Univ., Ames.
C. E. Beer, and J. K. Koelliker.
Iowa State Water Resources Research Institute, Ames, Completion Report ISW-RRI-41, August, 1971. 32 p, 4 fig, 2 tab, 23 ref. OWRR A-021-IA (1).

Descriptors: *Irrigation efficiency, *Denitrification, *Nitrogen, *Farm wastes, Chemical oxygen demand, *Nitrates, Ammonia, *Lagoons, Waste treatment, *Waste disposal, Anaerobic conditions, *Waste water treatment, Application, *Effluents, Iowa, Biochemical oxygen demand, Chemical oxygen demand, *Phosphorous, Organic matter, *Filtration, Infiltration, *Soil profiles, Sprinkling.
Identifiers: *Soil filtration.

Swine lagoon effluent was applied to soil for final treatment. The active soil profile appears to offer great potential as a final treatment media for partly treated animal wastes and cattle feedlot runoff. Effluent sprinkled on a grass-covered soil profile reduced COD, nitrogen, and phosphorus concentrations 79-95, 40-80, 95-99 percent, respectively over a 3-year period. Loadings ranged from 13.9 to 48.1 in. of lagoon effluent per May-October season. Removal of COD was attributed to biological activity and physical filtration in the upper inches of the soil. Phosphorus reduction resulted from chemical activity of the clay fraction near the soil surface. Nitrogen reduction was attributed primarily to denitrification deeper in the soil profile. The organic matter in the soil served as the carbon source for denitrification rather than the lagoon effluent. Organic matter content of the lower region of the soil profile was reduced and nitrogen removal by denitrification decreased. For disposal fields that are operated primarily for BOD removal, about 24 in. per year can be applied in most areas of Iowa. In areas where nitrate concentration in the percolate is of concern, applications should be limited to 600 lb/acre of nitrogen per season.

0640 - A2, A4, F2, F3

HANDLING LIVESTOCK WASTE,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering and Animal Science.
G. L. Pratt, D. W. Johnson, and M. L. Buchanan.
North Dakota Farm Research, North Dakota State University Reports on Environmental Quality, Vol 4, No 28, p 22-24, March-April, 1971. 1 tab.

Descriptors: *Farm wastes, *Treatment, *Water quality control, Oxidation lagoons, Aeration, Disposal, Drying, Farm lagoons, Filtration, Dewatering, Separation techniques, Waste storage, Confinement pens, Settling basins, Runoff.
Identifiers: *Groundwater pollution, Feedlots, Slatted floors.

Congress has been developing legislation since 1948 to prevent water pollution. The Federal Water Quality Act of 1965 was the culmination of this development. The act provided that states could set water quality standards and administer them. In 1967 the North Dakota legislature adopted a comprehensive water pollution control act. These acts have necessitated research on managing and disposing of livestock wastes. The major phases of manure handling are collection, storage, treatment, and disposal. Various methods of collection, storage, treatment, and disposal are listed with their relative advantages and disadvantages. However, spreading on cropland has been the standard method to dispose of livestock manure for a long time. Research to date indicated that it is still the most practical method for preventing pollution. (Dorland-Iowa State)

0641 - A3, C4

BACTERIAL COUNTS OF A SECTION OF THE RED RIVER -- SUMMER, 1970,
North Dakota State Univ., Fargo. Dept. of Bacteriology.
M. C. Bromel.
North Dakota Farm Research, North Dakota University Reports on Environmental Quality, Vol 4, No 28, p 60-61, March-April, 1971.

Descriptors: *Water pollution, *Coliforms, *Waste dilution, North Dakota, Cultures, Oxygen demand, Treatment facilities, Salmonella, Clostridium, Shigella, Fishkill.
Identifiers: *Red River, Bacteriological analyses, Coliform count.

Numerous surveys by state and federal agencies from 1935-1969 indicate that the Red River has become progressively more polluted as the municipal and industrial population along its banks increase. During the summer of 1970, from June 8 through July 28 an intensive biological and bacteriological survey of the Red River was undertaken. Surface and bottom water samples were collected from a boat with a Van Dorn water sampler. Biological and chemical analysis on each sample included the following determinations: dissolved oxygen, pollution, number of animals sensitive to pollution, and total suspended solids. The bacterial counts, especially the coliform counts, were far over the 5,000/100 ml allowable by North Dakota and Minnesota standards for potable or recreational water. There was consistently present a high concentration of bacteria in the Red River at the Fargo intake averaging 500,000 bacteria per milliliter of water. The dissolved oxygen level at several sites was below the two-state standard (5 ppm) minimum. The presence of Shigella dysenteriae in the Wild Rice River when the coliform count was very low (500/ml) is remarkable since this form of Shigella is very rarely found in the U.S. (Dorland-Iowa State)

0642 - F4

AGRICULTURAL WASTES: PRINCIPLES AND GUIDELINES FOR PRACTICAL SOLUTIONS.
New York State Coll. of Agriculture, Ithaca.

Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. 172 p.

Descriptors: *Farm waste, *Water quality control, Pesticides, Eutrophication, Liquid waste, Surface runoff, Dehydration, *Waste water treatment, Oxidation lagoons, Incineration.
Identifiers: Composting, Land spreading.

The purpose of this 1971 Conference was to take the knowledge obtained from research and field experience and convert this knowledge into information which can be used to solve the problems in agricultural waste management. Another benefit of this proceedings may be to point out areas where the information is weak or missing. This could be helpful in planning more appropriate research in the future. (Bundy-Iowa State)

0643 - A3, F3

AGRICULTURE:S RESPONSIBILITIES IN A CLEAN ENVIRONMENT,
New York State Dept. of Environmental Conservation, Albany.
R. W. Pederson.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York, p 1-5.

Descriptors: *Farm wastes, *Pollution abatement, *Pesticides, *Water law ecosystems, Contaminants, Water quality control.

Agriculture's responsibilities in the all-out effort to achieve and maintain a clean environment are to recognize and understand its relationahips to other

facets of the economy, to seek still greater knowledge on the 'hows' of waste management, and to apply the principles and guidelines that lead to practical solutions. Agriculture is an interlocked part of our society and culture, and our environmental problems are becoming more severe very rapidly. The new New York Department of Environmental Conservation has set goals of achieving greater effectiveness in correcting yesterday's costly mistakes, and of preventing the future degradation of our environment. Effective steps in pollution prevention mean a substantial commitment of manpower and financial resources, individual and corporate investments that aren't immediately profitable, new attitudes, and environmental conscience, and more government controls. The Department of Environmental Conservation's activities can affect land use by pesticide controls, by water supply and sewage controls for new subdivisions, controls over stream alteration, and controls over industrial plant location through permit issuance for water discharges and licensing of new air emissions. The total ecological system is very delicately interwoven and such things as the domino effect of DDT poisoning can be a very real threat to our ecology. (Schmitt-Iowa State)

0644 - A3, F3

ENVIRONMENTAL QUALITY AND PRODUCTIVITY,

Environmental Protection Agency, Washington, D.C. Water Quality Office.
J. D. Denit.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 6-11, 2 tab, 5 ref.

Descriptors: *Farm wastes, *Water quality control, *Surface runoff, Lagoons, Eutrophication, Water pollution sources, Water law.

World needs demand expansion of the already immense American livestock industry. The problem which now confronts the industry is the adverse impact of production wastes on the environment, particularly water quality. Due to the fragmented nature of earlier studies, a definite pattern of animal waste pollution has emerged only in the last two years. Fish kills from feedlot-runoff in Kansas in 1964 was an indicator of the twenty-four kills in twelve states in 1969. The combination of production oriented and traditional zero-cost, waste management philosophies is now leading to severe pollution problems. Anaerobic lagoons are designed on raw waste strength instead of runoff quality. Farmers have not been informed of state Water Quality Standards or their responsibility in meeting them. Even though organic waste loads from lagoons are higher than raw domestic wastes, the concentrations of nitrogen and phosphorus are of greater significance, because no industry is more dependent upon a pure water supply than agriculture. In conserving water quality, the agricultural operator is engaging in notable self-service and making an investment in survival. (Schmitt-Iowa State)

0645 - A3, A7, F4

PESTICIDES AND PEST CONTROL IN THE FUTURE,

Cornell Univ., Ithaca, N.Y. Dept. of Entomology.
D. Pimentel.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 12-14, 1 ref.

Descriptors: *Farm wastes, *Pesticides, *Agricultural chemicals, *Pest control, Ecosystems, Water quality control, Regulation.

One billion pounds of pesticides were applied in the U.S. during 1970. Seventy percent was for farm use and the remaining for public and governmental use. Ninety-nine percent of the 200,000 species of plants and animals were non-target species, but many of these were affected. The Environmental Protection Agency has taken over the responsibility of pesticide regulation from the Dept. of Agriculture. In 1965, the overall return for every dollar invested in insect control with pesticides was 4 to 5 dollars, while the return per dollar invested in bioenvironmental control was 30 dollars. Development research in bioenvironmental control is slow, tedious, and costly. Prescription use of pesticides could have the advantages of expert advice, rapid distribution of new information from government agencies, more accurate control of the amounts used, and the establishment of a precautionary public attitude. Some pesticides would be banned and some applied only by state-licensed custom sprayers. Aware of the insidious destruction by pollution, the aim would be to keep the advantage of technology, but reduce the associated environmental hazards. (Schmitt-Iowa State)

0646 - A3, C3

FARM LAND RUNOFF,

Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
R. T. Oglesby.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 15-19, 11 ref.

Descriptors: *Farm wastes, *Runoff, *Nitrogen compounds, *Phosphorus compounds, Fertilizers, Water quality, Eutrophication, Soil erosion, Water pollution sources.

Agricultural wastes and many materials in agricultural usage are translocated to aquatic systems where some of them cause significant problems. Nitrogen, applied as fertilizer or from manures, leaks from agricultural activities in quantitites sufficient to promote nuisance algal growth in receiving waters where this element is a limiting factor, and many, through accumulation in groundwaters, constitute a health hazard as well. Large quantities of phosphorous are lost in runoff, primarily through erosion of soil-phosphorus particles. The significance of this form of phosphorus in stimulating algal growth is not fully understood but is probably not high. Organically bound phosphorus, such as that occurring in animal wastes, may add significant amounts of this element in a form available to plants. (Schmitt- Iowa State)

0647 - C5, F5

ENVIRONMENTAL PROBLEMS IN THE FOOD PROCESSING INDUSTRY,

Cornell Univ., Ithaca, N.Y. Agricultural Experiment Station.
D. L. Downing.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971. p 20-24, 6 tab.

Descriptors: *Farm wastes, *Water pollution sources, *Liquid wastes, Waste water disposal, Industrial wastes, Air pollution.

The food processing industry ranks fifth in the U.S. in the volume of liquid wastes generated, producing about 700 billion gallons annually. This waste contains a high amount of suspended solids of which only part is settleable; therefore, the national food industry ranks first in the amount of suspended solids released to the environment. The BOD5 of food-plant effluent is normally several thousand ppm compared with a few hundred for typical municipal sewage. The pH of food processing wastes range from below 5.0 for sulphur dioxide bleaching processes to about 12.0 for lye peeling of vegetables. Pigments in cannery wastes are very difficult to degrade, often persisting after passing through a municipal treatment plant. Olive, pickle and sauerkraut brine range up to 15% in sodium chloride content. Unlike some industries where waste products can be utilized, most solid wastes from canneries have to be hauled to land-fill type operations. Transmission of plant pathogens is a major reason wastes are not normally spread on the cropland. Adding to the waste problem is the fact that the food industry uses about 50% of all package utilization. Air pollution and noise pollution are still other problems it will take much ingenuity to solve. (Schmitt-Iowa State)

0648 - A3, B1, F5

FERTILIZER PRACTICES WHICH MINIMIZE NUTRIENT LOSS,

Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
D. J. Lathwell, W. S. Reid, and D. R. Bouldin.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, Syracuse, New York. p 25-35, 6 fig, 2 tab, 8 ref.

Descriptors: *Farm wastes, *Fertilization, *Nutrient requirements, Water pollution sources, Crop response, Rates of application, Soil erosion.

Water is the transport agent for nutrients, organic matter, and sediments from agricultural land. The major flow of runoff occurs in the spring when accumulated snow and ice melt. Experimental data demonstrate that the major quantity of nutrient loss occurs during the spring runoff period. The major form of inorganic nitrogen in the soil is usually nitrate, even if ammonium fertilizers are added becuase of the universal occurrence in soil of microorganisms which convert ammonium to nitrate. The nitrate ion is completely dissolved in the soil solution and moves wherever the soil water moves. The nitrate may be leached into the groundwater, into tile drains or into surface runoff. To avoid these losses, moderate amounts of fertilizer nitrogen should be added just before the crop begins its period of minimum growth. If the fertilizer is added too soon, some or most of it may be carried off before the plant can take up the nitrogen. Phosphorus fertilizer reacts rapidly with the soil to form relatively insoluble products. The major source of phosphorus loss from agricultural land is associated with sediment loss. Therefore, control of erosion is essential if phosphorus is to be kept on agricultural land. All of the control measures outlined above are economically feasible. (Schmitt-Iowa State)

0649 - A3, B1, E2

LAND DISPOSAL OF MANURE IN RELATION TO WATER QUALITY,

Cornell Univ., Ithaca, N.Y. Dept. of Soil Science.
S. D. Klausner, P. J. Zwerman, and T. W. Scott.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 36-46, 8 tab, 10 ref.

Descriptors: *Farm wastes, *Surface runoff, *Fertilization, Soil erosion, Water pollution, Eutrophication, *Waste disposal, Waste water treatment, *Nutrients.

Disposal on land is the most practical final placement for farm manure, as it is a source of plant hutruent and organic matter. Nitrogen in manure is very mobile in a soluble form. Phosphorus becomes 'fixed' and is removed largely by the

physical removal of soil, organic matter, or manure by surface erosion. Vegetation acting as a sink for incoming nutrients as well as a control of erosion are necessary for control of nutrient removal. Incorporating the manure with the soil shortly after spreading is an important consideration as immobilization of nutrients increases and odor and fly problems decrease. Winter spreading causes numerous problems. Frozen soil is impervious to water and subject to runoff during thaws. Spring applications of manure can pose a threat to water quality if improperly managed. Late in the spring, surface and subsurface flows of water are no longer at maximum levels, thus decreasing the pollution potential. Concrete evidence as to the maximum rates of manure that can be applied without causing a polltuion hazard under most soil and weather conditions is non-existent. Continuing research hopefully can answer unsolved problems of economic means of handling animal wastes. (Schmitt-Iowa State)

0650 - B1

GUIDELINES FOR MINIMIZING PESTICIDE POLLUTION,

Cornell Univ., Ithaca, N.Y. Chemical-Pesticide Program.

R. F. Pendleton, and J. E. Dewey.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 47-51.

Descriptors: *Farm waste, *Pesticides, *Pesticide drift, Pesticide toxicity, Water quality control, Phytotoxicity.

The worst aspects of pesticides are usually the most newsworthy. In order to retain the necessary use of pesticides it is imperative to use all possible means to minimize or prevent their becoming pollutants. Pesticides when properly used are tools. When they move off target or are otherwise misused they become pollutants. They become particularly important as pollutants when they move into water and cause either immediate toxicity to organisms present, or, more seriously, are of a persistent and accumulative nature and move into the food chain. Many factors contribute to pesticide drift; some physical, some climatic. The smaller the droplet and the greater the wind, the greater the drift. The choice of pesticides influence drift damage from toxicity, phytotoxicity, illegal residues, and volatilization. Choosing the right machinery for a particular job is most important. In most cases a short-lived, biologically degradable, non-cumulative compound may be substituted for an environmentally dangerous compound. Poor operational procedures and misuses are probably the greatest contribution to pesticide pollution, which can be greatly reduced through education programs involving pesticide applicator safety and known principles of conservation. (Schmitt-Iowa State)

0651 - B1

ANIMAL WASTE HANDLING IN THE UNITED KINGDOM,

Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.

C. E. Ostrander.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 52-53.

Descriptors: *Farm wastes, *Dehydration, *Waste water treatment, Aerobic treatment, Anaerobic digestion, Domestic wastes.

The poultry industry in England, Scotland, and Holland is quite different from that in the United States. There are many smaller operations in the 1,000 to 5,000 bird range, they have less mechanization, and they look at quality differently. However, one of the world's largest poultry operations is located near Nottingham, England and produces 60,000,000 broilers a year in addition to maintaining 3,500,000 laying hens. There is much interest in the United Kingdom in dehydration of manure. This is probably due to the fact that they can include dehydrated poultry manure in commercial feed formulations. The United Kingdom is very concerned about water pollution as they depend on rivers for water supply and do not want polluted effluent dumped into them. Holland appeared to be putting fairly potent effluent into drainage ditches. They have tried natural lagoons, but low temperatures and lack of sunshine prevented proper operation. Some are converting to aerated lagoons. Other methods being tried include the Floc-tower system, centrifuging, anaerobic digesting, and aeration in oxidation ditches. They are concentrating livestock, and waste problems are becoming more acute. (Schmitt-Iowa State)

0652 - D4

LIQUID WASTE TREATMENT I. FUNDAMENTALS,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.

R. C. Loehr.

In: Agricultural Wastes: Principles and Guidelines for Practical Solution, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 54-62, 1 fig, 1 tab.

Descriptors: *Farm wastes, *Aerobic treatment, *Anaerobic digestion, Pollution abatement, *Waste water treatment.

Controlled and uncontrolled biological systems are the major systems used to treat organic wastes. The systems can treat liquid or solid wastes, can be aerobic, anaerobic, or facultative, and can be within controlled structures or unconfined on the land. In biological systems microorganisms utilize the biodegradable wastes for food. Synthesis or growth is affected by the ability of the microorganisms to metabolize the wastes, the temperature and pH of the system, and the presence of adequate nutrients, trace elements, and toxic materials. It is not possible to have a system in which there is no net accumulation of solids with time due to nonbiodegradable material. Bacteria are the most important group of microorganisms followed by fungi, whih re non-photosynthetic multicellular plants. Algae are photosynthetic autotrophs, utilizing sunlight and inorganic compounds to synthesize cells. In aerobic treatment carbon is oxidized to microbial protoplasm and carbon dioxide, while in anaerobic systems some carbon is reduced only to methane. For optimum nitrification a dissolved oxygen concentration of about 2 mg/l is necessary. In general, microbial reaction rates are doubled for every 10 deg C rise in temperature of the waste system. (Schmitt-Iowa State)

0653 - D4

LIQUID WASTE TREATMENT II. OXIDATION PONDS AND AERATED LAGOONS,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.

R. C. Loehr.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 63-71, 3 fig, 1 tab, 2 ref.

Descriptors: *Farm wastes, *Oxidation lagoons, *Farm lagoons, *Aeration, *Aerobic treatment, Dissolved oxygen, *Waste water treatment.

Oxidation ponds and aerated lagoons are among the simplest liquid waste treatment systems currently used. Bacteria and algae are the key organisms in an oxidation pond, with the active bacterial mass under 50 mg/l. In most oxidation ponds there are ample algal nutrients in the influent carriage water and resulting from bacterial metabolism to produce excess oxygen from algal growth. Satisfactory performance depends on the balance between the bacteria and the algae. Oxidation ponds are organic matter generators, since algal cells are produced. Unless algal cells are removed from the effluent of the pond prior to discharge, little reduction in the ultimate waste load will have occurred. Temperature affects the rate of metabolism of microorganisms; thus, the rate at which the pond can be loaded. Loading relationships should be in terms of BOD5 per surface area per day, and generally range from 20 to 50 pounds per acre per day. An aerated lagoon differs from an oxidation pond in that aerobic conditions are maintained by mechanical means, with algae generally not present. Dissolved oxygen should be maintained at 1-2 mg/l with the detention time from 1-10 days. (Schmitt-Iowa State)

0654 - D4

LIQUID WASTE TREATMENT III. THE OXIDATION DITCH,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.

R. C. Loehr.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 72, 2 fig, 1 tab, 1 ref.

Descriptors: *Farm wastes, *Sewage treatment, *Aerobic treatment, Oxygen demand, Stabilization, Oxidation lagoons, *Waste water treatment.

The oxidation ditch, or Pasveer ditch, is an aerobic biological waste treatment system with a long liquid detention time and adequate mixing. The key components are a continuous open channel and a surface aeration rotor, which mixes the ditch contents and supplies oxygen. Untreated wastes can be added directly to the ditch. The effluent from agricultural wastes normally is not suitable for discharge to surface waters, but is suitable for land disposal. If sufficient oxygen is supplied, odors are negligible. BOD5 reductions of 80-90% can be obtained. Characteristics include low capital cost, ease of operation, and minimum maintenance. The total solids concentration can range up to 4-6%. Because of long detention times, the food to organism ratio is only from .03 to 0.1 lb. BOD per lb. MLVSS (Mixed Liquor Volatile Suspended Solids) per day. Velocities of 1.0 to 1.5 ft./sec. should be maintained to minimize settling. The depth of liquid ranges from 15 to 30 inches with rotor immersion one-fourth to one-third the liquid depth. Livestock oxidation ditch effluent must be kept in aerated holding units or disposed of in a short time to avoid anaerobic conditions and odors. (Schmitt-Iowa State)

0655 - D4

ANAEROBIC BIOLOGICAL WASTE TREATMENT SYSTEMS,

Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.

A. W. Lawrence.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agriculture Waste Management, February 10-12, 1971, Syracuse, New York. p 79-92, 6 fig, 3 tab, 18 ref.

Descriptors: *Farm wastes, *Anaerobic digestion, *Methane bacteria, *Waste water treatment, *Farm lagoons, Pollution abatement.

The anaerobic process, one of the major biological

wastewater treatment processes, is most effectively applied in the treatment of concentrated wastes, such as those from animal production exceeding 1% organic solids. The anaerobic process converts organic matter to methane and carbon dioxide. The methane can be vented to the atmosphere or burned as a heat source. Microbiologically, the anaerobic process is complex with many species of microorganisms involved. However, the bacteria can be functionally divided into two groups, acid formers and methane formers. The methane producing bacteria are extremely sensitive to environmental change. A typical organic loading rate for a completely mixed tank is .2 lb. volatile solids per day per cubic foot. Completely mixed systems are quite expensive and require extensive operator control, which makes them unattractive for agricultural purposes. The lagoon is probably the most widely used anaerobic process configuration in agricultural waste treatment at this time. Attractions include low capital and operating costs and minimal operating requirements. Anaerobic processes can be designed by either the rational approach which applies to completely mixed systems or the empirical method which is used in designing lagoons. (Schmitt-Iowa State)

0656 - A9, D3

CHLORINATION OF WASTEWATER EFFLUENTS,

Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 93-101.

Descriptors: *Farm wastes, *Disinfection, *Chlorination, Water treatment, Public health, Waste water treatment, Diseases.

Certain diseases caused by enteric pathogenic microorganisms can be transmitted from infected human and animal sources to susceptible human populations by water supply systems. Examples include typhoid and cholera. Due to water supply and recreational use of our rivers, there is a trend to require disinfection, or chlorination, of sewage and wastewater. Aqueous solutions of chlorine can be prepared from either dissolution of gaseous chlorine or the hypochlorite salts. Chlorine, as a strong chemical oxidizing agent, inactivates the key enzyme systems within the pathogenic microorganism. The process of chlorination is usually controlled by measurement of the chlorine residuals and is called the orthotolidine test. Pathogenic organisms are usually present in very low numbers; therefore, indicator organism used in wastewater is called the coliform group, consisting of bacteria of intestinal origin of warm-blooded animals, the same origin as the pathogens. Coliforms, however, have a longer survival time in natural waters. Factors affecting disinfection include temperature, contact time, concentration, chlorine species present, pH, and type of organism. Cost of chlorination is on the order of one cent per thousand gallons of wastewater, with control of the process being straightforward and relatively simple. (Schmitt-Iowa State)

0657 - D2, D3, D4

SOLIDS DESTRUCTION OR SEVERE TREATMENT,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
D. C. Ludington.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 102-106, 1 fig, 1 tab, 3 ref.

Descriptors: *Farm wastes, *Waste water treatment, *Incineration, *Solid wastes, Pollution abatement, Chemical degradation.
Identifiers: Wet-air oxidation process.

There are three basic processes which can be used to destroy solid matter or convert solid matter into liquids or gases. These three processes are (1) biological, (2) chemical, and (3) thermal. A biological process is one which utilizes bacteria to decompose or break down solid matter. These processes can only attack those solids which can be biologically degraded. Biological processes can be subdivided into two categories; aerobic which require the presence of dissolved oxygen, and anaerobic which takes place in the absnece of dissolved oxygen and produces offensive odors as products of destruction. Total reduction for biological destruction is 30-50%. Chemical destruction of solids is a process which chemically oxidizes the solid material in an aqueous solution at high pressure and temperature and in the presence of air but without a flame. The process, also known as the wet air oxidation process, operates at temperatures about 500 deg F and pressures from 150 to 3000 psig and can effectively convert all the volatile solids in solid material into carbon dioxide, water, and nitrogen. Thermal destruction is the rapid oxidation at temperatures 1000 to 1400 deg F, near atmospheric pressure and with a flame. Also known as incineration, this process can convert all the volatile solids to gaseous products and heat. (Schmitt-Iowa State)

0658 - D2

MOISTURE REMOVAL,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 107-114, 7 fig, 1 tab, 4 ref.

Descriptors: *Farm wastes, *Dehydration, *Drying, *Absorption, Waste storage, Incineration, Waste water treatment.

Removal of water from animal manures provides many advantages for manure management systems, including a reduction in offensive odor, a reduction in weight and volume, and a change in handling characteristics. The range of ideal moisture content is 10-15%, since ammonia is produced in the 75-15% range, and below 10%, the manure becomes dusty. The possible means of water removal are, (1) mechanical, (2) absorption, and (3) thermal. Mechanical removal consists of using pressure to force the water from manure. Absorption is a functional method of moisture removal as long a sufficient absorption material and air movement is provided. Thermal means of moisture removal can be subdivided into dehydration and drying. Dehydration, the removal of moisture at a temperature considerably greater than ambient, must be accomplished in complex equipment with the added cost of a fuel source. Drying, the removal of water by evaporation at a temperature slightly above ambient, is controlled by, (1) environment, (2) configuration, and (3) air movement. Thickness of manure should be 1/4 inch or less for drying with a maximum air flow of 800 fpm. Dehydration should be considered only if there is a market available for the dehydrated product, or if the cost is considered a treatment. (Schmitt-Iowa State)

0659 - C5, D4

COMPOSTING,

Rutgers - The State Univ., New Brunswick. N.J. Dept. of Soils and Research.
S. J. Toth, and B. Gold.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 115-120, 2 tab, 11 ref.

Descriptors: *Farm wastes, *Artificial use, *Aerobic conditions, *Humus, Thermophilic bacteria, Carbon cycle, Decomposing organic matter.
Identifiers: *Composting.

The production and use of artificial manures or coposts for soil improvement practices is as old as the art of agriculture. Composting can be defined as the process involving the conversion of organic residues into liqnoprotein complexes (humus) via thermophilic organisms under optimum moisture and aeration conditions. In the process, CO_2 is evolved and the temperature of the pile may reach 155 to 170 deg F. Air moisture, nitrogen, phosphorus, and potassium are necessary ingredients for composting. Unless sufficient moisture is present the pile will dry out and decomposition will cease. If too much moisture is present or air is excluded, anaerobic conditions are produced and obnoxious odors will result. Microorganisms require nitrogen for their growth so composts made from plant materials with less than 2% total nitrogen will require the addition of either organic or inorganic nitrogen. Small amounts of additional phosphorus and potassium may be needed, with 20 pounds of superphosphate and 10 pounds of muriate of potash usually being sufficient. Any materials containing cellulose can be composted, the only exceptions being plastics and resins with a closed ring structure. Characteristics of ideal compost include dark color, inorganic matter content of 80% or more, moisture content between 10 and 20% total nitrogen from 2.5 to 3.5%, and a pH between 5.5 and 6.5. Due mainly to low organic matter, garbage composting in the United States has been largely unsuccessful. (Schmitt-Iowa State)

0660 - E2, E3

UTILIZATION OF AGRICULTURAL WASTES,

Agricultural Research Service, University Park, Pa.
W. R. Heald, and R. C. Loehr.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 121-129, 49 ref.

Descriptors: *Farm wastes, *Waste disposal, *Water reuse, Fertilization, Artificial use, Waste disposal.
Identifiers: Recycling.

Waste management can be thought of in three categories: the prevention of, the recovery of, or the disposal of wastes. Recovery, or recycling is the return of wastes to its natural state, and along with salvage, or utilization of wastes is potentially the most efficient operation. The land will continue to be the ultimate disposal site for animal wastes, and is considered a recycling process when coupled with crop production. Benefits other than nutrient value include increased infiltration capacity of the soil, and reduced soil erosion resulting from better plant cover. Methods of utilizing animal wastes are composting, energy or methane production and refeeding. Composting is feasible but a market must be developed before the process is financially attractive. In general, the nutritive value derived from animal wastes incorporated in feed rations is greater if the wastes of single stomached animals are added to the feed ration of ruminants and if the ruminant wastes are treated chemically before being added to feed rations. Unknowns related to transmittal of drugs, feed additives, and pesticides to the second animal and to the agricultural product, such as eggs and milk, remain to be classified. A variety of costs must be developed before the value of utilization and recycling can be determined.
(Schmitt-Iowa State)

0661 - A5, B1, C3, D3, E1

ODORS AND THEIR CONTROL,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
D. C. Ludington.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 130-136, 1 fig, 1 tab, 12 ref.

Descriptors: *Farm wastes, *Odor, *Poultry, Runoff, Water pollution, Air pollution, Air circulation, Waste treatment.
Identifiers: *Odor control, Soil columns, Cages, Plow-furrow-cover, Oxidation ditch, Chemical treatment, Odor control costs.

The seriousness of odors produced from poultry operations have increased with changes to the 'modern' poultry house. Sources of odors around a poultry operation includes: (a) ventilation air, (b) loading areas and outside storage tanks, and (c) the land after spreading. Controlling odors from these sources can be accomplished to varying degrees by different methods. The following list of odor control methods is an attempt to put these methods in perspective as to success of odor removal. Ranking of odor control methods for the various odor sources: (a) Ventilation air: (1) adequately aerated liquefied manure, (2) moisture removal (moisture content reduced to 30-40% w.b.), (3) frequent (daily) cleaning, (4) chemical treatment (if sufficient chemical is used, this treatment could be higher on the list); (b) Loading area and outside storage tanks: (1) adequately aerated liquefied manure, (2) moisture removal (30-40%), (3) chemical treatment; (c) Land after spreading: (1) adequately aerated liquefied manure, (2) plow-furrow-cover or sub-surface injection, (3) moisture removal, (4) frequent cleaning and spreading (daily), (5) chemical treatment. The final decision on an odor control method must be based upon cost and the local situation. The local situation depends upon nearness of neighbors or degree of odor control necessary. No matter how carefully the method is chosen, if good management and good housekeeping are not followed, the system will fail. (Bundy- Iowa State)

0662 - B1, F4

WASTE HANDLING ALTERNATIVES,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
R. W. Guest.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York. p 137-141, 2 fig.

Descriptors: *Farm wastes, Liquid wastes, Odor, Waste storage, Storage capacity, Aerobic treatment, Oxidation lagoons, Cattle, Poultry, Swine, *Waste water treatment, Waste disposal.
Identifiers: *Semi-fluid material, Manure spreaders.

Methods of handling agricultural manures are changing. The reason--primarily because the predominant form of the manure has changed. Prior to ten years ago, more or less, straw or other bedding was used which absorbed part of the moisture in the manure. Not only has the form changed, but also a drastic increase in the volume of waste material to be handled in one location has occurred. The conventional method of handling manure is with the conventional manure spreader (without modification), gutter cleaners, pit scrapers and manure bucket loaders. To be successful using the conventional method, dairy manure and poultry manure must have dry matter added, whereas swine manure can be spread without added dry matter. Semi-fluid material is of most interest because most of today's large operations use this method. The solution to handling semi-fluid rests with three alternatives: (1) develop equipment to handle it in this form, (2) change to liquid by adding water, or (3) change the form to a solid. The liquid handling is gaining popularity because conventional mechanical pumping methods may be used. The ease of storing liquids is also an advantage for using this system. It enables an operator to store manure, thus reducing labor. The treatment process must be considered, however, in any of these systems to reduce odors. (Bundy-Iowa State)

0663 - B1, F2

INTEGRATION OF COMPONENTS INTO A SYSTEM,

Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
R. J. Young.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management February 10-12, 1971, Syracuse, New York, p 142-149. 7 fig.

Descriptors: *Farm wastes, *Water quality act, Landfills, Farm lagoons, Incineration, Treatment, Oxidation lagoons, Regulations, Fertilizers, Nutrients, *Standards, *Institutional constraints.
Identifiers: *Air quality standards, Land spreading, Composting, Local regulations, State regulations.

In analyzing the various methods for handling animal wastes, each method must be considered with the individual management application in mind. It is also apparent that there are a number of constraints and alternatives which must be taken into consideration before a given system is adopted. These constraints are the local, state and federal regulations in regard to air and water quality standards, public health laws and environmental protection regulations. The long-range consequences of any action taken must be evaluated so that the solution of one waste disposal problem does not create another. High priority should be given to the incorporation of animal wastes into a cropping system to get the maximum uptake of nutrients. If possible, recycling and reuse of animal wastes should be part of the management system. The primary consideration is to be given to source control. Examination of all of the feasible methods that meet the conditions of state and federal regulations may show that the cost of waste disposal for a particular product is far too costly, and therefore a more economical procedure may be a change in management practice which would prevent or significantly reduce the amount of waste materials generated. (Bundy-Iowa State)

0664 - F3

ADVISORY GROUPS FOR ENVIRONMENTAL PROTECTION AND AGRICULTURAL COOPERATION,

Wisconsin Univ., Madison. Dept of Dairy Science.
J. W. Crowley.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York, p 150-156.

Descriptors: *Farm waste, Regulations, Waste disposal, Cattle, Public health, Safety, Legal aspects.

The idea of an advisory group can be illustrated by experiences with advisory groups in other general problems. In dairy production, the involvement of various production groups, marketing groups, and quality control agencies has a long history. There have been occasions when one group formulated ideas without due consideration of the needs or responsibilities of the other group. Also, there have been many questions or problems that require immediate practical solutions but only judgment or guesses are available. When this occurs, the best judgment or guess results when all groups involved discuss, debate, and finally compromise on the practical solution. The primary objective of the advisory committee is to develop guidelines. These must be acceptable to all groups that have enforcement responsibilities. The suggestions in the guidelines must also be practical and realistic; however, they cannot assure compliance with regulations. The advisory committee is essentially an Ad Hoc group; however, permanent structure is needed so that a representative can request and get action for revision. The guidelines are essentially an educational publication and should be continually up-dated as needs arise. (Bundy-Iowa State)

0665 - B2

WASTE MANAGEMENT ON A MODERN DIARY FARM,

R. Everingham.

In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York, p 157-160.

Descriptors: *Farm waste, *Cattle, Confinement pens, Soil disposal fields, Septic tanks, Odors, Liquid wastes, New York, Waste treatment.
Identifiers: *Dairy wastes, Liquid-manure spreader, Pit agitation, *Syracuse (N.Y.).

A New York dairy farmer gives an account of his 100-cow free-stall liquid-manure-handling system. The system is located within a 15-minute drive to downtown Syracuse, which makes him very aware of the odor problems that a dairy operation might cause. The liquid manure tank was designed on the specifications of 1-1/2 cubic feet per animal per day with enough capacity for two months. At the time the pit was built, it was decided that a two-month clean-out period would be sufficient, but after operating the system for awhile, it was recognized that a four-month period would be better. This would eliminate having to spread the manure during the summer months or the cold winter months on frozen ground. Also, the specifications of 1-1/2 cubic feet per animal per day should be increased to 2. The equipment used to remove the manure consists of an agitator pump and a 1400-gallon liquid-manure spreader. In his operation, the spreading, especially in the summer, is the most critical part of the operation. The operator at this point feels the system is workable. (Bundy-Iowa State)

0666 - A2, B1, F2

PERFORMANCE OF DUCK WASTEWATER TREATMENT FACILITIES,

New York State Veterinary Coll., Eastport. Duck Disease Research Lab.
K. J. Johanson.

In: Agricultural Wastes: Principles and Guidelines for Practical Solution, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York, p 161-166. 3 fig, 3 ref.

Descriptors: *Farm waste, *Poultry, Oxidation lagoons, Settling basins, Waste water disposal, *Waste treatment, Chlorine, Run-off, *Treatment facilities.
Identifiers: *Pre-settling lagoon, Confined buildings, *Duck wastes.

The Long Island duck industry is presently comprised of 35 farms and processing plants, marketing approximately 7 million ducks a year. This figure represents about 65% of the nation's ducks with the majority going to New York restaurants

and markets. A minimum of 6 gal. of water per duck per day is necessary. Most farmers use between 10 and 20 gal. of water per duck per day. In the past, ducks were given free access to the freshwater streams and rivers and their wastes were carried out into the waterway, which caused serious pollution. In order to curb this pollution, the New York State Department of Health required duck farmers to comply with a four-phase program of water pollution abatement. The first two phases of this program called for the removal of ducks from open waters and providing facilities that would remove settleable solids. The third phase of the order called for the disinfection of the waste effluent. The fourth phase called for nutrient removal. Each farm involved in waste treatment is issued an operating permit after the system has been inspected and approved by the New York State Dept. of Environmental Conservation. The permit describes the approved facilities and specifies what equipment is incorporated into the system, such as the size, number and capacity of aeration lagoons, settling lagoons, chlorination tanks, pumps, and the number of aerators to be utilized. These facilities cannot be altered without prior approval of the New York State Department of Environmental Conservation. (Bundy-Iowa State)

0667 - D1, F5

FOOD PROCESSING WASTEWATER TREATMENT,

Harnish and Lookup, Assoc., Newark, N.Y.
P. Russell.
In: Agricultural Wastes: Principles and Guidelines for Practical Solutions, Cornell University Conference on Agricultural Waste Management, February 10-12, 1971, Syracuse, New York, p 167-172. 3 fig, 2 tab, 14 ref.

Descriptors: *Waste water treatment, Irrigation, Lagoons, Activated sludge, Aeration, Water management, New York.
Identifiers: *Food processing, Wastes, Spray irrigation.

In the food processing sector of the agricultural industry, wastewater treatment and disposal is one of the most significant problems facing today's corporate management. In New York state alone, over 100 food processing plants produce wastewater equivalent to 5 million people. The problem must be completely determined in order to provide a proper wastewater management program. An in-plant wastewater sampling program is essential to determine wastewater sources and characteristics. A process flow schematic is also essential. To treat the wastewater, preliminary treatment includes screening, nutrient additions, pH control, and equalization in many cases. In some cases, spray irrigation is a very suitable means for wastewater disposal from food processing operations. The important elements of a spray irrigation system are adequate surface area and a soil which allows for infiltration into the ground. In other instances where a BOD removal efficiency up to 85% is adequate, aerated lagoons have been employed successfully in treating food processing wastewaters. Methods including stabilization ponds, filter, and chemical treatment are used when advanced treatment is necessary.
(Bundy-Iowa State)

0668 - C1, D4

PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTES--SECOND PROGRESS REPORT,

California Univ., Berkeley. Sanitary Engineering Research Lab.
Gordon L. Dugan, Clarence G. Golueke, William J. Oswald, and Charles E. Rixford.
California University, Sanitary Engineering Research Laboratory, Report No. 70-1, 165 p, 24 fig, 55 tab, 51 ref. US Public Health Service 5RO1 UI 00566-03.

Descriptors: *Farm wastes, *Poultry, Waste water treatment, Sedimentation, Oxidation lagoons, Anaerobic digestion, Algae, Sludge, Methane, Organic loading, Hydrogen ion concentration, Temperature, Centrifugation, Coagulation, Dewatering, *Cost analysis.
Identifiers: Volatile solids, Grit.

A 36-week study was initiated to provide information on the economics of treating animal wastes. Chickens were chosen, mainly for convenience sake, as the waste producers to be studied, and 113-twenty week old leghorn pullets were placed in cages. The treatment system used consisted of inclined troughs under the cages which were flushed with water from a flushing bucket, grit removal, sedimentation, an oxidation lagoon for the sedimentation tank supernatant, and an anaerobic digester for the solids. The systems approach was used, and system balances were performed for total solids, volatile solids, total unoxidized nitrogen and energy for the chickens, sedimentation tank, digester, and algae. All balances were performed from week 5 through week 36 except for the digester, where operation was terminated at week 24 and the solids dewatered, dried, and studied for possible further reuse. An economic analysis of an integrated system of 100,000 laying hens revealed a cost of approximately 2 cents/dozen eggs for a system based on the one tested. However, consideration of an extremely conservative algae harvesting rate of 12 tons/acre/year at a price of 5 cents/lb (dry weight) dropped the overall waste handling outlay to approximately 1 cent/dozen. On this basis, additional studies were recommended to aid in the implementation of treatment facilities for animal wastes as soon as possible. (Lowry-Texas)

0669 - A2, B1

ANIMAL AND HUMAN METABOLIC WASTES.

Illinois Univ., Urbana. Council on Environmental Quality.

Proceedings of First Allerton Conference, December, 1970, Special publication no. 21, College of Agriculture, Illinois University at Urbana-Champaign, April, 1971, p 23-25. 2 tab.

Descriptors: *Farm wastes, *Water pollution, *Biochemical oxygen demand, *Sludge disposal, Municipal wastes, Anaerobic digestion, Oxidation, Fertilizers.
Identifiers: Pollution abatement, Population equivalents.

Livestock needed to produce America's meat supply also produce 2 billion tons of manure per year. Undiluted livestock wastes are 100 times more concentrated than municipal sewage. Pollutants include plant nutrients, oxygen-demanding components, infectious agents, color, and odor. Aerobic bacteria thrive at Dissolved Oxygen levels down to .5 ppm, but fish need about 4 ppm. Typical BOD livestock population equivalents include dairy cow — 12, 200 pound hog — 2.5, and laying hens — 0.10. The greatest potential for stream pollution is feedlot runoff. Methods of abatement include diverting rainwater around lots, collecting runoff in detention ponds, and putting roofs over lots. Most odor nuisance can be avoided by incinerating, composting, refeeding proteinaceoulsolids, or anaerobically digesting. Farmland can be used to dispose of digested sludge of municipal waste treatment plants. Typical fertilizer contents of total sludge (water and solids) are 5 per cent nitrogen, 3 per cent phosphorus, and .5 per cent potassium. Land, not watercourses, should be the receptor of livestock and municipal waste residues. (Schmitt-Iowa State)

0670 - B1, D1, E1, F4

ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES,

Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
Raymond C. Loehr.
Journal Water Pollution Control Federation, Vol 43, No 4, p 668-678, 2 fig, 2 tab, 10 ref.

Descriptors: *Farm wastes, *Disposal, *Treatment, *Systems analysis, Runoff, Pollutant, Nutrients, Aerobic treatment, Anaerobic digestion, Dentrification, Nitrification, Effluents, Legal aspects, Waste water treatment, Waste disposal.
Identifiers: Options, Land disposal, Oxidation ditch, Pollutional characteristics alternatives.

The various systems for treating wastes from enclosed confined animal production operations are discussed. There is no one process or waste management system that will be adequate for all animal production operations. Aeration systems such as oxidation ditches are gaining acceptance for waste handling and treatment. It is unlikely that current liquid waste treatment systems for treating concentrated animal waste water will produce effluents that can be discharged to surface water. Land disposal is an integral part of feasible animal waste treatment systems. (Christenbury-Iowa State)

0671 - A5, C2, D2

REMOVAL OF WATER FROM ANIMAL MANURES, PART II: EFFECTS OF VELOCITY ON AIR DRYING,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
In: Agricultural Waste Management and Associated Odor Control, Cornell University AWM 71-04, September 1, 1971. 10 p, 2 tab, 7 fig, 4 ref.

Descriptors: *Farm wastes, *Poultry, *Drying, Waste storage, Odor.
Identifiers: Air-drying manure.

Water can be removed from animal manures by mechanical, thermal, and absorptive means. Thermal removal was investigated by utilizing a thin layer of unheated air, and a very low or 'static' air velocity. The equilibrium moisture content of chicken manure is comparable with other agricultural hygroscopic materials. Effects of humidity on drying time are significant but sample variation has an effect similar to a plus or minus 15% relative humidity change. Temperature, configuration of manure, thickness, compaction, velocity of air, and the biological state of the manure also affects the drying rate. Exposure to drying on both sides had an effect on 1/4 in. thick manure samples for velocities less than 700 FPM, but the effect was insignificant for 1/8 in. samples. Velocities greater than 800 FPM did not appreciably reduce the drying time from that of the 800 FPM level. Drying times for velocities 800 FPM or greater were approximately 1/3 that for 'static' conditions. The time required to remove the last 0.9 percent of water was approximately 8 hours at 'static' conditions and 5 hours at the higher velocities.
(Schmitt-Iowa State)

0672 - A6, C3

MEASUREMENT OF MANURE GASES BY GAS CHROMOTOGRAPHY,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. L. Day.
In: Agricultural Waste Management and Associated Odor Control, Cornell University, AWM 71-04, September 1, 1971. 6 p, 1 fig.

Descriptors: *Farm wastes, *Gas chromatography, *Ammonia, *Carbon dioxide, Methane, *Hydrogen sulfide.

Identifiers: Varian Aerograph Model 200 Chromatograph, Porapak T, Porapak S, Porapak Q, Porapak R, Carle T.C. detector.

A combination of gas chromatograph equipment was sought to measure manure gases, specifically ammonia. Previous work had used both thermal conductivity and hydrogen flame detectors for measuring methane, hydrogen sulfide, and carbon dioxide. A setup using silica gel and molecular sieve columns in series was considered undesirable since the molecular sieve is suspected of permanently retaining CO_2, NH_3, and H_2O. Experiments were conducted with a Varian Aerograph Model 200 Chromatograph with T.C. detector with a 1/8 in. X 8 ft. of 100-120 Porapak T column and a Carle T.C. detector with 1/8 in. X 8 ft. of 50-80 mesh Porapak Q in series with 1/8 in. X 8 ft. of 50-80 mesh Porapak R. Ultimately it was found that there was as much CO_2 in a cylinder marked as 123 ppm NH_3 and the balance N_2 as in a CO_2 cylinder marked as 0.49% CO_2, 20.8 O_2, and balance N_2. This explained the identical elution time for the NH_3 and CO_2 cylinders. 123 ppm NH_3 was below the detection level for the gas chromatograph setups. NH_3 in the absence of CO_2 was used in other tests. The thermal conductivity and hydrogen flame detector chromatographs were not very reliable for quantitative measurement of ammonia in the 2,000 to 12,000 ppm concentration range; the threshold level appears to be 1% or higher. (Schmitt-Iowa State)

0673 - A5, C1

OLFACTORY MEASUREMENT OF ANIMAL MANURE ODOR,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
A. T. Sobel.
In: Agricultural Waste Management and Associated Odor Control, Cornell University, AWM 71-04, September 1, 1971. 21 p, 12 fig, 7 tab, 11 ref.

Descriptors: *Farm wastes, *Poultry, *Drying, *Odor.
Identifiers: Air-drying manure.

The gas chromatograph can detect compounds to 10-12g of any material, but odorous compounds below this level can be readily detected by the human nose. Consequently, an odor panel was created and asked to rate various manure samples as to the presence of odor, and the offensiveness of the odor. A scale of 0-10 was used with zero representing no odor and 10 representing a very strong and offensive odor. Samples included manure that was undiluted, diluted in various proportions, and manure that was dried to various moisture contents. The use of a rating method utilizing the human nose for odor evaluation provides valuable information for comparing manure handling and treatment systems. Ratings for odor presence and odor offensiveness are very similar. Descriptive terms help in catagorizing odors. Olfactory observation along with visual observation produces a different rating in comparison with olfactory observation only. Visual observation may introduce some bias. Since there is no right answer to an olfactory test, the test must be set up and run under conditions such that the results can be used for comparison only. (Schmitt-Iowa State)

0674 - A5, B1, C1

CONTROL OF ODORS THROUGH MANURE MANAGEMENT,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
D. C. Ludington, A. T. Sobel, and B. Gormel.
In: Agricultural Waste Management and Associated Odor Control, Cornell University, AWM 71-04, September 1, 1971. 17 p, 13 fig, 8 tab, 2 ref.

Descriptors: *Farm wastes, *Poultry, *Drying, *Odor.
Identifiers: Air-drying manure.

Attempts to mask, counteract, or oxidize odors from manure have been largely unsuccessful. If odors cannot be controlled once they have been formed, an effort must be made to inhibit the production of odors. To evaluate the success of efforts to control odors a measuring device is needed. A panel of humans rating odor presence and offensiveness from 1 to 10 has been found the best device for evaluation. Experiments were conducted to check the influence of moisture removal and manure removal on the odor offensiveness of the gases released from chicken manure. Removing moisture reduced the odor level. Diluted manure always produced the highest offensiveness and undiluted manure the next highest. Daily scraping which did not allow buildup of manure was also a successful technique for controlling odor. A manure management system which either removes the manure from the building at least daily without manure buildup or removes moisture from the manure will cause a minimum amount of air pollution. (Schmitt-Iowa State)

0675 - D2

UNDER CAGE DRYING OF POULTRY MANURE,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
B. Gormel, A. T. Sobel, and D. C. Ludington.
In: Agricultural Waste Management and Associated Odor Control, Cornell University, AWM 71-04, September 1, 1971. 15 p, 7 fig, 7 tab.

Descriptors: *Farm wastes, *Poultry, *Drying, Waste disposal, Odor.
Identifiers: Air-drying manure.

Various means to achieve drying of poultry droppings before they could mat together into a solid mass were investigated. Fins made of different materials placed at various angles, screens, and rotating pins were investigated, with air movement at 3 to 4 cfm per bird. The moisture content of manure from caged layers was reduced to 50% by use of metal fins below the cages. Fins at more than 45 deg. angles caught a low percentage of the manure and thus, had small effect. Supplementary fins at 30 deg. beneath the 45 deg. fins were not self-emptying. Air circulation is of great importance in fin drying of poultry manure. Vertical fins will hold about 46% of the total manure when the fins are placed 3/4 in. apart. Half-inch expanded metal allowed too high a percentage of fresh droppings to pass into the pit to be a significant benefit in the drying process. Rotating pins reduced the moisture content to about 50% but something stronger than the 1/4 in. maple dowel 7 3/4 in. pins is needed. In these tests, drying took place partially on the devices such as screens, metal fins or spindles with significant additional drying of the crumbled manure occurring in the chamber pits because the devices prevented the formation of a solid mass of droppings in the pit. (Schmitt-Iowa State)

0676 - A4, C3, C4, C5

CHEMICAL AND MICROBIAL STUDIES OF WASTES FROM BEEF CATTLE FEEDLOTS,

Agricultural Research Service, Lincoln, Nebr. Soil and Water Conservation Research Div.
T. M. McCalla, and F. G. Viets, Jr.
Proceedings: Pollution Research Symposium, May 23, 1969. Typescript, 24 p, 14 tab, 77 ref.

Descriptors: *Microorganisms, Chemical properties, Cattle, Farm wastes, Odor, Runoff, Confinement pens.
Identifiers: Great Plains, Nebraska, Feedlot.

Chemical and microbial characteristics of beef cattle waste are discussed along with some of the possible microbial and chemical transformations that reduce the disposal problem. The cattle feedlot waste depends on the ration feed. Generally, cattle in feedlots are started on a high-roughage ration and quickly shifted to a high-concentrate one. A high-concentrate ration has about 75% to 85% digestible material and 5% to 7% minerals, resulting in 4 to 5 lbs. of feces per animal per day. Pollution of groundwater beneath beef cattle feedlots appears to be determined by a number of factors; namely, stocking rate, manure removal, depth of water table, and soil texture and structure. Indications are that low stocking rates and frequent manure removal contribute to nitrate leaching into the water table. Also, feedlots in which the groundwater is relatively close to the surface are more apt to contain nitrate in excess of 10 ppm than are feedlots with a deeper water table. Beef cattle feedlots established on coarse-textured, sandy soils may permit more movement of pollutants to the groundwater than those established on fine-textured clay soils. (Dorland-Iowa State)

0677 — A1, B1, D1, E1, F1

THE POLLUTION POTENTIAL OF THE CONFINED LIVESTOCK FEEDING INDUSTRY

Midwest Research Institute, Kansas City, Missouri.
The Pollution Potential of the Confined Livestock Feeding Industry, Final Report, Midwest Research Institute, 425 Volker Bolevard, Kansas City, Missouri, November, 1971. pp. 1-224.

Descriptors: *Farm Wastes, Biochemical Oxygen Demand, Cattle, Feedlots, Waste Treatment, Economic, Runoff, Aerobic Treatment, Sheep, Swine, Poultry.
Identifiers; Manure Handling Techniques.

The confined livestock feeding industry has been studied in depth. Typical feedlot operations have been examined, livestock wastes have been charcaterized, and waste management techniques and treatment processes have been evaluated. Animal wastes are highly concentrated. Conventional treatment processes can be applied to these wastes, but will not produce effluents suitable for stream discharge. Such treatment, therefore, is seldom feasible and rarely necessary if good management practices are followed. Animal waste management is aimed at returning the wastes to the land, with essentially no effluent reaching natural waterways. Appropriate management practices include: 1) minimizing the quantity of runoff by diversion of all water outside the feedlot; 2) Controlling runoff emanating from inside the feedlot; 3) detaining liquid runoff fro mthe feedlot in ponds or lagoons; 4) returning the detained liquids to the lands as required to prevent detention pond overflow; and 5) periodically removing solid wastes from feedlots for ultimate disposal on land. Such practices will be compatible with the industry's economic structure, acceptable to the industry's management, and effective in eliminating known pollution hazards. Auditional research is needed to insure that the synthetic chemicals used in livestock feeding operations are not harmful when returned to the environment. (Bundy-ISU)

0678 - F4

THE FUTURE OF FARM ANIMAL WASTE MANAGEMENT,

Minnesota Univ., Minneapolis. Dept. of Agricultural Engineering.
James A. Moore, and Donald B. Brooker.
Agricultural Engineering, Vol 51, No 7, p 414, 417, July 1970.

Descriptors: *Farm waste, *Water treatment, *Water pollution control, *Long term planning, Manure, Odor, Agricultural engineering.

Predicts the future development of livestock waste management schemes. It includes a discussion of future water quality requirements as well as the necessity for odor control. The need for mechanization as well as increased energy consumption are discussed. (Miner-Iowa State)

0679 - A3, C3

NITROGEN LOSSES FROM ALKALINE WATER IMPOUNDMENTS,

San Diego State Coll., Calif. Dept. of Civil Engineering.
Frank E. Stratton.
Journal of the Sanitary Engineering Division, Proceedings of the American Society of Civil Engineers, Vol 95, No SA2, p 223-231, 1969. 5 fig, 1 tab, 3 ref.

Descriptors: *Alkaline water, *Nitrification, *Nitrogen, Impoundments, Ammonia, Analysis, Analytical techniques, Hydrogen ion concentration, Temperature, Winds, Effluents, Lakes, Surface waters, California.
Identifiers: Elfin Forest Lake (Calif), Gaseous ammonia nitrogen, Degasification.

A method of estimating the loss of gaseous ammonia from alkaline waters consists of analysis of samples from outdoor impounded water subject to mixing by wind. Another method involves the use of a floating cell and acid trap to determine ammonia liberated from an impoundment. The field tests were conducted from June to September in two small California eutrophic impoundments: Elfin Forest Lake with pH 9.5-9.8, and a pH 9.1 effluent pond at the Santee Water Reclamation. The measured rate of loss of ammonia nitrogen for the Elfin Forest Lake was 3.3 milligrams per square foot/day, whereas that for the Santee pond, 9.1 milligrams per square foot/day. The determined values constituted 14% and 22% of the predicted values for these basins, respectively. (Wilde-Wisconsin)

0680 - B1, F3, F4

ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE,

California Univ., Davis.
W. J. Clawson.
Journal of Animal Science, Vol. 32, No. 4, April 1971, p 816-820, 1 tab, 9 ref.

Descriptors: *Farm wastes, Economics, Cropland, California, Waste management, *Waste disposal, *Waste treatment, *Feed lots.

No one method will satisfy the need for suitable waste management in animal agriculture. Two basic pathways seem to be available for disposal of animal waste. The first is utilization of all or parts of the animal waste where a cost is incurred and a value for the product (s) is returned. The alternative may be outright destruction or degradation of animal waste where a cost is incurred and no return is evident. Acknowledgment must be made of the fact that agriculture will be forced to stop pollution and that the additional cost of this type of waste management may not be recovered from waste alone. Future research must help provide more methods of cleaning and transporting animal wastes. Another approach is to study methods which will permit the effective growth and fattening of animals in less confined areas than is currently the case. By treating the removal and distribution of animal wastes as an expense to the animal production industry, evaluation of waste disposal methods is improved and a more intelligent evaluation of alternative methods may be made by the animal industry. (Bundy-Iowa State)

0681 - C2, D4, E2

EFFECT OF FEEDLOT LAGOON WATER ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF SOILS,

Kansas State Univ., Manhattan. Dept. of Agronomy, and Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
David O. Travis, W. L. Powers, L. S. Murphy, and R. I. Lipper.
Partially supported by OWRR, Dept. of Interior. Soil Science Society of America Proceedings. Vol 35, No 1, p 122-126, January-February 1971. 5 p, 7 fig, 4 tab, 12 ref. OWRR Project A-016-KAN (2).

Descriptors: *Farm wastes, *Water pollution effects, *Path of pollutants, *Irrigation water, *Waste water disposal, Lagoons, Saline soils, Nitrates, Salts, Leaching, Soil water, Soil chemistry, Soil properties, Soil texture, Soil structure.
Identifiers: Feedlot lagoons.

Lagoon water from cattle feedlot runoff was added to undisturbed soil columns 42 cm long and 6.7 cm in diameter. The infiltration rate of the lagoon water into the columns was measured and recorded. After each run, the soil columns were sectioned into 3-cm increments and analyzed for Ca, Mg, Na, K, and NH4 ions. Also the electrical conductivity of a saturation extract from the top 15 cm of each column was determined. Water flow in the soil columns stopped for all soils before two pore volumes of filtrate could be collected. The percentages of Na, K, and NH4 ions increased in the surface increments of the soil columns. The electrical conductivity of the saturation extracts for all soils was increased by more than 200% by adding the lagoon water to the soil. The saturation extract of the treated soils had electrical conductivity values of between 2.80 and 5.05 mmhos/cm. (Knapp-USGS)

0682 - A5, D2, F2

AERATION OF LIQUID POULTRY MANURE; A STABILIZATION PROCESS OR AN ODOUR CONTROL MEASURE,

Guelph Univ. (Ontario). Dept. of Microbiology.
R. G. Bell.
Poultry Science, Vol. 50, No. 1, January 1971. p 155-158. 3 fig, 9 ref.

Descriptors: *Farm wastes, Biochemical oxygen demand, *Odor, *Aeration, *Poultry, Anaerobic digestion, *Degradation (Decomposition), Liquid wastes, *Waste water treatment.
Identifiers: Fatty-acids.

The offensive odors associated with the storage of liquid manures are caused by the accumulation of the by-products of the anaerobic decomposition of fecal organic matter. A direct relationship has been observed between the concentration of one such group of by-products, the volatile fatty acids, and the odor quality of stored liquid poultry manure. It was suggested that a 0.1% fatty acid content was an acceptable level for new facilities and 0.2% was a minimum level for the initiation of prosecutions under any proposed air pollution legislation. Aeration, on purely theoretical grounds, must be a means of preventing stored liquid manure from acquiring a foul odor since anaerobiosis and the presence of free oxygen are incompatible. In practice it is now well established that aeration is an effective way by which to control the odor of liquid manure. The present study was undertaken to ascertain whether the fatty acid content remained a reliable odor assessment criteria for aerated stored manure; and to observe whether an aeration rate sufficient to control odor would result in the stabilization of the manure. The fatty acid content was shown to provide a reliable assessment of the odor quality of stored aerated liquid poultry manure. For satisfactory odor control in the manure storage system containing 0.562 cu. ft. of water per hen it was only necessary to satisfy 37% of the daily applied BOD. Aeration as used in the experimental system must be considered as an odor control measure and not as a stabilization process. (Bundy-Iowa State)

0683 - B1, F4

ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE,

Purdue University, Lafayette, Ind. Dept. of Animal Science.
J. H. Conrad, and V. B. Mayrose.
Journal of Animal Science, Vol. 32, No. 4, April 1971. p 811-815. 22 ref.

Descriptors: *Farm wastes, *Confinement pens, *Swine, *Odors, Farm management, Irrigation, Biochemical oxygen demand, *Aeration, *Waste water treatment.
Identifiers: Slotted floors.

Farmer-producers are becoming larger and more specialized. An estimated twenty-five percent of the hogs are produced in total confinement and another fifty percent of the hogs produced by large producers are in partial confinement during the growing and/or finishing period. As confinement feeding increases, concern about the volume of wastes excreted does also. Some procedures of measuring and facts about fecal production are discussed. An ideal manure handling system should incorporate the ultimate in automation, oxidize volatile solids, require a minimum amount of maintenance and be economical to operate. Waste disposal systems discussed include; mechanical or hand scraping and cleaning in conjunction with total hauling and spreading, a combination of scraping and flushing the wastes into a lagoon or holding pit, a slotted floor over a pit, a slotted floor over a pit with oxidation wheel, slotted floor over a lagoon, slotted floors over a pit with oxidation wheels and a lagoon, and the plow-furrow-cover technique. Another problem with swine confinement is gas generation. Some of the gases generated are toxic while others cause offensive odors. Speculation into the future has come up with this system, perhaps with slight modifications, as an acceptable one. Animals will be reared in totally enclosed buildings on slotted floors. Wastes will be flushed by recycled lagoon water into the lagoon which contains a floating aerator. Effluent containing both liquid and suspended fine solids will be used for crop irrigation. (Bundy-Iowa State)

0684 - A2, A5, D1, E1

CHANGING PRACTICES IN AGRICULTURE AND THEIR EFFECT ON THE ENVIRONMENT,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering; and California Univ., Davis. Dept. of Agricultural Engineering.
Raymond C. Loehr, and Samuel A. Hart.
CRC Critical Reviews in Environmental Control, Vol 1, No 1, p 69-99, February 1970. 31 p, 7 fig, 9 tab, 67 ref.

Descriptors: *Reviews, *Bibliographies, *Water pollution sources, *Farm wastes, Waste treatment, Aesthetics, Odors, Sewage disposal, Disposal, Farm management, Water pollution control, Environment, Water quality, Air pollution, Urbanization.
Identifiers: Animal production wastes.

This review emphasizes one facet of agriculture, animal production as an example of the changes that have taken place in agriculture. The major topic areas include: productivity increases, changes in size of operations, handling problems, waste characteristics, surface and groundwater quality, land application of wastes, land runoff, odor production, and waste management techniques. Because farms are located in relative isolation surrounded by apparently unlimited land, air, and water, contaminants generated by agriculture usually would be sufficiently dilute or stabilized before potential problems become real. Modern developments in agriculture and growing recreational use of rural lands are tending to eliminate this relative isolation. The large livestock producer is in the animal rather than in the crop-farming business. He relies on commercially available feeds for a considerable portion if not all of his feeding requirements, has a minimum interest in utilization of the resultant manure in crop production, and may not have adequate land of his own for satisfactory disposal of the animal wastes. The outlook is

for continuation of these trends in modern agriculture and for an increase in the environmental problems described in this review. No new facility or expansion of existing facilities for agricultural production should be considered without prior planning which should include the probable environmental effects of the disposal of wastes from the facility. (Knapp-USGS)

0685 - A5, A6, B1, D1

GASES AND ODORS FROM STORED SWINE WASTES,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
Arthur J. Muehling.
Journal of Animal Science, Vol 30, No 4, p 526-531, April 1970. 18 ref.

Descriptors: *Farm wastes, Ammonia, Manure, *Gases, Odor, Methane, Carbon dioxide, Hydrogen sulfide, *Hogs.
Identifiers: Swine confinement, *Manure odors, Storage pits.

One major problem arising from the storage, handling, treating and eventual utilization or disposal of hog wastes associated with confinement hog systems is the inevitable presence of gases and odors. The most important gases generated in a hog confinement unit are thought to be carbon dioxide, ammonia, hydrogen sulfide, methane and a large group of trace compounds such as amines, mercaptans, and skatoles. Under normal conditions in an adequately ventilated confinement unit no noxious gas reaches lethal or even harmful concentrations for pits or humans. Critically dangerous conditions exist when the oxygen content of the air diminishes from the normal 21 to 10% or less. It is only under special conditions such as during a ventilation failure, or during rigorous agitation of the manure pit that dangerous levels are reached. It may be possible to apply the industrial methods of treating odors; namely, dilution, absorption, adsorption, masking, counteraction and burning to the control or odors from stored manure. (Miner-Iowa State)

0686 - E3, F5

NEW PROCESS CONVERTS CATTLE RUMEN TO FEEDSTUFF,
D. Natz.
Feedstuffs, Vol 43, No 28, July 10, 1971. 1 fig.

Descriptors: *Farm wastes, Cattle, Suspended solids, *Waste treatment, *Feeds.
Identifiers: Feeding trials.

A practical means of turning rumen content (paunch) of slaughtered cattle into a valuable feed ingredient is claimed by Dr. Paul A. Stahler, a Minnesota medical doctor. The patented 'Stahler Conversion Process' actually converts the paunch material into two usable feed ingredients. One is a concentrated liquid fed to hogs as a top dressing over grain. The other is a dehydrated product which is fed to cattle much like silage. Stahler's process first separates the liquids and solids by suction, then compresses the high moisture solids to extract more liquid. The liquids then go into a holding for sterilization and processing. The solids move into a revolving drum-type heating and drying unit where they are exposed to 2000 to 3000F temperatures. The solids can then be pelleted if desired. Stahler reported that the paunch, when processed according to the prescribed methods, will provide a minimum of 75% of the commonly accepted nutritive requirements of beef cattle during the finishing phase. He said that it has even more potential as a pre-finishing ration - from about 400 to 800 pounds. The cost to produce this material in 1960 was about $17.04 per ton. During feeding trials conducted by Stahler, cattle gained an average of 2.5 pounds per day on a ration of which a major part was paunch products. Stahler predicted that beef production nationally could be increased by 25% by utilizing the rumen content of animals as a feed product. (Wallin-Iowa State)

0687 - B2, D4, F5

OPERATION OF AN ANAEROBIC POND ON HOG ABATTOIR WASTEWATER,
Steeg (Henry B.) and Associates, Inc., Indianapolis, Ind.; and Wastewater Treatment Plant, Logansport, Ind.
C. F. Niles, and H. P. Gordon.
In: Proceedings, Industrial Waste Conference, 25th, May 5-7, 1970, Purdue University, Engineering Extension Series No. 137, Part II, p 612-616, 1 tab.

Descriptors: *Waste water treatment, *Operating costs, Anaerobic conditions, Effluents, Activated sludge, Biochemical oxygen demand, Labor, Pretreatment, Management, Indiana, *Lagoons, *Industrial wastes.
Identifiers: *Abattoir wastewater, Anaerobic lagoons, Secondary treatment, Suspended solids.

The development of a design for an anaerobic pond for pretreatment of the wastewater from an abattoir, design criteria and details of the anaerobic pond, and the operating techniques being used in treating the effluent from the anaerobic pond before discharge to the river are described. Some information on operating results, labor requirements and power consumption are also included. It was estimated that processing 400 hogs per hour on a one shift kill would result in a flow of 800,000 gal per day with a peak rate of 1400 gal per min. It was further estimated that this wastewater would contain 8000 pounds of BOD and 6650 pounds of suspended solids per day. The effluent from the lagoon was introduced into the activated sludge secondary treatment step of the city sewage treatment plant. For successful operation on a year-round basis, a cover for the lagoon was considered necessary. The cover was composed of straw and grease and maintained temperatures year-round above 80 degrees F. (Dorland-Iowa State)

0688 - C2, C3, C4, C5

CHARACTERIZATION OF WASTE TREATMENT PROPERTIES OF PIG MANURE,
Newcastle-upon-Tyne Univ. (England). Dept. of Agricultural Engineering.
J. R. O'Callaghan, V. A. Dodd, P. A. J. O'Donoghue, and K. A. Pollock.
Journal Agriculture Engineering Research, Vol 16, No 4, p 399-419, December 1971. 13 fig, 15 tab, 8 ref.

Descriptors: *Farm wastes, *Hogs, Feeds, Biochemical oxygen demand, Chemical oxygen demand, Solid wastes, Hydrogen ion concentration, Nutrients, Phosphorus, Potassium, Confinement pens.
Identifiers: *Total solids, Volatile solids.

The daily faecal and urinary production from individual pigs were measured over the live-weight range 20-90 kg. Three different feeding regimes were employed. Faecal and urinary production can be expressed as a percentage of meal and water consumed; the values are influenced by feeding regime. The results from the study on individual pigs were, in general, confirmed by a trial carried out on groups of pigs. There was no significant difference in the quantity of manure produced by hogs and gilts. Feeding regime was found to influence significantly the major properties of pig manure. The properties studied included biochemical oxygen demand, chemical oxygen demand, total solids, volatile solids, pH and the major nutrient elements, nitrogen, phosphorus and potassium. No significant reduction in either oxygen demand or volatile solids was achieved by storing the manure in dung channels for periods of up to 18 weeks. (Bundy-Iowa State)

0689 - A3, B1, F4

WASTE MANAGEMENT FOR FEEDLOTS,
Nebraska Univ., Lincoln. Coll. of Agriculture.
E. A. Olson.
Extension Service Bulletin, E.C. 71-795, (1971). 14 p, 15 fig.

Descriptors: *Farm wastes, *Nebraska, Livestock, Runoff, *Feed lots, *Water pollution control, *Pollution abatement, Legal aspects.

Guidance and information are provided to help livestock producers develop facilities that will, by proper waste management, help prevent pollution. Careful selection of a new site for livestock production facilities can help reduce potential water and/or air pollution problems. Methods for controlling and managing waste runoff for existing or new lots are described. These techniques are based on results of recent research on waste management by USDA Agricultural Research Service personnel and the University of Nebraska. The Nebraska Water Pollution Control Act requires that programs to control livestock wastes be operational by December 13, 1972. (Bundy-Iowa State)

0690 - B1, C1

AN IMPROVED METHOD FOR SEPARATE COLLECTION OF URINE, FECES, AND EXPIRATORY GASES FROM THE MATURE CHICKEN,
Agricultural Research Service, Fargo, N. Dak. Metabolism and Radiation Research Lab.
G. D. Paulson.
Poultry Science, Vol 48, No 4, p 1331-1336, 1969. 3 fig, 7 ref.

Descriptors: *Farm wastes, *Urine, *Poultry, Sampling, Carbon dioxide.
Identifiers: Surgical modification, Poultry urine collection, Metabolism cage.

An improved method for surgical modification of the chicken and collection apparatus to facilitate separate collection of urine and feces is described. There was no mortality from surgery, and the modified birds were normal, as evaluated by outward appearance, feed and water consumption, urine and feces excretion, and post examination of sacrificed birds. A metabolism unit and a system for collecting respiratory CO2 from the chicken are also described. (Miner-Iowa State)

0691 - B3, C2

THE EFFECT OF HUMIDITY AND FLOORING TYPE ON THE MOISTURE CONTENT OF BROILER EXCREMENTS,
West Virginia Univ., Morgantown. Dept. of Animal Industries and Veterinary Science.
R. A. Peterson, M. A. Hellickson, W. D. Wagner, and A. D. Longhouse.
Poultry Science, Vol 49, No 2, p 439-443, March 1970. 1 fig, 2 tab, 2 ref.

Descriptors: *Farm wastes, Livestock, *Poultry, *Manure, Humidity, Air environment.
Identifiers: Broilers, Moisture content, *Flooring systems.

Experiments were conducted in part to determine the effect of humidity and flooring type on the moisture content of excreta from broilers. The experiments using broiler type chicks fed a high energy ration were conducted in four controlled 1.8 x 2.4 x 2.4 m environmental chambers. Relative humidity was measured and maintained. The following types were used, (1) 2.5 cm by 2.5 cm. welded wire (2) 1.3 cm. by 2.5 cm. welded wire and (3) 1.9 cm. flat wooden slats spaced 0.6 cm. apart. The average moisture content was significantly less in excreta collected under 1.9 cm. flat slats than collected beneath either 2.5 x 2.5 cm. or 1.3 x 2.5 welded wire floors. (Miner-Iowa State University)

0692 - B1, C1

EFFECT OF FEED PROCESSING ON DIGESTIBILITY OF ANIMAL FEEDS,
Kansas State Univ., Manhattan.
H. B. Pfost.
(1970) 21 p, 22 tab, 20 ref.

Descriptors: *Farm wastes, Feeds, Feed lots, Cattle, Microorganisms, Ammonia, Hogs.
Identifiers: *Daily gain, Daily feed, Starch.

Some degree of starch gelatinization improves the feed efficiency for beef, swine and broiler feeding enough to be economically feasible under typical conditions in the United States. The utilization of urea in ruminant rations can be improved by use in combination with gelatinized starch. The results of using a highly gelatinized product for feeding swine appear interesting from a research standpoint and may prove to be practical later. Much of the past research which involved grain processing is difficult to interpret because of the failure to measure and report chemical and physical changes which occurred during processing. Standardized methods which are correlated with animal performance need to be developed. Protein availability must be considered as well as starch availability. Future developments in equipment for processing must consider the economic costs required to obtain desired levels or product change. (Bundy-Iowa State)

0693 - C5

IDENTIFICATION AND EXCRETION OF ESTROGEN IN URINE DURING THE ESTROUS CYCLE OF THE EWE,
Purdue Univ., Lafayette, Ind. Dept. of Animal Sciences.
E. D. Plotka, and R. E. Erb.
Journal of Animal Science, Vol 29, No 6, p 934-939, 1969. 2 fig, 1 tab, 27 ref.

Descriptors: Farm wastes, *Sheep, *Urine, Organic compounds, *Chromatography.
Identifiers: Estrone, *Estrogen, Pregnant ewes.

Estrone was identified in urine of the non-pregnant ewe by comparing its behavior to crystalline standard estrone and by its failure to separate from added 14C-estrone through solvent partitioning, paper chromatography, successive thin-layer chromatography in different systems, gas-chromotography, (GLC) on three columns, derivative formation and chromatography of the derivatives. The highest average rate of excretion of estrone and estradiol occurred during estrus averaging 394 and 479 ug./24 hr. as compared to the lowest rates of 20 and 17 ug./hr., respectively, the second day after estrus. Expressing excretion rate as ng/mg. of urinary creatine was highly correlated (r-0.97-0.98) to total excretion based on total collection of urine for 24 hours. (Miner-Iowa State)

0694 - A2, B1

MANAGEMENT PRINCIPLES APPLICATION TO THE DISPOSAL OF CATTLE MANURE TO PREVENT POLLUTION,
Washington State Univ., Pullman. Coll. of Engineering Research Div.
D. E. Proctor.
Paper presented at the Eighth Texas Industrial Water and Wastewater Conference, Lubbock, Texas, June 6, 1968. 13 p, 1 fig.

Descriptors: *Farm wastes, Dairy industry, *Waste disposal, Confinement pens, Runoff, *Washington, Aerobic treatment, Lagoons.
Identifiers: Anaerobic lagoons, *Monroe (Wash).

The Sanitary Engineering Section of the College of Engineering Research Division was asked to consider the manure problem at a dairy and milk processing plant near Monroe, Washington. Winter flooding and cost were two problems that influenced the systems set up for the 230 to 240 cows. The final system consisted of scraping and flushing the manure into a central slurry sump. From here the manure can either be pumped to the fields for disposal through a manure 'gun' or pumped to one of three storage lagoons. Each lagoon measures 115 feet by 115 feet by 18 feet and all three can hold about 430,000 cubic feet of material. (Wallin-Iowa State)

0695 - A5, B1

CONTROL OF POULTRY HOUSE VENTILATION SYSTEMS USING SOLID-STATE CONTROLS,
Agricultural Research Service, State College, Miss. Farm Electrification Research Branch.
F. N. Reece, and J. W. Deaton.
Transactions of the American Society of Agricultural Engineers, Vol. 14, No. 6, p 1073-1075, November-December, 1971, 3 fig, 2 tab, 7 ref.

Descriptors: *Confinement pens, *Ventilation, *Poultry, Temperature, Cooling, *Waste treatment.
Identifiers: *Solid-state controls, Humidity controller, Variable-speed d-c motor.

Chickens, because of size, growth characteristics and sensitivity to light, lend readily to manipulation of production efficiency through confinement housing. However, as with any livestock, the success of confinement housing is dependent largely on the ventilation system. The conventional poultry-house ventilation system generally uses multiple fans, usually low-pressure axial-flow type, controlled by time clocks and thermostats, to regulate ventilation rate and control house temperature and humidity. The application of solid-state voltage control devices, used to control the speed of permanent split-capacitor, fractional-horsepower motors, further refines the system by providing resolution of the incremental steps of the multiple-fan system. The application of variable-speed, 1-hp and larger, d-c, electric motors with solid-state control to poultry-house ventilation systems appears to offer a method of solving some of the current problems in ventilation systems. By using a variable-speed, d-c motor and an appropriate, solid-state power controller regulated manually in summer and by means of dry-bulb or dew-point temperature transducers in winter, ventilation rate can be controlled in windowless poultry houses over the entire range necessary for optimum conditions throughout the year. The system provides a method of reducing the complexity of design and operation of ventilation systems. (Bundy-Iowa State)

0696 - A2, C1, C5

QUALITY OF EFFLUENT FROM SWINE PRODUCTION AREAS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering; and North Carolina Water Resources Research Inst., Raleigh.
J. W. D. Robbins, G. J. Kriz, and D. H. Howells.
Paper No. 69-706 presented at 1969 Winter meeting of the American Society of Agricultural Engineers Chicago, Illinois, December 9-12, 1969. 42 p, 21 fig, 4 tab, 21 ref. FWPCA Grant 13020 DGX.

Descriptors: *Farm wastes, Water quality control, *Surface waters, Discharge, Lagoons, Hogs, *Nitrates phosphorus, Coliforms, Biochemical oxygen demand, Chemical oxygen demand, *Toxicity, Antibiotics, Water pollution sources.
Identifiers: *Effluent disposal, Land application, Direct discharge, Automatic sampler, Feed additives.

Results are presented of the swine waste phase of a study initiated to identify the amounts of and factors governing pollutional loadings reaching surface waters and to answer whether and under what conditions animal wastes are a significant source of stream pollution. Knowledge of these factors is necessary to develop meaningful waste control, treatment, and disposal requirements for surface water protection. Results from representative swine waste management systems of lagooning, land disposal, and direct discharge to stream demonstrated the superiority of land disposal in controlling stream pollution. Discharge of lagoon effluents or direct discharge into surface water is unacceptable from a water quality standpoint. In land disposal, care must be taken that good management practices of soil and water conservation are followed to minimize movement of wastes into streams. The amount of wastes applied per unit area should be low enough to prevent excess nitrate levels in groundwater. Toxic substances in the wastes are a cause of difficulties in BOD tests on lagoon wastes. (Dorland-Iowa State)

0697 - A2, A3, B1, C1, E1

ROLE OF ANIMAL WASTES IN AGRICULTURAL LAND RUNOFF.
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
Environmental Protection Agency, Water Pollution Control Research Series, August 1971. 114 p, 32 fig, 19 tab, 75 ref, 2 append. EPA Program 13020 DGX 08/71.

Descriptors: *Farm wastes, *Runoff, *Agricultural runoff, *Water pollution, *Farm lagoons, Waste disposal, Sampling, Analysis, Disposal.

Twelve typical agricultural areas representing three types of animal waste management techniques--lagooning, direct discharge into streams, and land spreading including pasture and drylot units--were studied to determine the amounts of and factors governing stream pollution from swine, dairy, beef, and poultry production operations. More than 1500 stream and lagoon effluent samples were collected with an automatic sampler developed for the study. The samples were analyzed for bacteria, nutrients, and degradable organics. Hydrological and waste management data were also collected. Study results point to the superiority of land spreading for the disposal of animal wastes. Good soil and water conservation practices should be used to minimize the movement of wastes into streams. Higher rates of runoff result in heavier pollution. The location of disposal areas away from streams is important in controlling the amount of entering wastes. Even when land disposal areas are poorly located, the ar. ount of pollution entering streams is usually low; and watershed factors, such as surface culture and ease of erosion, are of primary importance in governing the magnitude of pollution which reaches the streams. Direct dumping of animal wastes, treated or untreated, into streams is completely unacceptable and should be prohibited. (Dorland-Iowa State)

0698 - A2, A9, C1, D1

CHARACTERISTICS AND EFFECTS OF CATTLE FEEDLOT RUNOFF,
Robert S. Kerr Water Research Center, Ada, Okla.
M. R. Scalf, W. R. Duffer, and R. D. Kreis.
In: Proceedings, Industrial Waste Conference, 25th, May 5, 6, and 7, 1970. Purdue University, Engineering Extension Series No. 137, Part 2, p 855-864, 10 fig, 3 tab, 6 ref.

Descriptors: *Farm wastes, *Runoff, *Fishkill, Cattle, Dissolved oxygen, Diversion structures, Sedimentation, Biochemical oxygen demand, Algae, *Confinement pens*, Impoundments, *Water pollution sources, *Agricultural runoff, *Water pollution effects, *Cattle, *Feed lots.
Identifiers: Algal blooms.

Cattle feedlot capacity in the United States has been increasing at about 10 percent annually in recent years. Essentially, all this growth has been in the form of large scale feedlots of 5000 to 100,000 head capacity. As with the concentrations of people, the concentration of thousands of animals in a small area produces massive environmental problems. Rainfall runoff may contain pollutant concentrations 10 to 100 times those of raw municipal sewage, and uncontrolled access to streams can result in oxygen depletion, fish kills, and other long term, undesirable ecological conditions for miles downstream. This study was designed to measure the quantity of rainfall runoff and its pollutional characteristics from a commercial feedlot and evaluate the effect of this wastewater on small impoundments. Less than two weeks of sedimentation in runoff collection ponds produced on effluent with pollutant concentrations of 10 to 30 per cent of the mean direct runoff concentrations. The necessity of further treatment was demonstrated when the feedlot operator pumped collection pond effluent through an inadequate treatment system into a 45-acre flood control reservoir. Essentially, all game fish in the reservoir were killed due to dissolved oxygen stress and high ammonia concentrations. (Dorland-Iowa State)

0700 - A2, B1, F2

LIVESTOCK WASTE DISPOSAL AND WATER POLLUTION CONTROL,
Colorado State Univ., Fort Collins. Cooperative Extension Service.
R. W. Hansen.
Colorado State University, Cooperative Extension Service, Bulletin 480a, October 1971. 13 p, 4 fig, 2 tab, 6 ref, append.

Descriptors: *Farm wastes, Feed lots, Cattle, Runoff, Odor, Lagoons, Settling basins, Nitrogen, Phosphorus, Potassium, Colorado, Waste disposal, Waste water treatment, *Water pollution control.
Identifiers: Controlled runoff, Anaerobic lagoons.

The purpose is to acquaint the feedlot operator and the livestock man with the general requirements for the control of pollution from livestock facilities. Both federal and state agencies are active in developing and implementing controls to enhance environmental quality. These efforts obviously and logically include livestock enterprises. General information is provided on types of systems that may be used to prevent pollution from feedlot runoff. The design of the system should be done by competent engineers. Engineering services are available from the Soil Conservation Service and consulting engineering firms. (Bundy-Iowa State)

0701 - A2, A3, A4, C1

WATER POLLUTION AND AGRICULTURE,
Kansas State Department of Health, Topeka. Environmental Health Services.
M. W. Gray.
(1968), 14 p, 2 tab.

Descriptors: *Farm wastes, Feed lots, Runoff, Kansas, Rainfall, Biochemical oxygen demand, Bacteria, Coliform, Streptococcus, Fishkill, Cattle, Lagoons, Irrigation.

Natural runoff pollution is defined as pollution resulting from all silts and organic materials carried by watercourses not originating from municipal, industrial, or agricultural operations. Agricultural pollution is pollution as a result of surface runoff, seepage, percolation and return flow from cultivated land used for producing food and feed crops. Animal feedlot pollution is pollutants originating from animal feeding operations of restricted area where the feed supply is nutritionally balanced for maximum animal weight gain prior to marketing. The public generally thinks first of pollution as originating from some industrial plant with black clouds of smoke pouring from its stacks and equally black foul liquids pouring from subterranean channels. The public probably will not be acquainted with pollution from agriculture except fishermen who have practiced their art in the areas of some of our highly intensified farming-livestock areas. (Bundy-Iowa State)

0702 - A3, C4

BUFFALO LAKE PROJECT, RANDALL COUNTY, TEXAS.
Robert S. Kerr Water Research Center, Ada, Okla.

December 1968, 64 p, 7 fig, 10 tab, 36 ref.

Descriptors: *Farm wastes, *Runoff, Rainfall, Bacteria, Coliforms, Streptococcus, Lakes, Recreation, Water sports, *Texas.
Identifiers: *Buffalo Lake (Tex).

Buffalo Lake is a shallow, man-made reservoir of 18,150 acre-feet capacity located on Tierra Blanca Creek, some 50 miles southwest of Amarillo, Texas. During this study the lake was only 13 feet deep at its deepest portion near the dam. At this depth the lake contained 3990 acre-feet of water and had a surface area of approximately 950 acres. The shoreline is characterized by gently sloping sandy beaches readily accessible by automobile. The overall objective of the Buffalo Lake pollution study as sponsored by the Texas Water Quality Board is to determine the cause of the recurring pollution of Buffalo Lake. The objectives include the answers to the following questions: (1) What effect do the various waste sources have on the bacteriological quality. (2) What is the fate of the three indicator groups of bacteria entering the lake. (3) What effect does the extensive water contact recreational use of Buffalo Lake have on the total coliform, fecal coliform and fecal streptococci densities. (4) What are the densities of coliforms in and around the lake before and after rainfall. (5) Does the bottom mud in the lake contain any appreciable densities of the three bacterial indicators. (6) Do any appreciable concentrations of pesticides exist in the lake. (7) What corrective measures should be taken to control the bacterial pollution of Buffalo Lake and its tributaries. It was recommended that the city of Hereford should properly chlorinate its treated sewage effluent on a continuous basis to protect the bacteriological quality of Tierra Blanca Creek; and that any portion of Buffalo Lake which becomes contaminated by bacterial density of over 200 fecal coliforms per 100 ml should be posted to water contact recreation. (Bundy-Iowa State)

0703 - B1, D1

FEEDLOT WASTE MANAGEMENT: SOME SOLUTIONS TO THE PROBLEM,
Agricultural Research Service, Lincoln, Neb.
N. P. Swanson, and C. B. Gilbertson.
Paper presented at the 1971 annual meeting, American Society of Agricultural Engineers, Washington State University, June 27-30, 1971, Paper No. 71-522. 6 p, 9 ref.

Descriptors: *Farm wastes, *Feed lots, Moisture content, Sampling, Runoff, Settling, Basins, Weirs, Analytical techniques.
Identifiers: Bedloads.

Feedlot waste management has come under increased scrutiny for the related reasons of waste disposal problems and pollution potential. Measurement of these wastes is necessary to determine their chemical and physical content, to determine rates of waste accretion and degradation, and to assess the transport of wastes by runoff. Characterization of feedlot wastes required quantitative measurement of manure accumulations on the feedlot surface, runoff from rainfall and snowmelt, movement into the soil profile, and the air quality surrounding the feedlot. The measurement and sampling of runoff from feedlots must include solid contents and bedloads. Some satisfactory methods of measurement include volumetric measurement, Parshall flume, and weirs; methods found unsuitable include the trapezoidal flume and Hs - and H - type measuring flumes. Time-sequential, rotating dipper, proportional samplers are satisfactory for obtaining representative samples of feedlot runoff. Ideally, a runoff hydrograph should be accompanied by a sequence of representative samples of the runoff and bedload, each sample taken over a uniform time interval. (Bundy-Iowa State)

0704 - B1, F1, F2

PLANNING ANIMAL WASTE DISPOSAL SYSTEMS,
Oregon State Univ., Corvallis. Cooperative Extension Service.
W. E. Matson.
Oregon State University, Extension Circular 736, May 1971. 15 p, 15 fig, 4 tab.

Descriptors: Farm wastes, Regulation, Economics, Government agencies, Costs, Waste disposal, Legal aspects, Odor.

Problems of animal waste disposal will continue to be important factors in determining the location of large scale livestock enterprises. The producers and the public must realize animal waste handling, treatment, and disposal will cost something. No one treatment process or treatment system will be the solution for all animal production units. Sanitary engineers, agricultural engineers, economists, agronomists, animal husbandry people, and others will need to closely coordinate activities. Research and demonstration projects are badly needed. Many of the most obvious cases of pollution could have been prevented if the facilities were located in different areas. The economics of pollution and nuisance control in animal production may mean the difference between success and failure for the facility. Livestock operators are urged to keep informed of current regulatory policies of the Department of Environmental Quality. The Cooperative Extension Service can be helpful in planning expansion or dealing with waste disposal problems. (Bundy-Iowa State)

0705 - B1

A MATHEMATICAL SIMULATION OF BEEF ANIMALS--A REALITY WITH POTENTIAL,
Oklahoma State Univ., Stillwater.
M. D. Paine, J. A. Witz, A. F. Butchbaker, J. E. McCroskey, and C. M. Bacon.
Paper presented at the 1971 Fall Meeting, Oklahoma Section, American Society of Agricultural Engineers Stillwater, November 5, 1971. 21 p, 7 fig, 3 tab, 9 ref.

Descriptors: *Mathematical models, *Cattle, *Environmental effects, *Computer models, Computer programs, Simulation analysis, Model studies, Numerical analysis, Data processing, Energy transfer, Metabolism, Theoretical analysis, Optimization, Feed lots, Nutrient requirements, Energy.
Identifiers: Thermal activity, Energy balance.

The development of beef feedlots with one time capacities of 30,000 head and more has created a need for better mathematical estimates of the effects of climate and nutrition upon beef production. This greater production places greater demands up0n management and encourages the use of systems modeling techniques to develop a better mathematical model of a beef animal than existed. This model would allow data from feeding trials to be applied to another location in a dif-

ferent environment. The basic conceptual model is represneted by a combination of three energy reservoirs with energy flow between the reservoirs. These reservoirs represent digestion, metabolism, and thermal activity. The model can then simulate growth responses to energy intake and environmental factors. The model can thus be used to calibrate optimum values of the parameters used in a simulation and thus show the most economical feed ration or any other such factor. The model should prove, after further calibration, useful in feedlot situations. The present model and optimization routines can now be used to predict results of management decisions. (Dorland-Iowa State)

0706 - B1, F4

HANDLING, STORAGE, AND TREATMENT OF DAIRY AND BEEF CATTLE WASTES IN CONFINED SYSTEMS,

Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
J. A. Moore, and D. W. Bates.
Paper No. 69-935, presented at the 1969 Winter Meeting of the American Society of Agricultural Engineers at Chicago, Illinois. 9 p, 6 fig, 8 ref.

Descriptors: *Farm wastes, *Storage tanks, *Disposal, Cattle, Treatment facilities, Confinement pens, Labor, Structural design, Slurries, Storage, Waste disposal, Waste treatment, Waste water treatment.
Identifiers: *Mechanization, *Land spreading, Gutter cleaners, Bedding, Slatted floors.

Increasingly complex systems for manure management of livestock operations have been developed. This complexity is mainly due to pressure from environmental concerns and the need to reduce labor requirements in these operations. The development of manure handling systems in dairy operations is reviewed. These systems range from hand labor systems to the more modern gutter cleaner where the system was completely mechanized to reduce labor to a minimum with a corresponding increase in capital investments. These systems are all based on the liberal use of bedding to absorb the liquid from the wastes. The use of bedding involves the cost of obtaining the bedding and keeping it in place. Producers have begun to try to reduce these costs by reducing the use of bedding. Recently there has been an increase in the use of storage tanks under the floor and the use of slatted or partly slatted floors. If there was little or no bedding in the manure it would spread itself in and out of the building storage tank, eliminating the need for a mechanical distribution system. The need to reduce odors and solids will bring about more efficient treatment systems in the future. (Dorland-Iowa State)

0707 - A5, D3

A METHOD FOR THE TREATMENT OF ANIMAL WASTES TO CONTROL AMMONIA AND OTHER ODORS,

Vineland Labs., Inc., N.J. Research Div.
William Seltzer, Stanley G. Moum, and Tevis M. Goldhaft.
Poultry Science, Vol 48, No 6, p 1912-1918, November 1969. 4 tab, 10 ref.

Descriptors: *Odor, *Ammonia, *Farm wastes, Air pollution, Poultry, Hogs, Cattle, Bactericides.
Identifiers: Paraformaldehyde, Methogen, Odor control, *Manure odors.

Discusses the use of flaked paraformaldehyde for direct treatment of animal wastes to prevent or eliminate the noxious gases from animal quarters. Paraformaldehyde is a mixture of polyoxymethylene glycols containing 90-99% polymerized formaldehyde. Paraformaldehyde liberates formaldehyde gas as it decomposes. For many years ammonia gas has been used to neutralize formaldehyde gas. This work is predicated on using the principal in reverse. The action of the flake paraformaldehyde on the animal wastes was concluded to be both chemical and antimicrobial and these combined actions make it of value in the control of noxious odors and gases emanating as a result of bacterial fermentation. (Miner-Iowa State)

0708 - C3

TOTAL ORGANIC CARBON DETERMINATIONS ON SWINE WASTE EFFLUENTS,

North Carolina State Univ., Raleigh.
J. W. D. Robbins, G. J. Kriz, and D. H. Howells.
Paper presented at the 1969 Winter Meeting American Society of Agricultural Engineering, Chicago, Illinois, December 9-12, 1969. Paper No. 69-928. 26 p, 9 fig, 19 ref.

Descriptors: *Farm wastes, *Biochemical oxygen demand, Hogs, Runoff, Lagoons, Confinement pens, Hydrogen ion concentration, Nitrates, Ammonia, Bacteria, Chemical oxygen demand, *Analytical techniques.
Identifiers: *Total Organic Carbon, Fresh manure.

Total organic carbon measurements (using a Beckman 915TOC analyzer) were made on swine waste effluents to establish a rapid and accurate auxiliary method to substitute for and/or complement the BOD test for determining degradable organic contents and/or oxygen demand loadings. The standard BOD test has very limited value for characterizing fresh swine waste and swine waste lagoon effluents although it has considerable applicability for more dilute swine wastes in land drainage. Toxic substances, high solids contents, and/or the requirements for high dilutions in analyses are major factors in this regard. The TOC analysis provides a convenient, rapid, and dependable method for determining the amount and strength of wastes entering streams through land runoff from swine growing operations. While the TOC can be useful in characterizing raw swine waste effluents, its utility for this purpose is presently limited by difficulties common to the standard BOD analysis. If a satisfactory relationship with oxygen demand could be developed, the TOC test would be a better pollution parameter than BOD. Conjunctive use of BOD and TOC parameters can be useful in characterizing swine wastes and wastewaters, particularly when toxic materials and other factors limit the BOD test. The degree of BOD/TOC variability is one indication of wastewater consistency and the possible presence of toxic materials. Also, the BOD/TOC ratio is an indication of the ease of biodegradation and/or the degree of stabilization. (Bundy-Iowa State)

0709 - A2, F3, F4

BEEF CATTLE FEEDLOT WASTE MANAGEMENT PROGRAM,

Robert S. Kerr Water Research Center, Ada, Okla.
J. L. Witherow, and M. R. Scalf.
Mimeo, April 1971. 2 fig, 1 tab, 11 ref. EPA Program 13040--04/71.

Descriptors: *Farm wastes, *Water pollution sources, *Regulation, Cattle, Kansas, Texas, Oklahoma, Feed lots, Livestock, Confinement pens.

The Environmental Protection Agency's beef cattle feedlot waste research has an objective to develop technically and economically feasible systems to abate the pollutional effects of confined beef production. Surveys show that the number of 1,000 head feedlots and the total number of cattle on feed are increasing while the number of small feedlots is decreasing. This change is in conjunction with a shift of feedlots from the midwest corn belt to the high plains area and the Southwest. A breakdown by states is given for the number of cattle on feed and the size of feedlots. Pollutional damages from large feedlots are cited. Implementing waste management systems in Kansas, Texas, and Oklahoma is by recent laws and specific regulation adopted by agencies of these states. The design requirements are described. Lack of understanding by the feedlot operator and the number of enforcement personnel are major obstacles in implementation. Pollution control and labor cost may result in total environmentally controlled cattle feedlots becoming common during this decade. (EPA abstract)

0710 - B1, D1, E1

FARM ANIMAL WASTE DISPOSAL,

Ontario Water Resources Commission, Toronto. Div. of Research.
S. A. Black.
Water Management in Ontario Research. Publication No. 28, December 1967, 36 p, 1 fig, 9 tab, 44 ref.

Descriptors: *Farm wastes, *Confinement pens, Feed lots, Runoff, Nitrogen, Biochemical oxygen demand, Chemical oxygen demand, Fertilizer, Economics.

The theories and implications involved with the processing, treatment and disposal of farm animal wastes are described. Farm animal wastes have been contributing polluting materials to waterways for many years. The changing nature of farming in the very recent years, however, has increased considerably the pollution potential of farm animal wastes. Since this change is still in process, an intensive study into improving the methods and facilities for the disposal of farm animal wastes is well justified, as the methods of disposal available to the farmer may well control the location and magnitude of his enterprise in the future. (Bundy-Iowa State)

0711 - A4

THE NITRATE HAZARD IN WELL WATER, WITH SPECIAL REFERENCE TO HOLT COUNTY, NEBRASKA,

Geological Survey, Lincoln, Nebr.
R. A. Engberg.
Nebraska Water Survey. Paper 21, University of Nebraska, Conservation and Survey Division, Lincoln, October 1967. 18 p, 6 fig, 15 ref.

Descriptors: *Farm wastes, Feed lots, Nitrates, Wells, Well data, Well regulations, Percolating water, Pumping, Cattle, Water pollution sources, Water pollution.
Identifiers: *Infant feeding.

High nitrate concentrations in drinking water are a potential health hazard and should be of concern to the user. They not only render the water unsafe for use in infant feeding but generally indicate that the supply is contaminated. Reports of high-nitrate water from several wells in northern Holt County prompted the Lincoln, Nebraska, office of the U.S. Geological Survey to look into the problem -- to determine its seriousness, define causes, and suggest ways to cope with it. To augment the analytical information already on file, water samples were obtained from 71 wells for determination of the nitrate concentration. Concentrations ranging from 0.1 to 409 ppm (parts per million) were found. In order to predict whether a certain well is likely to yield water containing nitrate derived from a nearby source, the rate the well will be pumped and the direction of groundwater movement need to be known. The greater the rate of pumping, the greater the area from which the pumped water will be derived. A well inside or very close to a feedlot is likely to yield high-nitrate water whether the rate of pumping is small or large, whereas a well more distant from the feedlot may need to be pumped heavily for the high-nitrate water to be drawn into it. (Bundy-Iowa State)

0712 — C2, C3, C4

CATTLE FEEDLOT WASTE CHARACTERISTICS,

Colorado State University, Fort Collins. Colorado Graduate Student.
E. M. Jex.
Cattle Feedlot Waste Characteristics, Master of Science Thesis, Colorado State University, Fort Collins, Colorado, January 1969, pp. 1-70, 17 fig, 13 tab.

Descriptors: *Farm Wastes, *Feed Lots, Cattle, Biochemical Oxygen Demand, Hydrogen Ion Concentration.

This study was undertaken to investigate the aqueous characteristics of cattle feedlot wastes. There were two areas of investigation: 1) Biochemical oxygen demand (BOD) characteristics; 2) Conductivity, oxidation-reduction potential, pH, dissolved solids, volatile solids, coagulation and foaming characteristics. The data and results reported here represent laboratory analysis of feedlot manure samples (combined urine and feces sample from feedlot pens) diluted with distilled water to varying degrees. A modification of the classical first stage BOD equation was developed which allows calculation of total BOD versus curves which closely approximate the experimental data. Equations were derived from the van't Hoff-Arrhenius relationship permit calculation of the BOD rate constant k and the ultimate combined demand L at any temperature. (Bundy - ISU).

0713 - C2, C3, C4, D4

SOME AEROBIC DECOMPOSITION PROPERTIES OF DAIRY-CATTLE MANURE,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale, and D. L. Day.
Transactions of the American Society of Agricultural Engineers, Vol. 10, No. 4, p 546-548, 1967, 11 fig, 6 tab.

Descriptors: *Aerobic treatment, *Farm wastes, Biochemical oxygen demand, Cattle, Nitrogen, Phosphorus, Potassium, *Waste water treatment.
Identifiers: *Oxidation ditch, Volatile solids.

Additional information on aerobic decomposition properties of dairy-cattle manure would be helpful in designing Pasveer ditch dairy-production units. Information is needed on such characteristics as (a) percent of the volatile solids that can be broken down into carbon dioxide and water, (b) percent of solids that will be left in the ditch, and (c) BOD of the effluent. An experiment was conducted with the above factors in mind. The following conclusions were drawn: (a) the greater the concentration of dairy cattle wastes added to an aerobic digestion chamber, the lower the breakdown of the volatile solids; (b) approximately 50 percent of the volatile solids will be decomposed in a retention time of 18-1/2 weeks when the daily added wastes amount to 1/2 percent of the volume. (Manure contained 12.5 percent dry matter.) (c) Approximately 46 percent of the volatile solids will be decomposed in a retention time of 18-1/2 weeks when dairy cattle wastes are added at a rate of 1 percent of the volume of the aeration chamber daily. (d) The effluent, as indicated by the 5-day BOD, of all systems was reduced by more than 90 percent. (e) Salts are concentrated to some extent, but they did not appear to retard bacterial action for the concentrations obtained. (Bundy-Iowa State)

0714 - C4

EVALUATION OF CULTURE MEDIA FOR THE ISOLATION OF SALMONELLAE FROM FECES,

Iowa State Univ., Ames. Dept. of Veterinary Microbiology and Preventative Medicine.
R. M. Sharma, and R. A. Packer.
Journal of Applied Microbiology, Vol 18, No 4, p 589-595, 1969. 6 tab, 25 ref.

Descriptors: *Salmonella, *Farm wastes, *Cultures, Cattle, Hogs, *Isolation.
Identifiers: Brilliant Green MacConkey Broth, Tetrathionate Broth, Selenite Broth.

A study conducted on 300 fecal samples from a cow and a pig, each artificially contaminated with approximately four Salmonella organisms revealed that, of the three enrichment broths used in conjunction with the three selective media, the maximum number of isolations were obtained with Brilliant Green MacConkey broth (BGMB), followed by those obtained with tetrathionate (TTB), and the least with selenite broth. The combination of BGMB with Brilliant Green neutral red-lactose agar (BGNRLA), and TTB with desoxycholate citrate agar (DCA) gave an equal number of isolations. Of the three selective media used in conjunction with the three enrichment broths, the maximum number of recoveries were obtained on BGNRLA, followed by those on DCA, and least number of isolations on bismuth sulfite agar (BSA). The combination of selenite F broth-BSA appeared to be somewhat inhibitory for the growth of Salmonella organisms. Of the two selective media combinations, the DCA-BGNRLA combination yielded the highest number of isolations. The use of all three selective media gave still better results. (Miner-Iowa State)

0715 - F4

OVERALL PROBLEMS AND AN APPROACH TO DISPOSAL OF ANIMAL WASTE,

Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
R. J. Young.
In: Proceedings Poultry Waste Management Seminar, Athens, Georgia, June 23, 1970, p 1-5.

Descriptors: *Farm wastes, *Dehydration, Forced drying, Oxidation lagoons, Odor, Runoff, Poultry, Economics, Waste disposal.

As agricultural specialization, intensity, and productivity increased, problems of disposing of liquid, solid, and gaseous by-products greatly intensified. In addition to the conflict of interest over the environmental quality, is the mammoth problem of disposal of large amounts of solid waste which is not only extremely offensive but has the potential to pollute both surface and subsurface waters. Investigations have been conducted on disposal systems, identification and control of odors, prevention of water pollution, removal of nutrients, reutilization of animal wastes either as fertilizers or feedstuffs, and new methods of waste management which can become economically part of the total production system. As to odors, some masking agents were slightly effective, although the best control was to prevent the formation of the odor compound. The oxidation ditch as well as drying methods in treating animal wastes were also evaluated. (Bundy-IowaState)

0716 - A8, D4

BIODEGRADATION OF POULTRY MANURE FROM CAGE LAYERS,

Agricultural Research Service, Beltsville, Md. Husbandry Research Div.
C. C. Calvert, N. O. Morgan, R. D. Martin, and H. L. Eby.
In: Proceedings Poultry Waste Management Seminar, Athens, Georgia, June 23, 1970, p 6-12, 3 tab, 2 ref.

Descriptors: Farm wastes, Waste disposal, Poultry, Odor, Biodegradation, Larvae, Nitrogen, Drying, Protein, Fertilizer.
Identifiers: *Pupae meal.

An attempt has been made to degrade poultry manure to a relatively dry and odorless product, and at the same time produce some return over the cost of the investment. The work utilizes the common house fly to process and biodegrade manure from caged laying hens. Two stages of the house fly cycle -- the larvae and pupae -- are used. The fresh manure was seeded with house fly eggs, approximately 3 eggs/gm., and the eggs were allowed to hatch and the larvae were allowed to tunnel and aerate the manure. The process results in deodorizing a very obnoxious product, reducing its moisture content and volume, and has produced byproducts in the form of high protein pupae meal and a potentially useful fertilizer and/or soil conditioner. (Bundy-Iowa State)

0717 - C1, F5

PROCESSING PLANT SANITATION AND ITS RELATIONSHIP TO WASTE MANAGEMENT,

Cagle's, Inc., Atlanta, Ga.
J. K. Keim.
In: Proceedings Poultry Waste Management Seminar, Athens, Georgia, June 23, 1970. p 13-15.

Descriptors: *Farm wastes, Poultry, Biochemical oxygen demand, Sewers, Municipal wastes, *Food processing industry, Water pollution sources, Industrial wastes.
Identifiers: Processing plant sanitation.

In processing plant sanitation there can be no halfway measures. There is no substitute for cleanliness in a food preparation establishment. The problem has two main factors: the amount of pollutants in the effluent, and the amount of effluent itself. The blood during poultry processing creates a big problem. The two largest sources of blood are the bleeding alley and the contents of the vacuum lung tank. Some plants still have a continous stream of water running over the floor while others permit it to accumulate and then at cleaning time push it into a gutter and wash it down to the separator. The majority of the blood handled in this way also ends up in the sewer, only a minor amount being sufficiently solid to fail to escape from the separator. If the plant is connected to a city sewer, the chances are very great that the charge is based on B.O.D. load. These charges would soon pay for equipment to reduce the loading. Relatively new cleaning systems utilize high pressure and small volume and make the cleaning operation more efficient. (Bundy-Iowa State)

0718 - F5

WATER UTILIZATION IN PROCESSING PLANTS,

Agricultural Research Service, Athens, Ga. Animal Products Lab.
D. Hamm.
In: Proceedings Poultry Waste Management Seminar, Athens, Georgia, June 23, 1970, p 16-22, 2 tab.

Descriptors: *Farm wastes, Poultry, Biochemical oxygen demand, Bacteria, *Food processing industry, Water utilization.
Identifiers: *Poultry processing plant.

A poultry processing plant (PPP) today is a ravenous user of clean water. Water usage per bird processed more than doubled during the 8 year period from 1957 to 1965 -- up from a 5 to 7 gallon average to a 12 to 15 gallon average. This means a total of 28 lbs of input or 36 lbs water per pound of edible product. Like all functioning biological systems, a PPP uses water to transport, disperse, and to regulate temperature. Parts and wastes are water flumed; water scalds the bird, washes it to disperse and transport wastes and debris; water cools it; and water cleans up the building and equipment. There are three general problem areas insofar as water in and from PPP's are concerned. The problems are: (1) how to cut down on volume; (2) how to reduce total waste loading; and (3) how to process the waste water before returning it to the environment. Research is needed to find ways to reduce the quantity required in poultry processing plants. (Bundy- Iowa State)

0719 - A9, B1, E3

FEEDING PROBLEMS ARISING FROM THE USE OF POULTRY LITTER ON PASTURES,

GEORGIA Univ., Athens. School of Veterinary Medicine.
D. J. Williams.

In: Proceedings Poultry Waste Management Seminar, Athens, Georgia, June 23, 1970. p 23.

Descriptors: *Farm wastes, Poultry, Cattle, Fescues, Pastures, *Animal diseases, Fertilizer, Waste disposal.
Identifiers: *Fat necrosis, Dead fat.

Cattle grazing on tall fescue heavily fertilized with poultry house waste may be developing a condition which tentatively has been called 'fat necrosis' or 'dead fat,' among other things. Postmortems on cows showed portions of the abdomen area covered with this very hard, chalky fat and in some instances this fat has completely closed the small intestines and surrounded kidneys, shutting off the urine process. Empirical evidence indicates that grain supplement 4-6 weeks prior to parturition prevents the development of this condition. (Bundy-Iowa State)

0720 - A9, B3, E3

PROGRESS REPORT: PASTURE FERTILIZATION USING POULTRY LITTER,

Agricultural Research Service, Watkinsville, Ga. Soil and Water Conservation Research Div.
S. R. Wilkinson, W. A. Jackson, R. N. Dawson, and D. J. Williams.

In: Proceedings Poultry Waste Management Seminar, Athens, Georgia, June 23, 1970, p 24-29, 6 ref.

Descriptors: *Farm wastes, *Waste disposal, Poultry, Litter, Fescues, Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Fertility, *Animal diseases, Fertilizer.
Identifiers: Nitrate poisoning, Grass tetany.

Growing chickens and using the litter to produce extra grass and beef has been profitable. This practice has transformed the North Georgia countryside from eroded red clay to lush green grass by enhancing soil fertility, conservation, and wise land use. However, in some pastures where rates of litter applications have been high, animal health problems such as nitrate poisoning, grass tetany, and fat necrosis have appeared. The objectives were to produce under controlled and recorded conditions a tall fescue pasture heavily fertilized with broiler litter for the purpose of studying cumulative effects of high rates of broiler litter fertilization on selected soil, plant, and animal parameters in a grazing ecosystem; including the development of potential animal health problems of nitrate poisoning, grass tetany and fat necrosis. The research has not yet been completed, but the trends indicate that each ton of broiler house litter supplies about 60 lbs. of N, 30 lbs. of K, 30 lbs. of Ca, 8 lbs. of Mg, and is an important source of Zn, as well as micronutrients. The application of 14 tons of broiler house litter over a 365 day period has made some significant changes in soil chemical properties. Broiler manured fescue grass was consistently higher in total N than inorganic fertilized fescue except during the spring. (Bundy-Iowa State)

0721 - A3, A5, E2

HOW ENVIRONMENTAL PROBLEMS AFFECT FARM EQUIPMENT DESIGN,

Sperry Rand Corp., New Holland, Pa.
R. M. Alverson.

Agricultural Engineering, p 20-22, January 1971. 3 fig.

Descriptors: Farm wastes, Fertilizers, Odor, Runoff, Nutrients, Equipment, *Design, *Pollution abatement, *Environmental effects, *Farm equipment, Agriculture.
Identifiers: *Spreaders, Environmental trends.

The two most prevalent environmental trends in the U.S. today are the demands for 'clean' water and 'pure' air. These trends have been precipitated by both federal and state legislation. The Water Quality Act of 1965 (Public Law 89-234) was the first major federal legislation to force states to set minimum water quality standards and it established the Federal Water Pollution Control Administration. Future design consideration will include environmental quality concepts such as noise and vibration reduction and increased aesthetics. Future machines must also meet legal requirements for environmental protection. Design engineers should consider the trends of the environmental movement in every country where their products are sold. Legal rulings, if not aesthetic values alone, may soon require that farm equipment and procedures be non-polluting. For example, spreading manure on frozen or snow-covered ground causes a potential water pollution hazard. Odor problems with manure spreading are also prevalent. When manure is spread on the land, it may become mandatory to incorporate it into the soil. Fertilizer spreaders, pesticide applicators and tillage implements also create unwanted sources of nutrients, toxic chemicals and sediment. The environmental effects of these machines must be considered in their design. (Bundy-Iowa State)

0722 - C4

THE USE OF FLUORESCENT ANTIBODY TECHNIQUES FOR DETECTION OF STREPTOCOCCUS FAECALIS AS AN INDICATOR OF FECAL POLLUTION OF WATER,

North Texas State Univ., Denton. Dept. of Biological Sciences; and Clemson Univ., S.C. Dept. of Biological Sciences.
R. Abshire, and R. K. Guthrie.

Water Research, Vol 5, No 11, p 1089-1097, November 1971. 5 tab, 16 ref.

Descriptors: *Testing procedures, *Sampling, *Indicators, Streptococcus, Fluorescence, Water quality, Sewage effluents, Runoff, Water pollution sources, Bacteria, Pollutant identification.
Identifiers: *Fecal pollution, Streptococcus Faecalis, *Bacterial indicators.

A slide method for use of fluorescent antibody identification of Streptococcus faecalis is described. This method permits S. faecalis of fecal origin to be distinguished from those soil and water forms which are able to reproduce in water and sewage. Reactions were specific as confirmed by biochemical tests. Non-specific cross species fluorescence was readily removed by adsorption. Results indicate that this technique provides a method which will be useful in those pollution studies which require rapid identification and quantitation of organisms indicating fecal pollution. (Dorland-Iowa State)

0723 - E3

FEEDING VALUE OF CATTLE MANURE FOR CATTLE,

Auburn Univ., Ala. Dept. of Animal Science.
W. Brady Anthony.

Journal of Animal Science, Vol 30, No 2, p 274-277, 1970. 6 tab, 14 ref.

Descriptors: *Farm wastes, *Manure, Cattle, Feeds, Reuse.
Identifiers: *Cattle manure, Manure feeding, Manure utilization, Feed supplement.

The objectives were to reappraise the feeding of manure-containing rations to fattening cattle and determine if cooking the manure improved it's feeding value. Rations containing wet cattle manure were readily consumed by fattening steers and these rations supported gain essentially equal to comparable cattle fed feeds without manure. Cooking or washing manure before mixing it with concentrate for feeding did not improve its feeding value. Carcass data were similar for manure-fed and other cattle. Wet manure collected daily per yearling steer was about 13.5 kg. (3.12 kg. dry matter) and about 6.6 kg. (1.52 kg. dry matter) was consumed daily. The digestibility data do not clearly indicate effective use of either manure energy or manure crude protein. However the data show that manure did not impair digestibility and actually saved concentrate dry matter used per unit of gain. This indirect evidence strongly suggests that manure was utilized to an appreciable degree for productive purposes. Feeding manure with concentrate did not completely alleviate waste disposal problems. Only about one-half of the manure collected daily was fed. The remainder of the daily excretion had to be disposed of elsewhere. (Miner-Iowa State)

0724 - B2, E2

GUIDELINES TO LAND REQUIREMENTS FOR DISPOSAL OF LIQUID MANURE,

Guelph Univ. (Ontario).
L. R. Webber, T. H. Lane, and J. H. Nodwell.

In: Proceedings Eighth Industrial Water and Wastewater Conference, June 6-7, 1968, Lubback, Texas. p 20-34, 1 fig, 4 tab, 19 ref.

Descriptors: *Farm wastes, Poultry, Confinement pens, Phosphorus, Potassium, Nitrogen, Crops, Landfills, Anaerobic digestion, Crop response, Rates of application, Fertilization.
Identifiers: *Stock piling, Incineration.

An intensification in the trend to raise livestock and poultry under high-density confinement housing has created problems in the disposal of liquid manures. Research is underway to produce guidelines that will assist producers in conforming to the pollution abatement laws in Ontario. The objectives are: (1) to set forth the accessible areas that producers must have for the utilization and disposal of liquid manure without causing water, air, or soil pollution; and (2) to test and to evaluate the guidelines by field and laboratory research and make, where necessary, revisions in the guidelines. Research has indicated that frequent and heavy applications of manure have resulted in a build-up in the soil of phosphorus and potassium without causing reductions in crop yield or contributing to the pollution of water supplied. A nitrogen balance for Ontario conditions is presented to show that crops of continuous corn or grass could be expected to utilize up to 300 lb N (from manure) per acre. Application rates greater than 300 lbs N/acre could lead to a depression of crop yield and cause water contamination. (Bundy-Iowa State)

0725 - A1, B3, E3

POLLUTION CONTROL IN CATTLE FEEDLOTS THROUGH USE OF MANURE AS FEED,

Auburn Univ., Ala. Dept. of Animal Science; and Alabama Agricultural Experiment Station, Auburn.
W. B. Anthony.

In: Proceedings Eighth Industrial Water and Wastewater Conference, June 6-7, 1968, Lubback, Texas, p 59.

Descriptors: *Farm wastes, Confinement pens, Cattle, Feeds, Feed lots, Silage, Grains.
Identifiers: *Fresh manure, Wastelage.

Sanitation for cattle fed in confinement necessitates a satisfactory and economical means of disposing of manure. In initial tests, fresh manure was blended with a concentrate and fed to cattle from which it was collected. The blending ratio was 40 parts of manure and 60 parts of grain. Although the feeding of manure directly to the cattle from which it was collected proved to be not

only possible but economically advantageous in terms of improved feed efficiency. Other ways of feeding cattle manure were investigated. The making and feeding of Wastelage evolved. Wastelage is made by combining feedlot manure with grass hay and storing the mixture in a silo. (Bundy-Iowa State)

0726 - A2, B2, F1

ECONOMICS OF WATER POLLUTION CONTROL FOR CATTLE FEEDLOT OPERATIONS,
Texas Tech Univ., Lubbock. Dept. of Agricultural Economics.
T. R. Owens, and W. L. Griffin.
In: Proceedings Eighth Industrial Water and Wastewater Conference, June 6-7, 1968, Lubbock, Texas, p 82-106. 10 tab.

Descriptors: *Farm wastes, Cattle, Feed lots, Economics, Runoff, Rainfall, Design, Costs, Water pollution control.
Identifiers: *High Plains.

One approach to the problem of water pollution from feedlots involved control of runoff by establishing collection basins and subsequently pumping the pollutant to an open land disposal area. A second suggested solution was a collection basin of sufficient size to hold polluted runoff until natural evaporation emptied the system. Data from secondary sources were used to develop the relationship between inches of precipitation and resultant runoff. Subsequently, design criteria were developed for various sizes of mechanical discharge and evaporative discharge collection systems. The various design criteria were then applied to three different sizes of feedlots, a 5000 head lot, a 10,000 head lot and a 25,000 head lot. Budgets were developed for each lot and for each system size and type, and total capital and annual operating costs were computed. The studies assumed that a part of the cost of operating any particular system would be the penalty imposed for overflow on the basis of current law, this penalty ranges from a minimum of $50/day to a maximum of $1000/day. The analysis of rainfall data provided an estimate of the number of overflows expected with any size and type of system. Thus, the cost of overflow was quantified by multiplying the number of overflows by the appropriate penalty rate. Finally, minimum cost systems providing only minimum overflow protection were compared with higher cost systems providing maximum overflow protection. Cost differences between the two systems were then evaluated to determine the increase in annual operating costs associated with additional protection. (Bundy-Iowa State)

0727 - A2, F5

EFFECTS OF AGRICULTURAL DISCHARGES INTO FRESH WATER LAKES,
Orange County Pollution Control Dept., Orlando, Fla.
C. W. Sheffield, and R. T. Kaleel.
In: Proceedings, Industrial Waste Conference, 25th, May 5, 6, and 7, 1970. Purdue University Engineering Extension Series No. 137, Part 2, p 904-913, 5 fig, 4 tab, 4 ref.

Descriptors: *Drainage effects, *Denitrification, *Eutrophication, Runoff, Nutrients, Bottom sediments, Drainage water, Nitrates, Water management, Peat, Phosphates, Dikes, Canals, Nitrification, Water pollution sources.
Identifiers: *Pumping discharge, Surface leeching, Nutrient removal.

Agricultural business has increased along with demands for its products. In the United States most winter and spring vegetable crops are grown in the warmer climates of Florida, Texas, Arizona, and California. To obtain crop growth needed for maximum production, land irrigation must be practiced. In Florida most of this farming is on peat soil that was at one time lake bottoms. Land of this nature is either developed naturally or reclaimed by man through diking and canaling systems. The effects of agricultural discharges on receiving waters are discussed, including what is being discharged chemically and how it changes the chemical, physical, and biological characteristics of the receiving fresh water lakes. The effects of nutrients into a lake are difficult to ascertain due to the effects of other nutrient sources such as sewage treatment plants, bottom recycling, rainfall, runoff, and surface leeching. However, there is a definite need to reduce turbidity, nutrients, and solids concentration in pumping discharge. (Dorland-Iowa State)

0728 - A5, B1, D4

ODORLESS PORK PRODUCTION: FROM CONCEPTION TO MARKET,
Smart (Paul) Hog Farm, Lawrence, Kans.; and Kansas Univ., Lawrence. Dept. of Civil Engineering.
P. Smart, and R. E. McKinney.
In: Proceedings, Industrial Waste Conference, 25th, May 5-7, 1970, Purdue University, Engineering Extension Series No. 137, Part 2, p 757-760, 4 ref.

Descriptors: *Farm wastes, *Aerobic treatment, *Waste treatment, Hogs, Aeration, Confinement pens, Activated sludge, Biochemical oxygen demand, Rotors, Odor, Anaerobic conditions.
Identifiers: *Swine confinement, Concrete slats, Mechanical breakdown, Oxidation ditch.

The world is faced with an ever-increasing population and an ever-increasing food demand. One of the most critical food demands is for high quality meat protein. It has been possible to meet the pork needs without intensified animal growing. But the future indicated that a change was needed. In the summer of 1965, a project began to take shape that was to result in a major hog growing operation which would set the pattern for a new concept in producing pork. It was proposed that a complete animal confinement system be constructed near Lawrence, Kansas, which would yield 10,000 marketable hogs per year. This confined hog system was designed to provide the optimum environment for the animals from conception to market. One thing was apparent; no one had fully solved the problem of manure disposal. Odor nuisances created by hog manure, especially during removal and spreading, required location a considerable distance from other people. Biological concepts employed in wastewater treatment systems provided the answers needed to solve the hog manure disposal problem. The system employed a system of aerobic treatment under slotted floors. (Dorland-Iowa State)

0729 - A5, B1, D3

DESIGN AND OPERATION OF A PILOT PLANT FOR COMPOSTING POULTRY MANURE,
Guelph Univ. (Ontario). Dept. of Microbiology.
R. G. Bell, and J. Pos.
Transactions of the American Society of Agricultural Engineers, Vol 14, No 6, p 1020-1023, Nov-Dec 1971. 6 fig, 6 ref.

Descriptors: *Farm wastes, Odor, *Poultry, *Waste treatment, Runoff, Air pollution, *Pilot plants, Aeration, Operation, Design.
Identifiers: *Composting.

A pilot plant for composting poultry manure is described. The composting unit consisted of a closed cylinder mounted on a steel frame, fitted with an internal rotor driven by an electric motor through a power train. Air was supplied by a fractional horsepower air compressor and was introduced into the composter through three manifold lines. Poultry manure can be composted, but the real question is whether composting reduces the pollution potential from poultry waste. The compost as discharged from the pilot plant was dark brown in color, had a nitrogen content of between 1.3 and 1.5 percent (dry wt. basis), a moisture content near 50 percent and a strong smell of ammonia. The compost did heat up which was an indication that the material was not stabilized. Even after being left unattended for several months, compost piles did not develop objectionable odors nor was there evidence of appreciable runoff during heavy rain storms. From these observations, it is concluded that composting does reduce the pollution potential of poultry manure and would, therefore, be a satisfactory way to treat manure prior to prolonged storage. (Bundy-Iowa State)

0730 - A4, C3, E1

AGRICULTURE'S EFFECT ON NITRATE POLLUTION OF GROUNDWATER,
Agricultural Research Service, Fort Collins, Colo.
B. A. Stewart, F. G. Viets, Jr., and G. L. Hutchinson.
Journal of Soil and Water Conservation, Vol 23, No 1, p 13-15, January-February, 1968. 1 fig, 1 tab, 8 ref.

Descriptors: *Nitrate, *Water pollution, *Fertilizers, *Soil profiles, *Groundwater, *Agriculture, *Wastes, Alfalfa, Grasslands, Feedlots.
Identifiers: Irrigated row crops, Domestic wells.

Contributions of fertilizers applied to soil and wastes from concentrated livestock feeding operations to pollution of groundwater were studied in the middle South Platte River Valley in Colorado. Amounts of nitrate moving through 129 soil profiles varied widely with land use. Average total nitrate N to a depth of 20 ft in lbs/acre was 1436 under feed-lots, 506 under irrigated row crops, 261 under dryland row crops, 90 under native grassland, and 79 under alfalfa. The average annual loss of N to groundwater under irrigated row crops was estimated at 25-30 lbs/acre. Feedlots located near homesteads had much more effect on nitrate content of water from domestic wells than did cropped land. (Skogerboe-Colorado State)

0731 - B1, C5, E3

DISPOSING OF ANIMAL WASTES,
Washington State Univ., Pullman.
D. O. Turner.
Crops and Soils Magazine, p 10-11, February 1971.

Descriptors: Farm wastes, Dairy industry, Lagoons, Fertilizers, Runoff, *Waste disposal, *Washington, *Waste treatment, Water reuse.
Identifiers: Urban expansion.

Handling wastes from dairy and beef operations is difficult. In Washington, a system was designed to handle the wastes from approximately 400 dairy cattle. The location was an alluvial flood plain which was subject to frequent and severe winter flooding. The wastes from the herd were scraped and flushed to a transfer pump where they could go directly to the fields or to the two winter storage lagoons, each of which have a capacity of one million gallons. Waste material from the lagoon was transported through a pipeline and applied to silage corn and ryegrass with a sprinkler. Application was limited because of a thatch from by the fiber content of the manure which allowed surface runoff. Current recommendations are that dairymen should have one acre of disposal land for every two cows. (Bundy-Iowa State)

0732 - D4, E2

CLOSED SYSTEMS FOR ANIMAL SEWAGE TREATMENT,
Massachusetts Univ., Amherst. Water Resources Research Center.
J. T. Clayton.

Completion Report FY 72-7, 1971. 11 p, 22 ref. OWRR A-009 MASS (4).

Descriptors: *Farm wastes, *Treatment facilities, Dairy industry, *Waste treatment, Sub-surface irrigation, Tertiary treatment, Cattle, Solid wastes, Water reuse, *Waste disposal, Aerobic treatment.

Stationary sloping screens were used to remove up to 75% of the solids in diluted dairy cattle manure. Two bench-scale aerobic treatment systems were then used to treat screened effluent. Two replicate systems, one using distilled water and one using system final effluent to dilute incoming manure were used to determine the effects of renovated water reuse. BOD reductions greater than 95% and COD reductions greater than 90% were obtained in all systems. No adverse effects of water reuse were found. Phosphate level was not affected and there was no appreciable build-up of fecal coliform or fecal streptococcus. A one-cow scale modified activated sludge system was used to treat 120 pounds of manure and 66 gallons of dilution water daily for more than six months. The final effluent was disposed of by a sub-surface irrigation system. Plastic nozzles were found satisfactory to release the liquid to the soil. BOD and COD were further reduced by about 95% in the tertiary treatment system (soil). Best performance was obtained in the two treatments in which activated sludge effluent was periodically applied to the soil.

0733 - A2, B1, D1, E1

ALTERNATIVES FOR WASTE MANAGEMENT FOR OPEN BEEF FEEDLOTS,

Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker, J. E. Garton, G. W. A. Mahoney, M. D. Paine, and A. Wetmore.

Paper number SWR 71-403 presented at 1971 Annual Meeting Southwest Region of the American Society of Agricultural Engineers, Sequoyah State Park, Oklahoma. April 1-2, 1971. 20 p, 3 fig, 1 tab, 16 ref. FWQA Grant 13040 FXG.

Descriptors: *Farm wastes, *Runoff, *Solid wastes, Confinement pens, Disposal, Farm lagoons, *Waste disposal, Cattle, Cost comparisons, *Waste storage, *Design criteria, Feedlots.
Identifiers: *Cattle feedlots, Runoff treatment, Mechanical removal.

During the 1960's, the number of fed cattle marketed in the United States increased from 13 million to 25 million. This increase in fed cattle produced resulted in a corresponding increase in waste production. Daily manure production of a beef animal is about 6% of his body weight. The object was to develop open beef feedlot design criteria to minimize pollution from runoff wastes and to facilitate handling of solid and liquid animal waste and to examine alternative feedlot waste disposal systems to determine minimum cost systems for effective waste disposal. Six systems of waste handling were investigated; tractor loader and dump truck, commercial loader and dump truck, tractor loader and pull spreader, commercial loader and spreader truck, rotary scraper, and an elevating scraper. Several types of runoff control systems were also investigated; solids settling and detention, solids settling and lagoon, detention and lagoon, detention pond only, broad base detention, and batch detention. The characteristics of the solid waste material and the changes it undergoes during storage in a feedlot were also studied. (Dorland-Iowa State)

0734 - A3, C5, D1

CATTLE FEEDLOT WASTE PROBLEMS,

Kansas State Univ., Manhattan.
R. I. Lipper, J. R. Miner, and G. H. Larson.

Paper presented at Oklahoma Cattle Feeders Seminar, February 2-3, 1967, Stillwater, Oklahoma. 9 p, 5 ref.

Descriptors: *Farm wastes, *Feed lots, Runoff, *Sprinkler irrigation, Water pollution, Cattle, *Kansas, Coliforms, Water reuse.
Identifiers: *Impounding.

Cattle feedlot runoff became recognized as a problem in Kansas during the late 1950's. Incidents of septic streams and fishkills were noted immediately following rainfall in areas where no known municipal of industrial waste discharges existed, and where chances of insecticide and herbicide residues seemed remote. To study feedlot runoff, two experimental feedlots were constructed. One was entirely surfaced with concrete; the other had concrete only around feed hunks. Rather than wait for natural storms, simulated rainfall was provided through six part-circle irrigation sprinklers spaced at the periphery of the lots. The first method for control of runoff to be studied involves impounding the runoff water until it can infiltrate adjacent land without producing further runoff. New animal research facilities are being planned at Kansas State University. Funds are being sought to incorporate research systems for processing total waste production from animals reared in several covered pens with concrete floors. Hopefully results will be used in setting standards for cattle feedlots. (Bundy-Iowa State)

0735 - C2, C3, C4, D4

SECONDARY TREATMENT OF HOG WASTE IN AN ANAEROBIC STABILIZATION POND,

North Dakota Water Resources Research Inst., Fargo.
Robert G. Butler.

North Dakota Water Resources Research Institute Report WI-221-011-69, December, 1969. 35 p, 4 fig, 11 tab, 44 ref. OWRR Project A-010-NDAK (1).

Descriptors: *Anaerobic conditions, Biochemical oxygen demand, *Oxidation lagoons, Farm wastes, *Bacteria, Waste water treatment, *Anaerobic bacteria, Photosynthetic bacteria, Microorganisms, Chemical analysis.
Identifiers: *Hog wastes.

This study relates the physical and chemical characteristics of the contents of an anaerobic stabilization lagoon to the bacteria that are responsible for the stabilization of the waste. The lagoon is fed by effluent from a settling tank that receives wastes from a hog barn. The lagoon operated as an unheated digester and maintained a pH between 7.2 and 8.1. The Redox potential varied from -370 to -403 millivolts. The mean concentration of volatile acids was 403 mg/l. The average level of BOD for the lagoon water was 566 mg/l. A BOD loading of 3,250 pounds per acre per day did not produce lagoon failure. Sulfate reducers were grown on Postgate's Media E. Methane producing organisms were detected. Photosynthetic organisms were grown on two different media.

0736 - A9, C4, E1

SALMONELLA IN WASTES PRODUCED AT COMMERCIAL POULTRY FARMS,

Rutgers - The State Univ., New Brunswick, N.J.
D. J. Kraft, Carolyn Olechowski-Gerhardt, J. Berkowitz, and M. S. Finstein.

Applied Microbiology, Vol 18, No 5, p 703-707, November 1969. 4 tab, 13 ref.

Descriptors: *Salmonella, *Poultry, Bacteria, Sampling, Pathogenic bacteria, Waste disposal, Farm wastes.

The potential of poultry excreta and manure from commercial farms to contaminate the environment with salmonella was determined. Composite samples of freshly voided excreta from 91 poultry houses were tested qualitatively for salmonella. Twenty-six (29%) were positive. Of the 36 farms tested, 18 showed positive samples. In a separate quantitative study salmonella densities ranged from less than 1 to over 34,000 per gram excreta (dry weight). Those samples from floor and caged birds were comparable with respect to the incidence of salmonella. As shown in a qualitative survey there were distinct differences. High densities of the pathogens were found in fresh excreta from caged but not floor birds. It is concluded that the spreading of these wastes could have disseminated substantial numbers of salmonella onto the soil possibly lending to the contamination of water via surface run-off. It is suggested that the recently developed plow-furrow-cover method of manure application may be advantageous in burying the waste thereby preventing its transport by surface run-off. (Hancuff-Texas)

0737 - C3, D4

REDUCTION OF NITROGEN CONCENTRATIONS IN SWINE LAGOON EFFLUENT BY BIOLOGICAL DENITRIFICATION,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. K. Koelliker, and J. R. Miner.

In: Proceedings, Industrial Waste Conference, 25th, May 5-7, 1970, Purdue University, Engineering Extension Series No. 137, Part 1, p 472-480, 6 tab, 11 ref. PHS Grant EC 00283-02.

Descriptors: *Farm wastes, *Denitrification, *Biological treatment, Hogs, Liquid wastes, Effluents, Nitrogen, Anaerobic conditions, Irrigation, Lagoons, Aerobic conditions, Oxidation-reduction potential, *Waste treatment, Waste disposal.
Identifiers: Carbon source, Anaerobic lagoons.

Conventional schemes that treat liquid animal wastes are designed to reduce organic material and to reduce solids volume before final disposal. Removal of nitrogen by such operations is incidental. If such lagoon effluent were released into the environment, problems would arise from the quantities of nitrogen remaining. Because of these problems, or potential problems, with irrigation disposal of anaerobic swine lagoon effluent, a study was undertaken to explore the feasibility of reducing nitrogen concentrations before disposing of the effluent. Reduction of nitrogen concentration by biological denitrification is discussed. The conditions necessary for denitrification are a source of NO3-N, an available organic carbon energy source, a population of denitrifying bacteria, pH 5-9, little or no molecular oxygen, and temperature 5-60 degrees C. There is not sufficient organic carbon in a well-nitrified swine waste effluent, however, adding raw swine manure at a feed rate of BOD5 = 3.26 NO3- N gives an efficiency of nitrogen removal of 91 percent. (Dorland-Iowa State)

0738 - A3, B1

MODELING FEEDLOT RUNOFF POLLUTION I. ANALOG SIMULATION,

Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
S. F. Kang, L. T. Fan, E. S. Lee, and L. E. Erickson.

Transactions of the American Society of Agricultural Engineers, Vol 13, No 6, p 858-869, Nov-Dec 1970. 11 fig, 3 tab, 26 ref. FWPCA WP-0141-02.

Descriptors: *Farm waste, Confinement pens, Computer model, Analog computer, Analog models, Simulation analysis, Runoff, Water pollution, Infiltration, Cattle.
Identifiers: *Dimensional analysis, Dynamic modeling, Feedlot.

The purpose of the investigation outlined is to investigate (feedlot runoff) a more realistic model; namely, a dynamic model represented by a set of

nonlinear differential equations using analog computer simulation. Since the feedlot runoff system does not generally remain at steady state, a dynamic model can represent the system more realistically than a static model. For a system of three parameters, fitting data by an analog simulation can be used effectively when high accuracy is not required. However, for a complex system with a large number of unknown parameters, the analog simulation approach can be very tedious and time consuming. The quasi-linearization technique is shown to be a useful tool for estimating parameters in a feedlot runoff system. The advantage of the quasilinearization technique is that, if the process converges, it converges quadratically. This technique has been proved useful not only in parameter estimation, but also in solving nonlinear boundary value problems in partial and ordinary differential equations. The quasilinearization technique also has disadvantages; two of the most important ones are the ill-conditioned problems and the convergence problem. (Bundy-Iowa State)

0739 - A4, A9, C3

NITRATE AND WATER,
Missouri Univ., Columbia. Dept. of Soils.
M. Christy, J. R. Brown, and L. S. Murphy.
Science and Technology Guide, University of Missouri Extension, Columbia, p 9808-9809, March 1965, 2 fig, 1 tab.

Descriptors: *Farm wastes, Nitrogen, Fertilizers, Legumes, Missouri, Alfalfa, Livestock, *Water pollution sources, *Nitrates, *Public health.

Nitrates in some water supplies have caused concern. A statewide survey showed that animal manures, inadequate sewage systems, and soil organic matter comprised the primary sources of nitrate in water supplies. Even though nitrate has been found in shallow wells all over the state, the largest percentage of such wells have been found in areas with greatest livestock numbers. Other sources include the nitrogen from legumes and fertilizers. Ponds usually have a low nitrate level. On the other hand, water of springs contains nitrate, thought to originate from natural soil leachings and bat guano deposits in nearby caves. The annual flow of some large springs may contain many times more nitrate-nitrogen than the total fertilizer nitrogen used annually in Missouri. The reason for concern is potential health hazards. Nitrate can be especially hazardous to infants. One problem is that boiling will not remove nitrates. (Bundy-Iowa State)

0740 - B1

PHOTOGRAPHIC STUDIES OF THE DUNGING BEHAVIOR OF PIGS IN CONFINEMENT,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. P. Hultgren, and T. E. Hazen.
Paper number MC 71-101 presented at the 1971 Mid-Central Meeting of the American Society of Agricultural Engineers, St. Joseph, Missouri, April 16-17, 1971. 15 p, 5 fig, 1 tab, 10 ref.

Descriptors: *Farm wastes, *Animal behavior, *Design criteria, Hogs, Training, Environmental effects, Light intensity, Temperature, Photography, Confinement pens, *Odor.
Identifiers: Dunging behavior, Time-lapse photography, Statistical analysis.

Each year in the United States, an increasingly larger volume of hogs are produced in confinement. Greater and greater emphasis is being placed on the control of offensive odors. Pen and pig cleanliness are important in odor control. Both are largely dependent on defecation behavior and feces placement. A research project was initiated to determine if pigs had a predictable defecation pattern and what housing design factors might influence this behavior. Time-lapse photographic observations on 180 pigs indicated that they spend an average of 81.1 percent of each 24-hour period sleeping, 7.6 percent standing, 10.0 percent eating, 0.9 percent drinking, and 0.4 percent defecating. Tested for effect on the dunging behavior were 3 levels each of air temperature and lighting, and 3 locations of air placement. When statistically analyzed, the treatment differences were seldom significant. The pigs developed some established activity patterns, however, which provide a basis for improved building design and sanitation. (Dorland-Iowa State)

0741 - A2, B1, F2

RULES AND GUIDELINES FOR THE CONTROL OF WATER POLLUTION FROM LIVESTOCK CONFINEMENT FACILITIES AND GUIDELINES FOR CONSTRUCTION OF SEALED EVAPORATION AND RETENTION PONDS.

Colorado Department of Health, Water Pollution Control Commission, Denver, April 10, 1968, 11 p, 3 fig.

Descriptors: *Farm wastes, Feed lots, Confinement pens, *Colorado, Lagoons, Regulation, *Water pollution control.

The Colorado Water Pollution Control Commission established rules for the prevention of water pollution from livestock confinement facilities in the state of Colorado. Guidelines established by the commission are included. Some of them pertain to preliminary considerations, pond surface area, pond storage volume, discharge and percolation, and pond shape, pond fencing and maintenance, land disposal system, embankments and dikes, pond bottom settling tank and biological treatment. (Wallin-Iowa State)

0742 - A9, C4

INFECTIOUS PANCREATIC NECROSIS VIRUS: COMPARATIVE FREQUENCIES OF ISOLATION FROM FECES AND ORGANS OF BROOK TROUT (SALVELINUS FONTINALIS),
Guelph Univ. (Ontario). Dept. of Veterinary Microbiology and Immunology.
C. Frantsi, and M. Savan.
Journal of the Fisheries Research Board of Canada, Vol. 28, No. 7, p 1064-1065, 1971. 1 tab, 4 ref.

Descriptors: *Fish diseases, *Brook trout, *Viruses, Trout, Fish, Bacteria, Fish hatcheries, Fisheries, Fish management, Pollutant identification.
Identifiers: *Stress, Feces, Organs, Infectious pancreatic, *Necrosis virus.

When isolation of infectious pancreatic necrosis (IPN) virus was attempted simultaneously from feces and organs of brook trout, the virus was isolated more frequently from organs than from feces. However, the greater the degree of stress on the fish, the closer the number of isolations from feces appeared to approach that from organs, and the virus was isolated from both organs and feces of each of 10 fish accidentally exposed to low oxygen concentration for 4 days. The findings suggest that masked viral and bacterial infections may be detectable if fish are plaed under stress. (Dorland-Iowa State)

0743 - B1, F1

GUIDELINES FOR DEVELOPING COMMERCIAL FEEDLOTS IN KANSAS,
Kansas State Univ., Manhattan. Cooperative Extension Service.
D. B. Erickson, and P. A. Phar.
Kansas State University, Cooperative Extension Service, Number C-418, (April 1970). 30 p, 2 fig, 20 tab, 15 ref.

Descriptors: *Farm wastes, *Feed lots, Cattle, Economics, Irrigation, Feeds, Runoff, Kansas, Cost analysis.

Guidelines are provided on costs of financing and constructing feedlots. The development of large feedlots handling 10,000, 20,000 and 30,000 head has been inspired by economics of scale and very favorable cattle and feed prices. The average investment for a 10,000 head capacity lot would be about $43.15 per head, while for a 30,000 head capacity lot the requirements drop to about $33.87 per head. The total feed and operating cost per head for each size feedlot is: 10,000 head - $85.36; 20,000 head - $83.89; 30,000 head - $82.24. The expansion of the large feedlots in Kansas will depend on the availability of feed, water, labor and cattle. Some areas will have the capacity to expand faster than others depending on existing grain production and development of irrigation. Shipping grain a considerable distance adds to cost of production. Knowledge of the number of cattle and hogs to be fed, crop production and the location of the market that will return the greatest income to the cattle owners is necessary for an assessment of the local potential for a feedlot. Expansion of the packing industry areas where feeding is increasing creates a greater opportunity for producers to sell their cattle. (Bundy-Iowa State)

0744 — A1, F3, F5

ANIMAL SLAUGHTER AND PROCESSING,
National Industrial Pollution Control Council, Washington, D. C.
S. S. Cross, R. W. Renaker.
Animal slaughtering and Processing National Industrial Pollution Control Council, Sub-Council Report February, 1971, 14 p.

Descriptors: *Farm Wastes, *Industrial Wastes, Air Contamination, Solid Wastes, Wastewater, Regulations, By-Products.
Identifiers: *Rendering, Animal Processing Wastes, Poultry and Animal Products.

The United States poultry and animal products Industries include approximately 7,500 establishments, The pollution problems of these industries cover the normal range of water, air, and solid pollutants. Substances collected in the process water include organic matter from blood, meat, or paunch contents, fats, oils, grease, nutrients, and dissolved inorganic solids. The rendering industry considers objectionable odors from edible and inedible rendering operations as its primary pollution problem. Ground manure is the principal solid waste from feedlot operations. New technology is needed to develop a standard water sampling procedure, design a program to identify where nutrient losses are occuring in processing operations, and design a program to study the effects of reduced water usage. The poultry and livestock - based industries have long demonstrated an awareness and a concern for environmental problems and have voluntarily initiated programs to develop corrective procedures. Government policies should continue to encourage and assist these industries in the identification and solution of major pollution problems. (Schmitt - ISU).

0745 - F4

ANIMAL WASTES.
National Industrial Pollution Control Council, Washington, D.C. Staff Report, February 1971. 15 p, 1 fig, 2 tab, 9 ref.

Descriptors: *Farm wastes, *Industrial wastes, Flow control, Byproducts, Waste storage, Pollution abatement, Water pollution sources.
Identifiers: *Animal processing wastes, Rendering.

Increased pollution from animal wastes is attributable to two of the fundamental factors behind most pollution problems -- population increase and the adoption of more efficient production or processing methods. Farm animals produce

over one billion tons of fecal wastes and 400 million tons of liquid excrement per year, with a human population of BOD equivalent of over 2 billion persons. Animal processing wastes frequently include blood, paunch contents, and clean-up materials. Only about 40% of a beef animal slaughtered for human food is considered edible. The rendering process, which involves the cooking of various types of carcass materials, is a significant source of pollution. Remedial actions being undertaken to deal with the animal waste problem include construction of water diversion structures around livestock feedlots and excrement collection in large storage tanks for later return to the land. Currently, research is under way to assess the use of chicken litter as a feed for ruminants. Pollution control in the meat packing industry is largely a matter of by-product recovery. Blood recovery, paunch handling, edible rendering, inedible rendering, and clean-up are the five key recovery processes. Completely enclosed animal factories with complete control of inputs and outputs are expected to become a reality in the not too distant future. (Schmitt-Iowa State)

0746 - D4, E3, F1

RECYCLING SYSTEM FOR POULTRY WASTES,

Lake Tahoe Area Council, Tahoe City, Calif.
G. L. Dugan, C. G. Golueke, and W. J. Oswald.
Journal Water Pollution Control Federation, Vol. 44, No. 3 p 432-440, March 1972, 3 fig, 2 tab, 9 ref.
EPA Grant 5R01 U100566-03.

Descriptors: *Farm wastes, Poultry, Nitrogen, Lagoons, Pumping, Aerobic treatment, Biochemical oxygen demand, Chemical oxygen demand, Nutrients, *Waste treatment, *Algae, Costs.
Identifiers: *Oxidation ditch, Hydraulic manure handling.

An integrated waste management system was developed in which animal enclosure sanitation was integrated with waste treatment. It was a largely closed hydraulic system involving an anaerobic phase and an aerobic phase in which oxygenation could be accomplished either by the photosynthetic activity of algae or by mechanical aeration. When photosynthetic oxygenation was used, algae were harvested. The range of application of the process is from small-scale to large-scale operations. Algae reclamation would be practiced in large-scale operations and induced aeration in smaller ones. An important operational feature of the system is to keep the solids content of the manure slurry to less than 3 percent, wet weight. At concentrations of 3 percent or less, 70 percent or more of suspended solids in manure slurries settle out of suspension in less than 30 min. Pond depth should not exceed 12 in. (30.5 cm). The indicated pond area per bird was 2 sq. ft. (0.19 sq. m.). An economic evaluation based on an integrated system of 100,000 egg layers and the application of the low-loading, high-cost, and overdesigned components used in the research indicates that the waste-handling costs of the system would be at the most, $0.02/dozen eggs. If the value of the algal crop were credited to the operation, the net waste-handling cost would be about $0.01/dozen eggs. (Bundy-Iowa State)

0747 - B1

ALTERNATIVES IN CATTLE FEEDLOT WASTE MANAGEMENT,

Iowa Univ., Iowa City. Dept. of Civil Engineering.
R. R. Dague.
In: Proceedings, Industrial Waste Conference, 25th, May 5-7, 1970, Purdue University, Engineering Extension Series No. 137, Part 1, p 258-265, 1 fig, 17 ref.

Descriptors: *Farm wastes, *Waste treatment, *Design criteria, Runoff, Waste water disposal, Waste water treatment, Waste disposal, Physical properties, Chemical properties, Biological properties, Control systems, Economic feasibility, By-products, *Feed lots, Cattle.
Identifiers: Population equivalents, Pollution potential.

In the 32 leading cattle-feeding states there are about 200,000 cattle feedlots. In 1967, the 22 million cattle produced in these feedlots produced about 200 million lb/day (dry weight) of manure. The control practices employed in a given region or state may be necessary and effective in that area but be unnecessary or ineffective in another area. The form of the wastes as they enter the environment may bear only a slight resemblance to what they are like when fresh. The manure accumulation on the feedlot surface is one waste--the runoff is another. The expression of animal waste quantities in terms of human population equivalents is very misleading, the important factor is the amount and characteristics of the material that actually enters the stream. The steps that should be involved in solving feedlot waste problems are: (1) Can the waste volume and/or strength be reduced at the source. (2) Can the physical, chemical, and biological characteristics of the waste be improved at the source. (3) Is it possible and feasible to recover by-products from the waste. (4) What systems will most economically accomplish the necessary degree of waste control or treatment. Management of the manure and the runoff are discussed. (Dorland-Iowa State)

0748 - A5, A6, C3, D4

THE ELIMINATION OF ODOUR FROM THE EFFLUENT GASES OF CHICKEN MANURE DRYING PLANT,

Loughborough Univ. of Technology (Ontario).
A. S. Hodgson.
Journal Agriculture Engineering Research, Vol. 16, No. 4, p 387-393, December 1971, 3 fig, 1 ref.

Descriptors: *Farm wastes, *Poultry, *Odor, Dehydration, *Drying, Feed, *Waste treatment.
Identifiers: Pilot experiment, Waste gas, Scrubber, Cyclone separator.

Practical means of reducing odor from a chicken manure drying plant waste gas stream were investigated. The cause of the odor and possible means of removal from the waste gas were studied. Although odor removal was possible, the cost is high. The problem should be considered during the plant design stage. A chicken manure drying plant must be designed initially with the problem of effluent gas odor of primary importance. For the plant studied, operation was consistent with the operating manual. Recycle rates were lower than expected which may increase the odor problem. The odor in the gas stream from the chicken manure plant is caused by ammonium salts of carboxylic acids, free acids and neutral material and possibly other material. The drying of chicken manure must be accomplished in a system which does not produce gaseous effluent with strong odor. The ultimate result of not considering the odor problem at the initial design stage is to risk having the plant shut down as a public nuisance. A closed system is probably the only satisfactory method for overcoming this problem. Modifications to a plant for odor removal are difficult and expensive. (Bundy-Iowa State)

0749 - A5, B2, D4

ROTOR AERATION OF SWINE WASTES,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. L. Day, J. C. Converse, and D. D. Jones.
Illinois Research, University of Illinois Agricultural Experiment Station, p 16-17, Spring, 1968, 4 fig.

Descriptors: *Farm wastes, *Oxidation, Aeration, Hogs, Gases, Odors, Confinement pens, Ammonia, *Waste water treatment, Costs, Waste treatment.
Identifiers: *Oxidation ditch, Foaming, Rotor aeration.

Laboratory tests on aeration of hog wastes indicated that it might be feasible to develop an oxidation ditch in a confinement swine house. With this method, self-cleaning slotted floors could be used without objectionable gases and odors coming from the gutter. Eighty pigs averaging 120 pounds were used. The gutter was filled with tap water, and 100 gallons of activated sludge from the Urbana waste-treatment plant was added as an inoculum at the beginning of the test. The major problem was foaming which began during the fifth week of operation. On the basis of an electricity rate of 2 cents per kilowatt hour, the power to furnish the proper oxygen supply costs about a half a cent per pig per day. During the second test, a rotor with a 3/4-horsepower motor was used to supply 0.9 pounds of oxygen per pig per day. Foaming was not as serious as during the first test. On the second test, an ammonia odor was very evident in the building, and appeared to be coming from the aerated waste. This odor subsided, however, during the ninth week and did not recur. Before the oxidation ditch can be unconditionally recommended for swine confinement buildings, several problems must be solved. The most immediate of these is the control of foaming. (Bundy-Iowa State)

0750 - D4

LAGOONING OF LIVESTOCK WASTES IN SOUTH DAKOTA,

South Dakota State Univ., Brookings. Dept. of Civil Engineering.
J. N. Dornbush, and J. R. Andersen.
In: Proceedings, Industrial Waste Conference, 19th, 1964, Part 1, p 317-325, 2 fig, 2 tab, 8 ref.

Descriptors: *Farm wastes, *Lagoons, Anaerobic conditions, Aerobic conditions, Poultry, Biochemical oxygen demand, Chemical oxygen demand, Ammonia, Nitrogen, *South Dakota, Waste water treatment.
Identifiers: *Dry solids, Volatile solids, Cages.

Current studies of lagoons in South Dakota have elucidated some of the basic factors influencing the design and operation of farm manure lagoons in a northern climate. To serve as an economical final method of disposal of farm manures, the lagoons must maintain anaerobic biological action and should be loaded on a volatile solids (VS) basis as are other sludge digesters. A loading rate of five to 10 lbs of VS per 1,000 cu. ft. of lagoon volume has been found satisfactory where winter conditions result in storage of manures for prolonged periods. Mixing the lagoon contents to disperse sludge deposits appears essential to avoid offensive odors. An adequate water depth to facilitate mixing is desirable and lagoon depths of five to eight ft. warrant consideration. (Bundy-Iowa State)

0751 - E3, F4

ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION,

Alabama Agricultural Experiment Station, Auburn. Dept. of Animal Sciences.
W. B. Anthony.
Journal of Animal Science, Vol. 32, No. 4, April 1971. p 779-802. 46 ref.

Descriptors: *Farm wastes, *Poultry, Swine, Cattle, Feed lots, *Waste treatment, *Waste disposal.
Identifiers: *Packing house wastes.

Livestock organic waste far exceeds the organic waste output of the human population in the United States. Livestock waste can be converted into a great resource but most waste management research is concerned with humans. However, some research has been done on using poultry

waste as a feed or feed component. Tests have been made on the feeding of autoclaved poultry manure (APW), cooked poultry manure (CPW), and soybean meal (SBM) to wethers and steers. Poultry manure has also been used indirectly for chick feed. In Britain, the feeding of poultry manure to sheep and cattle seems to have been widely accepted. In addition to poultry, waste management research has been carried out on pigs and cattle. Dried pig feces have been inserted into swine finishing rations and have been fed to swine. Steer manure has been an acceptable component of swine rations and in recent years has also been used for cattle feeding. The feeding of steer manure to cattle has proven satisfactory because it (1) largely eliminated noxious accumulation of manure in the feedlot, and (2) improved the efficiency of the cow as a converter of feed to human food. To avoid harvesting steer manure each day to blend with the grain prior to feeding, the wastelage concept was developed. Wastelage is the conversion of feedlot manure into silage. Manure may also be made useful for feed by yeast fermentation or by lactic acid fermentation. (Bundy-Iowa State)

0752 - B1, F1
ROLE OF THE SOIL CONSERVATION SERVICE IN DESIGN OF FEEDLOT WASTE MANAGEMENT FACILITIES,
Soil Conservation Service, Lincoln, Neb.
D. R. Vallicott.
(1970), 2 p.

Descriptors: *Farm wastes, *Design criteria, Construction costs, Cost sharing, *Standards, Runoff, Government supports.
Identifiers: *Feedlot runoff, *Soil Conservation Service, Runoff control.

The Soil Conservation Service works with farmers and ranchers in the planning and installation of soil and water conservation practices on their farms or ranches and, since feedlot runoff control can be effected by the installation of a system of conservation practices, it comes within the scoope of Soil Conservation Service responsibility. Assistance to the farmer or rancher comes from three sources: the Extension Service, the Soil Conservation Service, and the Agricultural Stabilization and Conservation Service for cost sharing where applicable. The Soil Conservation Service has, based on its knowledge in the design and performance of certain conservation practices, prepared an Engineering Standard and Specification for what has been termed 'Feedlot Runoff Control'. The standard has been prepared using what are considered proven methods and procedures. It is anticipated that improvements will be made as other methods and procedures are proven to be sound. (Dorland-Iowa State)

0753 — E3, F1
MANURE CAN BE PROCESSED AND SOLD AT A PROFIT
Agricultural Extension Service, University of California, Los Angeles.
J. Van Dam, and C. A. Perry.
A Publication of the Dow Chemical Company, The Practicing Nutrionist, Vol. 3, No. 4, pp. 40 & 42.

Descriptors: *Farm wastes, *Feedlot, *cattle, market value, waste disposal.
Identifiers: *Los Angeles County, Composting, stockpiling, packing cost.

A study to determine the actual cost of removal and disposal of manure from a beef feedlot in Los Angeles County was made by the Agricultural Extension Service. Manure was prepared for marketing in three basic forms and sold under four pricing conditions. Manure processing, packaging and marketing began with the mounding of the manure in the corrals, followed by its removal to a compost stockpile. Based on the volumes of the different product forms handled in the feedlot studied, the composted unprocessed manure had the greatest market potential. However, the processed bulk product had the greatest net revenue based on net returns, product form volumes and weighted average price, less total costs. While this study was not intended to determine the market for manure, it did determine that there was a market for various product forms - all within a competitive price range, and it is probable that a feedlot operator can make a profit from the sale of manure. (Bundy - ISU).

0754 - A3, B1, D1, E1
WASTE WATERS FROM FARMS.

Department of Scientific and Industrial Research, Notes on Water Pollution No. 17, June, 1962, 4 p, 11 ref.

Descriptors: *Farm wastes, Irrigation, *Waste disposal, Biochemical oxygen demand, Nitrogen, Biological treatment, *Waste water treatment.
Identifiers: *Soakaways.

Disposal of waste waters from farms has become a major problem as farmers have turned away from bedding down animals. Methods of disposal suggested include irrigation on land, soakaways, discharge to a sewer, and biological treatment and discharge to a stream. Silage liquor, herbicides, and pesticides all create a disposal problem. Consulting the local water quality authorities is usually the best procedure before attempting to dispose of liquors capable of water pollution. (Wallin-Iowa State)

0755 - B1, D4, E2
FEED LOT WASTE IN FLORIDA,
Orange County Pollution Control Dept., Orlando, Fla.; and Soil Conservation Service, Orlando, Fla.
C. W. Sheffield, and B. Beville.
In: Proceedings, Industrial Waste Conference, 25th, May 5, 6, and 7, 1970. Purdue University Engineering Extension Series No. 137, Part 2, p 914-918, 1 fig.

Descriptors: *Waste treatment, *Biological treatment, *Waste disposal, Subsurface drains, Sprinkler irrigation, Aerobic treatment, Anaerobic digestion, Dairy industry, Cattle, Biochemical oxygen demand, Turbidity, Retention, *Farm wastes, *Feed lots, Costs.
Identifiers: Grit chambers, Polishing ponds, Sand traps.

The problems associated with animal waste disposal are becoming tremendous compared to just a few years ago. An increased number of animals has created a problem of wastes from feedlots. It has been estimated that animal waste is ten times that from human waste, or approximately 55 pounds of manure per person would be one way of estimating the amount of manure from a feedlot operation. Therefore, it could be assumed that approximately two pounds per day of BOD as runoff is associated per steer or cow. Various methods of treating animal wastes from feedlot operations were reviewed and the most practical and economical means of treating the waste from dairy and beef cattle was determined. Construction and maintenance costs for a waste treatment facility for 800 dairy cows is presented. The treatment method consists of a grit chamber followed by an anaerobic pond, then an aerobic pond and a polishing pond. The effluent is discharged through a three to five acre sub-surface drain and a five acre spray irrigation system. (Dorland-Iowa State)

0756 - B1, F3
SWINE-WASTE MANAGEMENT,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. G. Jedele, and D. L. Day.
Paper No. 69-934, presented at the 1969 Winter Meeting of the American Society of Agricultural Engineers at Chicago, Illinois, 4 p.

Descriptors: *Farm wastes, *Legal aspects, *Design criteria, Hogs, Odor, Treatment facilities, Water pollution, Water quality, Design standards, Specifications, *Waste water treatment.
Identifiers: *Odor control, Stream pollution, Guidelines.

Producers of livestock are experiencing difficulties in the design of waste treatment facilities. These producers, motivated by a desire to avoid lawsuits or a desire to be good neighbors, are hard pressed to determine exactly how much treatment and what type of treatment is needed to prevent objectionable odors and stream and groundwater pollution. Most references and guidelines contain terms such as 'if you are not too close to your neighbors' and 'they sometimes release objectionable odors.' Producers want to know such things as how close is close and just how objectionable are the objectionable odors. Producers need to know their chances of being the object of a lawsuit or producing runoff that will result in pollution to water. Some type of guideline is needed to tell a producer what type of treatment he needs to satisfy his circumstances. (Dorland-Iowa State)

0757 — B2, C5, D4
AEROBIC TREATMENT OF SWINE WASTE
Research Associate, University of Illinois, Urbana,
R. L. Irgens, and D. L. Day.
In: Illinois Research, University of Illinois Agricultural Experiment Station, Fall 1965, pp. 14 - 15, 2 fig.

Descriptors: *Farm Wastes, Aerobic Treatment, Swine, Confinement Pens, Aeration, Biochemical Oxygen Demand, Chemical Oxygen Demand, ammonia, nitrate, phosphate, hydrogen Ion Concentration, Odor.
Identifiers: *Moorman Swine Research Farm,

A laboratory investigation was made to determine: How well can swine waste, which is more concentrated than municipal waste, be stabilized by aerobic treatment. How much must the liquid manure be diluted to obtain satisfactory results? How much air is required for the process of aerobic stabilization? Aerobic treatment of swine waste proved to be odor free and did not attract flies. Carbon dioxide was the only gas produced. The effluent had a low BOD, 12 to 20 ppm which will not pollute streams if discharged into them. Results of these experiments gave the following design requirements for an aerobic treatment plant: Volume in aeration tank or ditch — 6 cubic feet per pig; quantity of air required — 2500 cubic feet per pound of BOD at 3 percent efficiency of oxygen utilization. In the laboratory treatment system, results were more satisfactory when small amounts of manure were added daily than when large amounts were added weekly or monthly. It was thus concluded that odorless aerobic treatment could be integrated with self-cleaning slatted floors so the pig excreta would be deposited directly into the treatment plant. The manure collection gutters could be connected at the ends to make a continuous channel and an acrator would keep the solids suspended, circulate the liquid manure, and add the necessary oxygen. Facilities to field - test this method are being constructed. (Bundy-ISU).

0758 - B2, D1, E1, F3
HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE,
Texas Tech Univ., Lubbock.
R. C. Albin.
Journal of Animal Science, Vol. 32, No. 4, April 1971. p 803-810. 2 tab, 71 ref.

Descriptors: *Farm wastes, *Feed lots, Cattle, Water pollution, Biochemical oxygen demand, *Waste disposal, *Oxidation lagoons, *Waste

water treatment.
Identifiers: Liquid handling systems, Anaerobic lagoons.

The exponential expansion of cattle feeding in the United States during the last decade has created many challenges, among which are the handling and disposal of a by-product, feedlot waste. It can be categorized as solid or semi-solid waste and runoff water for most feedlots, or as a liquid suspension from confined feeding operations. The chemical and pollutional characteristics are variable. Numerous handling and disposal systems are available for management of cattle feedlot waste. The disposal system for a commercial feedlot could be characterized as a function of several parameters, such as climate, type of ration and cattle, feedlot surface, and cattle and human population densities, with the solution stated in economic equivalents. Final disposal of feedlot waste has been on the land in most instances. The oxidation ditch and a combination of aerobic and anaerobic systems offer possibilities. Socio-industry relationships might require ultimate disposal of runoff and effluent into streams with dehydration and/or incineration of the solid waste. Use of feedlot waste as a resource material offers unlimited possibilities as a conservation approach to feedlot waste management. The need for research in feedlot waste management is urgent. Critical evaluations of handling and disposal systems for cattle feedlot waste are needed in the areas of land use, socio-legal-industry relationships, environmental pollution, conservation and economics. (Bundy-Iowa State)

0759 - A2, B1, C1

STREAM POLLUTION FROM FEEDLOT RUNOFF,
Kansas State Dept. of Health, Topeka. Environmental Health Services.
J. L. Mayes, S. M. Smith, and J. R. Miner.
Paper presented at the Fourteenth Annual Conference on Sanitary Engineering, University of Kansas, Lawrence, January 8, 1964. 24 p, 4 fig, 8 tab.

Descriptors: *Farm wastes, Feed lots, Kansas, Runoff, Biochemical oxygen demand, Chemical oxygen demand, Ammonia, Nitrogen, Fishkill, Cattle, *Agricultural runoff, *Water pollution sources, *Water pollution effects.

During the investigation of water pollution complaints and fish kills, the Kansas State Department of Health has found animal feedlot runoff to be the cause of a number of water pollution problems. The principal problems have occurred in water courses below feedlots where large numbers of farm animals, primarily cattle, are concentrated in feeding areas. Water pollution studies of streams polluted with feedlot runoff indicate that the runoff is characterized by a high biochemical oxygen demand, high ammonia content, and heavy bacterial populations. The pollution problem is intermittent since it occurs during the following runoff, but it causes a severe slugging effect on the stream. Serious depletion of the dissolved oxygen content of the stream may occur, especially if the stream is small or the waste load is large. Present knowledge does not allow a quantitative prediction of the degree of pollution that can be expected from a given feedlot operation on a given occasion. This seems to be dependent upon a variety of factors such as the size of the lot; the cleanliness of the lot when runoff occurs; general topography of the area and the location of the lot with respect to receiving waters; the amount of rainfall, its intensity and pattern within the drainage basin; the size of the receiving stream and the pollution control measures in use. (Bundy-Iowa State)

0760 - B1

HIGH TEMPERATURE ENVIRONMENT EFFECTS ON GESTATING SWINE,
Oklahoma Agricultural Experiment Station, Stillwater.
G. W. A. Mahoney, I. T. Omtvedt, D. F. Stephens, E. J. Turman, and R. Edwards.
Paper presented at Annual Meeting of the Southwest Region, American Society of Agricultural Engineers, April 3-5, 1968, Baton Rouge, Louisiana, 14 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Farm wastes, Confinement pens, *Swine, Ventilation, Cooling, *Temperature, *Environmental control.
Identifiers: *Slotted floor, Farrowing, Control chamber.

The objectives were to investigate the effect of high ambient temperatures on swine prior to breeding and during gestation on the estrual cycle, conception rate and subsequent embryo survival; to attempt to determine the 'critical' periods of temperature stress prior to breeding and during gestation for subsequent testing; and to evaluate the performance of the environmental chambers constructed for this study. There was a definite tendency toward reduced corpora lutea, fewer viable embryo, lower survival rates and smaller embryos for the gilts in the heat stress chamber. The differences were significant ($p < 0.05$) for reduced viable embryo and survival rates for gilts stressed 1-15 days postbreeding. Rectal temperatures were significantly higher for gilts in the heat chamber. Also, six gilts, of the 32 in Trials 1 and 11, died due to heat prostration. The environmental chambers performed satisfactorily but needs some modification and improved instrumentation and controls. Humidity controls are needed so effects of environment with various high humidities and temperatures can be investigated. Present modifications of the heating system are currently in progress and should result in better control of high temperatures and result in more uniform temperature, rather than the present 6 degrees variation, or plus or minus 3 degrees above and below 102 degrees F. (Bundy-Iowa State)

0762 - F4

LIVESTOCK WASTE MANAGEMENT AND POLLUTION ABATEMENT.

Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, American Society of Agricultural Engineers, St. Joseph, Michigan, 1971, ASAE Publication PROC-271, 360p.

Descriptors: *Farm wastes, *Odors, Economics, Drying, *Aerobic treatment, Runoff, Cattle, Swine, Poultry, Dust, *Aerobic lagoons, Hydraulic structures, Water pollution control, Waste water treatment, Waste disposal, *Pollution abatement.
Identifiers: *Solid-liquid separation, Canada, Europe, *Anaerobic lagoons.

The proceedings of the International Symposium on Livestock Wastes includes approximately 100 papers. The topics include waste disposal systems, beef feedlot systems, legal and administrative considerations, characteristics, hydraulic transport, composting, drying, economics, aerobic treatment and storage, land disposal, refeeding, and solid-liquid separation. Contributions were received from Canada and Europe, as well as the United States. Each paper attempted to demonstrate techniques that allow the coordination of various waste treatment units into workable systems. Research of more than 200 scientists from 30 states and 9 nations was reported. Some were rather novel approaches that might be several years from acceptance and others are modifications of known technology with good prospects for more immediate acceptance.
(Bundy-Iowa State)

0763 - F3, F4

ANIMAL WASTES AND AMERICA THE BEAUTIFUL,
Department of Agriculture, Washington, D.C.
N. D. Bayley.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 6-7.

Descriptors: *Farm wastes, Confinement pens, Odors, Nutrients, Pathogens, Waste disposal, Economics, *Research priorites.

Along with the moving of animals from open range to confinement pens came waste management problems including odors, nutrients, and disease. All of these should be managed in such a way to make America more beautiful and a better place to live. The highest item on research priorities should be to find more and better ways to dispose of organic wastes on land. The next priority should be to control odors from wastes. Very little is known about this problem. A third priority for research should be to look at the entire technology required to deal with animal wastes. This would include starting with the feed produced for the animal to the disposal of the animal waste. Research must be able to evaluate all costs and benefits - tangible values such as outdoor recreaction and fish and wildlife enhancement, secondary benefits that are to some extent quantifiable, such as benefits to the economy - local, regional, or natural and intangible benefits we have not always considered, such as the preservation of natural beauty.
(Bundy-Iowa State)

0764 - F3

FUTURE PROSPECTS FOR ANIMALS AGRICULTURE,
Ohio State Univ. Columbia. Coll of Agriculture and Home Economics,
R. M. Kottman, and R. E. Geyer.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 9-18, 18 tab.

Descriptors: *Farm wastes, Economics, Income, Agriculture, Livestock, Poultry.
Identifiers: Diet-health relationships.

The opportunity for U.S. animal agriculture to provide larger supplies of all animal products during the next 30 years offers an exciting challenge. United States animal agriculture will however, face stiff competition from other food sources, but such competition will assist the U.S. animal agriculture by forcing it to remain progressive. To remain competitive, United States livestock and poultry producers, as well as processors of animal products are challenged to: (1) produce continually higher quality products on the farm with greater eficiency; (2) develop and implement dramatic new methods to control pollution and to utilize waste resources; (3) develop new, low-cost, convenient and tasty foods from animal sources; (4) encourage expansion of research designed to eliminate current unknowns regarding diet-health relationships; (5) DEVELOP AND IMPLEMENT NEW AND GREATLY EXPANDED PROGRAMS TO EDUCATE CONSUMERS AS TO THE HEALTH AND NUTRITIONAL PROPERTIES OF ANIMAL FOODS; (6) substantially increase industry-wide consumer marketing programs, especially zeroing in on the markets for protein, calcium, iron and other animal-derived nutrients essential to human growth and health.
(Bundy-Iowa State)

0765 - F3

ROLE OF STATE DEPARTMENTS OF AGRICULTURE IN PROBLEMS OF ANIMAL WASTE MANAGEMENT,
National Association of State Departments of

Agriculture, Washington, D.C.
S. Cath.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p. 21-22.

Descriptors: *Farm wastes, *Federal Governments, *State Governments, *Local Governments, Regulation, Control, Research priorities, Waste disposal.

State Departments of Health, Agriculture, and Environmental Protection, and Livestock Sanitary Commissions are some of the agencies that put regulations and control on cattle, hog, sheep, and poultry operations. The National Association of State Departments of Agriculture, at their 1969 convention, in resolution form, urged that the Secretary of Agriculture and the land-grant universities give a higher priority to waste disposal and requested the Congress to provide additional funds to carry out the necessary research. Also, the State and Local Governments must develop methods to prevent farm-urban confrontation on the waste and pollution problem. In the practical sense however, good regulatory enforcement of livestock waste disposal can only proceed as fast as the results of good research. Regulatory enforcement should never exceed the state of the art. Livestock industries should not have to cope with tnfair regulatory demands that cannot be met.
(Bundy-Iowa State)

0766 - F4

RESPONSIBILITIES OF A PROFESSIONAL SOCIETY TOWARD URGENT SOCIAL PROBLEMS,
Texas A and M Univ. College Station. Dept. of Agricultural Engineering.
R. E. Stewart.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 23-24.

Descriptors: *Technology, Engineering, Air pollution, *Social needs, Environment, Urbanization.
Identifiers: *American Society of Agricultural Engineers, *Professional societies.

Today is an age of growing doubt and mistrust of technology. Many of the benefits technology has brought to the West (and they are many) are being downgraded by the increasing concern over pollution, ugly environment, exploited resources, and disregard of human values. The engineer is increasingly cast in the role of a mindless villain for whom efficiency is measured only by dollar profits and losses. The dilemma, as it appears to be posed for the American Society of Agricultural Engineers (ASAE) and the community of agricultural engineers, is examined from the two viewpoints of urbanization and environmental quality; both of these factors represent urgent contemporary social problems. ASAE could help to reduce the urban crisis by turning massive attention to rural development, including redeployment of industry into the countryside. ASAE could help to solve the environmental problems by increased zeal in working with the public on chemical pesticides, wastes recycling, soil erosion, and wiser exploitation of natural resources. Such effort must be supported by the will of the people, as expressed through the public budgets. The benefits of such work should be at least equal to those derived from the mighty efforts applied to outer space. Moreover, this can be done without sacrifice of any capacity for food production.
(Bundy-Iowa State)

0767 - B1, F3

PUTTING IT ALL TOGETHER,
N. H. Curry.
In: Livestock Waste Managmement and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 25-26.

Descriptors: *Federal government, State governments, Budgeting, Design, Engineering, *Research and Development, *Planning, *Projects, *Project planning, Facilities, Bids.
Identifiers: Contractors.

The normal steps in the development process - from project conception to new facilities operation - for institutionally or corporately-owned research and demonstration installations, as well as privatley or corporately-owned waste treatment and handling units used in production operations. Some predictable problems and pitfalls are discussed. Due to the long process of development, many changes may be anticipated as the project plans develop. These include: (1) a general upgrading of the proposed quality of construction and the incorporation of more sophisticated equipment; (2) a better relation of the project facility design with the statistical design and operational procedures of the proposed experiments, or an improved solution to practical problems in a production facility (the time delay is not all bad); (3) changes in research, administrative, and elective official personnel; (4) project expansion or development of interdisciplinary programs; (5) continued construction cost inflation; (6) competition for funds with other projects; (7) a tendency of administrators in dealing with state legislatures or congress to 'horse trade', or drop smaller projects in order to assure obtaining the 'big ones.' This is not necessarily bad from an overall standpoint - few administrators are promoted for thinking small - but this is faint consolation to the individual or group badly in need of a new facility.
(Bundy-Iowa State)

0768 - D2

SYSTEMS FOR THE DEHYDRATION OF LIVESTOCK WASTES: A TECHNICAL AND ECONOMICAL REVIEW,
H. G. Scholz.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p. 27-29, 5 fig, 2 tab.

Descriptors: *Farm wastes, *Biological treatment, Aerobic treatment, Anaerobic digestion, Swine, *Dehydration, Drying, Liquid wastes, Poultry, Wastes water treatment, Economics.
Identifiers: *Humus manure.

Both biological decomposition and incineration result into a final product which is not marketable. On the other hand, dehydration followed by pulverization of livestock wastes offers the possibility of a product which can be bagged and sold as soil amendment. It is even possible, under European conditions, to have the returns from such a system redeem the capital and operating cost of the plant. Such a system has been designed and is in operation in Europe. In this system, wastes are homogenized and then conveyed to a rotary drum drier. Moisture is removed, and the dried material is conveyed to a cyclone and baged. Flue gas is scrubbed by pumping fresh liquid manure from the building into a verturi scrubber. Manure, heated through contact with the flue gas, falls, into a storage tank which is also used to aid in reducing the moisture content of the manure. The contents of the tank are mixed thoroughly to increase the evaporation surface area of the liquid. This mixing also helps homogenize the manure before it is pumped into the rotary drum. Wastes from poultry, dairy cattle and swine need be treated differently before the drying takes place. Different designs incorporating such pretreatments are described and illustrated with photos.
(Bundy-Iowa State)

0769 - B1, E2

A COMPUTER MODEL FOR STORAGE AND LAND DISPOSAL OF ANIMAL WASTES,
Florida Dept. of Agricultural Engineering. Univ., Gainesville.
R. A. Nordstedt, H. J. Barre, and E. P. Taiganides.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p. 30-33, 6 fig, 4 ref.

Descriptors: *Farm wastes, Computer models, Mathematical model, Waste storage, *Waste disposal, Optimization, Nutrients, Model studies, *Scheduling.
Identifiers: *Manure spreading, Tank wagon, Fortran IV Language.

A model was developed for optimizing and studing long-term scheduling decisions for removing livestock wastes from storage and spreading them on agricultural lands. The storage and land disposal system was modeled as a multistage decision process. Dynamic programming techniques were used to find the optimal disposal schedules (time and quantities). The maximum quantity which can be disposed in each time period is constrained by storage capacity, quantity of waste generated and land area available for spreading the wastes. An important feature of this model is that most parameters are permitted to be functions of time. Transport vehicle capacity, operation times, and cost of labor are not as significant as fixed storage cost, but they were sufficiently important to merit consideration in the design and operation of the system. Land availability and nutrient effectiveness (as compared to inorganic fertilizers) as a function of time were also significant. The model is sufficiently flexible for use as a decision tool in the design of operational systems as well as for use as a simulation tool in studying storage and land disposal systems. (Bundy-Iowa State)

0770 - B1

LIVESTOCK WASTE MANAGEMENT AND THE CONSERVATION PLAN,
Soil Conservation Service, Washington, D. C. Engineerineering Div.
C. E. Fogg.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p. 34-35, 2 tab, 8 ref.

Descriptors: *Farm wastes, Aerobic lagoons, Liquid wastes, Federal Governments, Local Governments, State Governments, Groundwater, Runoff, Biochemical oxygen demand, Irrigation systems, *Waste disposal, Waste water treatment.
Identifiers: Anaerobic lagoons, Health agencies.

Waste management systems must provide for utilization or disposal of livestock wastes without pollution or surface or ground waters and without objectionable odors. A sound system should (1) divert clean water away from areas where livestock wastes are concentrated, (2) provide controlled drainage of runoff from such areas, (3) PREVENT LEACHING OF CONTAMINANTS INTO GROUND WATER, (4) collect polluted runoff; and (5) treat or safely dispose of collected runoff. Solid manure should be removed and stockpiled until it can be safely spread on the land or deposited in the land. Liquid manure resulting from many dairy, swine and poultry operations as well as polluted runoff from concentrated livestock areas can often be disposed of by a water spreading or irrigation system utilizing the soil and plant cover for treatment. Nutrients in such wastes are used by the plants or tied up in the soil provided amounts applied are kept within recommended limits. Aerobic and anaerobic lagoons used singularly or in combination often provide at least partial treatment of liquid manure wastes.

They are usually supplemented by application of the effluent to the land by land spreading or irrigation. (Bundy-Iowa State)

0771 - B1, F4

TECHNOLOGICAL AND TECHNICAL CONCEPTIONS OF MANURE HANDLING IN CZECHOSLOVAKIA,

Vyzkumny Ustav Zemedelske Techniky, Repy (Czechoslovakia).
M. Velebil.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 36-38, 4 fig., 2 tab., 1 chart.

Descriptors: *Farm wastes, Cattle, Litter, *Waste disposal, Cleaning, Hogs, Economics.
Identifiers: *Czechoslovakia, Barn cleaning, Slatted floor.

The technology and techniques of handling swine and dairy manure are discussed. Results of laboratory and field research and experimentation, theoretical analyses and conceptions, and economical evaluations are included. Manure removal from the stables and its application on the field are described. (Bundy-Iowa State)

0772 - B2

A LAND RECYCLING LIQUID MANURE SYSTEM FOR A LARGE-SCALE CONFINEMENT OPERATION IN A COLD CLIMATE,

Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
J. E. Turnbull, F. R. Hore, and M. Feldman.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 39-43, 2 fig., 6 tab., 4 ref.

Descriptors: *Farm wastes, Water pollution, Confinement pens, Odor, Cattle, Liquid waste, Air pollution, Water reuse.
Identifiers: Sluice-gate recirculation system, Plow-cover injector system.

A full-scale liquid manure system is described for the confined housing of approximately 800 dairy cattle, 1,500 sheep, and 40,000 poultry situated on a 2,800 acre animal research site adjacent to suburban housing near the city of Ottawa. The system is based on the established practice of recycling animal wastes to cropland. Through design, planning and management, the system comes very close to meeting presently accepted criteria for the control of water, air and soil pollution. The system contains a total of six-months storage capacity to avoid the potential for water pollution from winter land application of manure. Waste removal from trench storage in cattle and sheep barns is assured by use of the European hydraulic flushing system, and conventional scraping is used for poultry. Manure is held in storage under quiescent, low odor conditions. When manure is agitated for removal from storage, some odor is produced at the building site and a nuisance potential is created. However, site planning makes this potential problem practically non-existent since adequate space separation between the barns and surrounding neighbors was provided. Enclosed tankers control odors during transport and by applying the principle of rapid soil cover of manure, a relatively odor-free method of land disposal is achieved. The development of an inexpensive hooded tanker outlet which directs manure downward in a four-foot wide swath allows a tractor and plow to straddle and cover the manure in several seconds. Manure application rates do not exceed presently accepted levels for soil pollution control. (Bundy-Iowa State)

0773 - A2, C2, C3, C4, C5

MEASUREMENT OF RUNOFF AND RUNOFF CARRIED WASTE FROM COMMERCIAL FEEDLOTS,

South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
J. M. Madden, and J. N. Dornbush.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 44-47, 2 fig., 6 tab., 4 ref.

Descriptors: *Farm wastes, Feed lots, Runoff, Biochemical oxygen demand, Chemical oxygen demand, Phosphate, Cattle, *South Dakota, Path of pollutants.

The objectives were to (1) determine the quantity and quality of runoff from livestock feeding operations in South Dakota, (2) to relate the above information to hydrological and geological considerations in order to appraise the overall influence of this runoff on specific beneficial uses of receiving water, (3) determine the influence of spring runoff as it occurs in northern climates, and (4) determine the pollutional characteristics attributable to the suspended matter in the feedlot runoff in order to extrapolate the effectiveness of proposed lagooning methods of treatment. Measurements have been made on four commercial sized feedlots for two years and an additional two lots for one year. Runoff has been quantified and composite and grab samples have been analyzed to determine the BOD, COD, dissolved and suspended solids, nitrogen forms, and phosphate content. The results have been used in the development of feedlot regulations and engineering standards for the control of feedlot runoff. Suggestions are also being made as to the type of treatment and management practice which will reduce the pollution potential. (Bundy-Iowa State)

0774 - A2, B2, C1

MANAGEMENT OF BARNLOT RUNOFF TO IMPROVE DOWNSTREAM WATER QUALITY,

Ohio Agricultural Research and Development Center. Wooster.
W. M. Edwards, F. W. Chichester, and L. L. Harrold.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 48-50, 5 fig., 8 ref.

Descriptors: *Farm wastes, Sprinkler irrigation, Runoff, Chemical analyses, Biochemical oxygen demand, Nitrogen, Phosphorus, Water quality.
Identifiers: *Biological analyses.

Quality of runoff from a small sloping barnlot is related to that of the larger farmland watershed of which the barnlot is a 0.005 part. Livestock waste was allowed to enter the stream system for a two year period, during which time the rate, volume, and quality of runoff was measured at the barnlot and downstream site. During the third year, barnlot runoff was diverted into a temporary storage pit and subsequently distributed through a sprinkler system onto nearby pasture land. Under these conditons no effluent from the barnlot was allowed to enter the stream system. Continued hydrologic and quality evaluations defined the effect of the barnlot runoff disposal system on downstream water quality. Chemical and biological analyses of runoff samples were made to relate water quality to hydrologic performance. BOD values for barnlot samples ranged from 10 to 420 mg/l as compared to <1 to 40 mg/l for stream samples taken at the watershed outlet. Concentrations of nutrients (mg/l) in the liquid phase of the barnlot runoff ranged from 10 to 70 total N, <1 to 15 NO3 (-)-N, <1 to 30 NH4 (+)-N, 5 to 60 organic N, and 1 to 10 P. Concentrations associated with the 0.1 to 1.5% w/v solid material separated from the runoff samples were <1 to 150 ppm NO3 (-)-N, 100 to 2,000 ppm NH4 (+)-N, 10,000 to 40,000 ppm organic N, and 300 to 1,200 ppm P. (Bundy-Iowa State)

0775 - A2, B1, C3

TRANSPORT OF POLLUTANTS FROM SLOPING CATTLE FEEDLOTS AS AFFECTED BY RAINFALL INTENSITY, DURATION, AND RECURRANCE.

Agricultural Research Service, Lincoln, Nebr. Soil and Water Conservation Research Div.
N. P. Swanson, L. N. Mielke, J. C. Lorimor, T. M. McCalla, and J. R. Ellis.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 51-55, 4 fig., 4 tab., 9 ref.

Descriptors: *Farm wastes, Feed lots, Runoff, Cattle, Microorganisms, Rainfall, Nitrogen, Phosphorus, E. Coli, Bacteria, Fungi, Coliform, Crops, Path of pollutants, *Central U.S.
Identifiers: Rainfall simulator.

The pollution of surface waters by cattle feedlot runoff is of serious concern in the midwestern United States. Pollutants are transported in solution, in suspension, and as bedloads by feedlot runoff. The pollutants may be chemicals, microorganisms, organic materials, and soil sediments. Research on a feedlot instrumented for continuing runoff measurement and sampling, and research using a rainfall simulator on runoff plots on 8- and 13-percent slopes in another feedlot indicate that the pollution potential is not a direct function of only the yield of runoff. In one experiment on an 8-percent slope, a simulated rain of 2.8 inches per hour provided runoff with initial rates of loss per acre per hour of 4680 lbs. of total solids, 1160 lbs. volatile solids, 11.6 lbs. phosphorus, and 66.9 lbs. of organic nitrogen. Both the chemical contents of runoff (conductivity, total N, NH4N, NO3N, and COD) and the volume of solids decreased with continuing runoff. Runoff samples contained appreciable numbers of E. coli, Enterococci, total bacteria, fungi, bacilli, and clostridium. Higher intensities of rainfall provide added energy for increased detachment and transport of solids which adds to the pollution potential of each unit of runoff. The chemical content of feedlot runoff is compared with analyses of runoff from cropland recently published by other researchers in the midwestern United States. (Bundy-Iowa State)

0776 — B1, C1, C5

CHARACTERISTICS OF MANURE ACCUMULATIONS REMOVED FROM OUTDOOR, UNPAVED, BEEF CATTLE FEEDLOTS.

Agricultural Engineer, Lincoln, Nebraska.
C. B. Gilbertson, T. M. McCalla, J. R. Ellis, and W. R. Woods.
Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19 - 22, 1971, p. 56 - 59, 6 fig., 4 tab., 8 ref.

Descriptors: *Farm wastes, Cattle, Feedlots, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen.
Identifiers: *Nebraska Field Laboratory, Unpaved feedlots.

Manure management is a necessary practice for beef feedlot operators unless area provided per animal is great enough to eliminate significant manure buildup on the feedlot surface. A study was initiated in 1968 to determine the effect of surface slope and cattle density on the quantity and quality of manure accumulation on outdoor beef feedlots. New feedlots with 3, 6, and 9% slopes were completed in July, 1968. Cattle were placed in each pair of lots at densities of 100 and 200 sq. ft. per head. Results have shown that considerable soil was mixed with accumulated manure by normal cattle movement within the lot. Dry matter removed from the lots

averaged 2.3 times more for cattle densities of 100 sq. ft. per head than for lots with cattle densities of 200 sq. ft. per head. Feedlot slope appeared to have little effect on the amount of material removed. Approximately 30% of the total solids removed was volatile. BOD and COD values were highly variable. Further, each ton of dry matter removed contained 24 to 34 pounds of N, (Bundy-Iowa State).

0777 - A1, B3, D1, E1

FEEDLOT MANURE MANAGEMENT IN A DESERT CLIMATE,

California Univ., Davis. Dept. of Agricultural Engineering.

S. R. Morrison, G. P. Lofgreen, and T. E. Bond.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 60-61, 2 fig., 2 tab., 8 ref.

Descriptors: *Farm wastes, Odor, Dust, Nitrogen, Lagoon, Sludge disposal, Evaporation, Aerated lagoons, Sprinkler irrigation.

Identifiers: *Anaerobic lagoon, Imperial Valley (Calif).

Manure management problems are somewhat different in desert climates from those in regions with higher rainfall, and in some respects are less severe since runoff is not likely to cause stream pollution. More usual problems are impairment of human environment due to dust, odors, and flies; manure disposal without available cropland; and cattle performance impaired by muddy lots in winter and heat and dust in summer. To overcome these problems in the Imperial Valley of California a system using slatted floors, anaerobic pits, aeration lagoons, and a sludge disposal area is under investigation. Initial tests were done to determine the effect of loading rate on decomposition of organic matter and nitrogen, and the surface area required for evaporation of liquid wastes. Two 210-day tests have been completed using standard feedlot practices and animals on a 90 percent concentrate ration. Reduction of organic matter generally increased with decreasing loading rate, with about 70 per cent being lost at 0.023 lb/day/ft3. About 50 per cent of the nitrogen was removed at this loading rate. A surface area of 50 sq. ft. per animal was sufficient to evaporate the water from the waste. The cattle performed satisfactorily on the slatted floors, which had also functioned well in tests of a sprinkling system for heat-stress relief. (Bundy-Iowa State)

0778 - C1, E2

LAND DISPOSAL OF CATTLE FEEDLOT WASTES,

Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.

E. L. Ifanges, L. A. Schmid, and L. S. Murphy.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 62-65, 4 fig., 1 tab., 4 ref.

Descriptors: *Farm wastes, Cattle, Feed lots, Runoff, Lagoon, Rainfall, Nitrogen, Phosphorus, Crop, Irrigation, Chemical oxygen demand, Crop response.

Identifiers: *Pratt Feed lot.

The objectives are 1) to characterize stormwater runoff from a feedlot, 2) to characterize manure generated in a feedlot, and 3) to determine the influence of different lagoon water and manure loadings on the soil, stormwater runoff from the disposal area, and corn yields. Analyses of runoff from rainfall have shown a COD of 4,000 to 10,000 mg/1, nitrogen of 100 to 800 ppm., phosphorus of 40 to 500 ppm. and total salts of 5,000 to 6,000 ppm. Analyses are being made to determine the concentration of other cations. Runoff from snowmelt has had a pollution load several times that from rainfall. During 1970, corn was grown on plots which received 0, 2, 4, 8, and 16 inches of lagoon water. Each plot was replicated 4 times and irrigated with well water as needed. Forage corn yields were measured. During 1970, corn also was grown on plots on which manure was plowed down at rates of 0, 10, 20, 40, 80, 160, and 320 tons per acre. Each plot was replicated four times and irrigated with well water. The manure was relatively high in nitrogen, calcium, iron and potassium with lesser amounts of magnesium, phosphorus, sodium and zinc. Plant population decreased as rate of manure application increased. Forage yields increased as rate of manure application increased up to 80 tons per acre. Above 80 tons manure per acre, corn yields were depressed. (Bundy-Iowa State)

0779 - B2, E1

EVALUATION OF BEEF FEEDLOT WASTE MANAGEMENT ALTERNATIVES,

Oklahoma State Univ., Dept. of Agricultural Engineering. Stillwater.

A. F. Butchbaker, J. E. Garton, G. W. A. Mahoney, and M. D.. Paine.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22 1971, p. 66-69, 6 fig., 2 tab., 6 ref.

Descriptors: *Farm wastes, *Pacific Northwest U.S., Waste treatment, Waste disposal, Cattle, *Feed lots, Confinement pens, Runoff, Design, Costs, *Design criteria, Southwest U.S., Central U.S., Computer programs.

Identifiers: Southern High Plains, Liquid flush system, Slotted floor.

The objectives were: (1) to develop beef feedlot design criteria to minimize pollution from runoff-carried wastes and to facilitate handling of solid and liquid animal wastes, and (2) to examine alternative beef feedlot waste disposal systems to obtain minimum cost systems for effective waste disposal. Waste handling systems for beef feeding operations were observed in the upper Midwest, Southern High Plains, desert Southwest, and Pacific Northwest. The systems studied included: slurry, solid, and runoff-carried waste handling systems. The ultimate disposal of the waste material was considered for each system. The design criteria developed represents the state of the art for most design considerations for confinement feeding facilities and open feedlot facilities. The results are presented in terms of flow diagrams and graphs comparing the various systems. (Bundy-Iowa State)

0780 - B1, C5

THE WASTE PATTERN OF BEEF CATTLE ON SLATTED FLOORS,

Agricultural Research Service, St. Paul, Minn. Livestock Engineering and Farm Structures Research Branch.

R. O. Hegg, and R. E. Larson.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p. 70-72, 2 fig., 4 tab.. 8 ref.

Descriptors: *Farm wastes, Cattle, Confinement pens, Oxidation lagoons, Water pollution, Aerated lagoons, Path of pollutants.

Identifiers: *Slatted floors, High energy ration.

The distribution of wastes from beef cattle on a slatted floor with respect to the location of the feeding area and the watering area was determined. Seven trials were run to determine the waste pattern on a slatted floor over an oxidation ditch at the University of Minnesota Experiment Station at Rosemount, Minnesota. The first four trials (I-IV) were run with the self-feeder and waterer along the same side of the slatted floor area. Trials (V-VII) were run with a waterer against the wall opposite the self-feeder. Trials I through IV show that approximately 60% of the urine and 60% of the fecal matter were collected on the half of the floor that was nearest the feeder and the waterer. Moving the waterer to the opposite wall for trials V-VII changed the urine pattern such that 62% of the liquid was collected on that half of the floor nearest the new location of the waterer. The fecal pattern also changed but not to the extent that the urine pattern changed. The average daily collection of total dry solids ranged from 3.1 to 5.2 lbs/animal. The average total liquid collected each day ranged from 1.3 gallons to over 4 gallons/animal. The trials indicate that placing the waterers and feeders in one area of the confinement unit tends to concentrate the wastes in that area. (Bundy-Iowa State)

0781 - B1, D1

ANALYSIS OF DUCK FARM WASTE TREATMENT SYSTEMS,

D. D. Schulte, and R. C. Loehr.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p. 73-76, 9 fig., 8 ref.

Descriptors: *Farm wastes, Model studies, Aerated lagoons, Phosphorus, Biochemical oxygen demand, Water consumption, Waste treatment, Ducks (Domestic), *Dynamic programming, Mathematical models.

In order to establish a rational basis upon which alternative duck farm waste water treatment systems could be evaluated, a mathematical model was developed. This model provided a structure in which the effect of the following items on the total annual cost of wastewater treatment could be considered: (a) capital costs of land and equipment; (b) interest and amortization rates; (c) operating costs of equipment and chemical costs; (d) treatment requirements for BOD, phosphorus, and suspended solids; (e) treatment system design; and (f) operational decisions such as water use rate and duck population. The efficiencies of three treatment alternatives, (plain sedimentation, chemical precipitation, and aerated lagoons), were established through bench scale tests and from mathematical equations and published information. Application of this model to a particular duck farm demonstrated the feasibility of using analytical models for agricultural waste management. Information available from this kind of approach provides a sounder basis for decision making. The results of this project, which was completed in June of 1970, will be used as an example of how mathematical models can be applied to problems of agricultural waste management. (Bundy-Iowa State)

0782 - A4, D4

MULTISTAGE LAGOON SYSTEMS FOR TREATMENT OF DAIRY FARM WASTE,

Florida Univ., Gainesville. Dept. of Agricultural Engineering.

R. A. Nordstedt, L. B. Baldwin, and C. C. Hortenstine.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 77-80, 7 tab., 8 ref.

Descriptors: *Farm wastes, *Sprinkler irrigation, Lagoons, Cattle, Biochemical oxygen demand, Groundwater, Water pollution, Aerobic lagoons, Nitrogen.

Identifiers: *Dairy, Multistage lagoons, Anaerobic lagoons.

The objectives are to (1) determine the design and operational parameters for treatment of dairy farm

waste by multistage lagoon systems in areas with warm climates, sandy soils and high water tables, (2) determine the groundwater pollution potential from this type of system and any necessary corrective measures, and (3) determine the effects of the effluent from this type of system on a seepage irrigated pasture. A multistage lagoon system has been designed and constructed on a 600-cow dairy farm. The system consists of one anaerobic and two aerobic lagoons in a series arrangement. The effluent from the third lagoon flows by gravity into a 40macre seepage irrigation system in permanent pasture. Influent and effluent of each lagoon is sampled in two week intervals. Test wells are located at 15, 50 and 100 foot intervals from the anaerobic lagoon and at 15 and 100 foot intervals from the second lagoon. Water is drawn from 30 sampling tubes in the seepage irrigated pasture at three week intervals. Results from the first five months of operation indicate an average influent BOD of 543 mg/l. at a flow of approximately 60,000 gallons per day. BOD reductions of 89%, 54% and 8% in the first, second and third lagoons, respectively, have been achieved for a total reduction of 95%. (Bundy-Iowa State)

0783 - A5, A6, D2, F1

SOLVING THE POULTRY MANURE PROBLEM ECONOMICALLY THROUGH DEHYDRATION,

Pennsylvania State Univ., University Park. Dept. of Poultry Science.
G. O. Bressler, and E. L. Bergman.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 81-84, 3 fig., 5 tab.

Descriptors: *Farm wastes, Anaerobic conditons, Odor, Drying, Poultry, Bacteria, Economics, Dehydration, Air pollution, Water pollution.
Identifiers: *Heater dryer, High velocity air, Time clock, Two-stage system.

Poultry manure handling is a two-pronged problem, high moisture content and anaerobic bacterial activity causing obnoxious odors. The objectives were 1) to remove as much moisture as possible from the poultry manure inside the poultry house to lessen the weight of the material to be handled; 2) to eliminate odors and flies; and, 3) to develop an automatic system of manure handling to eliminate manual labor. A two-stage drying system achieving these objectives has been developed. Stage 1 drying occurs inside the poultry house by application of high velocity air to the manure and stirring the manure frequently. In this stage manure is dried to about 30% moisture, which is 1/3 of the original weight and it is relatively free of obnoxious odors because odor producing bacteria are destroyed. Movement of air at high velocity (500 feet per minute) is accomplished by operating continuously 20-inch fans spaced about 35 to 40 feet apart lengthwise to the manure bays or pits inside the poultry house. Stirring is accomplished with a specially designed rake and cleaning device which turns, churns, tumbles, and mixes the poultry droppings as they fall to the floor underneath the birds. The dry, powdery product is free of obnoxious odors, has shelf life, and is in a form acceptable for merchandising as an organic fertilizer. Income now being received for this product exceeds the costs of Stage 1 and 2 drying methods. (Bundy-Iowa State)

0784 - B1

A FARM SCALE DAIRY WASTE DISPOSAL SYSTEM,

Washington State Univ., Pullman.
D. O. Turner, and D. E. Proctor.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p. 85-88, 4 fig., 4 tab., 6 ref.

Descriptors: *Farm wastes, Cattle, Sprinkler irrigation, Confinement pens, Lagoons, Nitrogen, Rotations, Waste disposal, Waste storage, Crop response, Washington.
Identifiers: *Large annual rainfall, Plastic irrigation pipe.

Livestock wastes from beef feed lots and from the dairy cattle industry are produced in large quantities in small areas. A systems approach to waste disposal has been developed by Washington State University in conjunction with the Washington State Department of Institutions' Honor Farm at Monroe. This system uses a covered confinement area to exclude excessive rainfall; a collection and transfer system to move wastes from confinement areas to storage lagoons; and pipeline and sprinkler systems to move wastes from confinement areas or lagoons to areas of ultimate disposal by field application. Animal waste from a herd of 250 mature Holsteins is scraped, flushed, and transported with minimum water into two 1,000,000-gallon capacity lagoons where it is held in winter storage for field distribution during the growing season. The organic degradation and nutrient recycling capability of soil as a receiver of wastes, coupled with seasonal application, appears to be the key to such waste disposal. Loading levels are being defined under field conditions. Crops under study are silage corn, cereal rye for greenchop, and grass legume pastures, as these crops complement dairy operations and tend to recycle nitrogen. Measurements are being taken of distribution patterns by the sprinklers, infiltration rates, bacteria survival, nitrate-nitrogen concentrations in the forage and through the soil profile to a 4-foot depth, BOD counts, botanical composition of forage stands, and crop yields. (Bundy-Iowa State)

0785 - E3

A TOTAL BIOCHEMICAL RECYCLE PROCESS FOR CATTLE WASTES,

Babson Bros. Co., Elmhurst, Ill. Environmental Div.
L. G. Carlson.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 89-91. 3 fig, 5 ref.

Descriptors: *Farm wastes, Cattle, Liquid wastes, Phosphates. Proteins, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Potassium, Microorganisms.
Identifiers: *Babson Biochemical Process, Reaction tower.

The Babson Biochemical Process accepts cattle wastes, such as liquid manure, and recovers undigested solids, as washed and cleaned particulate matter, from a counter-current classification tower. The solids are pelletized into slugs two inches in diameter and one-half inch thick. The remaining liquid, consisting of suspended solids, dissolved solids, and some colloidal matter, is pumped to a Reaction Tower, Reaction Vessel, and Enzyme Vessel complex, wherein, bubbles are formed as a function of the rate of mass transfer, and is key to this biochemical process. The residence time is a few hours with partial recycle to keep enzymatic activity high. Recovery of activity is very rapid, even after several weeks in the endogeneous phase. The effluent is then sent to a flocculation/coagulation (F/C) system, where phosphates, proteins, polysaccharides, metal ions, etc. are removed, dried, and fortified to make a fertilizer which is slow to dissolve. The liquid effluent from the F/C vessels is then de-ionized and decolorized, and used for drinking water, or partially de-ionized, and used for corral flushing of manure into a common pit. (Bundy-Iowa State)

0786 - F3

THE UK RECONCILIATION OF MODERN INTENSIVE LIVESTOCK FARMING WITH A BASICALLY URBAN SOCIETY,

Agricultural Development and Advisory Service, London (England).
K. B. C. Jones.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 92-94. 5 tab, 6 ref.

Descriptors: *Farm wastes, *Animal populations, Confinement pens, Poultry, Cattle, Biochemical oxygen demand, Solid wastes, Phosphates, Nitrogen, Water pollution, Regulations.
Identifiers: Council on Environmental Quality, United Kingdom.

Intensive livestock production will continue to be centered on those parts of the UK where the soils and climate are most favorable and where workers have the technical skills, and management the financial and marketing abilities to succeed. It is most likely that as now, these units will be in lowland areas near big centers of population. Wherever possible, correlation will be maintained between size of livestock unit kept and area available for manure spreading. In time, the law may make this concept on obligation. Planning permission for non-agricultural development may be refused if it is too near an existing livestock unit. Zoning may be more widespread. New developments already require the interests of vets, neighbors, planning authority, river authority and public health inspector to be met. These interests are achieving a better understanding of the farmer:s needs and of each other:s points of view. (Bundy-Iowa States)

0787 - A1, C5, F4

IDENTIFICATION OF CARBONYL COMPOUNDS IN A SWINE-BUILDING ATMOSPHERE,

Iowa State Univ., Ames.
L. D. Hartung, E. G. Hammond, and J. R. Miner.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 105-106. 1 tab, 10 ref.

Descriptors: *Farm wastes, Atmosphere, Odor, Swine, Organic compounds, Air pollution, Land management.
Identifiers: Carbonyl-free air, Sutton's equation, *Carbonyls.

Prior studies of swine-building atmospheres have identified amines, carbonyls and sulfur compounds in these gases. More detailed identification work is being done to determine which compounds of these three classes are responsible for odor. This information should be valuable for eventual odor-control technology. Carbonyls can be determined readily as the 2,4-dinitrophenyl-hydrazine (2,4-DNPH) derivatives. A measured quantity of swine-house gas was pulled through a reaction column composed of a solution of 2,4-DNPH (in 2.5M H_2SO_4) on celite. The 2,4-DNPH derivatives were eluted from the column with hexane at the end of the run. Tentative identification was by thin layer chromatography (tlc), which allowed quantitative measurement of those compounds present in largest concentrations. In these cases, the derivative was leached from the tlc material, diluted to a measured volume, and the ultraviolet absorption max was measured. Carbonyls identified to date and their concentrations when measurable are: acetone (125 ppb by volume), ethanal, butanal, methyl ethyl ketone (53 ppb), pentanal, nonanal. (Bundy- Iowa State)

0788 - A2, A5, B1, F2

IMPACT OF FARM ANIMAL PRODUCTION

AND PROCESSING ON THE TOTAL ENVIRONMENT,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. P. Taiganides, and R. L. Stroshine.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 95-98. 1 fig, 7 tab, 13 ref.

Descriptors: *Farm wastes, Biochemical oxygen demand, Chemical oxygen demand, Odor, Waste water (Pollution), *Environmental effects.
Identifiers: *Animal waste impact, Odor nuisance, Soil oxygen demand.

A long-term study under the auspices of the Agricultural Pollution Control Research Laboratory at Ohio State University will attempt to delineate the full impact of the world farm animal industry, from birth to the point of consumption, ultimate use, or death by decay, on the quality of the natural environment. The impact from the production of animals on USA farms was determined by using animal population figures from the 1969 U.S. Agricultural Statistics. Depending on the geographic region, various assumptions were made as to the amounts of manure which could reasonably be expected to be discharged into natural water bodies or disposed on land or into air resources. Assumptions on percentage of animals in total confinement, pasture or partial confinement were made to facilitate estimates of water runoff and land disposal. Odor nuisance could only be evaluated in qualitative terms by making assumptions on the extent of urbanization at each of the six geographic regions. A quantitative value for the impact of by-products and wastes from animal industries on the natural environment was obtained using BOD, COD, fertility nutrients, volatile solids, SOD (Soil Oxygen Demand) and physical quantities. An attempt was made to compare these values with values from other basic industries, such as car manufacturing and some chemical industries. (Bundy- Iowa State)

0789 - F3

LITIGATION EXPERIENCES OF FIVE LIVESTOCK AND POULTRY PRODUCERS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
T. L. Willrich, and J. R. Miner.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 99-101. 7 ref.

Descriptors: *Farm wastes, Odor, *Legal aspects, Water pollution, Swine, Cattle, Poultry, Missouri, Iowa, Judicial decisions.
Identifiers: *Law suits, Odor nuisance.

Several livestock and poultry producers have faced law suits from neighboring residents based upon complaints of odor and water pollution. Such public and private nuisance suits demand that producers consider the possible effects of their site selection and waste management practices upon neighbors. Cases concerning three beef producers, two swine producers and a poultry growing operation are considered in detail. The physical features of the systems are described, as well as the operation of the facilities. Both swine producers were utilizing confinement facilities with manure storage facilities beneath partially-slotted floors. In the Missouri case, both localized water pollution and odors were found to have caused damages to two nearby rural neighbors. Substantial punitive damages were awarded. The case in Iowa involved odors and their influence on neighbors located approximately 300 feet north of the operation. The first hearing of the case resulted in a hung jury. The poultry operation was in north-central Iowa, about 900 feet east-southeast of a farm home. The neighbors sought both damages and injunctive relief due to odors. (Bundy-Iowa State)

0790 - A5, A6, C3

ORIGINS AND IMPLICATIONS OF ENVIRONMENTAL QUALITY STANDARDS FOR ANIMAL PRODUCTION FIRMS,
Economic Research Service, Washington, D.C. Farm Production Economics Div.
J. B. Johnson, and L. J. Connor.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 102-104. 14 ref.

Descriptors: *Farm wastes, Feed lots, Runoff, Cattle, *Legal aspects, Water pollution control, Federal Government, Local Governments, State Governments, Control, Standards, Regulation.
Identifiers: *Feed lot firms, Nebraska Pollution Control Council.

The alternative measures of minimizing pollution from animal wastes can be categorized as (1) voluntary control measures adopted by animal producers, (2) individual legal actions, and (3) statutes and regulations established by local, State, and Federal Governments. Some individual producers and producer groups have adopted abatement technologies and taken other more drastic measures such as shifting the geographic location of their operations to minimize the pollution potential of their animal production operations. Certain animal production firms have been defendants in legal litigations by plaintiffs seeking to induce changes in the producers' animal production activities. Animal production firms are subject to different forms of private legal litigation, those being (a) trespass, (b) nuisance, (c) negligence, and (d) strict liability. Several local, State, and Federal Government agencies have existing statutes related to the management of animal wastes. Governmental statutes have generally implemented controls on animal production firms by (a) direct regulations such as licenses and registry requirements, (b) payments for installation of particular pollution control devices or lower rates of property tax, and (c) by charges such as fines or excise taxes for discharging excessive amounts of animal pollutants. (Bundy- Iowa State)

0791 - A5, A6, B1

METEOROLOGICAL CONTROL OF MALODORS FROM LAND SPREADING OF LIVESTOCK WASTES,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
R. A. Nordstedt, and E. P. Taiganides.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 107-109, 9 ref, 1 fig.

Descriptors: *Farm wastes, Odors, Meteorology, Air pollution, Model studies, Control, Waste disposal.
Identifiers: Land spreading, Odor nuisance.

One of the foremost problems in land disposal of livestock wastes is the emission of malodorous gases from these wastes and their transport into populated areas through the atmosphere. Therefore, malodors are a constraint on land spreading of livestock wastes. Chemical treatment of these wastes for abatement of malodors is usually quite expensive. The applicability of meteorological control to land spreading of livestock wastes, and the development of an air quality model to predict the odor nuisance potential from land spreading operations were investigated. Simulations with the air quality model have shown that meteorological control of malodors from land spreading of livestock wastes is possible. The model is limited by the need for data on emission rates of malodorous gases from various livestock wastes as well as the properties of these gases. Better dispersal equations and experimental determination of diffusion parameters will also assist in applying the model to field conditions.
(Bundy-Iowa State)

0792 - A5, A6, C3

CHROMATOGRAPHIC IDENTIFICATION OF MALODODORS FROM DAIRY ANIMAL WASTE,
Ohio State Univ., Dept. of Agricultural Engineering. Columbus.
R. K. White, E. P. Taiganides, and G. D. Cole.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 110-113, 5 fig, 2 tab, 8 ref.

Descriptors: *Farm wastes, *Chromatography, Analytical techniques, Odor, Hydrogen ion concentration, Aeration, Sulfur, Organic compounds, Cattle.
Identifiers: *Anaerobic dairy wastes.

Recent trends toward large, confined animal production units and the urban encroachment into agricultural areas have brought into focus the problem of odor nuisance from animal waste. There is a need for identifying satisfactory methods of controlling and abating the odor nuisance from animal waste. Before control techniques can be developed, an analysis of the odors and an understanding of the physical, chemical and biological conditions that help generate them is needed. The objectives of this study were: to separate and identify principal odorous compounds emanating from dairy animal wastes and to measure the effect of aeration on the production of principal odors from dairy animal wastes. Eight odorous compounds were tentatively identified by comparing Kovat Indexes for the principal odorous fractions separated by the gas chromatograph and the Kovat Indexes of known compounds. Also, an organoleptic evaluation of the odors was employed. The compounds tentatively identified using the column selected for hydrocarbons and sulfur compounds were hydrogen sulfide, methanethiol, methyl sulfide, diethyl sulfide, propyl acetate and n-butyl acetate. The amine compounds detected were trimethylamine and ethylamine. Aeration eliminated or diminished the production of the principal odors identified. (Bundy-Iowa State)

0793 - A5, A6, B1, D2

CONTROL OF ODORS FROM POULTRY HOUSES,
Agricultural Research Service, Beltsville, Md. Livestock Engineering and Farm Structures Research Branch.
G. B. Willson.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 114-116, 2 fig, 1 tab, 4 ref.

Descriptors: *Farm wastes, Odors, Dusts, Poultry, Filters, Ammonia, Control, Air pollution.
Identifiers: Water spray system, Pad-type filter, Dry filters, Burlap.

Odor and, to a lesser extent, the dust in ventilation air exhausted from poultry houses constitute an aesthetic nuisance. Use of filters and water spray chambers were evaluated for their effectiveness in removing the odor and dust. Three variations of baffle impingement filters with and without a water spray were tested. Dust removal efficiencies were determined by particle counts on filters through which a measured quantity of air had been drawn. Odor strength was evaluated organolepti-

cally. The baffle impingement filters reduced the odor although they only removed a negligible amount of dust. Introduction of a water spray ahead of the baffle improved the dust removal to around 50% and practically eliminated the odor. Control of odor and dust would enhance the desirability of poultry houses as neighbors. Use of the water spray baffle impingement filters should reduce air pollution complaints.
(Bundy-Iowa State)

0794 - A5, A6, C3, D3

AMMONIA DESORPTION FROM CONCENTRATED CHICKEN MANURE SLURRIES,
Agricultural Research Service, Ithaca, N.Y. Agricultural Engineering Research Div.
A. G. Hashimoto, and D. C. Ludington.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 117-121, 3 fig, 5 tab, 7 ref.

Descriptors: *Farm wastes, *Nitrogen, *Ammonia, Poultry, Hydrogen ion concentration.
Identifiers: *Chicken manure, Fick's Second Law.

The purpose was to determine the parameters affecting ammonia desorption from concentrated chicken manure slurries and to develop an equation to predict the rate of ammonia desorption. Analyses of variance were performed to determine whether any correlation existed between the desorption rate constant and the fraction of undissociated ammonia, (Fu), temperature, air flow, total and volatile solids, initial organic nitrogen concentration and initial ammonia nitrogen concentration. Preliminary analysis indicates that only Fu and temperature have significant correlation with the desorption rate constant under the experimental agitation rates and geometric shape of the reaction vessel. The desorption rate constant may be predicted by an equation of the following form: K/l-Fu = A (T/l-Fu)B where: K= ammonia desorption rate constant (hour-1); T = temperature (deg. F); Fu = fraction of undissociated ammonia; A and B = constants. The amount of base required to maintain the desired pH was recorded to determine which pH range might be the most efficient in stripping ammonia. Below pH 10.0 there is a direct relationship between the ratio of base required to ammonia removed and pH. Above pH 10.0 the ratio is independent of pH.
(Bundy-Iowa State)

0795 - A2, A9, C3, C5

ANTIBIOTIC RESISTANCE AND RESISTANCE TRANSFER BETWEEN BACTERIAL ISOLATES IN A WASTE LAGOON,
North Dakota State Univ., Fargo. Dept. of Bacteriology.
M. Bromel, Y. N. Lee, and B. Baldwin.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 122-125, 2 fig, 6 tab, 11 ref.

Descriptors: *Farm wastes, Liquid wastes, Salmonella, Microorganisms, Cattle, E. coli, Public health, Pathogenic bacteria, Transfer.
Identifiers: *Public health hazard, R factors.

The incidence and pattern of antibiotic resistance in bacterial isolates from liquid and solid bovine wastes and from the Red River of the North were determined by disc assay and tube dilution methods. Subsequent in vitro mating experiments were performed between the enteric members of these two groups of isolates so that the patterns of antibiotic-resistance transfer could be elucidated. Levels of antibiotics present in waste lagoon water and river water were determined by microbiological assay. Complete resistance to aureomycin, terramycin sulfamethazine and sulfaethoxypyridazine was shown by isolates of the genera Salmonella, Proteus, Streptococcus and Escherichia. Developing antibiotic resistance was shown by isolates of the teneral Shigella and Klebsiella. Drug sensitivity was shown only by clostridial isolates. Successful transfer of multiple drug resistance to sulfamethazine, penicillin and strepromycin was obtained from a Proteus sp. to an Escherichia sp. Results from the matings of the recombinants with drug-sensitive typhoid and dysentry organisms are reported. In some instances, detectable levels of terramycin and aureomycin were found in waste waters. The possibility for drug resistance transfer between organisms in livestock wastes and pathogens in public waters was significantly high and constitutes a potential public health hazard. (Bundy-Iowa State)

0796 - A2, C4

DIFFERENTIATION OF RUMINANT FROM NON-RUMINANT FECAL SOURCES OF WATER POLLUTION BY USE OF ENTERIC BACTERIA,
South Dakota State Univ., Brookings. Dept. of Bacteriology.
P. R. Middaugh, L. R. Koupal, R. L. Pierce, Jr., J. E. Tiede, and J. W. Zerfas.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 126-128, 1 fig, 35 ref.

Descriptors: *Farm wastes, Runoff, *Coliforms, Microorganisms, Bacteria, *Streptococcus, Nitrogen, Cattle, Sheep, Goats, Lagoons, Pollutant identification.
Identifiers: *S. bovis, Fecal pollution.

Studies on methods for improving the land disposal of animal wastes or on methods to minimize storm run-off waste pollution of streams or lakes would be aided if feed lot wastes in water could be differentiated from non-ruminant or human waste sources. A laboratory study was based on the presence of a fecal streptococcus, Streptococcus bovis, in feces of ruminant farm animals, cattle, sheep and goats which have from 1 to 20 million cells per ml. of rumen fluid. In a preliminary survey of fecal streptococci occurring in lakes and rivers and in municipal wastes and a dairy lagoon the predominant organism was Streptococcus faecalis and its varieties which represented 90% of the fecal streptococci. S. bovis constituted only 3% of the streptococci. The standard media used to cultivate gut bacteria were highly inhibitory for S. bovis cells which were added to water samples. An improved medium with reduced sodium azide, 0.02%, improved anaerobic culture conditions and the quantitative collection of the bacteria on membrane filters led to a selective method using a starch hydrolysis overlay. The improved medium quantitatively detected S. bovis bacteria added to river water samples and allowed their routine isolation. Of the isolates, 92% were found to be Streptococcus bovis and 8% were S. faecalis variety liquefaciens. To be an effective pollution indicator, S. bovis must survive sufficiently to be readily detected.
(Bundy-Iowa State)

0797 - C4, E3

GROWTH KINETICS OF RUMEN BACTERIA IN SOLUTIONS OF POULTRY EXCRETA,
Kentucky Univ., Lexington.
H. E. Hamilton, I. J. Ross, J. J. Begin, and S. W. Jackson.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 129-131, 8 fig, 12 ref.

Descriptors: *Farm wastes, Poultry, Feeds, Hydrogen ion concentration, Microorganisms, Growth rates, Cattle.

Poultry excreta contains nutrients that can be utilized as a livestock feed. Successful feeding trials with untreated litter have proven the feasibility of utilizing excreta as a feedstuff. Excreta from hens fed a drug-free diet was blended and diluted with water, sterilized, and placed in a fermentor equipped with an indirectly driven agitator, automatic pH controller, temperature controller, foam controller, and sampling device. The solution was then inoculated with rumen fluid from a steer being maintained on a diet containing sterilized chicken manure and fermented anaerobically for 48 hours. Samples were taken as the fermentation process progressed and diluted and plated for microflora counts. The colonies in the inoculated tubes were counted after 7 days of incubation. There was logarithmic growth beginning about three hours after inoculation and subsiding about ten hours after inoculation. High solids levels decreased the maximum population and increasing and/or decreasing the pH from that in the rumen altered the maximum population.
(Bundy-Iowa State)

0798 - B3, C5, D4

THE ROLE OF MICROORGANISMS IN THE MANAGEMENT OF ANIMAL WASTES ON BEEF CATTLE FEEDLOTS,
Agricultural Research Services, Lincoln, Nebraska.
T. M. McCalla, and L. F. Elliott.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 132-134, 2 fig, 3 tab, 28 ref.

Descriptors: *Farm wastes, Cattle, Feed lots, Microorganisms, Pathogenic bacteria, Nitrogen, Crops, Odors.

Animal wastes on feedlots may leave the feedlot by mechanical removal, runoff, percolation through the soil profile, volatilization, or decomposition. Of these mechanisms, microbial decomposition plays a major role in the rate and route of manure loss. Laboratory and feedlot studies, at Lincoln and Central City, Nebraska, indicate mechanical removal of manure from the feedlot may be necessary only after several years of accumulation. The manure in the feedlot can be mounded to provide a protected drained area for the animals, and the manure serves as a compost pile to aid in decomposition. The feedlot studied is level with a high water table and limited runoff occurs. Laboratory studies have indicated as much as 90% of the nitrogen and 50% of the carbon in the manure and urine can be lost by decomposition in a 4-month period. Soil microorganisms can be managed to reduce odors and to dispose of animal wastes without pollution of surface or ground waters. If the surface of the feedlot is aerobic, many odor-causing compounds can be metabolized before they reach the atmosphere. It may also be desirable to maintain aerobic conditions at the feedlot surface for sanitary reasons. Laboratory studies conducted at Lincoln showed Salmonella sp. added to beef manure died rapidly under aerobic conditions but survived under anaerobic conditions. Feedlot soil atmosphere studies found high concentrations of CH_4 and CO_2.
(Bundy-Iowa State)

0799 - B2

AGITATION IN LIQUID MANURE TANKS,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. I. Sewell.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 135-137, 4 fig, 1 tab, 5 ref.

Descriptors: *Farm wastes, Model studies, Liquid

wastes, Pumps, Slurries, Design, On-site tests, Cattle, Mixing.

Few problems with agitation were encountered in two full-scale field tests of liquid manure systems at dairies. Adding water to the tanks immediately after emptying greatly facilitated agitation. As the quantity of waste hay, silage, and green chop entering the pits increased, agitation became more difficult. Scraping manure into the tanks before appreciable drying had occurred also facilitated agitation. Minimizing the entry of twine, wood chips, and coarse hay into the pits reduced downtime. While the results of the model studies suggested that best agitation could be achieved in pits equipped with side and center baffles, effective agitation was achieved in pits constructed with cover support columns and without baffles. As the model studies suggested, cover support columns did not adversely affect agitation. In designing liquid manure pits where agitation difficulties are expected, center and side baffles should be considered. (Bundy-Iowa State)

0800 - B2, C2

MEASURING METHOD FOR EVALUATING THE ABILITY TO PUMP SEMI-LIQUID AND MANURE,

Bayerische Landesanstalt ue Landtechnik, Weihenstephan (West Germany).
K. Grimm, and G. Langenegger.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 138-141, 145, 9 fig, 10 ref.

Descriptors: *Farm wastes, Liquid wastes, Pump testing, Measurement, Pumps.
Identifiers: Consistency factor, Manure pump, Manure consistency.

A large number of pumps are on the market; some are very well adapted to pumping liquid manure and some lack several things which one could wish for. A technical measurement for the capacity of individual pumps to boost liquid manure is necessary in order to put the individual pumps to work at the correct place and to be able to plan liquid manure installations. Tests haves shown that all semiliquid and liquid manure mixtures may be evaluated in a relatively simple way insofar as the ability to be pumped is concerned. Measuring manure consistency by the ball method is described. This method of measuring provides a uniform prerequisite for testing pumps and thereby makes an exact examination possible with varied semi-liquid manure mixtures with different consistencies. (Bundy-Iowa State)

0801 - A3, B2, C2, C3, C4

PUMPING CHARACTERISTICS, BIOLOGICAL AND CHEMICAL PROPERTIES OF DAIRY MANURE SLURRIES,

British Columbia Univ., Vancouver. Dept. of Agricultural Engineering.
L. M. Staley, N. R. Bulley, and T. A. Windt.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 142-145, 6 fig, 2 tab.

Descriptors: *Farm wastes, Cattle, Irrigation, Biochemical oxygen demand, Hydrogen ion concentration, Potassium, Sodium, Chloride, Ammonium, Sprinkler irrigation, Waste disposal, Design pumps.
Identifiers: *Dairy, Piping losses.

A manure handling system has been designed to permit a zero grazing management practice and utilize above ground storage and sprinkler irrigation methods of waste disposal. Manure from the exercise yard and holding area is scraped into a 288 cubic foot below grade sump. From this point the complete system is operated by a 30 HP electric motor and Holz helical type manure pump. The pump is used for filling the 100,000 US gallon above ground storage tank; for agitation and mixing within the tank and returning the slurry to the sump for dilution if necessary, before pumping through a 4 inch diameter aluminum irrigation system to a standard No. 104 Rainbird sprinkler. BOD, COD, pH, ammonia, organic and nitrate nitrogen, total and ortho phosphate, sodium, potassium, chloride, total volatile and suspended solids were determined at bi-weekly intervals for (1) water inputs, (2) manure into and out of storage and (3) water outflows from field drains. Sampling began June 2, 1970 and will continue throughout the winter season. (Bundy- Iowa State)

0802 - A5, B1, D4, E3

AUTOMATED HANDLING, TREATMENT AND RECYCLING OF WASTE WATER FROM AN ANIMAL CONFINEMENT PRODUCTION UNIT,

Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. P. Taiganides, and R. K. White.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 146-148, 4 fig, 3 ref.

Descriptors: *Farm wastes, Confinement pens, Oxidation, Odors, Dusts, Aerobic treatment, Biological oxygen demand, Waste water treatment, Water reuse, Hogs.
Identifiers: *Automatic flushing, Flushing tanks, Solids separator, Fuch's oxygenator.

Manure is flushed out by flooding the gutters of a confinement building where 500 pigs are raised from 20 to 220 lbs. This way no labor is needed to scrape the manure out plus no offensive odors are released into the building because of frequent flushing. The flushed wastewater is pumped onto a screen which separates the solids from the liquid. The solids are aerobically digested, deodorized and stored before final disposal onto agriculturally productive land. The liquids separated at the screen are discharged into an oxidation ditch. Ditch effluent is clarified and the supernatant is pumped back into the building as flushing water. Provisions to disinfect the recycled water for odor and disease control are present in the system. Laboratory-scale model was tested to arrive at maximum loading rates for odor control. Four loading rates ranging from 30-80 lbs VS/1000 ft/day were tested. Preliminary results show that hourly loading is better than daily slug loading. All loading rates can be effective, but the higher rates require closer supervision. Odors given off are ammonia-like at first but change to earthy or musky inoffensive odors after the 6th day. Foaming was much greater with slug loading. However, the settling characteristics of the slug-load unit were better than hourly-loading. (Bundy-Iowa State)

0803 - D4, E3

MANURE MANAGEMENT IN A 700-HEAD SWINE-FINISHING BUILDING; TWO APPROACHES USING RENOVATED WASTE WATER,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
R. J. Smith, T. E. Hazen, and J. R. Miner.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 18-22, 1971, p 149-153, 7 fig, 2 tab, 14 ref.

Descriptors: *Farm waste, Confinement pens, Swine, Chemical oxygen demand, Settling, basin, Oxidation treatment, Sludge, Water reuse.
Identifiers: *Flushing gutter, Anaerobic lagoon.

Iowa State University had used fresh water for flushing manure from a confinement building but difficulties in effluent disposal stopped this practice. Two systems of waste water renovation were examined. Preliminary studies showed that adequate manure removal and reduced water use could be obtained by intermittent discharge of a tank of cleaning water. Mechanisms for controlling such discharge are described. The presence of an open flushing gutter in the pen area was found to affect defecation habits very favorably, also the action of the pigs' feet improved manure transport. The effect on the pigs of exposing them to their renovated effluent was unknown; hence, the first scheme included an anaerobic lagoon followed by an oxidation ditch, both external to the building. Total sludge return to the oxidation ditch was used by incorporating a settling tank. Conventional sanitary engineering measurements were made at various points in the cycle; these included oxygen demand, solids, various inorganic ions and a membrane filter count of coliform density. Tests were started in January 1969, and it was found that a stable, odorless effluent of less than 150 mg/l BOD5 could easily be obtained, even at low ditch temperatures. (Bundy-Iowa State)

0804 - B2

IMPROVING WATER UTILIZATION EFFICIENCY IN AUTOMATIC HYDRAULIC WASTE REMOVAL,

Agricultural Research Service, Beltsville, Md. Agricultural Engineering Research Div.
E. E. Jones, G. B. Willson, and W. F. Schwiesow.
In: Livestock Waste Management and Pollution Abatement, Proceedings, International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 154-158, 11 fig, 8 ref.

Descriptors: *Farm wastes, Velocity, Automation, Hogs, Water utilization.
Identifiers: *Automatic hydraulic waste removal, Flush tank.

One of the goals of the USDA Farmstead Water Systems Research is to improve water utilization efficiency in livestock sanitation. Reports of large volumes of water being used to remove solids from under slotted floors led to theoretical and model studies of automatic hydraulic waste removal in 1963. In 1966 certain principles developed from these studies were incorporated in a partically slotted floor swine building. A maximum design flush volume of 3 gallons per pig (300 gallons) was used. Movie film analysis of waste removal revealed that as much as 90% of the water was discharged clear at the end of the gutter. Reducing flush volume to 160 gallons resulted in incomplete waste removal. Major factors limiting water utilization efficiency have been identified and verified in design modifications. Unsteady flow conditions and the modification of fluid properties by dissolved and suspended solids result in velocities about 30% higher than predicted by Manning's formula. Above velocities of 3 fps the relationships between waste deposition, depth of flow and duration of flow determine water utilization efficiency. Automatic hydraulic waste removal by making possible daily or more frequent waste removal will provide a batter livestock environment at less cost. (Bundy-Iowa State)

0805 - D4

HIGH RATE POULTRY MANURE COMPOSTING WITH SAWDUST,

North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
W. S. Galler, and C. B. Davey.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 159-162, 9 fig, 2 tab, 2 ref.

Descriptors: *Farm wastes, Poultry, Aerobic treatment, Carbon, Nitrogen, Grains, Cation exchange, Crop response, Waste treatment.
Identifiers: *Composting, Sawdust.

The feasibility of high rate, thermophilic composting of animal wastes mixed with carbonaceous materials and the affect of the compost on plant growth were investigated. Poultry manure and sawdust were initially selected in order to get the proper moisture content and carbon to nitrogen ratio (C:N). Each batch was characterized chemically in order to determine the moisture content, the proper C:N and available phosphorus, potassium, calcium, and magnesium. Sixteen batch studies were made using a 45 cubic foot rotating drum approximately two-thirds full. The composting mass was aerated continuously. The effects of aeration, agitation, C:N, and moisture content were studied. The pH, temperature, and oxygen uptake were studied for each run. Mass balances were made to determine nitrogen losses. Cellulose degradation was also studied. After removal from the composter, cellulose degradation took place as a fungus developed in the pile. The cellulose content decreased during the storage phase by over 25% in four to six weeks while the cation exchange capacity rose from 35 milli-equivalents per 100 grams to 67 milli-equivalents per 100 grams. Nitrogen losses for the properly run process averaged about 3.5%. The final product had a blackish-white color and an odor resembling a fresh humus soil. Greenhouse studies were made using tomatoes, wheat, millet and greenbeans. The plants were planted in soil compost mixture ranging from 0% to 100% compost by weight.
(Bundy-Iowa State)

0806 - D4

COMPOSTING DAIRY COW WASTES,

Agricultural Research Service, Beltsville, Md. Livestock Engineering and Farm Structures Research Branch.
G. B. Willson.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 163-165, 4 fig, 2 tab, 4 ref.

Descriptors: *Farm wastes, Aerobic treatment, Cattle, Hay, Silage, Grains, Odor, Waste treatment.
Identifiers: *Composting.

Composting is a biological process for the degradation of solid wastes. It has been used to reduce municipal wastes to an odorless, stable material that may be used as a soil conditioner. The compost may be easily handled or stored. Like other biological degradation processes, the process may be either aerobic or anaerobic or a combination. The aerobic process is faster and produces more heat, which maintains the elevated temperatures required. The aerobic process, which seems to have merit for treatment of farm animal wastes, was studied. Waste from the gutter of a stanchion barn was used. Two types of bedding, straw and wood sawdust, were evaluated. Several of the process parameters have been investigated on a pilot scale with approximately one-half ton batches and on a bench scale. These parameters include air flow rate, moisture content, temperature, pH, and agitation frequency. Dry matter was reduced about 60%. The total weight was reduced about 80%, including the effect of lowering the moisture content from 75 to 50% during the process. Volume was reduced 30 to 50% on a loose basis. The final product has a faint musty odor in a moist condition. It is odorless when air-dried to about 10% moisture content.
(Bundy-Iowa State)

0807 - A2, B1, C1, C5, E1

QUALITY OF EFFLUENT FROM FARM ANIMAL PRODUCTION SITES,

Louisiana Tech Univ., Ruston. Dept. of Agricultural Engineering.
J. W. D. Robbins, G. J. Kriz, and D. H. Howells.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 166-169, 5 fig, 4 tab, 4 ref.

Descriptors: *Farm wastes, Coliforms, Biochemical oxygen demand, Chemical oxygen demand, Carbon, Lagoons, Runoff, Water pollution sources, Water pollution control, Waste disposal.

Effluents from twelve animal production sites representing three types of waste management operations--land disposal, lagooning and direct discharge into streams--were measured and more than 1500 samples were collected for analyses. The water samples were analyzed for (a) bacterial densities--total coliforms, fecal coliforms and fecal streptococci; (b) degradable organics--biochemical oxygen demand, total organic carbon, total solids and volatile solids; and (c) nutrients--organic nitrogen, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total phosphate and orthophosphate. Other measurements included pH, conductivity, initial dissolved oxygen and temperature. Site data were collected in order to evaluate the pollutional potential of each site and the management factors determining the amount of wastes that reached water courses. These data included the number and size of animals, types and amounts of feeds, types of waste handling facilities and practices, waste retention or drainage times, soil classifications, rainfall, temperature, flow rates and some characterization of wastes produced. Study results point to the need for and superiority of land disposal for animal wastes to effectively control water pollution. Direct dumping of animal wastes into streams is essentially predictable by characterization of fresh wastes and should be prohibited. Effluents from waste lagoons were found to exceed raw domestic sewage in strength and should not be discharged without further treatment. (Bundy-Iowa State)

0808 - D4

WATER HYACINTHS TO FURTHER TREAT ANAEROBIC LAGOON EFFLUENT,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner, J. W. Wooten, and J. D. Dodd.

In: Livestock Waste Management and Pollution Abatement, Proceedings, International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p 170-173, 4 fig, 7 tab, 10 ref.

Descriptors: *Farm wastes, Water hyacinth, Aerobic treatment, Oxidation lagoons, Nitrogen, Phosphorus, Chemical oxygen demand, Waste water treatment.
Identifiers: *Anaerobic lagoon effluent.

Effluent from an anaerobic lagoon treating liquid swine manure was pumped through a series of four pools, each ten feet in diameter. Water hyacinths were grown on these pools in an effort to provide further treatment. The plants flourished, necessitating weekly harvesting of one-fourth of the growth. During the month of July 1970, nine pounds of ammonia were added to the system in the influent and less than one-fourth pound discharged in the effluent. During this same period, 28 pounds of COD were added and 2.6 pounds discharged. Extrapolating the system to a per acre basis indicates ammonium nitrogen removal to be in excess of 35 pounds per acre per day, COD removal to exceed 100 pounds per acre per day and phosphate removal to exceed 15 pounds per acre per day. Nitrate release was less than 0.3 pounds per acre per day. In one sample weekly harvest (Aug. 14 - Aug. 21), 450 plants with a total wet weight of 90 lbs. were removed from two of the ponds having a combined area of approximately 160 sq. ft. This corresponds to an increase of over 17,000 new plants per acre per day and an increase in wet weight of over 2500 pounds per acre per day. At a 4% dry weight conversion factor, this equals 100 pounds of dry weight per acre per day. The system has performed satisfactorily showing potential as a means of removing nutrients from partially treated animal wastes which are not removed by currently used processes. (Bundy-Iowa State)

0809 - D4

ENZYME-FACILITATED MICROBIAL DECOMPOSITION OF CATTLE FEEDLOT MANURE,

Colorado State Univ., Fort Collins. Dept. of Microbiology.
G. K. Elmund, S. M. Morrison, and D. W. Grant.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p 174-175, 4 fig, 7 ref.

Descriptors: *Farm wastes, Cattle, Feed lots, Enzymes, Biochemical oxygen demand, Microbial degradation, Amino acids, Proteins.
Identifiers: *Enzymatic hydrolysis.

The cleavage of the macromolecular fraction is a rate-limiting step preceding its oxidation or assimilation during the initial microbial decomposition of cattle feedlot manure. Increasing the initial rate of hydrolysis of the macromolecules may stimulate the development of a microflora actively involved in the subsequent stages of the decomposition process. Methodologies have been developed to evaluate and optimize conditions for enzymatic hydrolysis of manure substrates as well as bioassay techniques to measure the resultant increased rates of microbial activity. The results of studies with proteolytic enzymes are presented as a model system. Fresh manure from feedlot cattle receiving a high concentrate ration was exhaustively dialyzed, lyophilized and ground in a Waring blender. The non-dialyzable manure components contained 94 percent of the dry matter of fresh manure. The material contained 275 mg/gm protein of which 75 mg/gm was soluble protein. After three hours incubation with Pronase B grade (Calbiochem), essentially all of the soluble and 17.5 percent of the insoluble protein was hydrolyzed. Enzymatic hydrolysis of the protein fraction of feedlot manure appears to significantly increase the initial rate of microbial oxidation of the manure substrate. The results give promise to the use of hydrolytic enzymes to facilitate the overall rate of manure decomposition.
(Bundy-Iowa State)

0810 - A2, C3, C4

WATER AND SOIL OXYGEN DEMAND OF LIVESTOCK WASTES,

Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. P. Taiganides, R. K. White, and R. L. Stroshine.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p 176-179, 7 fig, 4 tab, 7 ref.

Descriptors: *Farm wastes, Sulfur, Carbon, Nitrogen, Waste treatment, Biochemical oxygen demand, Analytical techniques.
Identifiers: *Soil oxygen demand, Winkler method, Warburg respirometer.

The oxygen demands of animal manures placed in a water environment were measured using the standard BOD dilution-bottle technique and the Warburg respirometer method, using seeded and unseeded samples and incubating the samples at temperatures ranging from 12 deg. C to 28 deg. C. It was concluded that oxygen demand units should be reported in mg O2 per gram of total solids (mg/g TS) or as percent of TS. Seeding animal manure samples with supernatant from aerated sewage produced a significantly higher BOD curve than for unseeded samples. Total BOD (56 days at 20 deg. C) of animal manure constituted 40 to 50 percent of the COD, but the 5-day BOD is less than 14 percent of the COD of the same waste. Either the

Winkler method or oxygen meter may be used with similar accuracies in the measurement of dissolved oxygen in BOD bottles. Warburg respirometer is a good apparatus to use to determine oxygen demand of animal wastes. A test to measure the rate and ultimate oxygen demand of animal manure incorporated into top soil is called Soil Oxygen Demand (SOD). In the SOD test, waste is placed in an air-tight Warburg flask containing soil. As microbes decompose the waste, oxygen is consumed and carbon dioxide is released. The carbon dioxide is absorbed by a solution of 40 percent potassium hydroxide which is placed in a vial in the flask. The quantity of oxygen consumed is determined by measuring changes in the pressure in the flask and calculating the change in quantity of gas, using the ideal gas law. (Bundy-Iowa State)

0811 - C3, C4

BOD ANALYSIS OF SWINE WASTE AS AFFECTED BY FEED ADDITIVES,

North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
J. D. Ariail, F. J. Humenik, and G. J. Kriz.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 180-182. 8 fig, 3 ref.

Descriptors: *Farm wastes, Swine, Biochemical oxygen demand, Copper, Zinc, Sewage, Lagoons, Analytical techniques, Feeds.
Identifiers: *Feed antibiotics.

The effects of feed antibiotic, copper and zinc concentrations, and sample dilution upon the standard BOD5 analysis for swine wastes were investigated. Analyses were made on swine feces, lagoon influent and lagoon effluent. Antibiotic concentrations in the swine waste were found by modifying the AOAC (1965) microbiological method for the assay of chlortetracycline in animal feeds. The copper and zinc concentrations of digested samples were determined with an atomic absorption spectrophotometer. The amount of each inhibitory substance present in the BOD bottle for the various sample dilutions was determined. The amount of metal or antibiotic present was related to the amount of organics. Therefore all BOD dilutions that result in an acceptable oxygen depletion have similar concentrations of organics and inhibitory substances. Recommendations presented for the selection and determination of the most reliable BOD5 data for animal waste are different from commonly accepted criteria for obtaining the statistically best BOD5 results for domestic and industrial wastewater. The membrane filter technique outlined in Standard Methods for the determination of the fecal streptococcus content of sewage and animal waste is superior to the membrane filter technique utilizing Bacto-KF streptococcus broth.
(Bundy-Iowa State)

0812 - C4, D4

PORCINE ENTEROVIRUS SURVIVAL AND ANAEROBIC SLUDGE DIGESTION,

Illinois Univ., Urbana. Dept. of Microbiology; and Illinois Univ., Urbana. Dept. of Veterinary Pathology and Hygiene.
R. C. Meyer, F. C. Hinds, H. R. Isaacson, and T. D. Hinesly.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 183-184. 2 fig, 1 tab, 6 ref.

Descriptors: *Farm wastes, Sludge digestion, Viruses, Swine, Anaerobic digestion.

Little information is available on the effect of anaerobic sludge digestion upon viruses. Laboratory anaerobic digesters of 1 liter capacity were set up in duplicate employing sludge obtained from the local municipal sewage treatment plant. The digesters were monitored and upon stabilization after 4 to 5 days, they were seeded with 100 ml. of a virus suspension containing 10 deg PFU/ml. of a swine enterovirus. At time intervals ranging from 1/2 hr. to 12 days 25 ml. samples were withdrawn from each digester and pooled. The presence of infectious virus in the respective samples was determined by the capacity of a 20 ml. volume, upon oral administration, to infect 10-14 day old germ-free piglets. Fecal samples were collected from each pig twice a day (A.M. and P.M.) on the 3rd and 4th day post challenge and pooled. Possible infection of piglets by the indicator virus was determined by standard virologic procedures employing diploid porcine kidney cell cultures. Virus, when recovered from the piglets was identified by serologic procedures as the test agent. Virus could not be detected or demonstrated by pig challenge after the 4th day in the anaerobic digesters.
(Bundy-Iowa State)

0813 - A5, D2

THROUGH-CIRCULATION DRYING OF MANURE IN SUPERHEATED STEAM,

Drexel Univ., Philadelphia, Pa. Dept. of Chemical Engineering.
J. R. Thygeson, E. D. Grossmann, and J. MacArthur.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 185-189. 7 fig, 1 tab, 6 ref.

Descriptors: *Farm wastes, *Drying, Odor, Moisture content, Waste treatment, Waste disposal, Steam.
Identifiers: *Superheated steam, Continuous conveyor dryer.

Treatment of livestock waste to produce a biochemically stable and odor free product capable of use as a feed additive, soil conditioner, or fuel is described. The process involves the drying of a packed bed of wet manure extrusions in a closed cycle system employing superheated steam as the drying medium. The prospective advantages of this method of waste treatment include: (1) high production rate per unit area of plant; (2) minimum environmental pollution associated with the process; (3) relative insensitivity to changes in environmental and feed conditions; (4) capability of treating the undiluted manure; (5) production of a stable, odorless, free-flowing solid convenient for storing or transporting. Preliminary experimental studies on the extrudability of the wet manure and on the pressure drop and drying characteristics of the packed bed indicate that the material can be dried successfully in a through-flow system. The steam was forced through the bed of wet extrusions in a laboratory-scale test apparatus which permitted easy removal of the test section for periodic weighing. The equipment was capable of achieving the following limits on the drying parameters: bed depth of 9 inches; superficial velocity of 1000 feet per minute; fluid temperature of 350 deg F; superheat equivalent to 140 deg F. Provision for pressure drop, flow, and temperature measurement was incorporated in the system.
(Bundy-Iowa State)

0814 - D3

PYROLYSIS OF LIVESTOCK WASTES,

Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
R. K. White, and E. P. Taiganides.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 190-191. 3 fig, 3 tab.

Descriptors: *Farm wastes, Anaerobic conditions, Poultry, Swine, Cattle, Thermal capacity, Odor, Waste treatment, Incineration.
Identifiers: *Pyrolysis.

Pyrolysis is the 'anaerobic' incineration of wastes in contrast to combustion which might be termed 'aerobic' incineration. Pyrolysis is the chemical decomposition of materials heated to high temperatures in the absence of free oxygen. Animal manures were heated to 800 deg C at a controlled rate and in an airtight vicor tube placed inside a standard muffle furnace. The released gases were collected by displacing a brine solution and their composition was determined by a standard burrett gas analyzer. Quantities of gas produced and their average composition are tabulated. Advantages of pyrolysis include the production of gases which can be reclaimed for heat energy and a dry and innocuous residue product with reduced volume.
(Bundy-Iowa State)

0815 - D2

DRYING POULTRY WASTE,

Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
T. C. Surbrook, C. C. Sheppard, J. S. Boyd, H. C. Zindel, and C. J. Flegal.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 192-194. 4 fig, 4 tab, 5 ref.

Descriptors: *Farm wastes, Odor, Drying, Proteins, Poultry, Potassium, Phosphorus, Temperature, Time, Storage.
Identifiers: Pneumatic drying process, High temperature drying.

Experiments were conducted to evaluate a commercial poultry excreta drier and to minimize nutrient losses in the resulting product. The output of this machine was 340 pounds per hour of dried poultry waste. Drying is a potential way of handling poultry wastes from an economic standpoint. The final product, dried poultry waste, is in a form which can be easily handled. Samples of dried poultry excreta show a wide (11-38 percent) variation in protein content. From 50 to 65 percent of the available protein remains in the dried poultry waste. Trials were conducted to relate protein loss to the amount of heat as measured at one point in the drier. In temperature ranges from 450 deg to 700 deg F, there was a range of three percent on a dry basis from the same unprocessed waste. Generally speaking, the low range of temperatures were less destructive of protein. There is a relationship between protein loss and storage time. This is not evident for 14 days or less storage time. Protein loss is evident for storage periods of four to six months in commercial poultry houses.
(Bundy-Iowa State)

0816 - B1, F1

ECONOMICS OF WASTE DISPOSAL FROM CONFINED LIVESTOCK,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
W. H. M. Morris.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 195-196. 4 tab, 3 ref.

Descriptors: *Farm wastes, *Economic feasibility, *Waste treatment, Aerobic treatment, Costs, Fertilizers, Nutrients, Waste disposal, Oxidation lagoons.
Identifiers: *Field spreading.

The costs of handling livestock wastes must be considered in the framework of the total production system, and this may change the location, volume, consistency, and composition of the waste. Furthermore, such items as slotted floors and oxidation ditches often comprise a large part

of the total cost of a building. Under U.S. conditions, the cost of disposal of livestock wastes exceeds their value. No one system of disposal is the least costly or the most profitable under all circumstances. Factors such as the cost of labor and of capital and availability of land in different seasons determine the economically optimal system. No profitable method can be foreseen for industrial or domestic utilization of any significant part of the livestock waste produced. It is expected that the producer will continue to use the presently available systems of disposal for the foreseeable future. Spreading on land, anaerobic, and aerobic treatment and feeding all seem practical alternatives. The economic choice depends on the species, the environment, and many other factors. (Schmitt-Iowa State)

0817 - B1, F1, F3

MARKETING CONVERTED POULTRY MANURE,

Pennsylvania State Univ., University Park. Dept. of Animal Industries.

H. C. Jordan.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 197-198.

Descriptors: *Farm wastes, *Fertilizers, *Nutrients, *Poultry, Market value, Byproducts, Odor, Nitrogen.
Identifiers: *Compost, Soil conditioner.

Surveys were sent to firms engaged in processing and marketing poultry manure as a fertilizer or organic soil conditioner. The needs for a marketable product are: (1) Total anaerobic microbe count must be reduced through drying to control odor; (2) Odor must be reduced to nil and then may be mashed with a plesant odor for lawn and garden trades; (3) Nitrogen in the form of urea and uric acid must be stabilized so that it is not released quickly and does not burn plants for lawn and garden sale; (4) The product must flow through a lawn spreader and be easy to handle for lawn and garden trade; (5) The product must be stored in bags without picking up water and giving off odor for lawn and garden market; (6) Advertising and sale must be done without 'poultry manure' in the name of the product because of consumer or buyer resistance, with the possible exceptions of industrial sales and naming an organic product 'composted poultry manure'. One may need to guard against negative advertising of odors, diseases, burning plants, and drawing flies.
(Schmitt-Iowa State)

0818 - D1, E1, F1

THE ECONOMICS OF SWINE WASTE DISPOSAL,

Environmental Research and Applications, Inc., Wilton, Conn.

R. W. Okey, and S. Balakrishnan.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 199-203. 5 fig, 8 tab, 26 ref.

Descriptors: *Farm wastes, *Costs, *Economic feasibility, Aerobic treatment, Nitrification, Denitrification, Waste treatment, Waste disposal, Phosphorus.
Identifiers: Phosphorus removal.

It is desirable to codify and apply research findings from several applicable disciplines and to review the cost/effectiveness ratio of waste treatment procedures in the light of new pollution control laws. The essential requirements of treatment are considered to be the total stabilization of carbonaceous and nitrogenous materials with no creation of odors. Possible treatment methods include (1) ground disposal, (2) lagoon storage, (3) total oxidative treatment, (4) organic solids separation and treatment of the liquid stream, (5) primary treatment plus nitrogen and/or phosphorus removal and/or dissolved solids removal. The costs for waste treatment for a 5,000 animal swine system ranged from $17,600 for a 'solids separation prior to oxidative conversion of ammonia' system to $35,500 per year for a 'basic oxidation treatment with nitrogen and phosphorus removal' system. If total solids removal was required, the overall management costs of either system would be increased by $7,300 by adding a membrane system to remove all the inorganics. In addition, a satisfactory point of ultimate disposal must be found for the solids which were separated out. For small livestock systems, the cost per unit will be increased slightly for most treatments.
(Schmitt-Iowa State)

0819 - B1, F1, F3

ECONOMIC IMPLICATIONS OF ENVIRONMENTAL QUALITY LEGISLATION FOR CONFINED ANIMAL FEEDING OPERATIONS,

Oklahoma State Univ., Stillwater. Dept. of Agricultural Economics.

D. D. Badger, and G. R. Cross.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 204-207. 5 fig, 5 ref.

Descriptors: *Farm wastes, *Confinement pens, Costs, Regulation, Farm lagoons, Cattle, Hogs, Oklahoma, Waste treatment.

Recently instituted air and water quality standards and resulting State legislation have caused confined animal feeding operators to invest considerably more in construction and operation of their production system. Approaches being used to handle the animal waste and water runoff problem include stockpiling of manure, land spreading, use of oxidation ditches, and use of stabilization ponds. Beef wastes are handled mainly by scraping, loading, hauling, and dumping. Costs for this type of handling are 0.15 to 1.0 cents per pound of gain for sizable feedlots. Hog operations are generally either pasture, feeding flow-no lagoons, slotted or solid feeding floor with adjacent lagoon, or slotted floor with lagoon directly below. Pasture systems had waste handling costs of 0.5 to 0.1 cents per pound of gain, solid feed floor-no lagoon systems had costs of 1 to 0.2 cents per pound, and totally slotted floors had labor costs of 0.5 to 0.3 cents per pound of gain. Implications are that site selection will be much more critical in the future. Increased use of zoning to keep incompatible operations and urban areas separated will be necessary. (Schmitt-Iowa State)

0820 - A2, B1, F1

COST OF MAINTAINING SPECIFIED LEVELS OF WATER POLLUTION CONTROL FOR CONFINED CATTLE FEEDING OPERATIONS FOR THE SOUTHERN HIGH PLAINS,

Texas Tech Univ., Lubbock. Dept. of Agricultural Economics.

H. Y. Lee, and T. R. Owens.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 207-208. 1 fig, 5 ref.

Descriptors: *Farm wastes, *Cattle, *Agricultural runoff, Confinement pens, Feed lots, Costs, Texas, Water pollution control.
Identifiers: *Southern High Plains.

The Southern High Plains of the U.S. has witnessed the rapid expansion of confined cattle feeding operations. From less than 500,000 head of fed cattle marketed in 1959, the figure increased to over 2.5 million head by 1969 in the state of Texas alone. Surplus feed grain supply, abundant feeder cattle supply, dry and mild climate, gentle terrain, and an excellent transportation network contributed to the development. Some of these factors have also contributed to serious water pollution problems. An immediate solution to the problem might be the utilization of collection basins to collect feedlot runoff for subsequent discharge to an open field or modified playa lake or alternatively left for natural evaporation. The two runoff control systems are termed, respectively, 'mechanical discharge systems' and 'evaporative discharge systems'. Annual costs would range from $1,011 to $3,125 for 5,000 and 25,000 head lots, respectively. This is an average cost of 8.2 cents per head of occupancy. Disposing of solid manure is still a major problem with these systems. A 'modified environment system' consisting of concrete slotted floors and a roof covering the pen area and collection pits appears promising. This type of construction is estimated at about $75 per head, compared with $25 per head for a typical cattle feedlot.
(Schmitt-Iowa State)

0821 - B2, D4

AN OXIDATION DITCH FOR THE HANDLING AND TREATMENT OF POULTRY WASTES,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.

R. C. Loehr, D. F. Anderson, and A. C. Anthonisen.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 209-212, 5 fig, 3 tab, 5 ref.

Descriptors: *Farm wastes, *Aeration, *Aerobic treatment, *Poultry, Biochemical oxygen demand, Chemical oxygen demand, Waste storage, *Waste water treatment, *Oxidation lagoons.

An oxidation ditch was used to handle and treat poultry wastes from a cage layer operation. The results showed that an oxidation ditch is a reasonable alternative for handling, treatment and disposal of poultry wastes where odor control, liquid waste handling and reduction of the oxygen demand are desirable or necessary goals in a poultry operation. Mixed liquor should not be disposed of in surface waters; however, land disposal is an acceptable disposal method. There was no overflow from this ditch due to the high evaporation rate. The ditch acted as an aerated holding tank. Total solids exceeded 8% when the ditch was emptied after 274 days of operation. BOD5 was 4200 mg/l and total nitrogen was 3800 mg/l when the ditch was emptied in January 1971. Balances on the system showed 53 percent total solids, 62 percent volatile solids, 83 percent BOD5, 63 percent COD, and 31 percent of the total nitrogen were lost over the 274 day run. The original volume of the ditch was 1200 gallons. To offset 2100 gallons of evaporation, a total of 2900 gallons of water was added intermittently. After startup, the pH ranged from 5.0 to 6.5. Air flow in the control chamber was 3 to 5 cfm per bird for the 246 birds. (Schmitt-Iowa State)

0822 - B2, D4

DESIGN, INSTALLATION AND BIOLOGICAL ASSESSMENT OF A PASVEER OXIDATION DITCH ON A LARGE BRITISH COLUMBIA SWINE FARM,

Department of Agriculture, Abbotsford (British Columbia).

T. A. Windt, N. R. Bulley, and L. M. Staley.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 213-216. 1 tab, 7 fig, 11 ref.

Descriptors: *Farm wastes, *Aeration, *Oxidation lagoons, Hogs, Waste Storage, Biochemical oxygen demand, *Waste water treatment, Odor.
Identifiers: Pasveer ditch.

One 350 to 400 hog unit of a 25,000 commercial

swine enterprise was equipped with a Pasveer oxidation ditch. The ditch was a capacity of 3,000 cubic feet and is approximately 220 feet long, 3 feet deep, and filled and maintained at a 22 inch liquid level. Hogs were placed in the structure in early June 1970. Foaming occurred about one month after placement and was controlled with an antifoam agent. The oxidation ditch has given complete odor control of the waste. The effluent from the ditch is easily handled by most pumps for final disposal. The cost of operating the 5 horsepower rotor for the ditch was about 25 cents per finished hog, at an electricity cost of 1.1 cents per Kw-hr. The oxygen concentration in the ditch measured at two-week intervals has varied from 3 to 6 ppm oxygen. The theoretical loading rate of volatile solids was based on a value of 5.9 pounds of volatile solids per day per 1000 pounds of live weight. The BOD has ranged from 600 to 2,000 ppm in the oxidation ditch, compared with a BOD value of 40,000 ppm for the raw 2aste. There seems to be a cyclic nature to the quality of contents in the oxidation ditch but this is not completely understood. (Schmitt-Iowa State)

0823 - D4, F4

BEEF WASTES AND THE OXIDATION DITCH TODAY AND TOMORROW,

Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
R. E. Larson, and J. A. Moore.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 217-219. 4 ref.

Descriptors: *Farm wastes, Aeration, *Oxidation lagoons, Waste storage, Cattle, Biological oxygen demand, *Waste water treatment.

The oxidation ditch can be operated as a batch system for treatment of beef animal wastes in cold climates. Its role as a management system, however, will be limited to that of collection, odorless temporary storage and partial treatment. Secondary and complete treatment of wastes will probably be accomplished by land disposal. In areas with below zero winter temperatures, a 'ditch' can be operated successfully for a 150-day batch period. After starting with a loading rate of 50 cu. ft. per animal, the solids concentration builds up to about 10-11%, which appears to be a maximum for successful operation. An estimated 20-30% REDUCTION IN SOLIDS HAS BEEN ACCOMPLISHED. These results and the other measured parameters indicate the design criteria for use of the oxidation ditch for beef systems will be very critical and additional research is necessary. There is also a need to study the interrelation between ventilation system design and the efficient operation of the ditch. Solids handling, especially with high roughage and whole grain rations, present some unsolved problems. (Schmitt-Iowa State)

0824 - D4

AEROBIC TREATMENT OF LIQUID AND SOLID POULTRY MANURE,

Guelph Univ. (Ontario).
J. Pos, R. G. Bell, and J. B. Robinson.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 220-224. 7 tab, 6 fig, 11 ref.

Descriptors: *Farm wastes, *Oxidation lagoons, Biodegradation, Nitrification, Denitrification, Aeration, Poultry, Waste storage, *Waste water treatment.
Identifiers: *Compost.

Effects of aerobic treatment on liquid and solid poultry manure have been evaluated in a number of pilot studies. The changes in composition of liquid manure continuously aerated in 'fill and draw' oxidation ditches have been monitored over a number of 28-day storage periods over the last two years. While BOD reductions were less than had been expected on the basis of theoretical rotor efficiency, losses of nitrogen caused by nitrification-denitrification were very large and exceeded 50% of input as soon as active population of nitrifiers had become established. Solid manure aeration was evaluated in a drum fitted with an internal mixing rotor. The input consisted of equal volumes of poultry manure and soft wood shavings. The compost when discharged, after six days retention within the machine, was dark brown in color and had a strong but short-lived odor of ammonia. Although not completely stabilized, the compost could nevertheless be stored for extended periods of time without developing objectionable odors. (Schmitt- Iowa State)

0825 - C4, C5, D4

MICROBIOLOGICAL ASPECTS OF AEROBICALLY TREATED SWINE WASTE,

School of Agriculture, Aberdeen (Scotland). Bacteriology Div.
K. Robinson, J. R. Saxon, and S. H. Baxter.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 225-228. 7 fig, 2 tab, 6 ref.

Descriptors: *Farm wastes, *Aerobic treatment, Aeration, Chemical oxygen demand, Salmonella, Streptococcus, Pathogenic bacteria, *Waste water treatment.
Identifiers: *Staphylococcus.

The aerobic microbial degradation of swine wastes was evaluated in field studies. Studies on the influence of diet on the composition of waste as a microbial substrate have shown the excretion of inhibitory levels of copper. Chemical analyses of some of the soluble components have made it possible to compare the rates of breakdown of these components with changes in pH and the rate of removal of Chemical Oxygen Demand. A progressive and marked fall in oxygen solubility occurs as the waste concentration increases. Suspensions of Salmonella, Streptococcus, or Staphylococcus were inoculated into aerating urine cultures; these organisms survive for periods exceeding 8 days. It is possible to produce a biologically stable effluent, occasionally with a satisfactory BOD, and a clean, odorless, residual solid. Further work is needed to show how the process of purification can be improved and more clearly understood. (Schmitt-Iowa State)

0826 - E2, E3

CROP PRODUCTION AND SOIL ANALYSES AS AFFECTED BY APPLICATIONS OF CATTLE FEEDLOT WASTE,

Southwestern Great Plains Research Center, Bushland, Tex.
A. C. Mathers, and B. A. Stewart.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 229-234. 2 tab, 6 fig, 3 ref.

Descriptors: *Farm wastes, *Grain sorghum, *Crop response, Soil tests, Leaching, Nitrates, Cattle, Feed lots, Irrigation effects.

A field study was initiated in 1968 to determine the effect of varying rates of cattle feedlot waste on crop growth, nitrate content of forage, and accumulation of nitrate, chlorides, and other constituents in the soil profile. Rates of feedlot waste were 0, 10, 30, 60, 120, and 240 T/A applied to the same plots annually. One treatment received 240 T/A the first year only. Commercial fertilizer treatments of 240-0-0 and 240-50-50 lbs/A applied annually were also included to compare to the waste treated plots. Wastes were spread and plowed under in the spring. In 1969, the plots were not irrigated prior to seeding grain sorghum, but they were in 1970. Seasonal irrigations were applied as needed to provide adequate moisture for plant growth. Soil samples were taken before the experiment was started, at seeding times, and following harvests. Samples were analyzed for nitrate, nitrite, ammonium, chlorides, and conductivity. Yield values and soil analyses concerning the first two years of the study are presented and discussed. (Schmitt-Iowa State)

0827 - B2, D4

A BARRIERED LANDSCAPE WATER RENOVATION SYSTEM FOR REMOVING PHOSPHATE AND NITROGEN FROM LIQUID FEEDLOT WASTE,

Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
A. E. Erickson, J. M. Tiedje, B. G. Ellis, and C. M. Hansen.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 232-234. 2 fig, 2 tab.

Descriptors: *Farm wastes, Nitrification, Denitrification, Nutrient removal, Feed lots, Hogs, *Waste water treatment.
Identifiers: *Barriered Landscape Water Renovation System.

A Barriered Landscape Water Renovation System (BLWRS) consists of an inexpensive impervious water barrier installed below the surface of sand soils. The barrier modifies the soil environment so that an aerobic zone and an anaerobic zone are formed in the soil. The liquid waste is spread on the aerobic zone where the organic matter is decomposed and the nitrogen compounds nitrified. The nitrate is leached into the anaerobic zone where denitrification takes place. The phosphate is removed from the system by adsorption on a phosphate adsorber and in the soil. The renovated water, low in adsorption on a phosphate adsorber and in the soil. The renovated water, low in nitrogen, phosphate, and organic matter, seeps off the edges of the barrier into the aquifer or the water can be collected and recycled. Anaerobic swine waste was spread on this barrier. The total nitrogen content of the wastewater was 440 ppm and of the effluent less than 2 ppm. The average phosphate content of the waste was 38 ppm and of the effluent 0.04 ppm of phosphate. This simple, inexpensive, and efficient way of disposal of feedlot wastewater will also protect surface and underground waters from contamination.
(Schmitt-Iowa State)

0828 - E2, F1

DISPOSAL OF BEEF MANURE BY DEEP PLOWING,

Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
D. L. Reddell, W. H. Johnson, P. J. Lyerly, and P. Hobgood.

In: Livestock Waste Management and Pollution abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 235-238. 4 fig, 4 tab, 6 ref.

Descriptors: *Farm wastes, *Deep tillage, *Cost comparisons, Cattle, Crop production, Crop response, Trenches, Waste disposal.

Four tillage techniques for deep plowing large quantities of manure into the soil were evaluated at El Paso and Pecos, Texas, during the summer of 1970. The soil at El Paso is a sandy loam, with a

sandy subsoil. The soil at Pecos is a silty clay loam. Up to 900 tons of manure per acre can be plowed under with a 30-inch moldboard plow at a minimum cost of 4.5 cents per ton. In sandy soils, the disk plow should be able to plow under at least 600 tons per acre with a minimum cost of 2.1 cents per ton. The 18-inch plow is limited to about 300 tons per acre. The trencher seems most versatile from the standpoint of high rates and soil penetration depths. The costs will be high and in the order of 50 cents per ton at the 900 ton level. The complete mixing of manure and soil as done by the trencher is impressive. At this time, the water quality program shows no serious pollution problem for surface water runoff. The soil water samples at the 4-foot depth indicate that denitrification is taking place. The major groundwater and soil pollution problem would appear to be from sodium chloride. (Schmitt-Iowa State)

0829 - A3, C3, C4, E2

WATER QUALITY OF RUNOFF FROM GRASSLAND APPLIED WITH LIQUID, SEMI-LIQUID, AND 'DRY' DAIRY WASTE,

Auburn Univ., Ala. Dept. of Animal and Dairy Science.
T. A. McCaskey, G. H. Rollins, and J. A. Little.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 239-242. 1 fig, 5 tab, 4 ref.

Descriptors: *Farm wastes, *Return flow, Water quality, Cattle, Odor, Biochemical oxygen demand, Agricultural runoff, *Water reuse, Waste disposal.
Identifiers: *Field-spreading.

Dairy waste was applied to runoff plots to simulate rates of application employed on Auburn University Agr. Exp. Station: (a) irrigation of waste from a holding tank; (b) spreading by a tank wagon, and (c) conventional manure spreader for applying 'dry waste'. Irrigation of liquid manure on grassland at 0.96 tons per acre (dry basis) once each 3 weeks has been practiced with commercial equipment for 21 months. There were no significant odors, flies, or manure accumulation problems at the disposal site. The application of 0.6 tons per acre once or twice during a three-week period by a tank spreader for 19 months also did not cause any problems. The application of waste by the conventional method on permanent disposal sites at rates greater than 3.2 tons/acre once each three weeks resulted in marked accumulation of manure solids. Rates exceeding those accomplished with one or two applications per three-week cycle are not advised unless a cropping system is used. The average BOD5 was 147 mg/l for runoff from grassland applied with an accumulative total of 34 tons (dry basis) per acre as irrigated waste, 45 mg/l for 22 tons/acre of semi-liquid waste, 87 mg/l for 122 tons/acre dry waste, and 17 mg/l for the control. (Schmitt-Iowa State)

0830 - C3, E2

FATE OF INORGANIC FORMS OF N AND SALT FROM LAND-DISPOSED MANURES FROM DAIRIES,

California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
D. C. Adriano, P. F. Pratt, and S. E. Bishop.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 243-246. 1 fig, 7 tab, 8 ref.

Descriptors: *Farm wastes, *Nitrates, *Leaching, Ammonia, Denitrification, Salts, Chlorides, Cattle, Path of pollutants, Waste disposal.
Identifiers: *Field-spreading.

Because land disposal without pretreatment is the most common method of disposal of cattle wastes in Southern California, salts and nitrates in soils and groundwaters must become important factors in dairy waste management. Average nitrate-nitrogen concentrations of 92, 74, and 66 ppm in soil solutions at the 10 to 19 foot depth for corrals, pastures, and croplands, respectively were found in the Chino-Corona dairy area. These solutions will eventually reach the underlying groundwater, which at the time of sampling, had lower nitrate concentrations. Reducing the present cow population of 10 per disposal acre to about 3 per acre would keep nitrate-nitrogen levels at less than 10 ppm in soil solutions beyond the root zone, in soil profiles under croplands and pastures. Under existing conditions, manure from 20 dairy cows had about the same amount of salt as 3 acre-feet of irrigation water. Maximizing ammonia volatilization from manure before incorporation into the soil will reduce the nitrate-nitrogen pool in the soil. (Schmitt-Iowa State)

0831 - B2, E2

EFFECT OF RATE OF POULTRY MANURE APPLICATION ON SELECTED SOIL CHEMICAL PROPERTIES,

Arkansas Univ., Fayetteville. Dept. of Agronomy.
L. H. Hileman.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 247-248, 5 fig.

Descriptors: *Farm wastes, *Poultry, *Fertilization, Crop response, Salinity, Soil properties, *Soil chemical properties, Salts.
Identifiers: *Field-spreading.

Poultry manure, especially broiler litter, is a valuable by-product of the poultry industry. Long-time use by farmers has indicated soil imbalance results from continuous heavy applications. On a dry weight basis, broiler litter contains 4.11% nitrogen, 1.45% phosphorus, and 2.18% potassium. Broiler litter containing 26% moisture was mixed into the upper 4 inches of Ruston sandy loam, Sharkey clay loam, and Captina silt loam, at rates of 5, 10, 15, and 20 tons per acre for a greenhouse study. Ky-31 Fescue was planted but did not germinate. A rapid rise in soil temperature and in pH was noted on all soils. The ammonia released may react with the soil clay exchange capacity resulting in high levels of Ca, K, and Mg ions in the soil, contributing to the soluble salt level. Soil potassium levels increased greatly. High levels of potassium combined with ammonia inhibit the germination and growth of most crop plants. Even at the 5-ton rate, severe salt toxicity was found on all three soils three months after litter incorporation. Salt problems can be determined by soil conductivity measurement. (Schmitt-Iowa State)

0832 - A4, B1, C3, C4, E2

GROUNDWATER POLLUTION DUE TO HIGH ORGANIC MANURE LOADINGS,

Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
T. J. Concannon, and E. J. Genetelli.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p 249-253, 4 fig, 3 tab, 15 ref.

Descriptors: *Farm wastes, *Groundwater, Water pollution, Salinity, Poultry, Fertilization, Bio-indicators, Sampling, Waste disposal.
Identifiers: *Groundwater pollution.

Four specific methods of disposing of organic manures utilize soil as the ultimate disposal media. These include lagooning, sanitary landfilling, subsoil injection, and the PFC method. All these methods could cause serious pollution of ground waters due to heavy loadings of organic and inorganic materials. Contaminants studied were total organic carbon (TOC), NH4+, SO4, PO4, Cl, Na, Mg, Ca, and K. Bacteriological analyses were also performed. Four loading rates, 0, 15, 30 and 45 tons of dry poultry solids per acre were used in field plots as well as laboratory soil columns. Although TOC concentration levels were high in the field plots, no significant difference could be found between control and treatments. Nitrate concentrations exceeded USPHS limits, but the levels were not significantly different from the control. Chloride concentration did not exceed USPHS limits, sulfate concentrations slightly exceeded the limits. All fecal coliform tests were negative. Soil columns provided a controlled means for studying the soil as an effective disposal media for solid waste. (Schmitt-Iowa State)

0833 - B1, E2

EFFECT OF MANURE HANDLING SYSTEMS ON PLANT NUTRIENT CYCLING,

Wisconsin Univ., Madison. Dept. of Soil Science.
R. F. Hensler, W. H. Erhardt, and L. M. Walsh.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p 254-257, 6 tab, 4 fig, 7 ref.

Descriptors: *Farm wastes, *Fertilization, *Crop response, Aeration, Farm lagoons, Nutrients, Cattle.
Identifiers: Plant nutrient cycling.

Fresh, fermented (stacked), aerobic liquid and anaerobic liquid cattle manure handling systems were compared with regard to plant nutrient utilization by corn. In greenhouse studies, dry matter yields and recovery of nitrogen, phosphorus, and potassium were about the same for fresh, fermented, and anaerobic liquid systems, but were significantly less for the aerobic liquid system. Total corn yields and recovery of nitrogen and phosphorus were not greatly affected by oat straw and wood shavings bedding rates up to 8%, but at the 16% rate, yields and nitrogen recovery generally were significantly lower. Regardless of the handling method, manure increased corn yields in field studies. Yield increases were greatest for fermented and anaerobic liquid manure applied in the spring. Runoff losses of total nitrogen ranged from 3 to 24 pounds per acre annually for winter applied manure as compared to about 3 pounds per acre for non-manured soil and spring-applied manure. The concentration of nutrients in the runoff was greater from the sod compared to the fallow soils and greater for fertilizer compared to manure treatments. (Schmitt-Iowa State)

0834 - A3, A5, B1, E2

SUBSURFACE DISPOSAL OF LIQUID MANURE,

Pennsylvania State Univ., University Park. Dept. of Soil Fertility.
H. D. Bartlett, and L. F. Marriott.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 258-260, 2 tab, 3 fig.

Descriptors: *Farm wastes, *Waste disposal, Underground waste disposal, Fertilization, Waste storage, Cattle.
Identifiers: Field-spreading.

The application of animal manure below the soil surface provides a disposal method which eliminates problems of odors, flies, and runoff. Available equipment applies liquid manure four inches below the surface at approximately one gallon per square foot, a rate approaching that of surface spreading practices. The annual application of 15 tons of dairy manure per acre added approxi-

mately 700 lb. N to the soil each year. Even after allowing for estimated crop removal and various losses other than through leaching, a considerable amount of N remained in the soil. Water soluble N accounted for about 160 lb. per acre in the 4 foot profile; it was assumed some moved below that level. The optimum rate of manure application is not substantially greater than that which will supply the maximum nitrogen required by any crop, plus some allowance for losses other than leaching. (Schmitt-Iowa

0835 - D4

AEROBIC STORAGE OF POULTRY MANURE,

Greenmount Agricultural and Horticultural Coll., Muckamore (Northern Ireland).
T. A. Stewart, and R. McIlwain.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 261-262, 2 tab.

Descriptors: *Farm wastes, *Aeration, *Aerobic conditions, Waste assimilative capacity, Poultry, *Waste storage, *Oxidation lagoons.

The use of an oxidation ditch, built directly underneath a 936 bird set of California cages, to aerobically store poultry droppings has been investigated for the past two years. The 2-foot long rotor is fitted with angle-iron type blades and is driven by a 1.5 H.P. electric motor at a fixed speed of 120 r.p.m. Droppings output of the birds during the first year of operation averaged 245 lb. per day, giving a total solids loading of 59 lb., of which 71% was volatile. The BOD of the fresh droppings during this period averaged 40,860 ppm., which was a daily BOD loading on the ditch of 10.3 lb. To avoid sedimentation, it was necessary to empty the ditch when the solids content of the liquid rose above 30,000 ppm. A nutrient budget at the end of the first yearly cycle showed that 43 percent of the total solids, 56 percent of the volatile solids, 60 percent of the COD and BOD and 66 percent of the nitrogen entering the ditch were lost through bacterial activity during storage. Foaming, floating feathers, and mechanical failure of rotor bearings were the main problems encountered. Electricity consumption averaged 1 kilowatt per hour. (Schmitt-Iowa State)

0836 - C4

SURVIVAL AND DETECTION OF LEPTOSPIRES IN AERATED BEEF CATTLE MANURE,

Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
S. L. Diesch, B. S. Pomeroy, and E. R. Allred.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 263-266, 2 fig, 1 tab, 16 ref.

Descriptors: *Pathogenic bacteria, *Farm wastes, *Aeration, Cattle, Aerobic conditions, Waste storage, Pollutant identification, Oxidation lagoons, Public health.
Identifiers: Leptospira pomona.

Leptospira pomona, a pathogen capable of infecting both man and animals, was studied in an extended aeration method of animal manure treatment. A laboratory oxidation ditch model was developed for studying leptospires at simulated winter environmental conditions. A fluorescent antibody technique was developed and utilized for detection of leptospires. Findings indicate that pathogenic leptospires are capable of survival for up to 18 days in an aerated model oxidation ditch and 11 days in effluent and sludge. These findings do not determine the ability of leptospires isolated from a manure environment to establish infection of man and animals. There must be public concern for potential contamination of the environment and the development of health hazards because shedding of leptospires may occur for long periods of time in infected cattle. The disease is of major economic and public health importance and widespread in animal reservoirs. Treatment of sludge and effluents by chlorination or other methods is needed before discharge. (Schmitt-Iowa State)

0837 - A5, B2, C3, C4, D4

AERATION WITH ORP CONTROL TO SUPPRESS ODORS EMITTED FROM LIQUID SWINE MANURE SYSTEMS,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
J. C. Converse, D. L. Day, J. T. Pfeffer, and B. A. Jones.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 267-271, 4 fig, 6 tab, 10 ref.

Descriptors: *Farm wastes, *Aeration, *Odor, Biodegradation, Hogs, Hydrogen sulfide, Organic acids, *Waste water treatment, Oxidation-reduction potential.

Five levels of aeration of a completely mixed liquid swine manure system were studied to determine the effect on odors produced and to study the degradation of manure under each system. Oxidation-Reduction Potential (ORP), pH, temperature, and dissolved oxygen levels of the mixed liquor were recorded daily. Analyses of the mixed liquor and off-gas were performed. The average ORP (Ecal) values for chambers 1 through 5 were +143, -212, -344, -425, -482 mv, respectively. An average D.O. of 4.68 mg/l was maintained in chamber 1 while measurable D.O. was only occasionally found in chamber 2, and never found in the remaining chambers. The total volatile acids concentration in chambers 2 and 3 was about 30 and 10 times less, respectively, than in chambers 4 and 5. The average total sulfides concentration in the mixed liquor of chambers 2 and 3 was about 22 and 3 times less, respectively, than in chamber 5. No hydrogen sulfide was found in the off-gases of chambers 1 and 2. Chambers 3, 4, and 5 had an average of 0.59, 5.78 and 21.57 mg/day as S washed from the off-gases. If the ORP in the liquid is maintained in a range from -300 mv to -340 mv and the pH is in the range from 7.7 to 8.5 the system will be relatively odorless when compared to systems undergoing anaerobic degradation. (Schmitt-Iowa State)

0838 - C3, D4

NITROGEN TRANSFORMATION DURING AEROBIC DIGESTION AND DENITRIFICATION OF DAIRY CATTLE WASTES,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Chang, A. C. Dale, and J. M. Bell.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 272-274, 1 tab, 7 fig, 6 ref.

Descriptors: *Farm wastes, *Nitrification, *Denitrification, Aeration, Aerobic conditions, Cattle, Nitrogen cycle, *Waste water treatment.

Besides biodegradable material, livestock wastes also contain large amounts of plant nutrients, which cause pollution problems if they are released to the environment without control. This study investigates the fate of nitrogen during anaerobic digestion of dairy cattle wastes and seeks a possible way of removing nitrogen before final disposal. The reduction of total nitrogen was found mainly due to the volatilization of ammonia during the aerobic digestion. Temperature has a significant effect on the stability of the digested wastes. For complete denitrification of the digested dairy cattle wastes, acclimated sludge and a sufficient supply of organic carbon are needed. The amount of glucose required for complete denitrification is 150 per cent of the amount theoretically calculated. This results in a 90 per cent reduction of total nitrogen. The amount of manure slurry needed for complete denitrification of digested dairy cattle manure is an equivalent of 149 mg COD per mg of oxidized nitrogen. With a sufficient supply of organic carbon, the average rate of denitrification is 13.26 mg of nitrogen per hour. (Schmitt-Iowa State)

0839 - D4

AEROBIC BIOLOGICAL BREAKDOWN OF FARM WASTE,

Rijkszuivel Agrarische Afvalwater Dienst, Arnhem (Netherlands).
P. Ten Have.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 275-278, 1 fig, 7 tab, 1 ref.

Descriptors: *Farm wastes, *Denitrification, *Aeration, *Activated sludge, Aerobic conditions, Cattle, Hogs, Costs, Waste water treatment, Slurries.

One of the ways to reduce dung surpluses is the exposure to aerobic biological breakdown. The aim of this treatment is not only the reduction of the suspended solids in the manure, but also of the volume by producing effluents which are discharged to watercourses. When using the activated sludge process with a load of 200-300 g BOD per cubic meter per day, the effluent BOD is normally 50-100 ppm. The activated sludge settles very well (Sludge, volume index mostly below 50), so sludge levels greater than 10 Kg MLSS per cubic meter can be maintained. The result is a low sludge load of less than 30 g BOD per Kg MLSS per day. When pig slurry is treated, about 40 percent of the original solids has to be removed as surplus sludge. With urine only, breakdown reaches 75 percent. The surplus sludge must be disposed but has a smaller volume, better dewaterability, and lack of obnoxious odors. A large part of the nitrogen is lost by denitrification, with 30 percent discharged with the effluent. Biological degradation is only economically justified in The Netherlands when agricultural use is impossible within a range of more than about 10 kilometers. (Schmitt-Iowa State)

0840 - A5, D4

LOW-VOLUME, SURFACE-LAYER, AERATION--CONDITIONED MANURE STORAGE,

Clemson Univ., S.C. Dept. of Agricultural Engineering.
C. L. Barth, and L. B. Polkowski.

Descriptors: *Farm wastes, *Aeration, *Odor, *Waste storage, Cattle, Farm lagoons, Aerobic conditions, Waste water treatment, Slurries.
Identifiers: *Surface-layer aeration.

Storage periods for wastes up to six months are necessary to maintain the quality of water resources and to complement schemes for intensified livestock production. A preliminary investigation of the procedure of low volume, surface layer aeration of stored, diluted dairy manure was made. Air was introduced into the supernatant of stored manure at various rates and depths. The supernatant of properly aerated storage units was characterized by higher oxidation-reduction potential, dissolved oxygen, and pH than poorly aerated and anaerobic storage. It also had lower volatile organic acid, ammonia, BOD, suspended solids and odor intensity. The sludge of the well-aerated unit was characterized by higher solids

concentration and a distinct surface separating the sludge and supernatant zones. Low volume, surface layer aeration effectively reduced odor production, produced a scum-free surface and a more concentrated sludge layer. Favorable storage conditions were associated with ORP greater than -50 mv (Ec), D.O. greater than 1.0 mg/l and pH greater than 8.0. An aerated depth of 20 to 24 inches was desirable. After sixty days storage, about 85% of total volume, 85% of the COD and 79% of the nitrogen was recovered.
(Schmittelowa State)

0841 - A5, B2, E2

SHORT TERM AERATION OF DAIRY CATTLE MANURE FOR IRRIGATION,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
J. R. Ogilvie, and A. C. Dale.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 283-285, 4 fig, 12 ref.

Descriptors: *Farm wastes, *Aeration, *Odor, Sprinkler irrigation, Waste storage, Cattle, Chemical oxygen demand, *Waste water treatment.

Short-term aeration reduces odors from dairy cattle wastes. This was demonstrated by use of a 2 H.P. floating aerator in a 15 foot diameter, 42 inch deep tank into which raw concrete yard manure was loaded in batch made to a maximum mixed liquor total solids content of 1.75 percent and a COD of 17,600 mg/l. Daily irrigation removed the excess liquid. The mixed liquor was odor free at all times, in the tank and on grassland. There is a conversion of soluble organics to cell material, as about 80% of the soluble COD is removed. The process requires very good mixing to prevent particles of roughage from settling. The mixing may be performed by a turbine in a baffled vessel or by a Kessener brush in a rectangular tank. Dilution of the raw manure is necessary to allow treatment but the extra two volumes of water are usually available from rainfall, washwater, or special addition. The volume of treatment facility is much reduced from the oxidation ditch. The input oxygen is the same or somewhat reduced. In cold climates, this process could be used with an additional aerated lagoon to take the winter effluent.
(Schmitt-Iowa State)

0842 - C5, D4, F2, F5

THE USE OF OXIDATION PONDS FOR POULTRY PROCESSING WASTE DISPOSAL,

Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
R. L. Wesley, E. B. Hale, and H. C. Porter.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 286-287.

Descriptors: *Farm wastes, *Poultry, *Industrial wastes, Oxidation lagoons, Odor, Virginia, *Food processing industry.

Poultry processing waste is a suitable substrate for biological degradation by both aerobic and anaerobic bacteria. Several poultry processors in Virginia have faced varying stages of court litigation involving waste disposal. A team of specialists, including a biologist, an agricultural engineer, an agronomist, a sanitary engineer, a poultry processing specialist and a member of the State Water Control Board Staff were appointed by the Dean of Cooperative Extension Service at VPI to assist a processor with his problems. This group gathered the basic facts concerning the problems as follows: (a) total hydraulic load; (b) BOD 5; (c) total solids; (d) total dissolved solids; (e) D.O., and (f) fecal coliforms. These determinations were made on raw effluent, treated effluent, and on the receiving stream. A treatment system composed of a grease and grit trap, a series of lagoons and natural aeration was developed. These lagoons cover 8 acres, have a capacity of 12 million gallons, and provide a detention time of 81 days. Reductions are as follows: (a) 97% BOD removal; (b) 87% solids removal, and (c) fecal coliforms are less than 100/100 ml in the receiving stream. This treatment cost approximately $30,000.
(Schmitt-Iowa State)

0843 - D4

ACCLIMATIZATION RESPONSE TIME FOR AEROBIC WASTE DIGESTORS,

Georgia Univ., Athens. Dept. of Agricultural Engineering.
D. T. Hill, and R. E. Smith.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 288-290, 5 fig, 2 tab, 5 ref.

Descriptors: *Farm wastes, *Activated sludge, Anaerobic digestion, Time lag, Biochemical oxygen demand, *Waste water treatment.
Identifiers: *Acclimatization time, Time constant.

Extant circumstances for many anaerobic swine waste lagoons in present use often ensure aperiodic effluents. The output from operating anaerobic lagoons is unacceptable for receiving streams. This research was conducted to establish design criteria for an aerobic activated -sludge reactor for use with the aperiodic effluents from anaerobic lagoons. Objectives were to determine a general prediction equation for the transient operation time as a function of the off time of an aperiodically operating treatment unit and to determine the effect of a low-maintenance aeration supply on the transient operation time of the aerobic process. The use of maintenance aeration was found to have no significant effect on the value of the acclimatization time. Since there was no solids removal during the study, acclimatization time was defined as the time necessary to achieve 63.6% BOD reduction in the liquid phase, and is referred to as a time constant. The acclimatization time ranged from 5.69 to 15.21 hours between zero and infinity for values of down time.
(Schmitt-Iowa State)

0844 — E3, F2

REGULATORY ASPECTS OF RECYCLED LIVESTOCK AND POULTRY WASTES

U. S. Department of Health, Education and Welfare Division of Nutritional Sciences, Rockville, Maryland.
J. C. Taylor.

Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, pp. 291-292, 15 ref.

Descriptors: *Farm wastes, *regulation, *recycling, administrative agencies, legislation, poultry.
Identifiers: *Food and Drug Administration, Federal Regulations.

Section 3.59 of the code of Federal Regulations is a formal statement of policy or interpretation under Subpart A of Title 21. It states that the Food and Drug Administration has not sanctioned and does not sanction the use of poultry litter as a feedstuff for animals. Poultry litter could contain drugs and antibiotics or their metabolites and disease organisms may be transmitted to other animals by using poultry litter in animal feed. Information thought useful for FDA to consider before changing its policy include: 1) a description of the processing methods and analytical controls, 2) degree of uniformity of the product, 3) status of pathogenic organisms or their toxic metabolites, 4) levels of pesticides, drugs, heavy metals, or other substances shown safe for animal consumption, and 5) No harmful residues from drugs, pesticides or other substances or from thier metabolites, degradation products, or derivatives should occur in the edible tissues or by-products of animals consuming the product. At this time, FDA does not have enough information to modify its regulation. (Schmitt - ISU).

0845 - A9, E3

CATTLE MANURE AS FEED FOR CATTLE,

Alabama Agricultural Experiment Station, Auburn. Dept. of Animal and Dairy Sciences.
W. B. Anthony.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 293-296, 2 fig, 11 tab, 10 ref.

Descriptors: *Farm wastes, *Recycling, *Cattle, *Animal pathology, Microorganisms, Nematodes, Feed lots, Feeds.
Identifiers: *Refeeding, Wastelage.

Manure from grain-fed steers was fermented by lactic acid bacteria and about 16% of the dry matter was converted to lactic acid. This lactic acid was neutralized by anhydrous ammonia and the final product contained 45% crude protein equivalent. When blended with corn, the ammoniated manure was readily consumed by sheep. Manure blended with ground corn in the ratio 1:1.5 (w/w) was a more efficient ration for finishing slaughter cattle than a balanced ration containing corn and supplement or corn, supplement, and ground hay. All manure voided by yearling steers fed in confinement was collected and made into wastelage (57 parts manure, 43 parts ground hay). The wastelage produced daily using the excreta from one full-fed yearling steer averaged 51 pounds. A portion (6 lb.) was fed to the steer that produced the manure and the remainder (45 lb.) was fed to a beef brood cow. Cottonseed meal added to a corn-wastelage ration did not appreciably increase animal gain. Spread of infection of internal parasites and other common ailments of feedlot cattle did not occur when manure was fed over a long period to cattle and sheep. Larvae of common stomach nematodes did not develop in wastelage. (Schmitt-Iowa State)

0846 - E3, F1

NUTRITIVE VALUE OF CHICKEN MANURE FOR CATTLE,

Cornell Univ., Ithaca, N.Y. Dept. of Animal Science.
L. S. Bull, and J. T. Reid.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 297-300, 7 tab, 14 ref.

Descriptors: *Farm wastes, *Recycling, *Cattle, *Poultry, Animal pathology, Coliforms, Nutrient requirements, Costs.
Identifiers: *Air dried chicken manure.

Chicken manure, as voided, contains about 75 percent water and 4 percent nitrogen. 70 percent of the nitrogen is derived from urinary sources and 30 percent from fecal matter. More than 60 percent of the total nitrogen is in the form of uric acid, 9 to 10 percent in ammonium salts and the balance is part of the fecal material. The use of urea and ammonium salts by rumen microorganisms is well documented. Acceptability, intake, digestion, and balance trials were conducted with dairy cattle and steers to determine the value of air dried chicken manure (ADM) as a source of nitrogen, calcium, and phosphorus. The dry matter content of the ADM as fed was 81.5% and the percentages of crude protein, calcium, and phosphorus were 30.1, 7.6, and 1.2, respectively. The gross energy value was 2688 Kcal per Kg as fed. Palatability was not a

serious diet problem as long as the ADM contained less than 20% moisture. ADM may be used as the sole source of supplemental N for steers and dairy cows fed low-protein basal diets. N, Ca, and P in ADM are readily available and well utilized by the animal. The economic advantages for producing ADM in large quantities are significant at current cost estimates. (Schmitt-Iowa State)

0847 - C1, D1, E3

STUDIES OF PROCESSING, NUTRITIONAL VALUE, AND PALATABILITY OF BROILER LITTER FOR RUMINANTS,

Virginia Polytechnic Inst., Blacksburg. Dept. of Animal Science.
J. P. Fontenot, K. E. Webb, B. W. Harmon, R. E. Tucker, and W. E. C. Moore.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 301-304, 5 tab, 1 fig, 16 ref.

Descriptors: *Farm wastes, *Recycling, *Poultry, Cattle, Animal pathology, Nutrients, Waste treatment.
Identifiers: Poultry litter.

A possible public health hazard exists when poultry litter is fed to ruminants. The objectives of this research were to develop a sterilizing method which will destroy pathogenic organisms in broiler litter, to determine the effect of sterilizing methods on the nutritional value of litter, to study variation in chemical composition of litter among producers and to study the palatability of cattle rations containing litter. The use of dry heat at 150 degrees C for 4 hours or longer was the only method which was consistently effective in sterilizing broiler litter. Autoclaving and the use of beta-propiolactone or ethylene oxide did not consistently affect chemical composition of litter. The use of dry heat at 100 or 150 degrees C resulted in a substantial decrease in crude protein content. There was loss of ammonia upon dry heating. In a series of nitrogen balance trials with sheep, nitrogen utilization was similar for litter autoclaved for 40 minutes, dry heated at 150 degrees C for 4 hours, or acidified to pH 6 and dry heated at 150 degrees C for 4 hours. There was considerable variation in the chemical composition of poultry litter samples obtained from different areas. No substantial amounts of pesticide residues were detected in broiler litter or in tissue from animals fed processed litter. There appears to be adaptation to acceptability of litter by cattle. (Schmitt-Iowa State)

0848 - E3

DEHYDRATED POULTRY WASTE (DPW) AS A FEEDSTUFF IN POULTRY RATIONS,

Michigan State Univ., East Lansing. Dept. of Poultry Science.
C. J. Flegal, and H. C. Zindel.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971. p 305-307. 7 tab, 9 ref.

Descriptors: *Farm wastes, *Recycling, *Poultry, Dehydration, Nutrients, Waste treatment.
Identifiers: Eggs, Dehydrated poultry wastes.

Poultry excreta, from caged layers, was collected and dehydrated. The resulting product of dehydration (DPW) was put into the diets fed growing chicks and laying hens to determine its nutritional value. The 4 week mean body weight of leghorn-type chicks was not influenced when up to 20 percent of the diet was DPW. When diets of 10 or 20 percent DPW were fed to broiler-type chicks, a significant reduction in mean body weights resulted at 4 weeks of age. Feed efficiency was inversely related to the level of DPW in the diet. In two laying experiments, involving leghorn-type laying hens, incorporation of up to 20 percent DPW did not influence egg production or feed efficiency to produce eggs. Egg quality factors were not adversely influenced by adding up to 40 percent DPW in the laying ration. Supplementation of the diets containing DPW in one experiment with calcium, phosphorus, methionine and energy had little influence on the criteria measured. The taste panel was unable to determine a difference between eggs from hens fed the control diet and eggs produced by hens fed diets containing 10, 20, and 30 percent DPW. (Schmitt-Iowa State)

0849 - E3

DRIED ANIMAL WASTE AS A PROTEIN SUPPLEMENT FOR RUMINANTS,

Michigan State Univ., East Lansing. Dept. of Animal Husbandry.
H. F. Bucholtz, H. E. Henderson, J. W. Thomas, and H. C. Zindel.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 308-310, 6 tab, 4 ref.

Descriptors: *Farm wastes, *Recycling, *Poultry, Dehydration, Nutrients, Ruminants, Proteins, Feeds.
Identifiers: Dehydrated poultry wastes.

A 134 day feeding trial utilizing nine yearling steers per group was employed in studying the value of dried poultry waste as a protein source for feed lot cattle. The ration was comprised of 80% corn silage and 20 percent shelled corn on a dry matter basis. Crude protein levels were adjusted to 12 percent of dry matter with one of the following protein supplements; dried poultry waste (DPW), 1/2 DPW - 1/2 urea, 1/2 DPW - 1/2 soybean meal, urea, and soybean meal. Average daily gain for the respective rations was: 2.75, 3.03, 2.88, 3.10, 3.35 pounds respectively. Gain differences were highly significant. Feed efficiency values were 10.43, 7.31, 8.14, 7.23, and 6.96 pounds respectively. The relatively poor performance of beef animals fed DPW may be related to the high proportion (32 percent) of product used in the ration. Digestibility and nitrogen balance values for sheep indicate that the animal manures can be successfully used as a source of energy and nitrogen in ruminant rations. From management and nutritional considerations, dehydrated animal wastes must contain more than 25 percent crude protein to economically compete with other supplemental nitrogen sources for ruminants. (Schmitt-Iowa State)

0850 - E3, F1

THE EFFECTS OF INCLUDING DRIED POULTRY WASTE IN THE FEED OF LAYING HENS,

Ministry of Agriculture, Fisheries and Food, Worcester (England). Poultry Husbandry Advisor.
B. Hodgetts.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 311-313, 9 tab, 12 ref.

Descriptors: *Farm wastes, *Recycling, *Dehydration, Poultry, Costs, Drying, Feeds.
Identifiers: Dehydrated poultry waste.

A farm trial was arranged to test the feasibility of including artificially dried poultry waste in the feed of a flock of 1800 caged laying hens. A flock of 800 birds was maintained as a control. The waste came directly from battery cages and was dried in a rotary drum type dryer. After preliminary trials it was decided to use an inclusion level of 10% dried poultry waste. After 58 weeks of lay, no real differences could be detected in terms of egg yield, mortality or egg gradings. The flock receiving dried poultry waste consumed 0.27 ounces of feed/bird/day less than the control. Body weight checks showed them to be 0.21 pounds/bird heavier at the end of the trial. The overall cost of the ration was reduced to $4.80 per ton by including dried poultry waste. This trial indicated that for the conditions prevailing it was technically, nutritionally and economically feasible to recycle poultry waste to the layers at a level of 10%. (Schmitt-Iowa State)

0851 - C1, E3

NUTRITIVE EVALUATIONS OF UNTREATED AND CHEMICALLY TREATED DAIRY CATTLE WASTES,

Agricultural Research Service, Beltsville, Md. Animal Science Research Div.
L. W. Smith, H. K. Goering, and C. H. Gordon.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 314-318, 8 tab, 5 ref.

Descriptors: *Farm wastes, *Recycling, Drying, Cattle, Sheep, Nutrients, Chemical degradation, Lignins, Cellulose, Wood wastes, *Waste water treatment.

Studies were conducted to determine the extent to which digestibility of manure plus urine and hardwood sawdust (barn waste, BW) or manure alone was increased by chemical treatments when reused as feed for sheep. Dairy cattle wastes were collected from a gutter cleaner. BW were (1) untreated or treated by adding and mixing either, (2) 3% sodium hydroxide, (3) 3% sodium peroxide, or (4) 3% sodium chlorite with the wet wastes. All were stored in plastic-sheet covered piles for 4 weeks before drying with forced hot air. The four materials were ground through a 3/8 inch hammermill screen and mixed as 83% BW, 10% cornmeal, and 7% soybean meal. These were pelleted and fed ad lib in a completely randomized experiment for 30 days. During the last 7 days, consumptions and digestibilities were measured. Dry matter digestibilities were: untreated, 23.05; sodium hydroxide, 27.32; sodium peroxide, 34.63; and sodium chlorite, 35.28. Cell wall digestibilities were: 9.67, 10.50, 17.11, and 21.92, respectively. Digestibilities of chemical treated feces were not increased to the extent observed in nitro. The less than predicted fiber digestibility may be the result of rapid passage of fecal fiber through the rumen or less than optimum treatment conditions. (Schmitt-Iowa State)

0852 - E3, E4

BIODEGRADED HEN MANURE AND ADULT HOUSE FLIES: THEIR NUTRITIONAL VALUE TO THE GROWING CHICK,

Agricultural Research Service, Beltsville, Md. Agricultural Engineering Research Div.
C. C. Calvert, N. O. Morgan, and H. J. Eby.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 319-320, 6 tab, 4 ref.

Descriptors: *Farm wastes, *Recycling, *Insects, *Larvae, Poultry, Drying, Nutrients, Feeds.
Identifiers: House flies, Musca domestica.

Initial studies demonstrated the feasibility of using the house fly larvae to biodegrade or process caged laying hen manure. Studies conducted on the comparison of processed hen manure, fresh dried hen manure, and soybean meal used these materials to constitute 22% of the diet. The materials contained 2.7, 5.2 and 8.0% total Kjeldahl nitrogen, respectively. Chicks receiving the two types of manure in the three week growth studies weighed 93 grams less than those receiving soybean meal. 22% manure does not support optimum chick growth. Newly emerged house flies contain about 69% moisture, and the dry material

is 75% protein and 7% fat. Dried ground adult house flies were diluted with cellulose to bring the protein content to 50% and this material was substituted in the chick diet of the growing chick. The total amount of fly meal in the chick diet was 22% and this was compared with 22% of 50% soybean meal. The adult house fly meal supports growth equally as well as soybean meal during the first three weeks of the growing period.
(Schmitt-Iowa State)

0853 - A9, E3

RECYCLING BROILER HOUSE LITTER ON TALL FESCUE PASTURES AT DISPOSAL RATES AND EVIDENCE OF BEEF COW HEALTH PROBLEMS,

Department of Agriculture, Watkinsville, Ga.
S. R. Wilkinson, J. A. Stuedemann, D. J. Williams, J. B. Jones, and R. N. Dawson.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 321-324, 5 tab, 3 fig, 17 ref.

Descriptors: *Farm wastes, *Fertilizers, *Crop response, Nutrients, Cattle, Fescues, Animal pathology.
Identifiers: Grass tetany, Nitrate toxicity, Lipomatosis.

Grass tetany, nitrate toxicity, and lipomatosis problems have occurred with beef grazed in tall fescue pastures heavily fertilized with broiler litter. Two Kentucky-31 fescue pasture systems were initiated in 1968 with one receiving 9.3 M.T. dry broiler house litter per acre per year, and a control receiving a maximum of 202 Kg N per ha per year from inorganic sources. These pastures were treated as ecosystems and changes in soil, plant, and animal components were evaluated. Soil from the surface 5 cm of the littered pasture had a higher percent of the exchange complex saturated with K, higher water soluble P and NO3, and a lower C/N ratio. Plant samples showed increased total N and potentially toxic levels of NO3-N accumulations during summer months in the forage. Perioline levels in fescue varied from a low in early spring and fall (160 micro g/g) to a maximum in August (830 micro g/g). Differential rates of uptake of K/Ca/Mg during early spring resulted in grass having K/Ca + Mg ratios greater than 2.2. Fat necrosis was detected by rectal palpation in 2 of 21 and 7 of 21 cows after 1 and 2 years of study in the broiler littered fescue and none in 1 of 24 in the control herd. (Schmitt- Iowa State)

0854 - E2

MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS,

Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
P. R. Goodrich, and E. J. Monke.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 325-328, 8 fig, 8 ref.

Descriptors: *Farm wastes, *Fertilizers, *Phosphorus, Nutrient removal, Phosphorus radioisotopes, Sprinkler irrigation, Leaching, Clay loam, Path of pollutants, Saturated soils.

The irrigation of animal wastes containing high concentrations of phosphate onto the soil was simulated. Two different soils and three concentrations of radioactive phosphate were used to dynamically trace the pollutant movement in saturated soil. The sandy loam with its higher clay content absorbed up to four times as much phosphate as did the sand used in this study. Soils do have a limited capacity to adsorb phosphate from solution. While this fact can be safely ignored with normal applications of phosphorus fertilizers, it must be determined and considered in the design of disposal fields for wastes where phosphorus concentrations can be quite high. The rate of absorption may be slower than implied by most literature references because the soil mass at any depth is unlikely to react quickly in total to the phosphorus influx. This was more true for the finer textured soils than for the coarser ones. Although the finer textured soils adsorbed more total phosphorus, the phosphorus front still reached depths much quicker than if the soil behind the front had been totally reactive. The linearized diffusion equation also predicted a much sharper adsorption front than was observed with the two soils tested. (Schmitt-Iowa State)

0855 - D2

TREATMENT OF LIVESTOCK-LAGOON EFFLUENT BY SOIL FILTRATION,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. K. Koelliker, J. R. Miner, C. E. Beer, and T. E. Hazen.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 329-333, 2 tab, 6 fig, 5 ref.

Descriptors: *Farm wastes, *Nutrient removal, Fertilization, Sprinkler irrigation, Farm lagoons, Leaching, Phosphorus, Nitrate, *Waste water treatment, Filtration, Iowa.
Identifiers: Soil filtration, Anaerobic lagoon effluent.

In Iowa, anaerobic manure lagoon effluent can be successfully treated and disposed of between mid-April and early November by sprinkler irrigation. To minimize the possibility of runoff, the application rate should be less than half the suggested infiltration rate for clear water on the same soil. On poorly drained soils, a total application of 2 inches was the amount that could be applied at 0.40 inch per hour without runoff. Soil filtration removed from 79-93 percent of the COD, 90-97 percent of the total P, and 48-67 percent of the total-N when 14.8 to 31.4 inches of lagoon effluent were applied in one season to field plots. The total-N is the constituent that likely will limit the amount of liquid that should be applied in a season because of high nitrate-N (130-190 mg/l N) found in the tile drainage with intense applications. 600 pounds per acre of N per season is recommended. Fescue, brome, and ryegrass have grown satisfactorily where lagoon effluent was applied as long as the soil did not remain flooded. Over a three year period, measures of the chloride ion, an indication of total salt content, show approaching equilibrium, the concentration in the tile drainage about equal to that of the lagoon effluent.
(Schmitt-Iowa State)

0856 - E3

GROWTH RESPONSE OF PLANTS UNDER SPRINKLER IRRIGATION WITH DAIRY WASTE,

Florida Univ., Gainesville. Dept. of Agricultural Engineering.
A. R. Overman, C. C. Hortenstine, and J. M. Wing.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 334-337, 6 tab, 9 fig, 8 ref.

Descriptors: *Farm wastes, Sprinkler irrigation, Crop response, Fertilizers, Cattle, Nutrient removal, Leaching, Slurries.
Identifiers: Dairy wastes.

The soil-plant system was used as a sink for the nutrients in dairy waste. Manure slurry of about 0.2 percent solids was applied to plants by sprinkler irrigation at various rates to determine growth response curves. For oats the rates were 1/4, 1/2 and 1 inch per week, while sorghum received 0, 1 and 2 inches per week. Ground water samples were collected periodically and analyzed for nitrates and phosphates. Growth response of both crops is described quite well by the Mitscherlich equation, which emphasizes relative yield. Relative yields of oats were 40, 65, and 88 percent of optimum for application rates of 1/4, 1/2 and 1 inch per week respectively. Maximum yield (green weight) for oats was estimated to be 12.25 tons per hectare (5 tons/acre), while the value for sorghum-sudan grass was 90.7 tons per hectare (36.8 tons/acre). Oats grown with dairy manure measure up to those grown with inorganic fertilizer in chemical composition, palatability, and digestibility. (Schmitt-Iowa State)

0857 - D1

NITROGEN REMOVAL FROM SEWAGE WATERS BY PLANTS AND SOIL,

Maryland Univ., College Park. Dept. of Agronomy.
V. Larsen, and J. H. Axley.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 338-340, 6 tab, 17 ref.

Descriptors: *Farm wastes, *Nutrient removal, *Soil filters, Denitrification, Nitrogen compounds, Ammonia, Leaching, Sewage disposal, Filtration.
Identifiers: Soil filtration.

The addition of 3000 pounds per acre of nitrogen, 50 tons of organic matter and 200 acre inches of water per year to plants and soil was studied in reference to changes in sewage as it entered the soil and passed through the soil to a depth of 30 feet. At this depth these waters were returned to the surface by pumps. By use of chloride as a tracer, ground water dilution estimates were made and a nitrogen balance sheet for the changes, losses, and destinations of nitrogen throughout the cycle was developed. The 65 ppm of N in sewage, when applied at a rate of 508 cm per year (200 inches per year), was reduced to 11 ppm of NO3-N after the sewage has passed through 3 meters of water unsaturated soil and 6 m of water saturated soil. Denitrification and immobilization of nitrogen were the two most important factors in nitrogen removal when treatment rates were 11.7 to 23.7 cm per week. (Schmitt-Iowa State)

0858 - B2, D2, D4, E3

RENOVATION AND REUSE OF WATER FOR DILUTION AND HYDRAULIC TRANSPORT OF DAIRY CATTLE MANURE,

Massachusetts Univ., Amherst. Dept. of Food and Agricultural Engineering.
R. E. Graves, J. T. Clayton, and R. G. Light.

In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, 341-344, 5 fig, 3 tab, 8 ref.

Descriptors: *Farm wastes, *Slurries, *Screens, Cattle, Aeration, Recycling, Coliforms, *Water reuse, Waste treatment.
Identifiers: Bar screening.

Slurries of dairy cattle manure contain many solids which form scum mats and sludges in holding tanks and cause other problems during treatment. A stationary sloping screen with a 0.02 inch bar spacing used as a pretreatment step removed over 50% of the total solids present in manure slurries ranging from 50:1 to 2:1 (water to wet manure by weight). Two aerated treatment systems were studied, one using settled screen effluent and the other the entire screen effluent. Each system was duplicated with one using recycled effluent in the loading slurry and the other using fresh water. No adverse affects on treatment operations were attributed to recirculation. There was little difference in the effluents between systems. Concentration of salts and minerals increased in the recir-

culated systems which might cause problems eventually. Population of two indicator organisms did not increase in the recycled systems. Clogging and damage to pumps and nozzles in irrigating systems is reduced for the screened liquid. Storage for intermittent application requires less volume, and scum mats are eliminated from ponds by screening. (Schmitt-Iowa State)

0859 - D2

THE SEPARATION OF SOLID AND LIQUID PARTS OF PIG SLURRY,

Instituut voor Landbouwbedrijfsgebouwen, Wageningen (Netherlands).
J. C. Glerum, G. Klomp, and H. R. Poelma.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 345-347, 2 tab, 5 fig.

Descriptors: *Farm wastes, *Slurries, *Separation techniques, Sieve analysis, Sedimentation, Dewatering, Hogs, Waste treatment.
Identifiers: Centrisieve, Decanter centrifuge, Vibroscreen, Rotary vacuum filter.

Experiments designed to separate solid and liquid parts of pig slurry were made with a centrisieve, two decanter centrifuges, a rotary vacuum filter, a vibroscreen, and a sedimentation silo. With the aid of a centrisieve between 30 and 40% of the dry matter could be removed from pig slurry with a dry matter content of 5 to 8%. The separated material has a dry matter content of 14 to 19%. High demands are made on the homogenity and supply of the slurry. The material separated by the decanter centrifuge was quite dry, but the energy consumption per unit capacity was very high. The separation capacity of the vacuum filter equaled that of the decanter centrifuge but had a lower energy requirement. The separated material from the vibroscreen continued too wet and the capacity was also low. The sedimentation silo showed the biggest reduction of the slurry was initially high (15-19%) and the storage time was long. The centrisieve performed best based on results, capacity and initial expense. The sedimentation silo also performed well. (Schmitt-Iowa State)

0860 - D2

DEWATERING POULTRY MANURE BY CENTRIFUGATION,

Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
I. J. Ross, J. J. Begin, and T. M. Midden.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 348-350. 2 fig, 1 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, *Dewatering, Centrifugation, Waste water treatment, Moisture content, Time, Temperature.
Identifiers: Imperforate basket type centrifuge, Manure washing.

Poultry manure is excreted at a moisture content of approximately 75 percent (wet basis) and can be dewatered by centrifugation. Tests have been conducted to determine the amount of fluid that can be removed from fresh manure in an imperforate basket type centrifuge. The variables investigated include (1) time of centrifugation - 1 to 12 minutes, (2) centrifugal force - 2000 to 10,000 g, (3) initial moisture content - 75% to 95% and (4) temperature - 40 to 120 degrees F. As much as 40% of the water can be removed from the manure at 75% moisture content and as much as 70% can be removed at 95% moisture content. Time of centrifugation in a bowl centrifuge for 1 to 12 minutes has little effect on the percentage of water removed except at low relative centrifugal forces (RCF) and high solids concentrations. Increasing the RCF significantly affects the percentage of water removed only at high solids concentrations. Increasing the temperature in the range of 40 to 160 degrees F increases the percentage of water that can be removed by centrifugation. (Schmitt-Iowa State)

0861 - D2, E3

CONCENTRATION OF PROTEINACEOUS SOLIDS FROM OXIDATION DITCH MIXED--LIQUOR,

Illinois Univ., Urbana. Dept. of Agricultural Engineering.
L. W. Holmes, D. L. Day, and J. T. Pfeffer.
In: Livestock Waste Management and Pollution Abatement, Proceedings International Symposium on Livestock Wastes, Ohio State University, April 19-22, 1971, p 351-354, 8 fig, 4 ref.

Descriptors: *Farm wastes, *Recycling, Aeration, *Centrifugation, Hogs, Nutrients, Proteins, Water reuse, Waste water treatment.

Biodegradation of swine waste in an under-the-floor oxidation ditch produces a mixed-liquor that contains minute, protein-rich particles. The 82.6 percent (dwb) portion of a swine ODML sample that passed through a 200 - mesh screen contained 75.6 percent (dwb) crude protein. Centrifuged samples of swine ODML contained a greater percentage (dwb) of crude protein and essential amino acids than corn. Centrifugation is one possible method of suspended solids concentration. The solid bowl basket-type centrifuge used in pilot plant trials was capable of concentrating the proteinaceous solids in swine ODML from an initial value of 1.2% S.S. to a desired concentration of 6 to 8 percent S.S. This represents a volume reduction of 85 percent. This removes a substantial amount of liquid that contains no measureable amino acids. COD reduction closely followed S.S. recovery values. Investigations into potential health hazards to man and animal arising from infection by pathogenic organisms in the manure will need to be conducted before this method of manure recycling may be advocated for common use. (Schmitt-Iowa State)

1000 — B1, E1

EQUIPMENT AND FACILITIES FOR MODERN METHODS OF SWINE MANURE DISPOSAL,

Oregon State University, Corvallis, Agricultural Experiment Station.
A. J. Muehling.
Reports of the Twelfth Annual Swine Day, December, 1970, p. 17-23, 8 fig.

Descriptors: *Farm wastes, *Waste disposal, *Hogs, Feed lots.
Identifiers: *Building design, Slotted Floors, Farrowing house, Construction methods, Nursery, building, Finishing building, Sow confinement, Hog production systems.

The use of slotted floors in swine housing has accelerated the use of confinement housing in hog production systems in the United States. Specific facilities which are necessary for swine production and which successfully employ the slotted floors are described. Detailed instructions for constructing the farrowing house, nursery building, and finishing building are given. Concrete slotted floors appear to endure better than wood or steel. However, manure probably is worked through expanded metal better than almost any other slotted floor material. All types of slotted floor materials are considered. The advantages of various construction materials and methods are discussed. Floor plans and pictures depict the actual building structures and give additional construction information. (Dudley - East Central)

1001 — A5, A8, C1, D4

INCLINED-PLANE TRICKLING FILTER FOR SWINE WASTE,

University of Georgia, Athens, Agricultural Engineering Department.
L. A. Mulkey, and R. E. Smith.
Presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972, Paper No. 72-952, Order No. N172 - 952, 16 p., 2 tab., 1 fig., 14 ref.

Descriptors: *Waste treatment, *Aerobic treatment, Odor, *Trickling filters, Flow rates, *Biochemical oxygen demand, Farm wastes, *Hogs, Feed lots.
Identifiers: *Inclined plane, Contact time, Organic removal, Psychoda fly larvae, Design equations.

Operating results of an aerobic inclined plane trickling filter to treat swine wastes are reported. The results indicate that this device can be used as a component in a waste handling system. The organic removal is erratic due to Psychoda fly larvae but a definite relationship exists and the equation $s/s_o = \exp(-0.03L/Q)$ (where s/s_o = BOD concentration ratio, L = plane length in feet and Q = flow rate in gal/hr-ft) may be used as a design guide in waste handling systems. Contact time for wastewater and biological growth is determined by t_o = 17.25 L/Q. Odor control was found to be a desirable attribute of the system and actions of macroorgonisms could aid in the transport of organic solids across the inclined plane. (Marquard - East Central)

1002 — A5, C1, F2, F3

USING ODOR INTENSITY LIMITS IN AIR QUALITY STANDARDS,

Clemson University, Clemson, South Carolina, Department of Agricultural Engineering.
C. L. Barth.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-441, 3 tab., 19 ref.

Descriptors: *Air pollution, *Odor, *Regulation, Clean Air Act, *Farm wastes, Livestock, Measurement, Quality, Feed lots.
Identifiers: Intensity, Primary odor list, Syringe dilution procedure, Osometer.

Because problems with the production and control of animal agricultural odors are sure to continue, tighter regulations governing odor intensities will occur. Related difficulties are: (1) Problems in establishing a list of basic odors, (2) difficulty in measuring odor intensities and in making objective odor quality measurements, Regulations governing odor control vary greatly from state to state. Conditions and terminology for odor control need to become more uniform. The status of odor regulations for each state is given. (Dudley - East Central).

1003 — A1, B1, E1

CATTLE FEEDLOTS AND THE ENVIRONMENT,

Environmental Protection Agency, Seattle, Washington.
Cattle Feedlots and the Environment, U. S. Environmental Protection Agency, Region X, Seattle, Washington, April, 1972, 63 p., 6 tab., 35 fig., 8 ref.

Descriptors: *Feed lots, *Design criteria, *Air pollution, *Water pollution, Farm wastes, Lagoons, Runoff, Waste Disposal, Pacific Northwest U.S.
Identifiers: Waste management, Site selection, Manure mounds.

This Environmental Protection Agency booklet presents comprehensive guidelines for the control and abatement of pollution originating from cattle feedlot operations. Feedlot wastes should be considered a natural resource capable of being recycled. Proper site selection, feedlot design, and management are needed to accomplish this. Site selection is the most important factor in minimizing water pollution. Guidelines call for feedlots to be isolated from waterways and outside of a 10 year flood plain. Feedlot design should retain all wastes on the premises until ultimate disposal. This may be done by manure mounds, holding ponds, or lagoons. Land disposal is currently the only industry-wide method acceptable for ultimate disposal of feedlot wastes. (Marquard - East Central).

1004 — A5, C3
CORRELATING OIL AND ODOROUS COMPONENTS IN STORED DAIRY, MANURE,
Clemson University, Clemson, South Carolina, and University of Wisconsin, Madison.
C. L. Barth, D. T. Hill, and L. B. Polkowski.
Paper presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972; Paper No. 72-950, Order No. M172-950, 17 p., 2 tab., 9 fig., 24 ref.

Descriptors: *Odor, *Chemical properties, Physical properties, Air pollution, Dairy industry, *Farm wastes, Cattle, Waste storage, Ammonia, Hydrogen sulfide,
Indentifiers: *Odor intensity index, Liquified waste management, Odorants, Volatile organic acid, Acetic acid, pH.

Three common odorants were identified and measured in stored dairy manure. A panel was selected to judge these odors which were present in only one of three flasks per set. The odorous flasks represented various degrees of aeration treatment. Results of the experiment showed that odorous components derived from lower aeration depths were the most difficult to distinguish. An odor intensity index (OII) was established from the experimental results. Volatile organic acid correlated best with the OII. Second best was hydrogen sulfide and poorest was ammonia. (Frantz - East Central).

1005 — A2, B1, C5, E1
FACILITY DESIGN
Wilson Company, Engineers & Architects, Salina, Kansas.
R. E. Crawofrd.
Presented at the Continuing Education Seminar: Topeka, Kansas, January 23, 1969; Hutchinson, Kansas, January 28, 1969, 14 p., 9 tab.

Descriptors: *Feed lots, *Runoff, *Water pollution control, Design, *Farm wastes, Livestock, Hydrology, Precipitation, Waste treatment, Waste storage, *Waste disposal, Irrigation.
Identifiers: *Waste management facilities.

Runoff control is an integral part of feedlot operation and cost. The principle steps are collection, storage and/or treatment and ultimate disposal. Biochemical oxygen demand, chemical oxygen demand, and dissolved oxygen data were taken to determine stream-flow conditions due to feedlot runoff. Runoff variables of size of feedlot, topography', stream location, and flow and precipitation patterns were studied. At present the use of a retention system appears to be the most economical solution to preventing stream pollution from feedlot runoff. Two general plans involving holding basins of ponds are examined in detail. (Wetherill - East Central).

1006 — B1, C5
HYPOTHALAMIC TEMPERATURE REGULATION IN CATTLE,
Texas A&M University, College Station.
R. E. Stewart, and E. M. Bailey, Jr.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-511, 20 p., 2 tab., 10 fig., 9 ref.

Descriptors: *Cattle, *Temperature control, Humidity.
Identifiers: *Hypothalmus, *Craniotomy, Cannalae, Respiration rate, Thermal environment, Eypothalmic heating, Rectal temperature, *Lypothalmic temperature.

It was theorized that routine access to the hypothalamus by the means of in-dwelling cannulae would allow rapid testing of efficiency in control of body temperature of cattle. A semi-stereotaxic method for cannulae installation was developed. The heat loss center of two female beef calves was heated by RF energy; some degree of correlation was observed between hypothalamic temperature and respiration rate. Animals were subjected to a step change in thermal environment (75° to 95° with very high humidity); rectal and hypothalamic temperatures were found to be coupled by the respiration rate, with marked individual differences. The approach appears to have merits as a system for rapid indentification of heat tolerant breeds and individuals. (Wetherill - East Central).

1007 — B1, F1
FEEDERS SCOLDED FOR FAILING TO LEARN THEIR "MANURE ECONOMICS",
Beef, Vol. 9, No. 7, p. 43, 66, March, 1973, 1 fig.

Descriptors: *Farm wastes, *Economics, Cattle, *Feedlots, *Waste disposal, Fertilizer, Texas, Irrigation.
Identifiers: Retention ponds, Playa lakes.

In these excerpts from a speech given at U.S. Department of Agriculture Southwestern Great Plains Research Center, Bushland, Texas, feedlot operators are urged to familiarize themselves with the economics of animal wastes used as fertilizers. The approximately one ton of manure a steer produces while in the feedlot is viewed as a liability by most feeders. Manure can be an economic opportunity for the operator who takes the time and makes the effort to turn it into a marketable commodity. (Wetherill - East Central).

1008 — A1, B1, F4
ANIMAL WASTE DISPOSAL AND CONTROL OF FEEDLOT RUNOFF,
Cooperative effort of Northern Plains Branch, Soil and Water Conservation Research Division, ARS, USDA, and the departments of Agronomy and Agricultural Engineering, Nebraska Agricultural Experiment Station - Headquarters in Lincoln, Nebraska, 4 p., 29 ref.

Descriptors: Feed lots, *Waste disposal, *Runoff, *Water pollution, *Soil contamination, Farm wastes, Cattle, Odor, Groundwater, Terraces, Sedimentation, Irrigation, Water table, Nitrates, Nebraska.

Evaluation and control of soil and water pollution from cattle feedlots and studies of the factors affecting feedlot pollution potential are the objectives of research studies initiated at Lincoln, Nebraska in 1968. Emphasis is on waterborne materials, but attention is also given to air transport and odor problems. Terrain, water table, runoff, sedimentation, vitrate concentrations, and climatic factors are studied at four test sites. Soil core samples confirm that flat feedlots are not major contributors to groundwater pollution. Corn fields were increased and no problems of nitrate or salt accumulations were discovered after application of runoff effluent to crops. Oxidation ditch studies have shown that, with aerobic maintenance of the ditch, odors are absent. Plans have been completed for two additional research sites. (Wetherill - East Central).

1009 — A2, C1, C5
STREAM POLLUTION FROM CATTLE FEEDLOT RUNOFF
R. K. White.
Project Completion Report No. 393X, United States Department of Interior, December, 1972, 33 p., 5 tab., 14 fig., 5 ref.

Descriptors: *Water pollution, *Cattle, *Farm wastes, *Feed lots, Runoff, Biochemical oxygen demand, Nitrogen, Water quality, Climates, Rainfall, Waste disposal, Irrigation, Ohio.

The extent to which downstream waters are polluted by animal wastes from barnlot runoff is studied. Sixty beef steers were placed in a .42 acre unpaved barnlot with a 13% southern slope. They remained there from November to May. Barnlot runoff was discharged into an intermittent waterway through an H-flume. Samples were collected in gallon bottles and kept at 4° C. Results show runoff occurs with a .5 inch rain. Biochemical oxygen demand concentration and transport were higher in winter and less in summer. Antecedent soil moisture conditions significantly affect the amounts of solids, biochemical oxygen demand, and chemical oxygen demand in the runoff, with increased amounts following dry periods. Runoff can be reduced by utilizing grassed waterways or collection ponds and irrigation. (Marquard - East Central).

1010 — A1, F4
PROCEEDINGS: LIVESTOCK WASTE MANAGEMENT RESEARCH REVIEW,
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, 133 p., November 29-30, 1972, 2 tab., 98 ref.

Descriptors: *Livestock, *Farm wastes, *Management, *Air pollution, Water pollution, *Soil contamination, *Waste treatment, *Waste storage, *Waste disposal, Runoff, *Feed lots, *Nebraska.

This multi-disciplinary team effort revealed the objectives and priorities in fighting agricultural pollution. Specific governmental and university programs were pinpointed, outlined, and reviewed. The papers presented were, in most instances, rather general. (Frantz - East Central).

1011 — A1, F3, F4
NATIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM,
Agricultural Research Service, Beltsville, Maryland, U.S. Department of Agriculture.
R. G. Yeck.

Descriptors: *Farm wastes, *Feed lots, Groundwater, Recycling, *Livestock, Air pollution, Water pollution, Soil contamination, Runoff, Waste disposal, Waste treatment, Odor, Nebraska.
Identifiers: *Livestock waste management research.

Farm waste research project areas are discussed in an overview. Some areas of research receive adequate concentration while other topics such as recycling farm wastes, are inadequately considered. Projects which need perfecting include those seeking to control feedlot runoff and odor due to land applications of farm wastes. Researchers are urged to cooperate and to work concurrently on related projects to prevent land, air, and water pollution. Recent cuts into research allocations necessitate increased teamwork. (Frantz - East Central).

1012 — F3, F4
REGIONAL LIVESTOCK WASTE MANAGEMENT PROGRAM,
R. W. Kleis.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 11-15, November 29-30, 1972, 1 tab.

Descriptors: *Research and development, *Livestock, *Farm wastes, Management, Air pollution, Water pollution, Waste treatment, Waste storage, Waste disposal, Recycling, Nitrogen, Nutrients, Confinement pens.
Identifiers: *Soil, U.S. Department of Agriculture, Environmental Protection Agency.

Livestock waste management projects and objectives are listed for state agricultural experiment stations. The primary purpose is to enhance the total effectiveness of all participating agencies and institutions while preventing unnecessary duplication. Present efforts have been building up, as have problems of waste management, for fifteen years. Needed are projections of not only economic costs, but also of social and environmental costs. (Frantz - East Central).

1013 — A1, F4
POLLUTION OF AIR, WATER, AND SOIL BY LIVESTOCK,
U.S. Department of Agriculture, Lincoln, Nebraska.

L. F. Elliott.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 23-28, November 29-30, 1972, 28 ref.

Descriptors: *Air pollution, *Water pollution, *Soil contamination, *Farm wastes, Feedlots, Odor, Surface waters, Groundwaters, Livestock.
Identifiers: Spectroscopy Chromatography, Nitrates, Oxidation, Soil profiles, Nebraska, Kansas.

Air, water, and soil pollution research projects are discussed. Air pollution studies include attempts at developing compounds which can reliably indicate odors. While surface water pollution from feedlots is no longer deemed a major problem, research has been necessary for the prevention of soil pollution and groundwater pollution at feedlot sites. Sealants in holding ponds and debris basins and management practices for land application of feedlot wastes are also being studied. (Frantz - East Central).

1014 — A2, B1, E1
APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTE,

University of Nebraska, Lincoln, Agricultural Engineering Department.
H. Wittmus.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 31-35, November 29-30, 1972.

Descriptors: *Waste disposal, *Waste treatment, *Farm wastes, *Livestock, Feed lots, Runoff, Irrigation, Nitrates, Nebraska, Kansas, North Dakota.
Identifiers: Mounding.

Disposal from unpaved, beef cattle feed lots has the greatest pollution potential. Separation of liquid and solid wastes is important. Separated liquids have been applied at up to 36 inches a year for two years without problems, however, long range effects of effluent application need further study. Likewise needed is the determination of the highest sustained rates at which solid wastes may be applied without soil deterioration and salinization. Mounding sometimes aids in denitrifying wastes. Other waste management systems used with varying degrees of success are: (1) drying entire waste, (2) incineration, (3) composting, (4) refeeding, (5) protein production, (6) building blocks, (7) raw material for oil, (8) methane production. Frantz-East Central).

1015 — A3, B1, C5, E2
DESIGN AND MANAGEMENT OF RUNOFF SYSTEMS,

Agricultural Research Service, Lincoln, Nebraska, U. S. Department of Agriculture.
J. A. Nienaber.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 39-45, November 29-30, 1972, 18 ref.

Descriptors: *Farm wastes, *Feed lots, Cattle, *Runoff, Drainage, Flumes, Terracing, Nebraska.
Identifiers: *Runoff control system, Debris basin, Holding pond, Disposal area.

A runoff control system has been successfully operated on two 1000 head feedlots. Designed from the University of Nebraska Field Laboratory, the system consists of three components: debris basin, holding pond, and controlled disposal area. This system was proven superior to the one-pond system for liquid and solid wastes. Broad basin terraces may be beneficial in flood protection as well as in runoff control. Shallow debris basins are recommended for minimizing waste odors. Wooden dams with crushed rock release runoff from debris basins. The suggested disposal area is from one half up to the full size of the feedlot itself. Rainfall, slope length, and size of operation are among factors which affect runoff control design. Alternative runoff control systems and their relative costs are discussed. (Frantz - East Central).

1016 — A3, C2, C3, C5, F4
CHARACTERISTICS OF ANIMAL WASTES AND RUNOFF,

U. S. Department of Agriculture, Lincoln, Nebraska.
J. R. Ellis.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 49-53, November 29-30, 1972, 29 ref.

Descriptors: *Conductivity, *Farm wastes, *Runoff, Thermal properties, Nutrients, Nitrates, Phosphorus, Ammonia, Pathogenic bacteria, Water pollution, *Physical Properties, *Chemical properties, *Biological properties, Animal parasites, Amino acids, Waste disposal.
Identifiers: *Pollution potential, Waste management.

Chemical, physical, and biological properties of farm wastes must be further studied to correctly determine the pollution and management problems they present. The pollution potential discharged into streams requires chemical analysis of farm wastes, while design of runoff control structures lends itself to determination of physical properties. Further research is likewise needed in assessing life of microorganisms in feces and in runoff control systems. Because comparatively little information has been established regarding the physical properties of farm wastes, further research is suggested in characterizing feces, urine, and housed feed lot wastes, especially regarding gross energy, freezing point, and thermoconductivity. (Frantz - East Central).

1017 — B1, C5, F1
WASTE MANAGEMENT AND ANIMAL PERFORMANCE,

University of Nebraska, Lincoln, Animal Science Department.
S. Farlin.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 57-59, November 29-30, 1972, 5 ref.

Descriptors: *Feed lots, *Farm wastes, *Waste treatment, Nutrition, Nebraska, Missouri, Iowa, Minnesota.
Identifiers: *Gains, Animal performance, Mounding, Cold/warm slot housing.

Increasing animal performance, hence profits, depends upon feed lot modifications such as mounding wastes in winter and decreasing cattle density. Also, cattle with access to sheltered lots generally show increased gains, higher grade carcasses, and higher dressing percentages than cattle in open lots. Additional research may be the key to making more accurate estimates on the effects of housing and waste management on returns from feeding cattle. (Frantz - East Central).

1018 — B1, D1, E1, F1, F2
EDUCATION, ACTION AND REGULATORY PROBLEMS OF ANIMAL WASTE MANAGEMENT,

University of Nebraska, Lincoln, Department of Agricultural Engineering.
E. A. Olson.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, November 29-30, 1972, p. 63-66.

Descriptors: *Nebraska, *Economics, Oxidation lagoons, Hogs, *Waste disposal, Ventilation, Farm wastes, Odor, *Feed lots, Cattle, Hogs, Inlets (waterways).
Identifiers: *Nebraska Livestock Feeders Association, Department of Environmental Control, Voluntary waste control, Regulatory waste control, American Soil Conservation Society, Rural Economic Agricultural Programs.

Problems associated with shifting from voluntary waste control to regulations adopted by the Environment Control Council are outlined. Inspections of feed lots and investigations of existing waste management systems are in progress. Also outlined is the educational program (including economic factors coordinated by county extension agents, consulting engineers and the DEC. Advised maintenance of present systems and future research needs are discussed in outline form. (Frantz - East Central).

1019 — A1, B1, E2, F2
PROBLEMS OF ANIMAL WASTE MANAGEMENT FROM THE LIVESTOCK FEEDER VIEWPOINT,

Chairman of the Environmental Management Committee of the Nebraska Livestock Feeders Association; Chairman of the Nebraska Feedlot Waste Control Advisory Committee.
W. Krejci.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 69-71, November 29-30, 1972.

Descriptors: *Feed lots, *Farm wastes, *Runoff, Odor, *Cattle, *Hogs, Lagoons, Surface waters, Nebraska, Air pollution, Legal aspects.
Identifiers: *Agricultural Research Service, Department of Environmental Control.

Livestock feeders have sacrificed some of their freedom for the improvement of the environment. Arguments and recommendations are considered from the feeders' viewpoint. Filtering runoff through fields is a suggested alternative to concentration of runoff into holding ponds. Also, swine wastes should be as much in governmental focus as are cattle waste problems. More extensive data will be required to control some feed lot runoff problems, but proper management and further governmental and educational cooperation will aid feeders. (Frantz - East Central).

1020 — A1, E2, F3
POLLUTION OF AIR, WATER AND SOIL BY LIVESTOCK,

U.S. Department of Agriculture, Lincoln, Nebraska.
T. M. McCalla, and G. E. Schuman.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 75-79, November 29-30, 1972.

Descriptors: *Air pollution, *Water pollution, *Soil contamination, *Feed lots, Odor, Runoff, *Waste storage, *Waste treatment, *Waste disposal, Livestock, *Farm wastes, Nitrates, Groundwater.
Identifiers: *Abandoned feedlot reclamation.

Although researchers have solved many problems, they have uncovered many areas which require further research. A standard method for defining odorous compounds is needed. More reliable maintenance and sealants are needed to prevent seepage into ground water. Experiments in land disposal should be carried out for at least ten years to assure long range effects. (Frantz - East Central).

1021 — A2, B1, E1, F2
APPLICATION, UTILIZATION AND DISPOSAL OF LIVESTOCK WASTES,

University of Nebraska, Lincoln, Agricultural Engineering Department.
O. E. Cross.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 83-89, November 29-30, 1972, 14 ref.

Descriptors: *Farm wastes, Feed lots, *Waste disposal, *Recycling, *Water pollution, *Application methods, Irrigation, *Soil management, Physical properties, Chemical properties, Runoff, Groundwater, Effluents, Nitrates, Centrifugation, Conductivity, Phytotoxicity, Cattle, Hens, Turkeys.
Identifiers: Micronutrients.

Research plans for fourteen projects are given. Research objectives and problems to be faced

are discussed. Current problems include waste management, waste utilization, runoff control systems, effluent disposal and effects of disposal on agricultural land. (Frantz - East Central).

1022 — A2, A5, B2, F3
RESEARCH NEEDS FOR THE DESIGN AND MANAGEMENT OF BEEF FEEDLOT RUNOFF CONTROL SYSTEMS,

Agricultural Research Service, Lincoln, Nebraska, U.S. Department of Agriculture.
N. P. Swanson.
Proceedings: Livestock Waste Management Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 93-97, November 29-30, 1972. 4 ref.

Descriptors: *Feed lot, *Waste disposal, Nebraska, *Farm wastes, *Pollutants, *Cattle, Gravity, Irrigation, *Runoff, Effluents, Infiltration.
Identifiers: Environmental Protection Agency, Buffer strips, Field disposal, Meat Animal Research Center, University of Nebraska Field Laboratory, Soil Conservation Service.

Current research should partially resolve feed lot runoff problems, but the goal is set for "zero pollution." New plans and objectives for overland flow, buffer strips, feed lot floor design and topographical research are discussed. These methods require researched proof of environmental acceptability. Proper distribution of effluent is of major concern to the Soil Conservation Service. Odor, because of nuisance suits, may be the greatest runoff problem. The facilities of the University Field Laboratory and Meat Animal Research Center is aiding research in several runoff control areas. (Frantz - East Central)

1023 — C1, E1
CHARACTERISTICS OF LIVESTOCK WASTE AND RUNOFF,

Agr'cultural Research Service, Lincoln, Nebraska, U.S. Department of Agriculture.
Proceedings: Livestock Waste Management Research Review, Nebraska Center of Continuing Education, Lincoln, Nebraska, p. 101-103, November 29-30, 1972. 29 ref.

Descriptors: *Farm wastes, *Physical properties, *Chemical properties, *Feed lots, Coliforms, Pathogenic bacteria, Lagoons, Management, *Waste disposal, Degradation, Runoff, Cattle.
Identifiers: *Catonic nutrients, Mounding, Microbial properties.

Defining physical, chemical and microbial characteristics is basic to current and future farm waste disposal and runoff control. Three projects whose aims are determining physical and chemical properties in relation to the mechanics of waste disposal are discussed. Approximately three years will be required to complete needed research in these areas. (Frantz - East Central).

1024 — B1, F4
WASTE-INDUCED PROBLEMS OF HOUSED LIVESTOCK,

U.S. Meat Animal Research Center, Agricultural Research Service, Clay Center, Nebraska, U.S. Department of Agriculture.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 107-110, November 29-30, 1972. 1 tab.

Descriptors: *Sheep, *Cattle, *Hogs, Nebraska, Recycling, Pollutants, Odor, Waste disposal, *Confinement pens, *Feed lots, Nutrients, Oxidation, Waste treatment, Transportation.
Identifiers: *Housed confinement, Meat Animal Research Center.

Although farm waste problems are in great need of research, livestock confinement provides numerous advantages: greater mechanization of chores, animal protection, and potentially increased production. Specific problems related to waste collection, treatment, transportation and disposal are listed in order to priority; odors, nutrient or chemical control or adjustment, treatment for reduction, land disposal, re-use, and system selection. Housed livestock research facilities at Nebraska's Meat Animal Research Center are described and possible research suggestions are listed. (Frantz - East Central).

1025 — D1, E1, F3
OTHER RESEARCH NEEDS,

University of Nebraska, Department of Agricultural Engineering.
W. E. Splinter.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 113-114, November 29-30, 1972.

Descriptors: *Farm wastes, Proteins, Runoff, *Feed lots, *Waste disposal, *Recycling, Confinement pens, Aquatic animals, Hogs, Cattle, Filters, Nebraska.
Identifiers: *Paunch manure, Horses.

While needs are being met in many research fields, several areas will require increased attention. Alternate methods of recycling cattle manure, the use of grass as a runoff filter, and the treatment and disposal of swine, horse and aquatic wastes should further be explored. (Frantz - East Central).

1026 — F3
REGIONAL ADMINISTRATOR'S SUMMARY,

Agricultural Research Service, North Central Region, Peoria, Illinois, U.S. Department of Agriculture.
T. B., Kinney, Jr.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 117-119, November 29-30, 1972.

Descriptors: *Farm wastes, Research.

The regional administrator encourages research efficiency by increased cooperation among state, federal and industrial groups. Research priorities must be justly established and sound research must be carried out on high priority problems. (Frantz - East Central).

1027 — F3
REGIONAL ADMINISTRATOR'S SUMMARY,

Agricultural Research Service, North Central Region, Peoria, Illinois, U.S. Department of Agriculture.
H. M. Tester.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Nebraska, p. 121-124, November 29-30, 1972.

Identifiers: *Program Planning Review.

Researchers should be required to do fewer reviews and reports that could be done through the Program Planning Review. The Program Planning Review plans and evaluates research programs and assesses the quality and effectiveness of research. (Frantz - East Central).

1028 — F3
AREA DIRECTOR'S SUMMARY,

'Agricultural Research Service, Clay Center, Nebraska, U.S. Department of Agriculture.
K. E. Gregory.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 125-126, November 29-30, 1972.

Descriptors: *Farm wastes, *Management, *Feed lots.
Identifiers: *U.S. Meat Animal Research Center, Agricultural Research Service.

High priority problems call for specific research approaches. Shortage of funds necessitates consolidation of some programs and reduction of others. Resources should be budgeted for efficient research at all locations. (Frantz - East Central).

1029 — F9
CONCLUDING COMMENTS,

Agricultural Experiment Station, College of Agriculture, University of Nebraska, Lincoln.
H. W. Ottoson.
Proceedings: Livestock Waste Management Research Review, Nebraska Center for Continuing Education, Lincoln, Nebraska, p. 127-129, November 29-30, 1972.

Descriptors: *Farm wastes, Crop production, Livestock, Soils, Marketing, Waste disposal, Odor, Feed lots, Confinement pens, Nebraska.
Identifiers: *Agricultural Research Service, Environmental Protection Agency, Land application.

The livestock waste management conference was a success. The conference was a bench mark inventory on which research in livestock waste management may be planned in the future. (Frantz - East Central)

1030 — C3, E3
RECOVERY OF ANIMAL FEED FROM CATTLE MANURE ,

Northern Marketing and Nutrition Research Division, Agricultural Research Service, Peoria, Illinois, U.S. Department of Agrioulture.
R. W. Jones, J. H. Sloneker, and G. E. Inglett.
Proceedings 18th Annual Institute of Environmental Sciences, p. 267-269, 3 tab., 17 ref.

Descriptors: *Recycling, *Farm wastes, *Cattle, *Feed lots, Waste disposal, Amino acids, Proteins, Filtration, Centrifugation, Illinois.
Identifiers: *Fractionating.

In the United States over 10 million tons of high grade protein are produced annually in cattle manure. Separating useful feed from fecal waste has become a valuable process which lowers feed costs and aids in waste disposal. Four methods for fractionating manure to remove undesirable constituents to produce high-protein feed supplement are described. Manure may be refined to remove the residue fraction, yielding a soluble fraction and a feed fraction that contains 64% of the original nitrogen. The feed fraction is higher in amino acid content than corn or wheat. The average steer annually produces $34 to $59 worth of feed fraction. Feed savings alone could be used to properly dispose of less usable waste fractions. (Frantz - East Central).

1031 — D2, E2, F1
ELECTRIC IN-HOUSE DRYING OF POULTRY WASTE,

Cornell University, Ithaca, New York, Department of Agricultural Engineering.
D. R. Price, A. T. Sobel, and H. R. Davis.
Paper presented at the 1972 Winter Meeting of the American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972. Paper No. 72-806, 12 p., 3 tab., 9 fig.

Descriptors: *Poultry, Odor, Nutrients, *Recycling, *Farm wastes, Physical properties, Moisture, Fertilizers, *Waste disposal.
Identifiers: New York, *In-house drying, High-rise poultry house, Circulating fans, Exhaust fans, Drying costs.

Forced air over manure removes water continuously in a high rise poultry house designed to house 30,000 caged birds. The drying process removes one-half of the wastes' total weight and reduces odor by minimizing bacterial activity. The dried manure is spread only once a year, thus recycling nutrients through cropland. Design figures for a high-rise poultry house and operation costs for the drying system are included. (Frantz - East Central).

1032 — A1, F4
NEBRASKA IS NO. ONE,
Calf News, p. 38-39, July, 1972, vol. 10, No. 7, 8 fig.

Descriptors: *Feed lots, Cattle, *Farm wastes, Odor, Irrigation, Laboratories, Percolation, Soil analysis, Nebraska.

Facilities of the Agricultural Research Service at the University of Nebraska were observed by CALF. A well equipped laboratory was found that supplies data which a computer stores and disseminates. Field sampling sites were examined. Runoff, air and water penetration into the soil, irrigation, and cattle breeding are only a few of the studies made through use of these facilities. (Wetherill - East Central).

1033 — A3, D1, F5
NITROGEN IN INDUSTRY,
Ultimate Disposal Research Program, Advanced Waste Treatment Research Laboratory, Water Quality Office, Environmentaal Protection Agency, Cincinnati, Ohio.
J. B. Farrell,
Presented at symposium on Nitrogen in Soil and Water, Hespeler, Ontario, Canada, March 30-31, 1971, 14 p., 3 tab., 2 fig., 13 ref. (PB-213 731, N.T.I.S.).

Descriptors: *Nitrogen, *Industry, *Fertilizers, *Water pollution, Ammonia, Farm Animals, Urea, Activated carbon, Chlorination, Denitrification, Industrial wastes, Waste treatment, Air pollution.
Identifiers: Nitric acid.

The extent of water pollution from industrial and fertilizer production sources is examined. Nitrogen from industrial production represents only a portion of the nitrogen distributed to water. Nitrogen water pollution from industrial sources then is restricted to isolated point sources. Large tonnage processes produce nitrogenous effluents in gaseous forms thus causing air pollution and not water pollution. Small tonnage production, however, can lead to large quantities of nitrogen lost. Recovery is impractical because of the economies involved in separating nitrogen from the wastes. Nitrogen may be removed biologically by changing nitrogen to ammonia or nitrates, then through chlorination, ion exchange, or $FeSO_4$ reduction can remove nitrogen entirely or convert it to a gas. (Marquard - East Central).

1034 — E3
TECHNIQUES FOR THE SAMPLING AND HANDLING OF ANAEROBIC MICROBES IN WASTE FERMENTATION SYSTEMS,
University of Kentucky, Lexington, Agricultural Engineering Department, Baylor College of Medicine, Houston, Texas, Dermatology Department.
H. E. Hamilton, I. J. Ross, and S. W. Jackson.
Transactions of ASAE, Vol. 16, No. 1, p. 172-175, 1973, 9 fig., 4 ref.

Descriptors: *Autoclaves, *Farm wastes, *Poultry, Livestock, Anaerobic conditions, *Fermentation, Analytical techniques, Dilution.
Identifiers: Rumen sampling, Fermentor sampling, Test tubes, Pipetting device, Inoculation, Microbial growth, Colony counting, Chemical changes.

An equipment and technique experiment involved the fermentation of autoclaved chicken excreta with rumen microbes obtained from a fistulated steer being fed a diet containing 23% chicken manure. The equipment pictured and described was designed and constructed for improving the efficiency of preparing test tubes for enumerating microbes in the fermented samples. This equipment successfully aided in the experiments requiring rapid handling and processing of large numbers of samples. (Frantz - East Central).

1035 - B1, F4
IMPLICATIONS OF CROP-PRODUCTION TECHNOLOGY FOR ENVIRONMENTAL QUALITY,
Illinois Univ., Urbana. Dept. of Agronomy.
S. R. Aldrich, W. R. Oschwald, and J. B. Fehrenbacher.
Environmental Geology Notes, Illinois State Geological Survey, No 46, p 7-24, May 1971. 8 fig, 6 tab, ref.

Descriptors: *Agriculture, *Environment, *Farm wastes, *Crop production, Farm management.
Identifiers: *Crop-production technology, Environmental quality.

Illinois is used as a model to examine some effects of technology on the environment. The effects of selected modern crop production technologies are examined, including the use of nitrogen and phosphorus as fertilizers. Recent restrictions on the use of certain production technologies and attacks on fertilizer use have led to analysis in greater detail of the possibilities for an consequences of producing crops with less use of available technology. Return to more primitive agricultural methods, however, is regarded as unwise. The justification for using each practice and subsystem of production must be challenged to insure the least undesirable impact on the environment. The utilization of the best available crop-production technology will likely meet the needs of society with the least harm to the environment. (Wray-Chicago)

1036 - F4
AGRICULTURE: THE UNSEEN FOE IN THE WAR ON POLLUTION,
N. William Hines.
Cornell Law Review, Vol 55, p 740-760, 1970. 21 p, 111 ref.

Descriptors: *Agriculture, *Water pollution, *Pesticides, *Fertilizers, Chemicals, Farm wastes, Nitrogen compounds, Phosphorus compounds, Water pollution sources, Water pollution effects, Irrigation practices, Leaching, Confinement pens, Domestic wastes, Soil disposal fields, Waste disposal, Eutrophication, Waste assimilative capacity, Salinity, Saline soils, Salt tolerance, Sedimentation, Sediment Control, Soil conservation.

Agricultural wastes have received practically no attention in recent efforts to prevent and abate water pollution. Control of municipal and industrial wastes may be cancelled by failure to control the four major sources of agricultural pollution: animal wastes, chemicals, sediment, and salt. Pollution from animal wastes results primarily from the use of feed-lots to fatten beef. Feedlot runoff is high in oxygen demand, depleting oxygen supplies in streams; furthermore, the various nutrients in such wastes cause eutrophication. Pollution from feedlots may be controlled by treating drainage and disposing of accumulated solid wastes, although the latter solution has proved difficult. Both agricultural fertilizers and pesticides are major factors in water pollution. Fertilizer, through its chief nutrients--nitrogen and phosphorus--is also responsible for eutrophication. Moreover, use of fertilizer is virtually unregulated. Although pesticide usage is strictly regulated, present regulations are not directed towards water pollution. The potential harm of pesticides has not been thoroughly evaluated. Quantitat ively, sediment is the most serious agricultural water pollutant; inefficiency of soil conservation districts is primarily responsible. Excessive salinity affects agricultural productivity. Irrigation increases the problem, and an adequate solution has been evasive. (Hart-Florida)

1037 - A1, C3
NITROGEN IN AGRICULTURE: THE PROBLEMS AND THE EFFECT ON THE ENVIRONMENT,
Edinburgh Univ. (Scotland).
Stephen Watson.
Advancement of Science, Vol 27, No 131, p 25-37, Sept 1970. 5 fig, 5 tab, 15 ref.

Descriptors: *Nitrogen, *Water pollution effects, *Land management, *Environmental effects, *Fertilizers, Ammonia, Nitrates, Ureas, Nitrogen fixation, Crop response, Nitrogen fixing bacteria, Nitrogen cycle, Legumes, Grasses, Proteins, Soil microorganisms, Sewage, Farm wastes.

About 80% of the world's human population utilizes only 20% of the world's available protein. The problem is not one of redistribution but of increasing protein supplies. World supplies of fixed N are divided into 60 million tons in animals, 1000 million in plants and 150,000 million in the soil. To this, 100 million tons are annually added by biological fixation and 10 million by industrial fixation. The production of N by soil microorganisms and the utilization of N by plants are reviewed in detail. The problem of proper pasture mixtures between grasses and legumes in combination with controlled grazing is considered and the phenomenon of increased N fertilizer application to grasslands is described. Combinations of legumes and grasses result in improved pastures and soil fertility but the process is too slow to rule out N fertilizer applications in combination with appropriate water applications. Field drying is a brittle process which may result in great protein loss unless carefully managed, particularly because of the high cost of evaporating water. The problem of water pollution due to increased N fertilizer application and intensified cattle feeding is considered in detail. Such pollution may be considerable, but will not be of the same order as that due to biological fixation, town sewage and industrial wastes. (Casey-Arizona)

1038 - A3, C3
CONCENTRATIONS OF POLLUTANTS IN AGRICULTURAL RUNOFF,
Texas Tech. Univ., Lubbock. Dept. of Civil Engineering; and Texas Tech. Univ., Lubbock. Dept. of Chemistry.
Dan M. Wells, Ellis W. Huddleston, and Robert G. Rekers.
Partially supported by FWQA. Water Resources Bulletin, Vol 7, No 1, p 124-132, Feb 1971. 9 p, 3 tab.

Descriptors: *Lakes, *Water quality, *Texas, *Farm wastes, *Water pollution sources, Runoff, Nutrients, Solutes, Nitrates, Phosphates, Herbicides, Pesticides, Playas, Overland flow.
Identifiers: Agricultural runoff.

Eighteen rural lakes in Lubbock County, Texas, were sampled on a routine basis following runoff-producing rainfall for a period of approximately eighteen months to determine whether or not runoff from intensively farmed agricultural areas contained significant concentrations of nitrates, phosphates, herbicides, or insecticides. An additional fifteen lakes lying within a triangle bounded by the cities of Plainview, Canyon, and Hereford, Texas, were sampled one time during the summer of 1969 to provide additional data regarding the nature and extent of the potential problem in an area with a different soil type and a slightly different cropping pattern. Based on results of detailed analyses of approximately two hundred samples of water collected from the lakes and an equal number of sediment samples collected from the same lakes at the same time, it appears that the concentrations of all chemical pollutants in runoff from agricultural lands in the High Plains are well below the allowable concentrations for drinking water. (Knapp-USGS)

1039 - A3, C3

NUTRIENTS IN STREAMS DRAINING WOODLAND AND FARMLAND NEAR COSHOCTON, OHIO,

Agricultural Research Service, Beltsville, Md. Soils Lab.
A. W. Taylor, W. M. Edwards, and E. C. Simpson.
Water Resources Research, Vol 7, No 1, p 81-89, February 1971. 9 p, 3 fig, 6 tab.

Descriptors: *Nutrients, *Runoff, *Forests, *Farms, *Ohio, Nitrogen, Nitrates, Phosphates, Potassium, Data collections, Water quality, Path of pollutants, Eutrophication, Appalachian Mountain Region, Farm wastes, Statistical methods, Fertilizers, Leaching, Water pollution sources.
Identifiers: Woodlands, Farm lands, Coshocton (Ohio).

Nitrogen, phosphate, and potassium concentrations were measured in streams draining woodland and farmland watersheds at Coshocton, Ohio 1966 through 1969. Temporal variations in the nutrient concentrations were much smaller than the changes in the rate of streamflow. No relationship was found between any nutrient concentration and streamflow, and no seasonal changes in concentration were detected. Nutrient losses from farmland were significantly greater than those from woodland. The nitrate-N concentration in the farm runoff was below 2 ppm except for one short period when it rose to 10 ppm. The input of nitrogen in the rain was greater than the loss in runoff from both watersheds. The average concentration of phosphate in runoff was 22 ppb (of P) from the farm and 15 ppb from the woodland. The analysis of the data shows that total nutrient losses cannot be calculated meaningfully unless both hydrologic and chemical data are available. The volume of water flow is the most important variable in this calculation. (Knapp-USGS)

1040 - D4, F5

STABILIZATION OF DAIRY WASTES BY ALGAL-BACTERIAL SYMBIOSIS IN OXIDATION PONDS,

Alexandria Univ. (Egypt). High Inst. of Public Health.
F. M. El-Sharkawi, and S. K. Moawad.
Journal of the Water Pollution Control Federation, Vol 42, No 1, p 115-125, January 1970. 4 fig, 5 tab, 17 ref.

Descriptors: *Dairy industry, *Oxidation lagoons, *Pilot plants, Algae, Biochemical oxygen demand, Biological treatment, Photosynthesis, Stabilization, *Waste water treatment, *Farm wastes.
Identifiers: *Alexandria (Egypt), Pandorina, Soluble organic solids.

A pilot-plant study of BOD reduction of milk processing wastes is reported. A synthetic dairy waste of 750 mg/l BOD was fed continuously to rectangular concrete basins with sloping sides to minimize sludging. The detention period was 10 days. An influent pH of 9.8 was maintained to keep the pH at a level conducive to algal growth. Tank depth was important in maintaining balance between the algal and bacterial fractions of the system. The microflora showed plasticity in adapting to environmental variations. Pandorina constituted a major member of the flora highly adaptable to interaction with dairy wastes. Pandorina could tolerate wide temperature variations (11 deg to 32 deg C) at a constant depth of 75 cm. Other organisms were responsive to specific conditions and when the dominant groups suffered a serious setback, the subdominants flourished. Biochemical oxygen demand (BOD) reductions were 80 to 90 percent at a BOD loading rate of 220 lbs/acre/day (246 kg/dia/day). (Aguirre-Texas)

1041 - A4, C3

STATISTICAL EVALUATION OF SALINITY AND NITRATE CONTENT AND TRENDS BENEATH URBAN AND AGRICULTURAL AREA-FRESNO, CALIFORNIA,

Agricultural Research Service, Fresno, Calif. Groundwater Recharge Field Station.
Harry I. Nightingale.
Groundwater, Vol 8, No 1, p 22-28, Jan-Feb 1970. 7 p, 6 fig, 5 tab, 8 ref.

Descriptors: *Water pollution sources, *Groundwater, *California, *Nitrates, *Salinity, Water wells, Aquifers, Irrigation water, Fertilizers, Urbanization, Statistical methods, Surveys, Conductivity, Farm wastes, Regression analysis.
Identifiers: Fresno (Calif).

The salinity and nitrate content of well water for an urban zone (Fresno-Clovis, California) and the immediate surrounding irrigated agricultural zone were compared using data for 1950 through 1967. Time trends in these water chemical properties were evaluated statistically by dividing the 18-year period into three 6-year periods. Salinity of the urban zone groundwater has increased with time, whereas that of the agricultural zone has fluctuated considerably. Possible reasons for changes are discussed. The nitrate content of well water from both zones has increased with time, with water from the agricultural zone showing the greatest increase. (Knapp-USGS)

1042 - A3, C5, E2

THE PROBLEM OF AGRICULTURAL POLLUTION IN WATER TREATMENT,

Pawtucket Water Dept., R.I.
John A. McManus, and Albert A. Zalfa.
Journal of the New England Water Works Association, Vol. 83, No. 4, p 311-321, Dec. 1969. 11 p, 2 tab, 2 fig.

Descriptors: *Water pollution sources, *Animal wastes, *Fertilizers, Farm wastes, Water pollution treatment, Legal aspects.
Identifiers: *Pawtucket (Rhode Island).

The main concern of the Pawtucket, Rhode Island water supply system is the problem of pollution due to farmers using animal wastes for fertilizer. Due to the lack of large reservoir at the lowest end of the drainage basin feeding the treatment plant, the results of the animal wastes on the fields are severe at the point of treatment. The drainage and the seasonal usage of the water supply system are described: The pollution problem is in part attributed to one cattle company which hauled their waste material into the basin and deposited the solid and liquid wastes in great quantities. Because of the lack of dilution or detention time, high bacterial levels resulted. A schematic diagram of the water treatment plant is shown and its capabilities are described. The problem is that existing state law does not allow the prohibition of fertilizing agricultural land with animal wastes, even if such methods result in water pollution. (Grossman-Rutgers)

1043 - A1, B1

WASTES IN RELATION TO AGRICULTURE AND FORESTRY,

Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
Cecil H. Wadleigh.
Dep Agr Misc Publication No 1065, Mar 1968. 112 p, 1 fig, 4 tab, 139 ref, 4 append.

Descriptors: *Water pollution sources, *Water pollution effects, *Agriculture, *Forestry, Agricultural chemicals, Fertilizers, Pesticides, Farm wastes, Farm management, Organic wastes, Industrial wastes, Forest management, Sediment load, Microorganisms.
Identifiers: Farm and forestry wastes.

The sources and effects of wastes contributed to air, water, and soil by agricultural and forestry management practices are briefly discussed. The major waste categories considered are radioactivity, chemical air pollutants, airborne dusts, sediments, plant nutrients, inorganic chemicals, organic wastes, infectious agents, allergens, industrial and agricultural chemicals, and heat. A bibliography of 139 entries is included. Appendices discuss wastes adversely affecting agriculture and forestry, research on waste management, and problems in waste management needing more attention. (Knapp-USGS)

1044 - A3, E2

EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN,

Wisconsin Univ., Madison.
R. J. Olsen.
Univ of Wisconsin, Water Resources Center, Report 1969. 79 p. OWRR B-004-Wis.

Descriptors: *Nitrification, *Soil nitrogen, *Public health, *Soil leaching, Groundwater, Soil profiles, Water table, Surface runoff, Farm wastes, Aerobic conditions, Incubation.
Identifiers: *Lake eutrophication, *Soil phosphorus, Alfalfa-bromegrass, Spring thaws, Fertilizer-nitrogen.

There is increasing evidence that agriculture is contributing to the increase in nitrate-nitrogen in streams, lakes, and domestic water supplies. High amounts of nitrate-nitrogen in water are a health hazard and contribute to lake eutrophication. Methods by which nitrogen may enter the water from agricultural sources include the leaching of nitrate-nitrogen through the soil profile to the water table and surface runoff, especially during spring thaws from manure applied to frozen soil during the winter. The data obtained from field experiments indicate that pollution of groundwater with nitrate-nitrogen can be limited by avoiding excessive rates of fertilizer nitrogen; providing a crop cover on the soil during the growing season; use of hay crops, such as alfalfa-bromegrass, in rotation with corn or other crops receiving fertilizer nitrogen; and not permitting unprotected manure to accumulate during the time of year when leaching can occur. Recovery of fertilizer nitrogen by three successive corn crops and as soil inorganic nitrogen following the last crop ranged from 72 to 88 percent. The average concentration of nitrate-nitrogen in the soil solution at the lowest profile depth sampled ranged from 14 ppm for virgin soils to 21 ppm for manure contaminated soils and to 33 ppm for cultivated soils. Rate of nitrification was directly related to the rate of manure application, presence of aerobic conditions, period of incubation, and soil phosphorus. The average recovery of nitrogen by chemical analysis of the soil receiving the higher manure rates after 37 weeks of incubation ranged from 24% for anaerobic conditions to 73 to 80 percent for the aerobic conditions. These data suggest that where animal manure is not to be used as a fertilizer, lagooning of the manure under anaerobic conditions may be an effective method of disposal with a minimum risk of water pollution. (Olsen-Univ of Wis)

1045 - A3

AGRICULTURE'S CONTRIBUTION TO THE FERTILIZATION OF CANAL LAKE,

Guelph Univ. (Ontario). Dept. of Soil Science.
F. R. Campbell, and L. R. Webber.
J Soil and Water Conserv, Vol 24, No 4, p 139-141, Aug 1969. 3 p, 2 fig, 2 tab, 9 ref.

Descriptors: *Eutrophication, *Nutrients, *Water pollution sources, *Agriculture, Nitrogen, Phosphorus, Fertilizers, Runoff, Farm wastes, Productivity, Aquatic plants.
Identifiers: *Canal Lake (Ontario).

Water quality, weed growth, and nutrient loadings of Canal Lake, Ontario were studied between May and November 1968. Relatively little nitrogen and phosphorus are contributed by the area's low-level agriculture. Precipitation contributes more nitrogen than streams. Agriculture contributes about 0.15 lb/acre, about a twentieth of the yield from an equivalent nonfertilized area. Most nitrogen probably comes from lake sediments, plants, and fixation of nitrogen in the lake. About 84% of the phosphorus probably originates in a lake upstream of Canal Lake. The agricultural yield is only about 63 lb from 30,000 acres. These contributions, of nutrients are negligible considering the total nutrients in the lake, the nutrient load of the streams and other sources of nutrients. (Knapp-USGS)

1046 - F1, F5

AN ECONOMIC ANALYSIS OF POULTRY PROCESSING WASTEWATER IN DELAWARE AND APPROPRIATE MUNICIPAL SEWER TAXATION,

Delaware Univ., Newark. Dept. of Agricultural and Food Economics.
B. L. Hudson.
M. S. Thesis, June, 1970. 92 p, 28 fig, 4 tab, 40 ref, 3 append. OWRR B-003-DEL (3).

Descriptors: *Waste water (Pollution), *Economics, *Waste water treatment, *Poultry, *Water pollution sources, Biochemical oxygen demand, Industries, Delaware, Sewage districts, Taxes.
Identifiers: *Sewage assessments.

One important characteristic of the poultry processing industry is its high water usage rate. This characteristic has become cause for great concern among processors due to the newer and more rigid water pollution regulations of both the federal and state governments. Five of Delaware's six poultry processing plants were studied primarily to determine the sources of waste and wastewater. The general study procedure involved isolating and analyzing effluents from individual in-plant operations. The scalding, dressing, eviscerating, and chilling operations are the main sources of wastewater. The clean-up operation also produces sizable amounts of wastewater although precise measurements were unavailable. Average main effluent volumes per processed bird varied considerably between plants, ranging from 3.2 to 8.2 gallons. A case study of Milford, Delaware's wastewater treatment operations indicated that sewage assessments may take the form of (1) annual contributions by firms to the municipality, (2) cost-sharing payments for construction and maintenance, and (3) payments based on variable rates. Equity and efficiency considerations suggest, however, that a combination property-marginal cost tax system might be more desirable. (Settle-Wisconsin)

1048 - B2, D4, E2

SPRINKLER APPLICATION OF ANAEROBICALLY TREATED SWINE WASTES AS LIMITED BY NITROGEN CONCENTRATION,

Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. K. Koeliker.
Ph.D. Thesis, 1972. 203 p, 11 fig, 66 tab, 60 ref, 16 append. OWRR A-021-IA (6).

Descriptors: *Anaerobic conditions, Irrigation, *Chemical oxygen demand, Denitrification, *Nitrogen, Application rates, Phosphorus, Lagoons, *Farm wastes, *Wastewater treatment, *Water reuse, *Sprinkler irrigation, Soils, Hogs, Wastewater disposal, Sands, Clays.
Identifiers: *Swine wastes.

The effectiveness of soil as a final treatment and disposal system for anaerobically treated swine wastes was examined. Anaerobic lagoon effluent was applied to grass covered and tile drained field by sprinkler irrigation during the May-October season. Over a 3-year period, average concentrations in the tile drainage were 5-21 percent of the COD, 20-40 percent of the nitrogen and 1-10 percent of the phosphorus applied in the anaerobic lagoon effluent. In 4-ft. laboratory soil columns with soils ranging in texture from sand to silty clay loam, less than 10 percent, on a mass basis, of the nitrogen added in anaerobic lagoon effluent was lost; unless the soil became so waterlogged that at some time during a 45-wk. period it would no longer infiltrate the 2 inches/wk. applied. Addition of 20 tons/acre of oats straw as an energy source to the top six inches of half the columns did not improve nitrogen losses. All textures of soils removed more than 95 and 99.8 percent of the COD and phosphorus, respectively, from the percolate. Soil has a great potential to remove oxygen-demanding material (COD) and phosphorus from anaerobic lagoon effluent; however, its effectiveness as a final treatment system is limited by an inability to successfully remove nitrogen. Therefore, anaerobic lagoon effluent should be considered as a very dilute solution of liquid nitrogen and its application to soil restricted to rates that are consistent with the nitrogen requirements of crops grown on the disposal area. (Powell-Iowa State)

1049 - A3, F1

ECONOMICS OF WATER QUALITY MANAGEMENT: EXEMPLIFIED BY SPECIFIED POLLUTANTS IN AGRICULTURAL RUNOFF,

Iowa State Univ., Ames.
J. J. Jacobs.
Ph.D. Thesis, 1972. 208 p, 5 fig, 58 tab, 129 ref, 2 append. OWRR B-015-IA (2).

Descriptors: Economics, Water quality control, Pollutants, *Agricultural runoff, *Sediments, *Phosphorus, Iowa, *Water management (Applied), Water pollution sources, *Cost analysis, Cultivation.
Identifiers: *Nishnabotna River Basin, Minimum tillage.

The role of economics in environmental quality management was analyzed, with particular reference to the optimal level of water quality in a selected use area. Sediment and phosphorus in agricultural runoff were the pollutants selected in depicting the role of economics in water quality management. The agricultural land in the Nishnabotna River Basin in Southwestern Iowa was the study area. This land was split up according to six capability classes, supplied by the Conservation Needs Inventory. These capability classes in combination with crop rotations, tillage methods and conservation practices are regarded as a cropping system. For each system the annual costs and returns in addition to sediment and phosphorus losses were estimated. With this information the minimum cost of achieving specified levels of water quality, i.e., sediment and phosphorus, were obtained. The study results point up the dominance of minimum tillage and continuous row crops in the optimal solutions. The results also indicate that the magnitude of the delivery ratio and the phosphorus constraints have a relatively small impact on the cost of the program. Furthermore, it was shown that the most stringent constraint could be met at an estimated cost of about $4.75 per acre with a delivery ratio of .25. While this cost does not appear to be unreasonable, comparing the control cost with the benefits to a municipal use indicates that this level of quality control can only be justified economically if there is a large reuse of the water (80-400:1) or substantial aesthetic benefits. (Powell-Iowa State)

1050 - A1, F2

THE LEGAL FUTURE: NEW THEORIES OF ENVIRONMENTAL PROTECTION,

California Univ., Berkeley.
P. S. Berry.
In: Transcripts of the Speeches, National Conference on Environmental Law, p 183-207, November 1970. 25 p.

Descriptors: *Environmental sanitation, *Remedies, *Legislation, *Pollution abatement, Natural resources, Resource allocation, Environmental effects, Conservation, Water pollution, Water pollution control, Air pollution, Federal government, State governments, Administrative agencies, Government finance, Industries, Forest management, Oil industry, Livestock, Mining, Lumbering, Land management, Taxes, Decision making, Legal aspects.
Identifiers: National Environmental Protection Act.

Historical approaches to conserving natural resources through statutory and common law means provide solely remedial measures. Recent trends in tort law evidence stronger methods of environmental protection. This has been achieved by broadening the concept of causation and imaginative applications of the public trust doctrine. Comprehensive protection of the environment may result from either a constitutional amendment creating a new civil liberty or stronger state statutes. The 1970 Michigan Environmental Protection Act is discussed, with emphasis upon what this new legislation will accomplish. The National Environmental Policy Act is criticized for its failure to prohibit ecologically unsound activities. The concept of corporate responsibility for private industry is discussed, and the traditional polarity between the private profit motive and national environmental preservation is considered. Environmental solutions must alter the basic nature of private industry. Possible means of attaining this include: (1) national law, (2) state law, and (3) voluntary charter amendment. Proposals are suggested for revising taxation objectives. The Public Land Law Review Commission's Report is criticized, and alternatives to its findings are proposed. (Rees-Florida)

1051 - A2, B2, C5

POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES.

Washington Univ., Seattle. Water and Air Resources Div.

Water and Sewage Works, Vol. 117, No. 18, p 291-297, August 1970. 6 fig, 3 tab, 15 ref.

Descriptors: *Fish hatcheries, *Salmonids, *Water pollution sources, *Biochemical oxygen demand, *Dissolved oxygen, *Hydrogen ion concentration, *Ammonia, *Nitrates, *Phosphates, *Solid wastes, *Animal wastes (Wildlife), Water pollution control, Food abundance, Chemical oxygen demand, Pathogenic bacteria, Animal parasites, Silts.
Identifiers: *Feces, Drugs.

The water pollution potential of salmonid hatchery operations was studied by surveying the literature, by questionnaire surveys, and by field tests. The study began in February 1969, and ended in February 1970. Pollution problems reported to be associated with fish hatchery operations included nutritional enrichment, algae and weed growth, taste and odor, settleable solids, pathogenic bacteria and parasites organic matter, chemicals and drugs. The literature review produced no positive results. The questionnaire survey revealed that 13 of 46 hatcheries responding indicated that they have had pollution problems. Field tests were conducted at the Green River Salmon Hatchery and the Kowlitz Trout Hatchery in the state of Washington to determine COD, BOD, and DO, pH, ammonia, nitrate, phosphate, suspended solids, dissolved solids, settleable solids, total solids, and total

volatile solids. It was determined that the greatest pollution occurred during pond cleanout, and the most prevalent pollutants were fish fecal wastes and residual food. The result of the discharge of these pollutants was that: (1) the dissolved oxygen level was lowered in the effluent, (2) nutrient pollutants (Nitrate and phosphate) resulting from decomposition of fish food were increased, (3) solid pollutants both dissolved and settleable were significantly increased. It was further found that there were relationships between pollutant production rates, feeding rates, fish size, loading densities, and water supply rates. (Little-Battelle)

1052 - A3, A4, B1, E2

EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUND WATER SYSTEMS,

Maine Univ., Orono. Dept. of Soil Sciences.
F. E. Hutchinson, R. A. Hoffman, and R. F. Jeffrey. Maine Water Resources Research Center, Orono, Project Completion Report, September 1972. 38 p, 8 fig, 21 tab. OWRR A-020-ME (1).

Descriptors: *Water pollution sources, *Groundwater, *Farm wastes, *Nitrogen, *Maine, On-site investigations, Analytical techniques, Poultry, Path of pollutants, Soil properties, Rates of application, Infiltration rates, Data collections.
Identifiers: *Poultry manure.

This research project was conducted in Maine to determine the maximum acceptable rates of application of manure in: (1) excessively drained glacial outwash, (2) well drained glacial till and (3) poorly drained Maine soils, using field plots and a lysimeter study. Periodic analyses of soil, soil water and groundwater samples from a Windsor loamy sand treated annually for two years with poultry manure at nitrogen rates up to 1400 pounds per acre. Results indicate that mineralization of N occurred rapidly and that nitrate content of the subsoil just above the groundwater became high at times at rates above 350 pounds of nitrogen per acre. Nitrogen did not move downslope in any form at the top of the fragipan in a Charlton fine sandy loam beyond a distance of 20 feet on a 10 percent slope below plots treated with rates of N up to 1400 pounds per acre for two consecutive years. When nitrogen in poultry manure was applied to a poorly drained Scantic silt loam, an unacceptable amount of nitrate N moved through the profile into the free water table from applications greater than 200 pounds of N per acre. (Woodard-USGS)

1053 - C4

BACTERIOLOGICAL WATER QUALITY ANALYSES OF METHODS FOR DETECTING FECAL POLLUTION,

South Dakota State Univ., Brookings.
Paul R. Middaugh. Completion Report April, 1970. 14 p. OWRR Project A-019-S DAK (1).

Descriptors: Water pollution sources, *Farm wastes, Bacteria E coli, Coliforms, Pathogenic bacteria, *Sewage bacteria, E coli, Enteric bacteria, Streptococcus bovis, Streptococcus faecalis, *Pollutant identification.

The initial or laboratory research phase of objectives were achieved. These were to improve the specificity, speed and reliability to bacteriological methods for determinging kinds and number of fecal bacteria in water resources. The major objective of distinguishing between human and animal sources of pollution was partially achieved by improved isolation of the rumen organism Streptococcus bovis. The objective of determining the survival of selected fecal coliform and fecal streptococcus in river water with and without filtration was completed in the M.S. Thesis study by Joseph Zerfas. He compared river water in laboratory flasks with environmental river exposure chambers to determine survival effect of temperature from 10 to 30C, decreased both coliform and streptococci equally with increased temperature. Added organic nitrogen fertilization of river from normal level 2.5 ppm N to 10 to 30 ppm N stimulated growth and lengthened survival time. Both kinds of organisms increased in survival in water with reduced dissolved oxygen compared to aerated water. In untreated river water fecal coliform bacteria lived longer than fecal streptococci, 7% and 0.1% survival respectively after 7 days. Water membrane filtered to remove protozoa gave 20% coliform and 100% streptococcus survival after 7 days. In M.S. Thesis study by L. Koupal, methods for detecting the rumen organism Streptococcus bovis resulted in a rapid, sensitive selective method using membrane filter for quantitative recovery from river water and selective medium incubated in 25% CO2+75% N2 gas grows S. bovis which is then detected by starch agar overlay. Only ruminants have S. bovis in numbers in feces so S. bovis in river survival studies was proven to be a useful tracer for ruminant pollution of surface waters. More rapid and sensitive methods for both indicator and pathogenic bacteria were being investigated when the project was terminated.

1054 - A2, B1, D4

APPLICATION OF SEWAGE TREATMENT TECHNIQUES TO FEEDLOT RUNOFF,

Nebraska Univ., Lincoln. Dept. of Civil Engineering.
T. McGhee, and R. L. Torrens. Paper presented at the 16th Annual Great Plains Waste Water Design Conference, Omaha, Nebraska, March 28, 1972. 18 p, 4 fig, 5 tab, 13 ref. OWRR-A-022-NEB (1).

Descriptors: *Biological treatment, *Farm wastes, Feed lots, Cattle, *Waste water treatment, Biochemical oxygen demand, *Agricultural runoff, *Chemical oxygen demand, *Sewage treatment, *Aerobic treatment.

Laboratory studies of the aerobic treatment of feedlot runoff were conducted to determine the effect of such handling upon waste characteristics and the design parameters required for such treatment. Liquid retention times (organic loading rate) and biological solids concentrations were varied. Studies of the application of the BOD test to this waste were also conducted. Liquid retention times in the laboratory system varied from one to eight days. The conclusions were: (1) An aerobic system can effectively treat this waste with COD reductions of 60 percent or more. (2) Retention times of three days or more are adequate to insure treatment of solids concentrations (MLSS) of 2000 mg/L. (3) The color of the runoff is affected only slightly by such treatment. (4) COD analysis is superior to BOD analysis in measuring the strength of this waste.

1055 - A2, A4

ANNUAL REPORT OF ACTIVITIES DURING FISCAL YEAR 1971.

Maine Univ., Bangor. Water Resources Center. Annual Report No 7, 1971. 18 p, 3 append. OWRR A-999-ME (7).

Descriptors: *Water resources, *Water users, *Planning, *Projects, Legal aspects, Bottom sediments, Geochemistry, Hydrology, Coniferous forests, Rivers, Lakes, Biochemical oxygen demand, Dissolved oxygen, Management, Livestock wastes, Water quality, Education, Eutrophication, Phosphates, Water pollution control, Chlorinated hydrocarbon pesticides, Model studies, Tubificids, Physicochemical properties, Gases, Political aspects, Attitudes, Environment.

The research program conducted under the auspices of the University of Maine's Water Resources Center to solve Maine's water problems are described. Twelve projects explored the following areas: Hydrologic relationships in a coniferous forest; An investigation of the causes, effects, and control of eutrophication in Maine lakes; Phosphate retention by lake sediments; Geochemical cycles involving flora, lake water, and bottom sediments; Legal aspects of water pollution control through implementation of the effluent charge concept; Effect of animal wastes applied to soils on surface and ground water systems; The effects of DDT and other chlorinated hydrocarbons on the growth of euryhaline microalgae; Phase III--Study of a river system as a chemical reactor; Effects of burrowing tubificid worms on the exchange of phosphorus between lake sediments and overlying water; A study of the physico-chemical parameters affecting the removal of colloidal particles from water by porous media; Dissolved pollution product gases in natural waters; and Political and environmental attitudes of voters and public officials related to alternative levels of water quality and correlated alternative systems of management of the Penobscot River. The Center's researchers extend their findings to users in an active coordination, information, education, and training program. (Auen-Wisconsin)

1056 - F1

AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE PERMIT SYSTEM OF WATER ALLOCATION,

Iowa State Water Resources Research Inst., Ames.
N. E. Harl, R. A. Baldwin, and D. W. Hubly. Iowa Water Resources Research Institute, Ames, Completion Report ISWRRI-43, November 1971. 261 p, 7 fig, 27 tab, 122 ref, 8 append. OWRR B-009-IA (2).

Descriptors: *Permit system, Economic efficiency, Water quality, Water resource investment, *Iowa, *Model studies, *Cost analysis, *Water allocation (Policy), Competing uses, Legal aspects, *Linear programming, Cost allocation, Evaluation.

The study contains three parts. In Part I, the literature of water allocation is reviewed and the permit system of administrative allocation is analyzed in terms of rational guidelines for allocating water as a scarce resource among competing alternatives. Special attention was given to the Iowa permit system, with the conclusion that the system acknowledges only two consistently identified points on a water user's production function (1) the point of zero output and zero water use, and (2) the point of maximum total product where the marginal physical product becomes zero. The system guidelines are insufficient for allocating water on efficiency bases if supply is limited and maximum physical productivity from water as a variable input is unattainable. In an effort to generate information about water productivities, to the end that additional points on the production function might be identified administratively as permits are granted under conditions of limited water supply in a particular area, a general model is constructed in Part II using a linear programming approach to resource allocation within an identified hydrologic area. In Part III, the general model was extended and refined to include detailed water quality considerations using both linear programming and simulation. The resulting Tandem Program Systems (TPS) Model makes possible cost adjustments in producing activities based upon the character of the wastes produced thereby, the assimilative nature of the stream and the treatment costs for maintaining a pre-determined level of water quality in the stream. Data from both the general model and the TPS model are presented. (Powell-Iowa State)

1057 - A2

EFFECTS OF POLLUTION, ESPECIALLY FROM FEEDLOTS, ON FISHES IN THE UPPER NEOSHO RIVER BASIN,

Kansas State Univ., Manhattan. Water Resources Research Inst.

F. B. Cross, and L. M. Cavin.

Completion Report 1971; 50 p, 6 fig, 7 tab, 16 ref. OWRR A-026-KAN (1).

Descriptors: *Fishkill, *Water pollution effects, Sampling, Habitats.
Identifiers: *Feedlot pollution, *Upper Neosho River Basin, Nocomis asper, Notropis rubellus, Noturus nocturnus, Notorus placidus, Notropis lutrensis, Notropis camurus.

In spring, summer, and early autumn, 1969 and 1970, a total of 49 collections of fish were made at 17 localities in the upper Neosho River Basin: Fifty-three species were recorded, approximately as many as were known from the same area prior to severe drought in the early 1950's, establishment of three mainstream impoundments in the 1960's, and severe pollution from feedlots in 1966-67. Species lists were not identical to those obtained in similar but less intensive surveys in 1952 and 1967. Changes in species composition are attributable partly to effects of impoundment (including introductions of some species) and partly to organic enrichment. Diversity indices are being determined for each collection, allowing comparisons among samples from the same site on different dates, between years, and among localities throughout the area. Three species known to have occupied these streams in the 1950's were not found in 1969 or 1970: the recently-described red-spot chub, Nocomis asper, Lachner and Jenkins, 1971; the rosyface shiner, Notropis rubellus; and the freckled madtom, Noturus nocturnus. Several additional species were found only rarely in 1969-70, including the Neosho madtom, Noturus placidus, the only species endemic to the Neosho basin. These four and others affected adversely are characteristic of clear, well-oxygenated streams having clean gravel riffles; their depletion is most logically attributable to effects of pollution. The two species selected for detailed study, with respect to differential trends in their populations associated with the period of organic pollution, were the red shiner, Notropis lutrensis, and the bluntface shiner, Notropis camurus. The red shiner became more abundant and more widespread within the streams studied, following fish-kills in 1966-67. Its increase seemingly occurred at the expense of the bluntface shiner, its nearest relative in the Neosho fauna. Apart from the advantage of comparing closely-related species, the bluntface shiner was chosen as the 'pollution intolerant' form because other species fitting that description were not obtained in numbers adequate for the kinds of comparisons desired. The comparative study involved habitats occupied and relative abundance; population structure and growth rates; reproductive requirements, fecundity, and spawning period; and response to reduced oxygen concentrations (routine metabolism, behavior under oxygen stress, loss of equilibrium, and capacity for recovery from temporary stress).

1058 - A2, A4, C3, E2

DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWATER FLOW IN OVERFERTILIZATION OF SURFACE WATERS,

Minnesota Univ., Minneapolis. Water Resources Research Center.

Jack D. Johnson, and C. P. Straub.

Minnesota Water Resources Research Center, Minneapolis, WRRC Bulletin 35, June, 1971, 176 p, 58 fig, 65 tab, 78 ref, 4 append. OWRR Project B-012-MINN (1).

Descriptors: *Mathematical models, *Watersheds (Basins), *Nutrients, Nitrogen, Phosphorus, Streamflow, Sewage treatment, Effluents, Annual wastes, Fertilizers, Precipitation (Atmospheric), Soils, Water pollution sources, Model studies, Minnesota, Snowmelt, Treatment facilities, Nitrogen fixation, Denitrification.
Identifiers: *Manure spreading, *Spring runoff, Depletion processes, Nitrogen transformation, Agricultural practices, Feedlot drainage, New Prague (Minn).

A nutrient enrichment accounting mathematical model was devised for the New Prague watershed in Minnesota. The New Prague watershed is 23.3 square miles in area and is predominately a rural watershed. Model input data was collected over a 2 1/2-year period from a stream gaging station and two automatic sampling stations. Over 800 water samples were analyzed. Extensive effort was placed on better understanding the nitrogen and phosphorus cycles. It is evident that the spring runoff process and accumulative winter fertilizer applications constitute the major portion of diffuse sources of nutrients in the watershed. Point sources from feedlots and municipal and industrial effluents contribute only 11 percent of the sigma N (total nitrogen, four components) and 7 percent TP (total phosphorus). Disperse sources accounted for 89 percent of sigma N and 93 percent of TP, with spring runoff in the two months of March and April accounting for 79 percent of the annual sigma N and 64 percent of the TP. The nutrient output from the watershed could be decreased by increasing penetration of the large amounts of sigma N and TP in snowpacks into the soil through land terracing to retart rapid spring runoffs and sub-surface drains to allow rapid drainage during the crop season.

1059 - A2, A3, A4, C3

NITRATE ACCUMULATION IN KANSAS GROUNDWATER,

Kansas Water Resources Research Inst., Manhattan.

Larry S. Murphy, and Jay W. Gosch. Project Completion Report, March 1970. 56 p, 13 tab, 19 fig, 38 ref. OWRR Project A-016-KAN.

Descriptors: *Nitrates, *Groundwater, Fertilization, Irrigation, Nitrogen, Farm wastes, Fertilizers, Ammonium compounds, Water pollution sources.
Identifiers: *Nitrate movement, Feedlots.

A study of nitrate-nitrogen accumulation in soils underlying feedlots in Kansas revealed accumulations of as high as 5000 kg/ha in a 4 meter soil profile. Age of the feedlots was found to be directly related to the amount of nitrate-nitrogen which had accumulated in the soil. Vertical movement of nitrate-nitrogen in feedlot soils had occurred even in areas of low rainfall (40-45 cm per annum). Large accumulations of ammonium-nitrogen but no nitrate-nitrogen were noted in a feedlot soil with a very low cation exchange capacity. Analyses of groundwater at that location were inconclusive in relating lack of nitrate-nitrogen in the soil profile with higher levels of nitrate-nitrogen in shallow aquifers. An investigation of the effects of high rates of applied inorganic nitrogen on nitrate-nitrogen accumulations in soil and groundwater was conducted azt two locations. Downward movement of nitrate-nitrogen under irrigated conditions was detected by deep soil sampling (5-6 meters) and comparisons of nitrate-nitrogen concentration peaks in the soil profile. Much variation in the amount of nitrate-nitrogen in the soil profile was noted even with uniform rates of nitrogen application. Investigation of nitrate-nitrogen accumulation in groundwater by means of check wells in the areas receiving large amounts of inorganic nitrogen revealed large fluctuations in the nitrate-nitrogen content over the life of the study but did not produce indications of definite trends. (McKenna-Kansas)

1060 - A2, F2

FOULING OF WATERS A MISDEMEANOR.

North Dakota Century Code Ann secs 61-01-12 thru 61-01-14 as amended (Supp 1969).

Descriptors: *North Dakota, *Water pollution sources, *Water pollution control, *Waste disposal, Water quality, Water quality control, Wastes, Industrial wastes, Refuse, Sewage effluents, Gasoline, Oil wastes, Farm wastes, Cattle, Sheep, Hogs, Sewage disposal, Streams, Rivers, Public health, Administrative agencies.

Section 61-01-12 provides that the fouling of public waters by depositing gas tars or other refuse from any gas house into streams, rivers or sewers that empty into public waters is a misdemeanor. Section 61-01-13 provides the fouling of public waters with dead animals, offal, or other refuse by depositing same on the banks or in any lake or stream within the jurisdiction of the state is a misdemeanor punishable by a fine of from $20 to $100. Section 61-01-14 provides that section 61-01-13 shall be construed to include: (1) privies and privy vaults; (2) any stable, shed, pen, yard, or corral where farm animals are located within sixty feet of the top of any lake or stream; and (3) any slaughterhouse, graveyard or cemetery within eighty feet of these waters. However, in an emergency, these provisions do not prevent any municipality from dumping untreated sewage into these waters provided they are not determined detrimental to public health. (Rees-Florida)

1061 - B1, F2

RULES FOR CONFINED FEEDING OPERATIONS WASTE WATER DISPOSAL.

Iowa Water Pollution Control Commission, Des Moines.

1969. 3 p.

Descriptors: *Iowa, *Farm wastes, *Livestock, *Confinement pens, *Water pollution sources, Cattle, Treatment facilities, Water pollution, Waste disposal, Waste water treatment, Water pollution control, Regulation, Permits, State governments, Administrative agencies, Legislation, Legal aspects, Poultry, Organic wastes, Adoption of practices, Waste water disposal.

Confined feeding operations for livestock and poultry in which potential pollution may exist and be subject to regulation are defined as a cattle feedlot or several cattle enclosures on a single property containing at least one hundred cattle and an animal population of greater than one animal for each six hundred square feet. Registration of the operation is required where one or more of the following conditions exist: (1) the number of cattle confined exceeds a thousand head, (2) the feedlot contributes to a watercourse draining a specified acreage of land above the lot, and (3) the runoff water from a feedlot flows into a buried conduit or well. Persons engaged in or intending to initiate livestock operations shall register such operation with the Water Pollution Control Commission. If the State Department of Health determines that an operation does not constitute a water pollution problem, provisions for control facilities will not be required. If an operation is polluting state waters, the operator shall obtain a permit for waste water disposal and shall provide necessary water pollution control facilities. Requirements for such facilities are specified. Such facilities shall be operated so as to prevent water pollution. (Shelnut-Florida)

1062 - E3

CONTINUED RECYCLING OF CATTLE MANURE,

University of California, Davis.

C. L. Ferrell, and W. R. Garrett.

Proceedings, Western Section, American Society of Animal Science, Vol. 24, p. 415-419, 1973, 5 tab., 5 ref.

Descriptors: *Cattle, *Farm wastes, *Recycling, Nitrogen, Calcium, Nutrient Requirements;, *Waste disposal, California.
Identifiers: *Ration, Digestion stalls, Forced air ovens, Digestibility.

Four Hereford steers were confined in digestion stalls and fed the basal ration at a maintenance level. Their manure and urine were recycled in forced air ovens at 100°C. for 48 hours. The recycled wastes were mixed, digested, then recycled again. It was found that the less digestible components of the feces increased while digestible components decreased substantially during each recycling. Less energy was digested in subsequent refeeding. Mineral and nitrogen content increased with each recycling, resulting in the only significant nutritional value of manure after recycling. (Frantz - East Central),

1063 — A1
AGRICULTURE AND ENVIRONMENT,

W. H. Garman.
Crops & Soils, Vol. 25, No. 9, p. 14-19, Aug.-Sept., 1973.

Descriptors: *Photosynthesis, *Water pollution, *Nitrates, Phosphates, Soils, Eutrophication, *Livestock, Agriculture, *Farm wastes, Farm animals, *Fertilizers, Feed lots, Algae, Plankton, Nutrients, Carbon dioxide, Wells, Lakes, Balance of nature.

Questions regarding agriculture and the balance of nature are answered. The use of nitrogen fertilizers can under some circumstances be harmful to farm animals, but has never presented a human health problem. Farming and nitrate fertilizers seldom, except under extreme circumstances, contribute to nitrate levels in streams, lakes, and water wells. Fertilizers seldom cause excessive algae growth. Long term experiments show that fertilizer use has not damaged soils. (Frantz - East Central).

1064 — A7, A8, C5
TOXICITY TO HOUSE FLIES AND HORN FLIES OF MANURE FROM INSECTICIDE FED CATTLE,

Entomology Research Division, Agricultural Research Service, Kerrville, Texas, U. S. Department of Agriculture.
R. O. Drummond.
Journal of Economic Entomology, Vol. 56, No. 3, p. 344-347, June, 1963, 2 tab., 6 ref.

Descriptors: *Toxicity, *Farm wastes, Feed lots, Larvae', *Insecticides.
Identifiers: *House flies (Musca domestica), *Horn flies (Hacmatobia irritans) Bayer 22408, Butonate, Bayer 37342, Famophos, Bayer 37341, Thodia IP 9895, Dipterex, V-C 13, General Chemical 1072, Bayer 29493, Stauffer P-1504, Chlorinated hydrocarbons, U.S. Department of Agriculture Animal Disease and Parasite Research Division.

Insecticides were added to cattle rations on long and short term experiments. In a 91-day test Co-ral and Bayer 22408 proved 100% effective in preventing development of larvae of horn flies and partially effective against house flies in the manure tested. Ten insecticides were used in 10-day tests. Some insecticides were effective against both species, while others were at least partially effective with either or both. (Frantz - East Central)

1065 — E2
EFFECTS OF SWINE LAGOON EFFLUENT OF THE SOIL AND PLANT TISSUE,

Iowa State University, Ames, Department of Agricultural Engineering; Department of Agricultural Engineering; and Department of Agronomy, respectively.
C. V. Booram, T. E. Hazen, and L. R. Frederick.
Presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, Kentucky, June 17-20, 1973, 19 p., 17 tab., 1 fig., 16 ref.

Descriptors: *Hogs, Cattle, Iowa, *Farm wastes, Confinement pens, *Lagoons, Anaerobic conditions, *Effluents, *Nutrients, Electrical conductance, Salts, *Waste disposal, *Irrigation, *Toxicity, *Water pollution, Corn (field), *Soil contamination, Water quality.
Identifiers: *Clarion-Webster Soil, Tile-drained grass plots, Plant tissues.

Twelve 40 x 60 feet tile drained plots of Clarion-Webster soil were given applications of anaerobic lagoon effluent. The soil received 0, 3.7, 11.3, and 22.6 inches of effluent per season. There were no significant plant population differences at the 0.10 level. Corn tissues were analyzed for 14 nutrients. (N,P,K,Mg,Ca, Na, Si, Mn, Fe, Cu, Zn, Al, Sr, and Mo). In the tissue analysis P, Na, Fe and Al increased while Mg content decreased with increasing applications of effluent. After 4 years of anaerobic lagoon effluent applications the electrical conductivity of the soil showed little change, (Frantz - East Central).

1066 — A3, C2, C3, C4, C5
WATER POLLUTION BY SWINE PRODUCTION OPERATIONS,

University of Missouri, Columbia, Department of Agricultural Engineering.
J. Robbins.
PH. D. Thesis, North Carolina State University, Department of Biological and Agricultural Engineering, 1970, 440 p., 48 tab., 51 fig., 57 ref.

Discriptors: *Effluent, *Waste disposal, Hydrographs, *Hogs, North Carolina, Nutrients, Lagoons, Soils, Runoff, Influent, Bacteria, Surface waters, *Water pollution, Drainage, Streams, *Farm wastes, Hydrologic systems, Sampling, Biochemical exygen demand, Nitrogen, Phosphates, Biodegradation.
Identifiers: *Organic carbon.

Seven swine production operations, three using lagoons, one direct discharge, two land disposal, and one control watershed were studied to determine the extent of effluent contribution to stream pollution. Data were collected to determine the effluent strength to be discharged into streams. An analysis was made for more than 1000 effluent and stream samples. An organic carbon analysis was successful in determining strengths of wastes and waste waters. The biochemical oxygen demand (BOD)/total organic carbon (TOC) ratio provided an indication of the ease of biodegradation and/or the degree of stabilization. It was found that anaerobic lagoons are not satisfactory as the sole means of treating hog wastes. Direct discharge of wastes into water creates gross pollution and should be prohibited. Land disposal was found to be the superior method for protecting water quality. Slope, degree of erosion, and drainage patterns are the important factors in determining the quality of streams draining agricultural basins. (Frantz-East Central).

1067 — A5, B1, E2
ANALYSIS OF ANIMAL WASTE STORAGE AND LAND DISPOSAL SYSTEMS,

R. Nordstedt.
PH. D. Dissertation, Ohio State University, Department of Agricultural Engineering, 1969, 101 p., 25 tab., 17 fig., 23 ref.

Descriptors: *Farm wastes, Odor, *Waste disposal, *Waste storage, Air pollution, Livestock, Feed lots, Fertilizers, Nutrients, Nitrates, Effluent, Diffusion.
Identifiers: *Scheduling model.

Systems which interact with storage and land disposal of farm wastes were analyzed and relevant interfaces and variables were identified. A mathematical model describing storage of wastes and their timely disposal on agriculture land was developed and tested. Odor nuisance potential of farm wastes spread on land was also deliniated. A scheduling model was developed. It could be an effective tool in the design and operation of waste storage and land disposal systems. The model takes into account all important system variables. The waste storage facility was the most significant investment, based on results of the scheduling study. Nutrient effectiveness as a function and land availability were significant. The pattern of the latter was a critical factor in determining minimum storage capacity. (Frantz - East Central).

1068 — B1, D2, D3, E3
NEW FEEDLOT CONCEPT USES CONVERTED MANURE AS FEED,

T. Zurowski.
Feedlot Management, Vol. 15, No. 8,, p. 26, Aug., 1973, 1 fig.

Descriptors: *Recycling, *Farm wastes, *Cattle, *Feed lots, *Nutrients, *Feeds, Economics, Bacteria.
Identifiers: *Refeeding,, Cowmel, Farm Ecology Company, Food and Drug Administration, *Cowdominium.

A Washington operation, Farm Ecology, has made plans for a cowdominium. This is a feed storage and a waste conversion plant. There the wastes are subjected to heat, pressure and either acidic or alkaline chemicals. The recycled product, Cowmel, is a highly nutritious and finely ground pellet. Economic feasibility and FDA approval is presently uncertain. (Frantz - East Central).

1069 — E2
MANURING OF POTATOES ON FEN SILT SOILS IN HOLLAND, LINCOLNSHIRE,

Agricultural Development an dAdvisory Ser'vice, Cambridge; Rothamsted Experimental Station.
C Berryman, T. Batey, T. H. Caldwell, and D. A. Boyd.
Journal of Agricultural Science, Vol. 80, p. 269-281, April, 1973, 12 tab., 1 fig., 17 ref.

Descriptors: *Silts, *Fertilizers, *Potatoes, Nitrogen, Phosphorus, Potassium, *England, *Nutrients, Drainage, *Farm wastes, *Waste disposal, Soil profiles.
Identifiers: *Tuber blackening.

Eighteen potato manurial experiments were conducted on silt soils in England between 1953 and 1963. The mean response to nitrogen in these soils was much larger than in most English soils, but responses were varied from site to site. The nitrogen was effective in increasing tuber size and yield of ware; Phosphorus increased tuber numbers and decreased ware percentage, Because of the heavy potassium content of the soils tested, responses to the potassium were slight. Cooking tests showed little effect of manurial treatment on the amount or degree of tuber blackening. The recommended fertilizer nutrient requirements for light and medium silt soils are N—200 kg/ha, P_2O_5—130 ka/ha, and K_2O—190 kg-ha. The same nutrient recommendations for the heavy silt soils were 200 kg-ha, 310 kg-ha, and 100 kg-ha respectively. (Frantz - East Central).

1070 — D4, E3
PERIODICITY OF THE BLUE-GREEN ALGAE AND THEIR EFFECT ON THE EFFICIENCY OF MANURE-DISPOSAL LAGOONS,

Agricultural Engineering Research Division, Agricultural Research Service, U. S. Department of Agriculture; National Bontanic Gardens, Lucknow, India, respectively.
H. J. Eby, and V. P. Singh.
Government Printing Office No. 0100-1575, Washington, D. C., April, 1972, 8 p., 2 tab., 2 fig.

Descriptors: *Recycling, Nutrients, *Waste water, *Lagoons, *Algae, Bacteria, *Sewage, Oxidation, Climatic zones, Proteins, Farm wastes.

Identifiers: *India Waste disposal lagoons, Seasonal growth.

Research was done to provide a starting point for expanding feed production and aiding in the biological purification of waste water. Research in India reveals that blue-green algae has self-limiting tendencies and may be used advantageously. Since growth periods in the species vary, scientists might possibly anticipate each specie's population peaks thereby controlling algae growth. Harvesting of algae serves two purposes: (1) to remove organic matter from becoming a pollutant, and (2) to serve as potential livestock and poultry feed. (Frantz - East Central).

1071 — B2, C5, D4
A COMPARISON OF THREE SYSTEMS FOR TRANSPORT AND TREATMENT OF SWINE MANURE

Agricultural Engineering Department, Ames, Iowa; Agricultural Engineering Department, Corvallis, Oregon.
H. L. Person, J. R. Miner, T. E. Hazen, and A. R. Mann.
Presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-439, 30 p, 2 tab., 8 fig., 6 ref.

Descriptors: *Hogs, *Waste treatment, *Farm wastes, Feed lots, Iowa, *Aerated lagoons, *Oxidation lagoons, *Effluent, Nutrients, Bacteria, Fungi, Slime, Odor, Pumping, Maintenance, Water quality.
Identifiers: *Waste transport, *Waste management systems, Rotating biological contractor, Flushing gutter, Hydraulic cleaning.

Four engineers have demonstrated and evaluated three systems for hydraulic transportation and disposal of manure. The aeration basin, lagoon aeration basin, and rotating biological contractor systems all successfully used treated effluent as a cleaning medium in swine farrowing and finishing buildings. Aeration basins treated liquid manure. Pumping was done economically and excess water proved virtually odorless. The process didn't add significantly to either water pollution or animal health problems. Systems and equipment are described in detail. (Frantz - East Central).

1072 — C5, E2
HUMAN AND ANIMAL WASTES AS FERTILIZERS

The Metropolitan Sanitary District of Greater Chicago; University of Nebraska, Lincoln; University of Missouri Columbia, respectively.
J. R. Peterson, T. M. McCalla, and G. E. Smith.
Fertilizer Technology and Use, 2nd edition, Soil Science Society of America, p. 557-596, 1971, 27 tab., 8 fig., 42 ref.

Descriptors: *Farm wastes, *Sewage, *Waste disposal, Irrigation, Nitrates, Soil profiles, Lagoons, Pathogenic bacteria, *Fertilizers, *Water pollution, *Soil contamination, Odor, Leaching, Chemical properties, Physical properties, Microbial composition, Crops, Toxicity.
Identifiers: *Human wastes, Plant yields, Digested sludge.

Solid waste from municipal wastewater treatment plants in the United States is analyzed quantitatively and qualitatively. If properly digested, the sludge has little odor and is relatively free of pathogens. The use of digested sludge to ameliorate spoils has been proven. Three years' use of digested sludge on corn land has resulted in increased grain yields with no visual toxic symptoms to the plants. Qualitative and quantitative studies were also made on animal wastes. Although most pathogens are generally destroyed in the holding of wastes, weed infestations may be a problem with the application of animal waste to soil. Specific instances of waste utilization for soil improvement are cited for various states. (Wetherill - East Central).

1073 — C3, E2
NITRATE CONTENT OF PERCOLATES FROM MANURED LYSIMETERS

University of Guelph, Guelph, Ontario, Department of Land Resource Science.
D. G. Bielby, M. H. Miller, and L. R. Webber, Journal of Soil and Water Conservation, Vol. 28, No. 3, p. 124-126, May-June, 1973, 4 tab., 3 ref.

Descriptors: *Nitrates, *Farm wastes, *Lysimeters, *Corn, Slurries, *Waste disposal, Groundwater, Soils, *Poultry, Irrigation, Denitrification, Ontario.
Identifiers: *Percolates, Guelph sandy loam.

The quantity and concentration of nitrates in percolates from lysimeters receiving liquid poultry manure applications were determined over a 3-year period. Nitrogen removed by corn, plus that in percolates, accounted for less than 25 percent of the amount applied to the soil. Most nitrates in the percolates were discharged from the lysimeters after corn harvest. The average concentration of nitrates in percolates from all treatments and for all years exceeded 10 parts per million. (Bielby, Miller, & Webber—University of Guelph).

1074 — B1, C5
SHRINKING CATTLE FOR RELIEF FROM HEAT STRESS

U.S. Department of Agriculture, Davis, California; Imperial Valley Field Station, El Centro, California, Department of Animal Science.
S. R. Morrison, R. L. Givens, and G. P. Lofgreen.
Presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, 12 p., 5 tab., 1 fig.

Descriptors: *Cattle, *Sprinkling, Feed lots, Air conditioning, Temperature, Performance, California.
Identifiers: *Heat stress, Respiratory rate.

Sprinkling cattle under shades during the summer in the Imperial Valley of California for one minute every 30 minutes when the temperature was above 80°F resulted in significantly higher feed consumption and rate of gain, compared with cattle under shades and not sprinkled. Efficiency of feed conversion, although favoring the sprinkling operation, was not significantly improved over that of uncooled cattle. Sprinkling was as effective as a refrigerated air conditioned barn at 75°F in one trial and more effective during a second trial. Sprinkling and refrigeration promoted greater comfort as indicated by the prevention of increases in respiratory rate and body temperature observed in the afternoon with control cattle. Both noncooled and cooled cattle consumed more feed and gained more weight with 40 feet per head of space than with 20 feet. (Morrison, Givens, & Lofgreen—U.S. Department of Agriculture & Imperial Valley Field Station).

1075 — B1, C5
THE EFFECT OF RATION ON ENGINEERING PROPERTIES OF BEEF CATTLE MANURE,

Agricultural Engineers, Chief Solid Waste Division, Lincoln, Nebraska Department of Environmental Control; Agricultural Research Service, University of Nebraska, Lincoln, U.S. Department of Agriculture.
G. A. Frecks, and C. B. Gilbertson.
Presented at the 66th Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, Paper No. 73-442, 24 p., 6 tab., 6 fig., 20 ref.

Descriptors: *Cattle, *Farm wastes, Kentucky, *Feeds, *Digestion, Volatility, Shrinkage, Porosity, Chemical properties, Physical properties, Volumetric analysis, Sieve analysis, Density, *Waste treatment, *Waste storage, Solids, Moisture content, Chemical oxygen demand, *Engineering.
Identifiers: *Ration, Drying rates.

Beef cattle were fed a high concentrate ration (HCR) and a high roughage ration (HRR) for five days. Samples of feces and urine were collected and analyzed to assist in the engineering design of materials handling and processing equipment and storage facilities. The total, volatile, and fixed solids content was not affected by the ration. Of the HCR wastes, 20% was retained on a 2mm. sieve as compared to 2% for the HRR wastes. Volume change from original moisture contents to dry solids was 53% for the HCR and 7.4% for the HRR feces. Due to its more porous structure the HRR feces dried at twice the rate of the HCR. (Frantz - East Central).

1076 — C4, D2, E3
HIGH-TEMPERATURE, HIGH PRESSURE EXTRUSION OF CHICKEN EXCRETA,

University of Kentucky, Lexington, Department of Agricultural Engineering; Department of Animal Sciences, respectively.
F. A. Payne, I. J. Ross, H. E. Hamilton, and J. D. Fox.
Presented at the Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-450, 22 p., 1 tab., 6 fig., 17 ref.

Descriptors: *Farm wastes, *Poultry, *Waste treatment, *Recycling, *Temperature, *Pressure, Moisture content.
Identifiers: *Extrusion, Thermal destruction, Uric acid, Chemical changes, Physical changes, Sterilization, Flash volitalization, Microbial organisms.

Chicken excreta and an excreta-feed mixture were extruded at a temperature range of 250° 300°F, for periods of 8.6 to 21.4 seconds. Pressures of 300 to 600 psi were utilized with the high temperatures to aid in microbial destruction. An analysis includes chemical and physical changes in the extruded material. Also given is an equation which can be used to predict microbial destruction. When extruded, chicken manure (which normally contains disease organisms) may become a versatile, low-cost, and highly productive food material. (Frantz - East Central).

1077 — A2, A4, E2
SOIL CONDITIONS UNDER FEED LOTS AND ON LAND TREATED WITH LARGE AMOUNTS OF ANIMAL WASTES,

Southwestern Great Plains Research Center, Bushland, Texas, U. S. Department of Agriculture.
B. A. Stewart and A. C. Mathers.
Contribution from Soil and Water Conservation Research Division, Agricultural Research Service, U.S. Department of Agriculture in cooperation with the Texas Agricultural Experiment Station, Texas A & M University, 3 p., 1 tab., 2 fig., 9 ref.

Descriptors: *Feed lots, *Farm wastes, *Water pollution, *Soil contamination, Cattle, *Nitrates, *Pollutants, Soil profiles, *Waste disposal, Water, Salt, Leaching.
Identifiers: *Soil conditions, Croplands,

Nitrate and other pollutants often accumulate in soil profiles under large feedlots. Water movement through these profiles, however, is usually very slow or does not occur, especially in the more arid areas. A greater pollution hazard results from spreading large amounts of animal wastes on cropland for the purpose of waste disposal rather than for improving soil conditions or crop growth and quality. A recent study showed that substantial quantities of nitrate accumulated when manure was applied to land at rates of 30 tons/acre or greater. Salt accumulation was also high enough to cause some injury to plant growth. Leaching can reduce the salt concentration, but may increase nitrate pollution of the drainage water. Indications are that pollution hazards are eliminated only when the growing crop utilizes most of the applied nitrogen. When the rate of manure

application is too high, nitrate will accumulate in the soil and in some crops or will move through the soil with percolating water. (Stewart, Mathers—U. S. Department of Agriculture).

1078 — C3, C5
EXCRETION STUDIES IN SWINE FED ARSANILIC ACID,

Abbott Laboratories, North Chicago, Illinois, Nutrition Research Department.
L. R. Overby and, D. V. Frost.
Journal of Animal Science, Vol. 19, No, 1, p. 140-144, January, 1960, 2 tab., 9 ref.

Descriptors: *Arsenic, *Farm wastes, *Swine, *Diets, *Feeding, Poultry.
Identifiers: *Arsanilic acid.

The rates of arsenic excretion were determined in the feces and urine of swine receiving arsanilic acid at 30, 60 and 90 gm. per ton of feed. Much more arsenic was excreted in the feces than in the urine. After 10 days of arsanilic acid feeding, total excretion was in approximate balance with intake at the two lower levels of feeding. After the arsenical was withdrawn from the ration, the characteristic excretion level continued for two days, then decreased rapidly. This conforms with knowledge of the rate of disappearance of arsenic from tissues of animals fed arsanilic acid. The nature of the major part of the arsenical excreted was not determined. Unchanged arsanilic acid was not detected in the urine, but was present in the feces in an amount representing about 5% of the arsanilic acid consumed. (Overby & Frost—Abbott Laboratories).

1079 — C1, E3
UTILIZATION OF DIFFERENT LEVELS OF POULTRY LITTER NITROGEN BY SHEEP,

Virginia Polytechnic Institute, Blacksburg, Departments of Biochemistry and Nutrition and Animal Science.
A. N. Bhattacharya, and J. P, Fontenot.
Journal of Animal Science, Vol. 24, p. 1174-1178, 1965, 4 tab., 28 ref.

Descriptors: *Sheep, *Nitrogen, Fertilizers, *Protein, *Feeds, Farm wastes, Nutrition, *Chemical properties, Samples, *Metabolism, *Recycling.
Identifiers: *Digestibility, *Nitrogen retention, *Poultry litter, Peanut hulls, Crude protein, Soybean protein.

A series of three metabolism trials were conducted with eight yearling wethers to study the utilization of the nitrogen in auto-claved peanut-hull broiler litter, containing 22.6% crude protein (dry basis). Poultry litter nitrogen replaced approximately 25, 50 and 100% of the nitrogen of a purified ration containing isolated soybean protein as the nitrogen source. Apparent digestibility of crude protein in the rations decreased significantly with each increase in litter nitrogen level above 25%. However, the depression was small when litter supplied 50% of the nitrogen. When litter supplied 25 and 50% of the nitrogen, digestibility of litter crude protein calculated by difference was 67 and 65%, respectively, compared with 71% when only soybean protein was used. Nitrogen retention, expressed as grams per day, percent of nitrogen intake or percent of absorbed nitrogen, was significantly lower at the 100% litter nitrogen level than when no litter was used. There were no consistent differences in ammonia and non protein nitrogen content of rumen fluid and in concentration of various nitrogen fractions in the blood plasma of sheep fed the different rations. (Bhattacharya and Fontenot — Virginia Polytechnic Institute)

1080 — A3, F4
NITROGEN COMPOUNDS IN NATURAL WATER—A REVIEW,

U. S. Geogogical Survey, Menlo Park, California.
J. H. Feth.
Water Resources Research, Vol. 2, No. 1, p. 41-58, 1st Quarter, 1966, 9 tab., 1 fig., 87 ref.

Descriptors: *Nitrogen, Water, *Farm wastes, Groundwater, Public health, Fixation, *Nitrogen cycle, *Water pollution, Air pollution, Soil Contamination, Fertilizers, Proteins, Rocks, Leaching, Precipitation, Atmosphere, Ammonia, Aerosols, Water quality, Geochemistry.

Nitrogen compounds in natural water are significant in public health, agriculture, industry and geochemistry. The many sources of nitrogen compounds and the deep involvement of nitrogen in the life processes of organisms makes the study of such compounds difficult. The sources include natural aerosols, precipitation, fixation by micro-organisms in soil and water, decaying organic matter, and animal and industrial wastes, as well as probably undiscovered sources in consolidated and unconsolidated rocks. Nitrogen compounds are both oxidized and reduced by organisms. Some nitrogen compounds are absorbed on clay. The theoretical end product in water and the compound probably most often determined is NO_3-1. The concentration of nitrogen compounds ranges from 0.0 to > 100 ppm. (parts per million) in surface water and from 0.0 to > 1000 ppm. in groundwater. Seasonal fluctuations occur. Much further research is needed, including improvements in methods of analysis, further investigation of sources, and detailed study of the nitrogen cycle in small drainage basins. (Feth—U. S. Geological Survey).

1081 — D3, E3
CONVERTING ORGANIC WASTES TO OIL,

Pittsburgh Energy Research Center, Pittsburgh, Pennsylvania.
H. R. Appell, Y. C. Fu, S. Friedman, P. M. Yavorsky, and I. Wender.
Bureau of Mines Report of Investigation/1971, RI 7560, U. S. Department of Interior, 1971, 20 p., 10 tab., 3 fig.

Descriptors: *Recycling, *Sewage sludge, *Farm wastes, Agricultural wastes, Wood, Lignins, Water, Temperature, Catalysts, Solvents, *Conversion, *Oil, *Solid wastes.
Identifiers: *Low-sulfur oil, refuse, Carbon monoxide, *Liquid fuels, "Waste products, "Continuous reactor, Sucrose.

The Bureau of Mines is experimentally converting cellulose, the chief constituent of solid waste, to a low-sulfur oil. All types of cellulosic wastes, including urban refuse, agricultural wastes, sewage, sludge, wood, lignin, and bovine manure, have been converted to oil by reaction with carbon monoxide and water at temperatures of 350° to 400° C and pressures near 4,000 psig, and in the presence of various catalysts and solvents. Cellulose conversions of 90 percent and better (corresponding to oil yields of 40 to 50 percent) have been obtained. A continuous reactor for use at maximum conditions up to 500° C and 5,000 psig has been operated successfully. Using sucrose as a feedstock, operation in this system has permitted a simplified and preliminary chemical study of the conversion process. Oil yields of over 30 percent have been obtained with this unit. (Appell, Fu, Friedman, Yavorsky, & Wender - Pittsburgh Energy Research Center).

1082 — D2, E3
COSTS FOR LARGE SCALE CONTINUOUS PYROLYSIS OF SOLID WASTES,

Texas Tech University, Lubbock, Department of Chemical Engineering.
H. W. Parker, C. J. Albus, Jr., and G. L. Smith.
Presented at the 74th National Meeting, American Institute of Chemical Engineers, New Orleans, March 12, 1973, Paper 43 b-rv, 4 tab., 5 fig., 17 ref.

Descriptors: *Solid wastes, *Costs, Cattle, Feedlots, *Waste disposal, *Recycling, *Electricity, *Farm wastes, Gases, Fuels, Fertilizers, *By-products, *Sodium chloride.
Identifiers: *Pyrolysis, Municipal wastes, *Retort, Char, *Pollution abatement.

Conceptual process designs which utilize the recently developed TTU retort to pyrolyze 2,000 tons per day of either municipal solid waste or cattle feedlot waste are reported. The major product of these processes is the production of 30 megawatts of electricity. A governmental entity which could finance the required 15 million dollar investment with 6 per cent bonds over a 20 year period would have to charge users $1.70 per ton of municipal refuse processed or $0.70 per ton of feedlot waste pyrolyzed. (Parker, Albus, Smith - Texas Tech University).

1083 — D2
CONTINUOUS SOLID WASTE—FEASIBILITY STUDY,

Dow Chemical Company, Freeport, Texas, Contract Research Department and Texas Tech University, Lubbock, Department of Chemical Engineering.
J. R. Massie, Jr., and H. W. Parker.
Paper presented to the 74th National Meeting of the American Institute of Chemical Engineers, New Orleans, March 12-15, 1973; Paper No. 43a, 31 p., 12 fig., 6 ref.

Descriptors: *Cattle, *Farm wastes, *Waste disposal, Recycling, *Solid wastes, Oxidation, Temperature, Energy, By-products, Economics, Texas, Air pollution, Water pollution, Drying.
Identifiers: Pyrolysis, *Continuous retort, Municipal refuse, Agricultural crop wastes, Char products, Fuel.

Continuous pyrolysis of a solid waste, cattle manure containing 30% moisture, was demonstrated in a six inch diameter retort at a mass flow rate of 136 lb/hr ft_2. The retort was an open cylinder with a grate at the bottom. Cyclic injection of oxygen containing and oxygen free gas served to limit the heated zone of the retort to its midsection, which contained no mechanical parts. Maximum temperatures in the hot zone were controlled by mixing oxygen free gas with the injected air. This retort may also be used for municipal refuse, agricultural crop waste, or natural resources such as oil shale and coal. When integrated into a process energy and by-products can be recovered from the retort as justified by economics, also air and water pollution problems can be easily controlled. (Massie, Parker - Dow Chemical Company).

1084 — D2, F5
CONVERSION OF URBAN REFUSE TO OIL,

Pittsburgh Energy Research Center, Bureau of Mines, Pittsburgh, Pennsylvania.
H. R. Appell, I. Wender, and R. D. Miller.
Conversion of Urban Refuse to Oil, Bureau of Mines Solid Waste Program, Technical Progress Report-25, U.S. Department of Interior, May, 1970, 5 p., 3 tab.

Descriptors: *Recycling, Temperature, *Sewage sludge, *Oil, Water, Gas, Steam, Sulfur, Organic matter.
Identifiers: *Processing, Furnace, *Fuels, *Urban refuse, *Cellulosic wastes, Carbon Monoxide.

Urban refuse, cellulosic wastes, and sewage sludge have been converted to heavy oil by heating under pressure with carbon monoxide and steam. Conversion of the organic matter to oil, water, and gas have averaged near 90 percent at temperatures of 250° to 400° C and pressures of 1,500 to 5,000 psi. The yield of oil, based on the dry organic matter of the waste materials, is usually near 40 percent. This is the equivalent of more than 2 barrels of oil per ton of dry, ash-free waste material. The oil from urban refuse and cellulosic wastes has a sulfur content near 0.1 percent. This low sulfur content makes the oil from refuse a desirable source of fuel oil. (Appell, Wender, Miller - Pittsburgh Energy Research Center).

1085 — A2, B1, C1, D2
CHARACTERISTICS OF RAINFALL

RUNOFF FROM A BEEF CATTLE FEEDLOT,

Environmental Protection Agency
Robert S. Kerr Water Research Center,
Ada, Oklahoma.
R. D. Kreis, M. R. Scalf, and J. McNabb.
Environmental Protection Agency report number EPA-R2-72-061, September, 1972, 43 p., 10 tab., 2 fig., 26 ref.

Descriptors: *Cattle, *Confinement pans, *Rainfall-Runoff relationships, *Pollutants, Farm wastes, Nutrients, Bio-chemical oxygen demand, Chemical oxygen demand, Coliforms, Streptococcus,
Identifiers: *Feedlot, *Manure wastes, *Wastes characteristics, Solids, Total organic carbon.

Rainfall runoff from a 12,000-head capacity commercial beef cattle feedlot was characterized and a treatment-disposal system used by the feedlot was evaluated. Fifty percent of the rainfall events produced measurable runoff from the feedpens. A four-to ten-inch manure mantle of the feedpen surface was found to prevent runoff from 0.2— to 0.3-inch rainfalls depending on intensity and antecedent moisture conditions. The total runoff from the feedpens was equivalent to 39 percent of the total rainfall during the study period. Direct runoff from the feedpens contained pollutant concentrations in the form of oxygen demand, solids, and nutrients that were generally an order of magnitude greater than concentrations typical of untreated municipal sewage. Dilution from direct rainfall and a few days of sedimentation in the runoff collection ponds reduced the concentrations of the pollutants up to 90 percent. The total weight of solids and oxygen demanding materials was reduced by about one-half, but the total weight of nutrients was not significantly reduced. The remainder of the treatment disposal system produced no appreciable improvement in the quality of the waste water. Final discharges still contained pollutant concentrations two to three times those of untreated municipal sewage. (Kreis, Scalf, McNabb - Environmental Protection Agency).

1086 — E3
THE EFFECT OF FEEDING LAYING HENS VARIOUS LEVELS OF COW MANURE ON THE PIGMENTATION OF EGG YOLKS,

A.R.S. Animal Science Research Division, Poultry Research Laboratory, Georgetown, Delaware, U. S. Department of Agriculture.
L. H. Littlefield, J. K. Bletner, and O. E. Goff.
Poultry Science, Vol. 52, No. 1, p. 179-181, January, 1973, 3 tab., 10 ref.

Descriptors: *Recycling, Cattle, *Farm wastes, Poultry, *Diets.
Identifiers: *Blood xanthophyll levels, *Yolk pigmentations, Blood.

Dried cow manure was added at the rate of 0, 2.5, 5, or 10 kilograms per 100 kilograms of diets containing 0 and 23 milligrams of xanthophylls per kilogram of diet to determine the effect on blood xanthophyll levels and the pigmentation of yolks produced by hens on these diets. There was a high positive linear correlation between the amount of cow manure added and the amount of xanthophyll in the blood, the amount of xanthopyhll in the egg yolk and the yolk visual score. There was a high negative linear correlation between pigmenting efficiency and the amount of cow manure added to the diet. Although cow manure was a good source of xanthophylls, it was not efficiently utilized by the hen as a source of xanthophylls. (Littlefield, Bletner, Goff - U.S. Department of Agriculture).

1087 — A6, C3
ENRICHMENT OF THE ATMOSPHERE WITH NITROGEN COMPOUND VOLATILIZED FROM A LARGE DAIRY AREA,

Soil scientists, U. S. Department of Agriculture, and Staff Research Associate, University of California, Riverside,
R. E. Leubs, K. R. Davis, and A. E. Laag.
Journal of Environmental Quality, Vol. 2, No. 1, p. 137-141, January-March, 1973, 3 tab., 3 fig., 18 ref.

Descriptors: *Dairy industry, *Cattle, *Nitrogen, Ammonia, *Air pollution, Feed lots, *Water pollution, Toxicity, *Farm wastes, Sampling, Temperature, Humidity, Winds, Rainfall,
Identifiers: *Distilled nitrogen, Nondistillable nitrogen, Atmospheric NH_3, Enrichment.

A dairy cow population of 143,000 in an area of 150 KM_2 enriched the atmosphere with distillable N (mostly NH_3) over an area in excess of 560 KM_2, over an area of 35 KM_2, where cow population density was approximately 1,600 cows KM_2, the concentration of distillable N in the atmosphere was between 20 and 30 times greater than at a control site outside the dairy area. Highest concentrations of N were associated with wet corral surfaces and favorable evaporative conditions. Approximately 20% of the total N absorbed by acid-surface traps in the dairy area was nondistillable N while filtered air samples contained 5% or less. Rainfall delivered three times as much N to the land surface inside than outside the dairy area.. (Luebs, Davis, Laag-U.S. Department of Agriculture and University of California).

1088 — C5
OBSERVATIONS ON THE EFFECT OF PROTEIN INTAKE AND STAGE OF GESTATION ON THE PROPORTION OF URINARY NITROGEN EXCRETED AS UREA IN SHEEP,

Rowett Research Institute, Bucksburn, Aberdeen, AB2 9SB.
J. J. Robinson, D. Scott, and C. Fraser.
The Journal of Agricultural Science, Vol. 80, No. 3, p. 363-368, June, 1973, 3 tab., 4 fig., 14 ref.

Descriptors: *Sheep, Diets, Energy.
Identifiers: *Protein intake, *Gestation, *Urinary nitrogen, Nitrogen retention.

The effect of altering the level of protein intake on urea excretion in ewes was assessed in two separate experiments. In Experiment 1, 14 pregnant (during the last 20 days of gestation) and 10 non-pregnant ewes were each offered a different level of digested N intake in the range 5-25 g/day. At all levels of protein intake urea N excretion was lower in pregnant than in non-pregnant ewes. In Experiment 2, 21 pregnant ewe lambs were each offered one of three diets supplying mean intakes of 83 (T, 1), 113 (T 2) or 147 (T 3) g crude protein/day. During the last 100 days of gestation the mean levels of urea N excretion were 6.9, 11.0 and 15.2 g/:day for T 1, T 2 and T 3, respectively. The corresponding values for urinary N excretion were 9.3, 13.8 and 18.2 g/day. At all levels of protein intake urea N excretion was lower just prior to parturition than 95 days prepartum; the difference was correlated with lamb birth weight and maternal body-weight change. A notable feature of both experiments was the low level of urea N excretion by the pregnant ewes in late gestation, at low protein intakes. It would appear that when energy intake is adequate the decrease in urea N excretion associated with pregnancy is a direct result of an increased N requirement for maternal and/or foetal growth. (Robinson, Scott, and Fraser - Rowett Research Institute).

1089 — D4, E3
A RECYCLED FEED SOURCE FROM AEROBICALLY PROCESSED SWINE WASTES,

University of Illinos, Urbana, Agricultural Engineering Department and Animal Science Department, respectively.
D. L. Day, B. G. Harmon.
Presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972, Paper No. 72-954, 10 p., 7 tab., 5 fig., 21 ref.

Descriptors: *Recycling, *Feeds, *Swine, *Farm wastes, Aerobic conditions, Water, Nutrients, *Oxidation lagoons, Proteins.
Identifiers: Odor control, Rats, *Waste management.

An intriguing amount of protein was noticed in swine oxidation ditch mixed liquor at the University of Illinois in 1967. Studies have been in progress since then to measure the nutritive value of the aerobically processed product and use it as a feed supplement in feeding trials to rats and hogs. Several methods of concentrating and feeding the product have been tried. Utilizing this product provides a source of water and nutrients for swine while minimizing environmental pollutants (air, water, soil). There is odor control and little if any effluent from the building. The results have been very favorable and economics appear competitive with other methods of waste management with a high degree of pollution control. (Day, Harmon - University of Illinois).

1090 — A7, A8, C5
COUMAPHOS AS A FEED ADDITIVE FOR THE CONTROL OF HOUSE FLY LARVAE IN COW MANURE,

Agricultural Research Service, Beltsville, Maryland and Tifton, Georgia, U. S. Department of Agriculture.
R. W. Miller, C. H. Gordon, N. O. Morgan, M. C. Bowman, and M. Beroza.
Journal of Economic Entomology, Vol. 63, No. 3, p. 853-855, June, 1970, 3 tab., 14 ref.

Descriptors: *Feeds, *Additives, *Cattle, *Farm wastes, Dairy industry, *Mortality, Milk, *Insecticides, Larvae.
Identifiers: *Coumaphos, *House flies, Musca domestic L.

The mortality of first-stage larvae of the house fly, **Musca domestica** L., seeded into the manure of dairy cows consuming 0-144 ppm coumaphos in their ration increased as the concentration of coumaphos in the ration was increased. At the 144 ppm level, larval mortality approached 100%. Although coumaphos residues were found in the feces no residues L 0.002 ppm) appeared in the milk of cows at any level of coumaphos fed. Neither feed intake nor milk production was affected by the feeding of coumaphos. The blood cholinesterase of 1 cow fed 150 ppm coumaphos over a 6-week period dropped to 20% of pre-experimental levels. (Miller, Gordon, Morgan, Bowman, Beroza - U. S. Department of Agriculture).

1091 — A7, A8, B3, C5
TOXICITY OF DROPPINGS FROM COUMAPHOS-FED HENS TO LITTLE HOUSE FLY LARVAE,

University of Massachusetts, Amherst, College of Agriculture, Department of Entomology and Plant Pathology.
J. S. Eversole, J. H. Lilly, and F. R. Shaw.
Journal of Economic Entomology, Vol. 58, No. 4, p. 709-710, August, 1965, 1 tab., 4 ref.

Descriptors: *Poultry, *Farm wastes, *Toxicity, *Insecticides, Massachusetts.
Identifiers: Flies, Larval: mortality, Coumaphos oral drench powder, Fannia canicularis, white leghorn hens.

White leghorn hens were fed mixtures of 50% coumaphos oral drench powder, and pelleted poultry feed. The insecticide levels were 0, 25, 75, and 125 mg of active ingredient per kg of feed. The mean mortalities of larvae of Fannia canicularis (L.) exposed to the droppings from these birds were 7.3, 18.0, 42.5, and 91.0%, respectively. Therefore coumaphos provided an effective degree of control when fed at the 125 mg/kg level. By a comparison of the concentrations of coumaphos required to produce approximately 90% mortality of the fly larvae in this field test with the results of our laboratory tests, it was estimated that approximately a 70-fold decrease in effectiveness occurred during passage of the insecticide through the birds. (Eversole, Lilly, & Shaw - University of Massachusetts).

1092 — A8, C5

EFFECT OF BACILLUS THURIENGSIS IN CATTLE MANURE ON HOUSE FLY LARVAE,

Animal Science Research Division, Agricultural Research Service, Beltsville, Maryland; Entomology Research Division, Agricultural Research Service, Beltsville, Maryland.
R. W. Miller, L. G. Pickens, and C. H. Gordon.
Journal of Economic Entomology, Vol. 24, No. 4, p. 902-903, August, 1971, 2 tab., 11 ref.

Descriptors: *Cattle, *Farm wastes, Larvae, *Mortality, Additives, Feeds, Poultry.
Identifiers: *Fly control, Bacillus thuringiensis Berliner, *Musca domestica L., Biotrol BTB-183.

A commercial formulation of Bacillus thuringiensis Berliner, Biotrol BTB 183-25 W, was fed to dairy cattle in an attempt to control house fly, Musca domestica L., larvae in the feces. A maximum larval mortality of 32% was obtained when cows were fed 3200 ppm of this formulation. In an in vitro experiment, complete control of house fly larvae was obtained to a level of 12,800 ppm of feces. (Miller, Pickens, Gordon - Agricultural Research Service).

1093 — C3, E3

DEHYDRATED POULTRY MANURE AS A CRUDE PROTEIN SUPPLEMENT FOR SHEEP

Biological Waste Management Laboratory, Beltsville, Maryland, U. S. Department of Agriculture.
L. W. Smith, C. C. Calvert, and J. R. Menear.
Proceedings 1973 Maryland Nutrition Conference for Feed Manufacturers, The University of Maryland. The American Feed Manufacturers Association cooperating, March 15-16, 1973, p. 35-44, 15 tab., 1 fig., 14 ref.

Descriptors: *Farm wastes, *Arsenic, *Sheep, *Nitrogen, *Feeds, Growth, Nutrition, Chemical properties, *Recycling.
Identifiers: *Poultry manure supplemented diets, Feed additives, Digestibility, Soybean oil meal.

Despite possible arsenical residues, dehydrated poultry-manure supplemented diets were consumed by sheep as readily as diets supplemented with soybean oil meal. Nitrogen from broiler manure supplemented diets was not significantly less digestible than SBOM nitrogen and was retained in the sheep equally well. The true digestibility of DPM-N was determined to be 81%, a value of similar magnitude determined by others for dry-mixed conventional feeds. Arsenic from different sources ingested by sheep was detected in all tissues assayed. Withdrawal of arsenic from feed results in a rapid decrease in tissue arsenic concentration. Significance of arsenic in poultry manure processed for ruminant CP supplements will depend on individual feeding regimes, arsenic concentration in manure and permissible levels established for lamb and mutton. (Smith, Calvert, and Menear - U.S. Department of Agriculture).

1094 — F1, F3

AGRICULTURE AND POLLUTION SOCIO - ECONOMIC ASPECTS,

University of Kentucky, Lexington, College of Agriculture.
A. F. Bordeaux, Jr.
Presented at the College of Agriculture Annual Conference, University of Kentucky, January 5-7, 1971, p. 1-7, 6 ref.

Descriptors: *Water pollution, *Economics, Surface waters, Technology, *Fertilizers, Conservation, Insecticides, *Farm wastes, Nitrates, Farm prices, Costs, *Waste disposal, Water treatment, DDT, Regulation, Kentucky, Agriculture.

As the interest in environmental protection heightens in the United States, farmers are increasingly criticized as pollutors of air and water. Costs of pollution must be met and farmers, declining in political power, feel the most pressure. Alternative chemicals are available to replace the DDT family, but they are less effective and more expensive. Providing for economical environment protection requires the cooperative efforts of economists, engineers and scientists. (Frantz - East Central).

1095 — A1, F4

BIOLOGICAL ASPECTS OF AGRICULTURE'S EFFECTS ON ENVIRONMENTAL QUALITY,

University of Kentucky, Department of Entomology.
H. W. Dorough.
Presented at the College of Agriculture Annual Conference, University of Kentucky, January 5-7, 1971, p. 8-13.

Descriptors: *Agriculture, Kentucky, Runoff, Farm wastes, Surface waters, *Insecticides, Toxicity, Soils, Dairy industry, Erosion, Fertilizers, Livestock, *Air pollution, *Water pollution, *Soil contamination, Sedimentation.
Identifiers: *Tobacco Industry, *Environmental quality.

Agriculture depends upon maintaining a quality environment. But, it may have various detrimental effects on that environment. The Environmental Quality Task Force in the University of Kentucky College of Agriculture was established to evaluate the following problems: pesticides, sediment, farm wastes and fertilizers. Concentrated pesticide use contaminates surface water, air and especially soil. Erosion and sedimentation aid in the transportation of pollution in streams. The phosphorus and nitrogen from farm wastes and certain nutrients from fertilizers are major sources of water pollution. Evaluation of the general use of pesticide contamination problem in Kentucky indicates cause for concern, but the situation is not yet critical. (Frantz - East Central).

1096 — D1, E1, F4

ENGINEERING AGRICULTURAL WASTES,

University of Kentucky, Lexington, Agricultural Engineering Department.
B. J. Barfield, H. E. Hamilton, and I. J. Ross.
Presented at the College of Agriculture Annual Conference, University of Kentucky, January 5-7, 1971, p. 8-13.

Descriptors: *Dehydration, Land use, Proteins, Erosion, Technology, *Waste disposal, Lagoons, Kentucky, Insecticides, Odor, Livestock, Oxidation lagoons, *Farm wastes, *Air pollution, *Water pollution, *Soil contamination.
Identifiers: Composting, Microbial disposal.

The extension of cities into farming areas, demands for more uniform quality products, increased farm production and increasing demands for processed foods are among recent trends causing problems for agricultural waste management. Soil erosion accounts for approximately 88% and livestock wastes for 11% of all agricultural pollution. But the amount of livestock waste that must be handled by mass management methods is expected to double by 1980. Soil disposal and microbial disposal media are the most common while composting and dehydration are also used. All agriculture waste problems must be met with technological, social economical acceptability. (Frantz - East Central).

1097 — A4, C3

NITRATE CONCENTRATIONS IN GROUNDWATER BENEATH A BEEF CATTLE FEEDLOT,

U. S. Department of Agriculture, Gunnison, Colorado and U. S. Department of Agriculture, Lincoln, Nebraska.
J. C. Lorimor, L. N. Mielke, L. F. Elliott, and J. R. Ellis.
Water Resources Bulletin, Vol. 8, No. 5, p. 999-1005, October, 1972, 3 tab., 4 fig., 6 ref.

Descriptors: *Nitrates, *Cattle, *Feed lots, *Water pollution, Irrigation, *Farm wastes, *Groundwater, *Water quality, Aquifer, *Samples, Nebraska, Wells.
Identifiers: 3-day study, transmissvity.

A study of nitrate concentration in the groundwater beneath a beef cattle feedlot near Central City, Nebraska was started in 1968. An intensive 3-day pumping study was conducted at the feedlot at the start of 1970 irrigation system. Little nitrate concentration was found in the groundwater coming from beneath the feedlot. Pumping caused a slight increase in nitrate concentration over the average concentration for the previous 2 years. (Lorimor, Mielke, Elliott, Ellis - U. S. Department of Agriculture).

1098 - E4, F5

BIBLIOGRAPHY OF PRODUCTS DERIVED FROM AQUATIC ORGANISMS.

Coastal Plains Center for Marine Development Services, Wilmington, N.C.

Center Publication No 71-3, August 1971. 113 p.

Descriptors: *Aquatic plants, *Fish, Poultry, Mink, Swine, Ruminants, Feeds, *Water pollution control, Sewage treatment.
Identifiers: *Animal husbandry, *Fish protein.

367 REFERENCES INCLUDE INFORMATION ABOUT BOTH FOOD AND MEDICAL PRODUCTS WHICH CAN BE OBTAINED FROM AQUATIC ORGANISMS. References on direct consumption of sea products, such as fishing methods and the use of fresh fish or shellfish, are excluded. Main emphasis is on conversion of aquatic plants and animals to products such as fertilizers, food supplements for domestic animals and man, drugs, other pharmaceuticals, and aquatic organisms for water pollution control. There is a permuted title index and an author index.

1099 - C4

SUMMER CONFERENCE OF SOCIETY FOR APPLIED BACTERIOLOGY, LIVERPOOL, 13--15 JULY 1971,

Office of Naval Research, London (England).
G. A. Hottle. Report No. ONRL-C-19-71, 31 August 1971. 12 p, 11 ref.

Descriptors: *Microorganisms, *Water pollution control, *Wastes, *Pathogenic bacteria, Conferences, *Public health, Rivers, *Sewage, Biochemical oxygen demand, Solid wastes, Ammonia, Nitrogen compounds, Nitrates, Phosphates, Sludge treatment, Dissolved oxygen, Bacteria, Fungi, Protozoa, Fermentation, Bacteriophage, Nutrients, Filters Equipment, Oxidation, Lakes, Wisconsin, Anaerobic digestiion, Algae, Eutrophication, Biodegradation, Plastics, Phosphorus compounds, Soil fungi, Pseudomonas, Dairy industry, Municipal wastes, Herbicides, Soil bacteria, Pesticides, Industrial wastes, DDT, Trace elements, Water quality, Detergents, Farm wastes, Urine, Aerobic bacteria, Carbohydrates, Bactericides, Clostridium, Streptococcus, Salmonella, Water purification, Sheep, Yeasts, Foods, Anaerobic bacteria, Soil contamination, Waste treatment, Organic matter, Digestion, Activated sludge, Actinonycetes, Hydrocarbon pesticides, Viruses, Water pollution sources, Water pollution effects, Path of pollutants.
Identifiers: Bdellovibrid, Pelodictyon, Polioviruses, Plasticizers, Phthalate, Thermophilic fungi, Polyethylene, Polypropylene, Bacillus, Corynebacteria, Streptothrix hyorhina, Cadmium, Dimethylnitrosamine, Amines, Carcinogens, Torulopsis spp., Aspergillus, Penicillium, Fusaria, Vibris.

The annual conference of the Society for Applied Bacteriology, held at the University of Liverpool, 13-15 July 1971, included a two-day symposium on 'Microbiol Aspects of Pollution' and a one-day session devoted to papers on individual research.

The following topics were discussed: (1) water pollution by domestic, agricultural and industrial wastes, (2) sewage treatment using combined aerobic-anaerobic systems, (3) microbial ecology of the activated sludge process, (4) microbial aspects of pollution in the food and dairy industry, (5) pollution of freshwaters with inorganic nutrients, (6) microbial degradation of plastics, herbicides, and pesticides, (7) aerobic methods for the treatment of farm wastes, (8) factors affecting algal blooms, (9) the role of obligate anaerols in the digestion of organic material, (10) health hazard of pollution, and (11) sewage pollution of natural waters. Individual research topics included (1) 'An Evaluation of Procedures for Enumerating Bacteria in Activated Sludge', (2) 'The Microbial Pollution of Water Courses as a result of the Sewage and Animal Wastes and the Application of Animal Slurry to Land', and (3) 'Methods for Analyzing the Microbial Decay of Solid Wastes'. (Jefferis-Battelle)

1100 - C3

DETERMINATION ON MERCURY IN SAMPLES FROM THE DUTCH ENVIRONMENT,
Interuniversitair Reactor Instituut, Delft (Netherlands).
J. J. M. De Goeij. Report No IRI-133-71-17, 1971. 21 p, 12 fig, 1 tab, 10 ref.

Descriptors: *Mercury, *Neutron activation analysis, Chemical analysis, *Industrial wastes, *Pollutant identification, Water pollution sources, Heavy metals, Separation techniques, Irradiation, Sediments, Cattle, Birds, Foods, Plants, Marine fish, Toxicity, Milk, Water analysis, Marine animals, Salmon, Herrings, Commercial fish, Automation.
Identifiers: *Biological samples, *Methyl mercury, *Rhine River, Seals (Animals), Tuna, Mackerel, Pilchard, Cod, Haddock, Liver, Brain, *Netherlands, Body fluids, Environmental samples.

Samples of sediments; biological tissues and fluids (birds, fishes, and man); human hair; foodstuffs; industrial products and pharmaceuticals; and plants and water were analyzed for mercury by neutron activation analysis. These samples, ranging from 100 mg-l/g, were irradiated in quartz vials, automatically decomposed and oxidized by sulfuric acid and hydrogen peroxide, and volatilized at 200C with HBr into a sodium acetate solution. Inactive mercury was added to the solution and stirred for 1 hr to break the mercury into small droplets to ensure isotopic exchange. The Hg was then collected on a sintered glass filter, washed with water then acetone, and finally dissolved in nitric acid and counted in a well type sodium iodide crystal. A sensitivity and an accuracy of 1.0-0.1 ppb/gram sample and 97-98 percent yield were achieved, respectively. Results showed that (1) one quarter of the birds tested had been killed by methylmercury; (2) in the food chain: sediments - grass - cow - milk, cumulative effects were absent; (3) Rhine River sediments showed increases of 18-23 ppm compared to previous tests; and (4) while Dutch fish, seals and coastal marine organisms were generally contaminated, imported canned fish and cod liver oil were in low ranges. Separate measurements showed not only that tuna had higher concentrations but that about 80 percent of the mercury in all fish was present as lipophilic methylmercury. (Mackan-Battelle)

1101 — C4, D4

BACTERICIDAL EFFECTS OF ALGAE ON ENTERIC ORGANISMS,
Texas University, Austin, Center for Research in water resources.
Ernest Davis, and Earnest Gloyna.
FWPCA grant 18050 DCL, Technical Report EHE-70-06, CRWR-55, 132 p. March 1970, 9 fig., 144 tab., 60 ref.

Descriptors: *Algae, *Cultures, *Enteric Bacteria, *Oxidation lagoons, *Pathogenic bacteria. Identifiers: Autogomistic effects, *Axenic cultures, *Dieoff fates, Aftergrowth, Blue-green algae, Field studies, Green algae, Laboratory studies.

A series of experiments involving the effects of blue-green and green algae on the dieoff rates of selected bacteria were conducted. Aexmic cultures of anabaena cyclindrica, A. niculans, oscillatoria chalybia, chlorella pyrenoidoso and scendedesm obluguus among others. Cultures of enteric bacteria species (adcaligeues, faecalis, enterobactec aerogenes, E, coli proteus vulgaris, psudomonas aerorginosa, and serratio marcercens) were added to the oxenic algal cultures during different periods of the algal life cycles. Filtrate from actively growing algae was exposed to cultures of enterics to determine whether any antibiotic compounds were imparted to the medium during lag phase growth of algae. To determine aftergrowth of the enteric species, the duration of the tests was extended to about 90 days. Mixed cultures of green and blue-green algae were exposed to both single species of enteric bacteria and mixed cultures. Mixed algal cultures cause a greater dieoff among the enteric bacteria than do individual species of algae. The dieoff characteristics of pathogenic species, namely Salmonella Typhosa, S. Paratyplin, Shigella Cysentiriae, S. Paracysentesiae, and Vibrac Comma were also determined. The pathogenic species did not survive as long as the enteric test species under similar test conditions. Virtually no aftergrowth was detected on the part of Pathogenes. (Aguirre - Texas).

1102 - C4, D4

MICROBIOLOGY OF A WASTE STABILIZATION POND,
Central Public Health Engineering Research Inst., Nagpur (India).
M. V. Bopandikar.
In: Advances in Water Pollution Research, Proceedings Fourth International Conference on Water Pollution Research, held in Czechoslovakia, April 21-25, 1969: London, Pergamon Press, Ltd, Sec II, Paper 16, September 1968. 7 p, 32 ref.

Descriptors: *Biological treatment, *Microbiology, *Oxidation lagoons, Bacteria, Efficiencies, Lagoons, Microorganisms, Organic Loading, Pathogenic bacteria, Ponds, Viruses.
Identifiers: *Bacterial removal, Viral removal.

Stabilization ponds developed by the author in India successfully treat sewage with an average BOD of 300 mg/l to 10 mg/l at a cost of only Rs. 40,000/MGD as against Rs. 1,000,000/MGD with conventional treatment. No work, however, has been done in India on the reduction of pathogens by pond stabilization treatment. Many variables affect the types and quantities of enteric viruses that occur in sewage and the limitations of available techniques for their detection further complicate attempts to judge their significance. A review of the techniques developed for sampling and concentration of viruses from large volumes of water is presented. Methods employed for collecting sewage samples for quantitative determination of viruses include: (1) the gauge pad or swab method, (2) resin adsorption method, and (3) ultra-centrifugation. It is shown that conventional secondary treatment (including chlorination) is not effective in removing virus contamination. However, marked reduction in the yield of viruses occurred during passages through oxidation ponds. Reduction in coliforms of fecal E. coli and fecal streptococci during 30 days passage through oxidation ponds ranged between 96.0 and 99.9%. (Aguirre-Texas)

1103 - A3, A4, F3

ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA.
Oklahoma Law Review, Vol 22, No 3, p 317-345 (1969). 29 p, 180 ref.

Descriptors: *Oklahoma, *Water pollution sources, *Administrative agencies, *Pollution abatement, Watercourses (Legal), Surface waters, Groundwater, Water supply, Water reuse, Water sources, Industrial wastes, Farm wastes, Sewage, Waste disposal, Waste treatment, Water users, Water quality, Standards, Wildlife conservation, Oil industry, Saline water intrusion, Toxins, Sediments, On-site investigations, Hydrologic cycle.

The article examines first the factors determining the nature and extent of water pollution: (1) the character of the state's water resources, their quality, quantity, and availability; and (2) the causes of water pollution categorized into the petroleum and other industries, agriculture, and municipal wastes. The second section of the article examines water pollution law as implemented by case law, legislation, or regulatory agencies' rules. Private remedies are discussed in regard to: (1) injuries to land and chattels; (2) nature of defendant's act; (3) nature of recovery; (4) plaintiff's standing; (5) defenses; (6) injury to water use rights; and (7) statute of limitations. The growth of a comprehensive state administrative program is explained. There are six agencies which administer this program: (1) the Pollution Control Coordinating Board has various coordinating functions; (2) the Water Resources Board performs industry plant inspections; (3) the Corporation Commission regulates the petroleum industry's activities; (4) the Health Department regulates the water supply and sewage disposal; (5) the Department of Agriculture regulates pesticides, and (6) the Department of Wildlife Conservation. (Rees-Florida)

1104 - A9, C4

FISH AS POTENTIAL VECTORS OF HUMAN BACTERIAL DISEASES,
Fort Detrick, Frederick, Md. Medical Sciences Labs.
Werner A. Janssen.
1970. 7 p, 40 ref.

Descriptors: Diseases, Vectors (Biology), Pathogenic bacteria, Pseudomonas, Fish, Oysters, Crabs, Clostridium, Salmonella, Shigella, E. coli, Bioindicators, Bullheads, White perch, Mycobacterium.
Identifiers: Aeromonas, Staphylococcus, Pasteurella, Leptospira.

The similarities between pathogens which infect humans and those found in fish suggests that fish may act as passive or active hosts for pathogens which infect man. Review of the relatively few studies conducted in the past and the author's own experience demonstrate the feasibility of this thesis. Because of the increased use of fish for food, the contamination of water, especially with human wastes, and the contact between man and the aquatic environment, research on this subject should be expanded. (Little-Battelle)

1105 - A2, F2

RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS.
Nebraska Water Pollution Control Council, Lincoln.

Nebraska Water Pollution Control Council, Lincoln, Neb, nd, 2 p.

Descriptors: *Nebraska, *Water pollution control, *Waste disposal, *Domestic animals, Legislation, Feeds, Water pollution sources, Water policy, Ad-

ministrative agencies, Regulation, Programs, Standards, Streams, Rivers, Pollution abatement, Administration, Cattle, Poultry, Water fowl, Animals, Legal aspects, Waste disposal, Farm wastes.

The Nebraska Water Pollution Control Council is empowered to effectuate a comprehensive program of water pollution control. Feedlot registration is a necessary portion of an overall waste disposal inventory. For clarity in implementing this Regulation, the word 'feedlot' is defined as the confined feeding of food, fur, or pleasure animals in buildings, lots, or ponds not normally used for raising crops or grazing animals. The confined feeding of enumerated animals, when grouped in numbers herein specified, shall come under this regulation. Any confined feeding within 500 feet of any watercourse also comes within the provisions of the Regulation. Registration of existing feedlots, prior to July 1, 1968, and proposed feedlots, at least sixty days prior to construction, is mandatory. Such registration must be accomplished on forms supplied by the Council. Detailed information must be provided on each feedlot. A failure to register is made punishable by statutory penalties. (Rees-Florida)

1106 - A1, B1, F3

MANAGING OUR ENVIRONMENT.
Agricultural Research Service, Washington, D. C.

Dept of Agriculture, Washington D C, Agriculture Information Bulletin No 351, April 1971. 48 p.

Descriptors: *Management, *Environment, *Agriculture, *Water pollution control, Sediments, Farm wastes, Nutrients, Phosphorus, Algae, Nitrates, Water reuse, Salinity, Pesticides, Livestock, Waste disposal, Oxidation lagoons, Dehydration, Runoff, Radioactivity, Fallout, Biocontrol, Insect control, Irrigation, Predation, Parasitism, Insect resistance, Insect attractants, Precipitation (Atmospheric), Genetics, Erosion control, Air pollution, Trees.
Identifiers: Feedlots, Composting, Plant residues, Recycling food, Processing wastes, Pathogens, Bioenvironmental controls.

Some of the major problems in agricultural research dealing with new and older methods of environmental management are described in an effort toward interesting the public in preservation of the quality of our environment. General material is presented under the subjects 'Protecting land, water and waterways,' 'Management of farm wastes,' 'Recycling food processing wastes,' 'New ways to fight pests--alternatives to pesticides,' and 'A green world--a clean world.' Among the problems discussed are prevention of animal wastes reaching waters, phosphorus from human wastes and detergents, multiple water reuse, and salinity in irrigated lands of the Southwest. Scientists are trying to prevent pesticide residues in soil and water and avoid pesticide overuse. Fallout from nuclear weapon testing calls for various decontamination treatments; food processing waste disposal and recycling is described, and recovery of potable water from seawater by reverse osmosis. Alternatives to pesticides are destruction of insects and weeds by introduction of predators, parasites, and pathogens which feed on or infect pests; resistant varieties, attractants, genetic control, bioenvironmental controls, and hormone and daylight manipulation. (Jones-Wisconsin)

1107 - A2, A3, A4, F3, F4

WATER POLLUTION CONTROL LEGISLATION, AGRICULTURAL RUNOFF, PART 6.
Congress, Washington, D.C.

Hearings before the Committee on Public Works, Subcommittee on Air and Water Pollution, 92d Cong, 1st Sess. April 2, 1971. p 2515-3188, 64 fig, 208 tab, 9 chart, 420 ref.

Descriptors: *Agricultural chemicals, *Chemical wastes, *Farm wastes, *Livestock, *Water pollution sources, Missouri, Kansas, Runoff, Fertilizers, Pesticides, Waste disposal, Nitrates, Leaching, Salts, Associated costs, Eutrophication, Legal aspects, Social aspects, Nutrients, Bodies of water, Legislation, Federal government.
Identifiers: *Agricultural runoff.

Testimony was heard by the Senate Subcommittee on Air and Water Pollution, as part of its investigation into the effects of agricultural waste runoff on water. Agricultural operations in Kansas and Missouri are examined. Agricultural water pollution results primarily from surface runoff of silt, animal wastes, pesticides, fertilizers, and other chemical and biological agents. The problem of concentrated animal wastes from large-scale feedlots is explored. Current methods of controlling agricultural pollution, changes needed to correct current problems, and cost impacts are covered from the viewpoint of industry, science, and elected public officials. An extensive appendix includes articles and scientific papers relating to water pollution from agricultural runoff. Methods of curtailing and preventing the discharge of concentrated organic wastes into rivers and streams are explained. The contamination of surface water from plowing under concentrated feedlot manure is discussed. The contamination of water supplies by inorganic fertilizer salts is also examined. (Grant-Florida)

1108 - A2, A3, A4, C1

EFFECTS OF AGRICULTURAL LAND USE ON THE QUALITY OF SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. I. Sewell, and J. M. Alphin.
Mimeographed paper presented at the Southeast Region Meeting of the American Society of Agricultural Engineers and Southern Section, Soil Conservation Society of America in Richmond, Virginia, February 14, 1972. 8 p, 3 tab, 7 ref. OWRR A-021-Tenn (1).

Descriptors: *Water quality, Feedlots, Lagoons, *Tennessee, *Farm wastes, On-site investigations, Water pollution sources, *Land use, Nitrates, Phosphates, Dissolved oxygen, Coliforms, Bacteria.

Surface water samples form twenty-four sites at four locations in Tennessee were analyzed to determine the effects of agricultural land use on the quality of surface runoff. The results showed that bacterial counts and chemical concentrations of surface water samples were dependent on land-use activities; however, the most important factors affecting the measured levels of these parameters were the location of the sampling points with reference to the source of the pollutants, dilution of the pollutants, and the time during the runoff cycle at which samples were taken. Concentrations of livestock increased the BOD, orthophosphates, and especially the bacterial counts of surface runoff samples from the areas affected. Of thirteen agricultural sites examined on flowing streams, none had dissolved oxygen or total nitrogen levels which failed to meet FWPCA standards for public water supplies, and only one site failed to meet the bacterial criteria.

1109 - B2, D4

AN EVALUATION OF AN ANAEROBIC LAGOON TREATING SWINE WASTES,
Mississippi State Univ., State College. Dept. of Civil Engineering.
James H. Scarborough.
Master's Thesis, August 1970. 92 p, 24 fig, 8 tab, 44 ref.

Descriptors: *Farm wastes, *Hogs, *Anaerobic digestion, Slurries, Confinement pens, Farm management, Waste treatment, Sampling, Biochemical oxygen demand, Chemical oxygen demand, Phosphate, Hydrogen ion concentration, Alkalinity, Nitrogen, Sedimentation, Water pollution sources, Odor, *Oxidation lagoons, Waste water treatment.
Identifiers: New-light swine farm.

Interest in the treatment of livestock wastes has grown in recent years due to concentration of livestock in areas where they are raised for commercial use and the migration to urban areas of those who are seeking a less polluted habitat. In Mississippi, an aerobic lagoon which treated swine wastes was studied for quality of incoming waste and effluent, as well as performance under varying temperatures. Random grab samples of influent and effluent were taken approximately once a week from February 10 to April 23, 1970, and again on May 19, 1970. The samples were studied for biochemical oxygen demand, chemical oxygen demand, phosphorous expressed as phosphate, volatile solids, total solids, most probable number of coliform bacteria per 100 ml, alkalinity, and total nitrogen. Results showed that anaerobic lagoons would reduce the pollutional characteristics of the waste considerably. The lagoon still contained an appreciable amount of oxygen demanding material and still caused highly odorous conditions, indicating that the effluent should receive further treatment. Perhaps anaerobic lagoons should only be used as a preliminary step rather than a complete treatment facility and should be followed by other means of treatment prior to the adequate and safe disposal of the effluents. (Atkins-Texas)

1110 - A3, A5, A9

LAKE TERMINOLOGY: WATER BLOOM,
Michigan State Univ., East Lansing.
J. O. Veatch, and C. R. Humphrys.
Bull Mich Agric Coll Exp Station, East Lansing, p 241, 1964. 1 fig.

Descriptors: *Eutrophication, Algae, Ducks, Color, Fishkill, Lakes, Odor, Toxicity, Water pollution effects, Water quality, Cattle.
Identifiers: *Definitions, *Water bloom, Toxic algae, Recreational use.

This lexicon of lake terminology defines a water bloom as: 'A prolific growth of plankton. A bloom of algae may be so dense that it imparts a greenish, yellowish, or brownish color to the water. The growth may be so concentrated in some parts of a lake that it interferes with swimming and boating. The algae not only imparts a disagreeable odor, but it may be a cause of fish mortality, and some species may be poisonous to cattle and ducks and a menace to drinking water supplies.' This entry includes an aerial photograph of an algal bloom concentrated in bay of a lake. (Eichhorn-Wis)

1111 - A3, A7, A9

POLYCHLORINATED BIPHENYLS,
David B. Peakall, and Jeffrey L. Lincer.
BioScience, Vol 20, No 17, p 958-964, September 1, 1970. 1 fig, 2 tab, 62 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Food chains, *Pesticide toxicity, Physical properties, Chemical analysis, Persistence, Absorption, DDT, Chemical properties, Plastics, Paints, Rubber, Resins, Gas chromatography, Spectrophotometry, Mallard duck, Poultry, Songbirds, Wading birds, Mussels, Herrings, Path of pollutants, Water pollution sources, Water pollution effects.
Identifiers: *Biological magnification, *Aroclors, *Polychlorinated biphenyls, Chemical structure.

The structural and physical properties, uses,

analytical methods, toxicology, levels in nature, and biological magnification of PCBs, and the ratio of DDT to PCB in the environment are summarized. Although nothing is known about the biological decomposition of PCBs, it is likely that they are more stable than DDT and its metabolites and thus have a tendency to accumulate up the food chain. No figures on the amount of these materials produced annually are available. Analysis of PCBs has been carried out by means of a combination of high resolution gas chromatography and mass spectrometry. Nitration and saponification have been used to separate PCBs from other residues for analysis. Although several studies have been carried out on the toxicology of PCBs, toxic levels are still largely undefined. Studies have shown, however, that there are striking alternations in the internal organs of some mammals and birds. Data taken from several studies indicate that the PCBs are capable of biological magnification of the food chain. Because of the apparent danger of these materials it is necessary to discover the major sources of their escape into the environment. Sixty-two references have been cited in this summary. (Little-Battelle)

1112 - A2, C3, C4, C5

CATTLE FEEDLOT RUNOFF NATURE AND BEHAVIOR,

Kansas State Univ., Manhattan. Dept. of Bacteriology.

J. R. Miner, L. R. Bernard, L. R. Fina, G. H. Larson, and R. I. Lipper.

Proceedings, Industrial Waste Conference, 21st, May 3, 4, and 5, 1966, p 834-847. 9 fig, 9 tab, 10 ref.

Descriptors: *Water pollution sources, *Surface runoff, *Cattle, *Farmwastes, Rainfall intensity, Chemical properties, Bacteria, Nitrogen, Coliform, Streptococcus, Laboratory tests, Data collection, Analysis.
Identifiers: Feedlot.

Stormwater runoff is becoming recognized as an important water pollutant. Runoff from cattle feedlots is particulary strong. Three types of experiments were conducted to evaluate the characteristics and behavior of feedlot runoff. Two feedlots (0.05 acres each) were constructed, one with a dirt surface and the second with a concrete surface. Ten head of cattle were maintained in each lot and rainfall was simulated by a series of sprinklers. The runoff was collected and tested for chemical and bacterial contamination. Tray experiments were conducted to determine bacteriological changes in manure lying on the feedlot surface. Anaerobic bottle studies were made to determine the effects of storage in deep ponds. Cattle feedlot produces a high strength waste with considerable quantities of nitrogen. Waste strength increased with low rainfall rates, warm weather and moist lot conditions. Runoff from the concrete surface lot was nearly twice as strong as from the unsurfaced lot. The bacterial nature of the stored feedlot runoff and litter changed continuously. Changes were a function of temperature and storage time. The fecal coliform: fecal streptococcus ratio does not appear to be an entirely reliable tool to identify the cause of an observed water pollution problem. (Goessling-Texas)

1113 - D4

AERATED LAGOON TREATMENT OF LONG ISLAND DUCK WASTES,

Cornell Univ., Ithaca, N.Y. Dept. of Civil Engineering; and Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.

Raymond C. Loehr, and Dennis D. Schulte.

2nd International Symposium for Waste Treatment Lagoons, June 23-25, 1970, Kansas City, Missouri, p 249-258. 7 fig, 2 tab, 11 ref.

Descriptors: *Oxidation lagoons, *Farm wastes, Pilot plants, Chlorination, Phosphates, Mixing, Coagulation, Flocculation, Dissolved oxygen, Biochemical oxygen demand, Aerobic conditions, Anaerobic conditions, Cost analysis, Design criteria, Mathematical models, Waste water treatment.
Identifiers: *Aerated lagoons, *Duck wastes.

Laboratory treatability studies were conducted in 1965 to determine the feasibility of treating duck wastes in a number of treatment systems. Pilot scale tests were then run on a aerated lagoon system in 1967. The pilot plant had a 250,000 gallon capacity, an 8 ft depth, and a 5 HP floating aerator. 35% of the duck waste water systems subsequently installed provided in excess of 90% BOD reduction, and 50% provided in excess of 85% BOD reduction, with aerator power relationships ranging from .002 to .04 nameplate horsepower per 1000 gallons. These systems included aerated lagoons, settling ponds, and chlorination. Studies are presently being conducted on the new methods of phosphate removal, with some type of removal to be implemented as soon as possible. (Lowry-Texas)

1114 - D4, F1

ANIMAL MANURE LAGOONS, A QUESTIONABLE TREATMENT SYSTEM,

Samual A. Hart.

2nd International Symposium for Waste Treatment Lagoons, June 23-25, 1970, Kansas City, Missouri, p 320-324. 1 tab, 19 ref.

Descriptors: *Farm wastes, *Oxidation lagoons, Organic loading, Infiltration, Evaporation, Percolation, Aeration, Oxygenation, Odors, Sprinkler irrigation, Aerobic conditions, Anaerobic conditions, Biochemical oxygen demand, Waste water treatment.
Identifiers: Aerated lagoons.

Both oxidation lagoons and oxidation ditches can be of significant value to the agriculture industry. First introduced in the early 1950's, these lagoons proved to be inexpensive to build and offer a minimum of maintenance. However, this system must be carefully designed in order to provide adequate treatment of agricultural wastes, and this care in design has not been inherent to lagoons in the past. Comprehensive field studies on cow manure have indicated that 60 ft to the third power of aerated lagoon volume is necessary to treat 1 lb BOD 5/day. In between totally mixed and aerated lagoons, and conventional oxidation lagoons are various degrees of anaerobic and aerobic treatment. Similar studies conducted on hog wastes fixed loading rates at 12 ft to the third power/400 lb pig as being capable of providing sufficient treatment. Oxidation lagoons were also studied, with loading rates of 30 ft to the third power/lb BOD5. Costs for the oxidation ditch treatment are $6 per hog of aeration equipment and $.006 per hog per day of power requirements. Overall, oxidation lagoons and ditches, and aerated lagoons can provide sufficient treatment if properly designed and maintained. (Lowry-Texas)

1115 - C3, D4, E3

CONTROL OF NITROGEN FROM ANIMAL WASTE WATERS,

Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.

Raymond C. Loehr.

Proceedings 12th Sanitary Engineering Conference on Nitrate and Water Supply: Source and Control, February 11-12, 1970, University of Illinois, Urbana: Illinois University, College of Engineering Publication, p 177-189, 1970. 13 p. 4 fig, 1 tab, 22 ref. FWQA Project WP-1493.

Descriptors: *Farm wastes, *Nitrogen compounds, *Waste treatment, *Nitrification, *Denitrification, Confinement pens, Farm lagoons, Organic wastes, Waste water treatment, Biodegradation, Aeration, Aerobic treatment.
Identifiers: *Nitrogen removal.

The trend in recent years for the confinement feeding of livestock and for increased numbers of animals per production unit results in highly concentrated, low-volume waste flows which represent a pollutional hazard to ground- and surface waters. The pollutional contribution from these activities is manifested by excessive nutrient concentrations, chiefly high levels of nitrogen, microbial impairment of surface waters, release of contaminents that complicate subsequent water treatment operations, and depletion of dissolved oxygen in surface waters. Control of such wastes commences with containment. The microbial synthesis which occurs during containment reduces nitrogen levels to a certain extent. Further removals can be accomplished by ammonia stripping using diffused aeration or by nitrification-denitrification. The most suitable method of disposal for treated wastes is on the land, where the remaining nutrients can be incorporated into crops. (Knapp-USGS)

1116 - B1, D1, E1

MANAGING LIVESTOCK WASTES TO CONTROL POLLUTION,

Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.

James A. Moore.

Water Pollution by Nutrients--Sources, Effects and Control, Water Resources Research Center, University of Minnesota, Minneapolis, WRRC Bulletin 13, p 29-34, June 1969. 2 tab.

Descriptors: *Pollution control, *Organic loading, *Cattle, *Hogs, *Sheep, *Farm wastes, Water pollution sources, Water quality, Waste disposal, Minnesota, Nitrogen, Phosphorus, Potassium, Aerobic treatment, Water pollution control.
Identifiers: *Manure processing, *Manure disposal, Livestock industry, Manure storage, Oxidation ditch.

High costs and larger quantities of inert and biologically stable materials prohibit many municipal waste treatment systems being used for animal waste disposal. No system has been designed to remove nitrogen and phosphorus in animal wastes. Four steps in the management of manure are suggested: (1) collection, (2) processing, (3) storage, (4) utilization or disposal. Drying manure simplifies sanitation problems because it is stable, relatively odorless, and breeds few flies. Energy required for drying limits method. Anaerobic lagoons are a popular method for stabilizing organic matter, because disposal problems are mostly eliminated. Animal waste can be treated in aerobic oxidation ponds with oxygen supplied by algae and natural reaeration supplemented by mechanical aeration. Impervious-bottom tanks and storage areas should be considered to prevent nutrient leaching during extended holding periods. Although economically non-competitive, more effort to dispose animal waste as fertilizer would alleviate the problem and prove beneficial to soils. (Bannerman-Wisconsin)

1117 - A1, F4

WATER POLLUTION BY NUTRIENTS-SOURCES, EFFECTS AND CONTROL, PAPERS PRESENTED AT 1966 ANNUAL MEETING OF MINNESOTA CHAPTER SOIL CONSERVATION SOCIETY OF AMERICA.

Minnesota Univ., Minneapolis. Water Resources Research Center. WRRC Bulletin 13, Minnesota Water Resources Research Center, June 1969. 79 p. OWRR Project A-999-MINN.

Descriptors: *Water pollution sources, *Water pollution effects, *Eutrophication, *Nutrients, Algae, Fish population, *Water pollution control, Farm wastes, Municipal wastes, Septic tanks, Recreation

wastes, Water quality.
Identifiers: *Nutrient sources.

The Bulletin includes the papers presented at a conference on 'Nutrient Pollution - Sources, Effects and Control' held in Minneapolis, Minnesota on January 8, 1969. The conference was planned as the Annual Meeting of the Minnesota Chapter, Soil Conservation Society of America. The papers, all individually abstracted, include the following titles: Nutrients and Other Forms of Pollution, Diagnosing Pollution in Lake Minnetonka, Effect of Eutrophication on Fish and Related Organisms, Health Aspects, Surface and Groundwaters, Animal Waste Disposal Problems and Trends in Minnesota, Managing Livestock Wastes to Control Pollution, Runoff and Sediment as Nutrient Sources, Controlling Nutrients and Organic Toxicants in Runoff, Treatment of Municipal Wastes, Septic Tank Effluents, Water Pollution in Recreational Areas - Sources and Control, and Setting Water Quality Standards and Regulating Nutrient Sources, Implementing Pollution Control.

1118 - A1, F4

WATER QUALITY MANAGEMENT PROBLEMS IN ARID REGIONS.
Robert S. Kerr Water Research Center, Ada, Okla. Treatment and Control Research Program.
James P. Law, Jr., and Jack L. Witherow, Editors. Federal Water Quality Administration Water Pollution Control Research Series 13030 DYY 6/69, October 1970. 105 p. FWQA Program 13030 DYY.

Descriptors: *Conferences, *Water quality, *Water pollution sources, *Water pollution control, *Arid lands, Irrigation, Agriculture, Evaporation, Salinity, Farm wastes, Surface waters, Groundwater, Planning, Irrigation effects, Wastes, Nutrients.

An international conference entitled 'Arid Lands in a Changing World' sponsored by the American Association for the Advancement of Science Committee on Arid Lands and the University of Arizona, was held at Tucson in June, 1969. The Federal Water Quality Administration provided financial support for the conference and solicited papers to be presented in the Water Management and Salinity and Desalinization sessions. This report presents a selected group of the papers presented at those sessions which should benefit those concerned with water quality management problems in arid regions. The title of the papers included in this report are as follows: nitrate removal from agricultural waste water; the effects of salinity standards on irrigated agriculture in the Colorado River basin; problems of pollution of irrigation waters in arid regions; water quality requirements and re-use of waste water effluents; salinity control in return flow from irrigated areas--a demonstration project; water quality control problems in inland sinks; natural pollution in arid land waters; distillation of waste waters: a water resource for arid regions; and animal waste runoff--a major water quality challenge. (Woodard-USGS)

1119 - B2, D4

TREATMENT OF AQUEOUS AGRICULTURAL WASTES FOR CLEAN WATER AND FOR MICROBIAL PROTEIN PRODUCTION,
Iowa State Univ., Ames. Dept. of Chemical Engineering.
G. T. Tsao. Iowa State Water Resources Research Institute, Ames, Completion Report ISW-RRI-33, Engineering Research Institute ISU-ERI, Ames-99959 April, 1971, 34 p, 27 fig, 12 ref. OWRR Project A-032-IA (6).

Descriptors: Oxygen, Absorption, *Foaming, *Aeration, *Cytological studies, Farm wastes, Waste water treatment, *Biological treatment.
Identifiers: Waldorf aerator, Cell growth, *Whey.

Cheese whey containing 35,000 ppm BOD is the most concentrated liquid waste that can be found in large quantities. It foams excessively when bubbled with gas. Cheese whey was successfully treated in a Waldhof aerator by Saccharomyces fragilis. This yeast can reduce about 85% of the BOD and produce single cell protein. A batch as well as a continuous growth process of this yeast was successfully developed. A fundamental study on the transient and steady state behavior of cell growth was also conducted. Through computer simulation, it was possible to predict growth pattern in batch and continuous processes. Oxygen is important in any aerobic biological process. The Waldhof aerator not only provides good aeration for yeast growth, but is also capable of handling highly foamy liquors like whey through its foam recycling mechanism. A sysmetical study on the working mechanisms of a Waldhof aerator was conducted. Foam fractionation of the yeast and other microbiological cells was also studied. Foam decay was found to follow a second-order rate pattern. A theoretical investigation was conducted on gas-liquid interfacial oxygen absorption. The effect of viable microbiological cells that consume the transferring solute on the rate of oxygen absorption was analyzed.

1120 - A3

SOURCES OF PHOSPHATE, AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STREAMS,
Rutgers-The-State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
Aytekin Bilgin.
M Sc Thesis, Rutgers University Graduate School, March 1971. 113 p, 29 fig, 7 map, 1 tab, 60 ref. OWRR Project A-027-NJ (1).

Descriptors: *New Jersey, *Water pollution sources, *Pollutants, *Phosphates, *Nitrates, Surface runoff, Leaching, Sewage disposal, Chemical wastes, Domestic wastes, Farm wastes, Industrial wastes, Fertilizers, Ammonia, Nitrogen cycle, Nutrients, Nitrification, Decomposing organic matter, Eutrophication, Balance of nature, Biochemical oxygen demand, Aquatic productivity.
Identifiers: *Middlesex County (N J), *Somerset County (N J), *Mercer County (N J), New Brunswick (N J), Princeton (N J).

A study was made from April to October 1970 of pollution in seven streams located in Middlesex, Somerset, and Mercer Counties, New Jersey. The objective of this investigation was to determine the origin, source, and concentrations of phosphate, ammonium, and nitrate polluting the streams. The following were the areas studied: Beaverdam Brook (E. Brunswick), Mile Run (New Brunswick), Six Mile Run (New Brunswick), Millstone River (Princeton), Rock Brook (Zion), Duck Pond Run (Princeton), and Big Bear Brook (Hightstown). Of these, Millstone River, located near a sewage disposal plant, and Mile Run, near a chemical plant, produced the highest phosphate and ammonia levels. Mile Run had the greatest BOD because of the heat and wastes polluting it. Nitrate contamination developed principally in areas where eutrophic conditions existed for some years, and where surface runoff leached out fertilizer residues from suburban lawns and cultivated agricultural soils. Moderate nitrate contamination was seen in Six Mile Run, Big Bear Brook, and Duck Pond Run. The highest nitrate level occurred in Beaverdam Brook where the adjacent watershed had been completely altered some 5 years earlier by bulldozing and grading operations. This activity completely destroyed the original soil profile and broke up and buried the former organic layer so that mineralization and nitrification was rapidly increased. (Glasby-USGS)

1121 - A3, A9, E1

WATER POLLUTION FROM LAND RUNOFF,
Agricultural Research Service, US Department of Agriculture.
K. C. Walker, and C. H. Wadleigh.
Plant Food Rev, Vol 14, No 1, pp 2-4, 1968. 3 p, 1 photo.

Descriptors: *Runoff, *Water pollution, Infiltration, Sediments, *Sediment yield, *Nutrients, Eutrophication, Inorganic compounds, Nitrates, Phosphates, Calcium, Magnesium, Fertilizers, Agricultural chemicals, Fishkill, Pesticides, Endrin, Irrigation, Acid mine water.
Identifiers: *Livestock wastes, Runnels, Feedlots, *Land runoff, Manure recycling, Bacterial pollution.

Contributions of agricultural activities to the pollution of runoff is surveyed, and it is found that sediment is by far the most prevalent entity that impairs water quality. Of the average annual precipitation, 30% becomes runoff and less than 1% infiltrates deeply. Sediment yield in the Mississippi basin averages 390 tons annually per sq mi. Large amounts of nutrients are lost with sediments. For example, the load per yr of nitrogen is 500,000 tons; phosphate, 750,000; calcium, 5,400,000; magnesium, 2,400,000; and livestock wastes, 1.6 billion (1965). Associated wastes brought the annual total to 2 billion tons. Organic waste problems are severe. 50,000 head of beef cattle produce as much waste as 600,000 people; therefore, serious economic and engineering planning is necessary for disposing of manure or for recycling it for fertilizer use. Major fish kills have occurred because of feedlot runoff, which with other farmland runoff contains high nitrates and phosphates. Pesticides usually are present but in low concentrations. Irrigation increases the natural salts content of runoff. Acid mine drainage is a problem in the Ohio River Watershed.

1122 — A3, A4, C3

NITROGEN CYCLE IN SURFACE AND SUBSURFACE WATERS,
Wisconsin University, Madison.
S. Witzel, E. McCoy, O. J. Attoe, L. B. Polkowski, and K. T. Crabtree.
Water Resources Center, University of Wisconsin, Technical Completion Report, December 1968, 65 p. 14 tab., 12 fig., 27 ref.
1968. 65 p. 15 tab., 12 fig., 27 ref. OWRR Project B-004-Wis.

Descriptors:: *Domestic animals, *Wastes, fertilizers, *Essential nutrients, *Nitrification, crops, toxicity, soil porosity, irrigation, ground water, runoff, frozen ground, soil erosion, water pollution, Dentrification, phosphorus compounds, algae, aquatic plants.

Autotrophic and heterotrophic nitrification have been studied with 191 samples of shallow water from streams, farm ponds and adjacent soils. Of 47 chosen for repeated tests, 45 produced no sub 2-N ranging 5-154 microgram/ML. Av. 48 microgram/ML. Only 2 produced no sub 3-N at 33 and 46 microgram/ML. Of 167 stock cultures of soil fungi, the main producers were in the aspergillus flavus-oryzae and A. Wentii groups (75% yielded 65-100 micrograms of no sub 3-N) and the penicillium genus (21 of 24 species yielded 7-19 microgram/ML of no sub 3-N from no sub 2-N, not from organic N). Nitrifiers of no sub 2, no sub 3 type were found in 5 other genera. Residual no sub 3 following crop maturity migrates downward from 12 inches to aquifer depth at 20 feet over winter on waupun and plainfield soils, respectively. One Wisconsin community had 86 wells with 34.5% unsafe containing high no sub 3 and another had 550 wells with 1/3 unsafe. Surface waters received less than 5.7 lb. N and 2.53 lb. p. per A. in flood flows from a 1346 A. watershed; 3.62 lb. N and 1.14 lb. p per A. from 3 farm areas totaling 246 A. Lancaster plots receiving 15 tons dairy cow wastes per A. lost 19.8% more N and 11.3% more P when applied on frozen ground in a year of high winter runoff.

1123 - B1, D2, D4

A FEASIBILITY STUDY OF A LIVESTOCK WASTE DISPOSAL SYSTEM INVOLVING THE REUSE OF WATER,

North Dakota State Univ., Fargo.
George L. Pratt.

Research Project Technical Completion Report to Office of Water Resources Research, December 1968, Washington, D. C. 24 p, 11 tab, 2 ref. OWRR Project A-001-NDAK.

Descriptors: *Water reuse, Stock water, Domestic animals, *Farm wastes, Potable water, Solid wastes, Urine, Water pollution, Aeration, Aerobic treatment, Biological treatment, Coagulation, Filtering systems, Filtration, Flocculation, Oxidation, Waste storages, *Waste water treatment, Water purification, Water treatment.

Separating solid materials from liquid wastes that have been removed from a livestock barn can be accomplished in several ways. In trials at the North Dakota Agricultural Experiment Station settling tanks and sand filters were evaluated. In one phase of the work treatment of overflow from a settling tank that collected beef waste was emphasized. No treatment, aeration, and treatment with aluminum sulfate (alum) were tested for the settling tank overflow. The settling tank removed the bulk of the solids. Alum treatment of the overflow was effective in reducing total solids to the point where it was nearly feasible to provide final treatment. In the second phase of the work a slow sand filter was tested under controlled conditions to determine its adaptability for final treatment of reclaimed water. Tests were run at three temperatures, 45 deg F, 70 deg F, and 100 deg F. Controlled amounts of organic material were added to the influent of the filter. The filter was easily managed and adaptable to a wide range of conditions. Its performance was better at 70 deg F than at 45 deg F or 100 deg F.

1124 — A2, A4, E2

EFFECT OF VARIOUS FACTORS ON MOVEMENT OF NITRATE NITROGEN IN SOIL PROFILES AND ON TRANSFORMATIONS OF SOIL NITROGEN,

Wisconsin University, Madison.
R. J. Olsen.

University of Wisconsin, Water Resources Center, Report 1969. 79 p. OWRR B-004-Wis.

Descriptors: *Nitrification, *Soil nitrogen, *Public health, *Soil leaching, Groundwater, Soil profiles, Water table, Surface runoff, Farm wastes, Aerobic conditions, Incubation.
Identifiers: Lake Europhication, *Soil phosphorus, Alfalfa-Bromegrass, Spring thaws, Fertilizer-nitrogen.

There is increasing evidence that agriculture is contributing to the increase in nitrate-nitrogen in streams, lakes, and domestic water supplies. High amounts of nitrate-nitrogen in water are a health hazard and contribute to lake eutrophication. Methods by which nitrogen may enter the water from agricultural sources include the leaching of nitrate-nitrogen through the soil profile to the water table and surface runoff, especially during spring thaws from manure applied to frozen soil during the winter. The data obtained from field experiments indicate that pollution of groundwater with nitrate-nitrogen can be limited by avoiding excessive rates of fertilizer nitrogen; providing a crop cover on the soil during the growing season; use of hay crops, such as alfalfa-bromegrass, in rotation with corn or other crops receiving fertilizer nitrogen; and not permitting unprotected manure to accumulate during the time of year when leaching can occur. Recovery of fertilizer nitrogen by three successive corn crops and as soil in organic nitrogen following the last crop ranged from 72 to 88 percent. The average concentration of nitrate-nitrogen in the soil solution at the lowest profile depth sampled ranged from 14 ppm for virgin soils to 21 ppm for manure contaminated soils and to 33 ppm for cultivated soils. Rate of nitrification was directly related to the rate of manure application, presence of aerobic conditions, period of incubation, and soil phosphorus. The average recovery of nitrogen by chemical analysis of the soil receiving the higher manure rates after 37 weeks of incubation ranged from 24% for anaerobic conditions to 73 to 80 percent for the aerobic conditions. These data suggest that where animal manure is not to be used as a fertilizer, lagooning of the manure under anaerobic conditions may be an effective method of disposal with a minimum risk of water pollution. (Olsen - University of Wisconsin).

1125 - A3, F4

ANIMAL WASTE DISPOSAL PROBLEMS AND TRENDS IN MINNESOTA,

Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
Evan R. Allred.

Water Pollution by Nutrients--Sources, Effects and Control, Water Resources Research Center, University of Minnesota, Minneapolis, WRRC Bulletin 13, p 22-28, June 1969. 2 fig, 3 tab.

Descriptors: *Livestock, *Wastes, *Farm wastes, Organic wastes, Minnesota, Biochemical oxygen demand, Farms, Pollutants, Water pollution sources, Eutrophication.
Identifiers: *Livestock waste disposal, Broiler farms, Livestock wastes comparison, Feedlots, Manure production, Food production wastes, Projected livestock farms, Wastes management.

The growing problem of animal waste disposal resulting from the trend toward concentration of livestock on fewer farms is discussed. Data compiled in Minnesota indicates large percentage of these farm animals are on feed and in confinement. The problem will accelerate as herds grow larger to meet future population demands. By 1980 there is a projected 10-fold increase in the average hog and feed-cattle herd size in Minnesota. Three reasons given for failure to solve animal waste disposal problems are: (1) reluctance to monetary expenditures on adequate methods, (2) because the problem has been considered unrelated to other parts of society, and (3) approaches have been used that are only applicable to other types of waste. Cost involved and the enormity of the problem are realized when data presented indicate a 250,000 bird poultry enterprise has a biochemical oxygen demand waste equivalent to a city population of 25,000. Eutrophication is increased by spreading manure on frozen ground and the consequent runoff in spring thaw. Since the cost of a treatment plant and storage is prohibitive to individual farmers, it is concluded that no immediate, simple solution is in sight. (Bannerman-Wisconsin)

1126 - A9

SAVANNAH RIVER ECOLOGY LABORATORY. ANNUAL REPORT, 1971.

Georgia Univ., Athens. Inst. of Ecology.
Robert J. Beyers, I. L. Brisbin, D. C. Coleman, J. B. Gentry, and J. W. Gibbons (editors).

August 1971. Parts 1 and 2. 420 p. AT (38-1)-310.

Descriptors: *Boron, *Nutrient requirement, *Cycling nutrients, *Radioactivity effects, Water pollution effects, Ecosystems, Thermal pollution, Radioecology, Southeast U.S., Microorganisms, Bass, Ecology, Snakes, Poultry, Rodents, Aquatic habitats, Aquatic plants, Amphibians, Turtles, Aquatic life, Path of pollutants, Reservoirs, Streams, Soil-water-plant relationships, Absorption.

Work at the Savannah River laboratory is reported which includes basic ecology (16 projects), radioecology (3), ecosystem radiation effects (2), and thermal effects on fish (2). Analysis of southeastern United States surface waters for boron showed levels which were usually less than 100 ppb. It appears that a higher level in most streams is by leaching of rocks and soil, as compared with the lower level in large reservoirs which is comparable with the level in rainfall (except in cases of salt water intrusion). Other studies include: radiation effects on ecosystems involving (respectively) microorganisms, fish, and broiler chicks; and nutrient studies in ecosystems involving aquatic macrophytes, harvester ants, an old-field mouse, small mammals, snakes, mosquitofish, turtles, and lizards. (Bopp-ORNL)

1127 - A4, B1

WHY NITRATES IN WATER SUPPLIES,

G. E. Smith.

Hoard's Dairyman, Vol 110, No 18, p 1048-1049, September 25, 1965. 3 fig.

Descriptors: *Nitrates, Feed lots, Fertilizers, *Farm wastes, Missouri, Water supply, Water wells, Water pollution sources.
Identifiers: *Water contamination.

Studies show that 75% of Missouri's water is contaminated by nitrates, primarily from feedlots. Shallow wells are most affected, but deep ones can be if improperly cased. To solve the problem, new properly encased wells should be dug some distance from feedlots. (Marquard-East Central)

1128 - D4, E3

USE OF DUCKWEED FOR WATER TREATMENT AND ANIMAL FEED,

Louisiana State Univ., Baton Rouge. School of Forestry and Wildlife Management.
D. D. Culley, Jr., and E. A. Epps.

Journal Water Pollution Control Federation, Vol 45, No 2, p 337-347, February, 1973. 1 fig, 5 tab, 28 ref.

Descriptors: *Farm wastes, Waste water treatment, Farm lagoons, Nutrient removal, Feeds, Livestock.
Identifiers: *Duckweed, Lemnaceae.

This scientific study was established to search for aquatic plants suitable for nutrient reduction in animal waste lagoons and for utilization in animal feeds. Criteria for evaluating the aquatic plants are given. Chemical composition of plants from the family lemnaceae are shown in tables based on eight test sites. Duckweed shows great potential, but minor problems include toxic buildup and excess water content. (Marquard-East Central)

1129 - A3, B2, C2, D2

BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS,

Nebraska Univ., Lincoln.
C. B. Gilbertson, J. A. Nienaber, T. M. McCalla, J. R. Ellis, and W. R. Woods.

Transactions of the ASAE (American Society of Agriculture Engineers), Vol 15, No 6, p 1132-1134, 1972, 6 fig, 8 ref. Support in part by EPA.

Descriptors: *Feed lots, Runoff, Continuous flow, *Farm wastes, Cattle, *Waste water treatment.
Identifiers: *Solids removal systems, Batch system.

Removing settleable solids from beef cattle feedlot runoff requires a working knowledge of the relationships between precipitation, runoff, solids, transport, and settling of the transported solids. The authors give physical descriptions of the working area and develop estimating equations which can be used to assist in design of solids removal systems in geographic areas with similar climatic and feedlot conditions. Two systems, a 'batch system', and a 'continuous flow' system, were constructed. In laboratory tests (Imhoff cone tests), about 40% of the total solids transported (by weight) settled in 16 to 18 minutes at zero

velocity of flow. Calculated bulk density of settleable solids was 6.71 lb. per cu. ft. with a standard deviation of 3.69 lb. per cu. ft. It was recommended that an open channel should be equipped with barriers to restrict runoff flow to near zero velocity to remove sufficient solids to maintain a satisfactory condition within the holding pond. (Wetherill-East Central)

1130 - D2, E3
THE OPCCO DRYER.

Agricultural Engineering, Vol 53, No 6, p 16-17, June, 1972. 2 fig.

Descriptors: *Recycling, Drying, Fertilizers, *Farm wastes, *Waste treatment, Poultry, Feeds.

A solid waste management system, developed and patented by Harvey Wenger and manufactured by Organic Pollution Control Corp., has been placed on several large poultry farms to turn poultry litter into fertilizer or into a feed additive for livestock. Michigan State University's Dr. Howard Zindel and other experts feel that the dryer, used so far primarily with poultry manure, can successfully handle all forms of animal wastes plus packing house offal, vegetable and fruit peel and pulp, and municipal sewage. Requiring an area of about 20-40 feet, the 40 ton per day unit operates on either natural or LP gas. Plans for developing other power supplies are being studied. The drying process is described and a schematic of the flow path is shown. The process is not inexpensive, but it does supply a solution to the waste problem. (Wetherill-East Central)

1131 - B1, C5
FIVE FEEDING SYSTEMS COMPARED.
Feedlot Management. p 34-37, January, 1971. 8 fig.

Descriptors: *Feed lots, Performance, Runoff, *Farm wastes, Cattle, Confinement pens.
Identifiers: Animal density, Open lot, Open shed, Cold barn, Warm barn.

Preliminary results are given on the influence of various housing systems on beef cattle and the effect of animal density on feedlot performance. It is indicated that housed confinement should be used to capacity and maintained year round for maximum benefits. Housed confinement tends to control illness and high density does not seem to jeopardize health or feed efficiency. Advantages and disadvantages are given for each type of housing studied. The five types of housing are open lot, open shed, manure pack shed, cold barn and warm barn. All five systems are designed to contain all animal wastes. (East Central)

1132 - F4
THE GREAT MANURE DILEMMA,
J. Gerstner.
The Furrow, p 1-2, September/October, 1970.

Descriptors: *Waste disposal, Waste treatment, Recycling, *Farm wastes, Livestock.

Disposing of animal wastes cheaply and without pollution is fast becoming one of agriculture's knottiest problems. United States livestock produce about two billion tons of liquid and solid wastes per year, enough to fill a square mile 10 feet high every day. Complicating the state of overproduction is the development of cheap commercial fertilizer. The large differences in livestock operations make one ultimate solution to manure handling doubtful, if not impossible. The characteristics of manure change with the type of animal, feed, and climate. The requirements for practical disposal vary with the operation's size, location, and amount of land available. Some methods being developed are: feeding processed manure to livestock, burying effluent, spreading and deodorizing it, and selling it. The animal waste problem is likely to prove less technical than economic. (Wetherill-East Central)

1133 - A1, B1, F2
POLLUTION CRACKDOWN.
The Furrow, p 4. September/October, 1970.

Descriptors: *Feed lots, *Regulation, Waste disposal, Recycling, *Farm wastes, Legal aspects, Livestock.

Cattle feeder George Reynolds was one of many stockmen forced to move farther away from expanding city limits. Many, like James Sinning, have faced law suits as high as $90,000 from people who moved next door after their feedlots had been established. Some stockmen are working with authorities to prevent embarrassing or costly law suits in the future. Lawsuit tips. Locate feedlots away from neighbors and streams. Ag engineer E. H. Davis says, 'Try to make friends with your neighbor, so you understand his problems and he understands yours.' (Wetherill-East Central)

1134 - D3, E3
FEED 'EM TRASH, CUT POLLUTION.
Beef, p 12. July, 1971.

Descriptors: Cellulose, Brush control, *Farm wastes, *Recycling, Proteins, *Feed lots, Texas, Feeds.

Texas Tech researchers have devised a process that takes paper, manure, brush, or any substance with cellulose and converts it to protein and sugar. The product can be used for animal feed and possibly in the future for human consumption. (Marquard-East Central)

1135 - A3, B1
ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES.

Beef, p 15. July, 1971.

Descriptors: *Feed lots, Runoff, *Farm wastes, Water pollution control, Nebraska.

75% of feedlot pollution problems can be controlled by the individual. Small operators can receive help from the Soil Conservation Service while large operators must go to engineers to solve the other 25%. Nine suggestions are offered for control of runoff. (Marquard-East Central)

1136 - B2, D4
FEEDERS HEAR WOES OF CONFINEMENT START.

Beef, p 16-17. July, 1971.

Descriptors: Ammonia, Feed lots, Waste storage, *Farm wastes, Oxidation, Proteins, Iowa, *Oxidation lagoons, Waste water treatment, Livestock.

Problems of an oxidation ditch at Iowa State University are described. Because the start-up period was during the winter, ammonia foam resulted. Later, equipment malfunctions, protein foam, and freezing of sewage created problems. How each problem was met, is described. (Marquard-East Central)

1137 - A2, B2, F2
REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEEDLOTS,
J. Richter.
Beef, p 20. July, 1971

Descriptors: *Feed lots, *Waste disposal, Farm wastes, Legal aspects, Water pollution control.
Identifiers: *Registration.

As of July 1, 1971, feedlots with over 1,000 head must apply for permits to discharge effluents into waterways. Smaller units, those that don't discharge from a single point source, or those that are in states of tougher control do not have to register. Agencies involved are the EPA and the Army Corp of Engineers working with the Refuse Act of 1899. (Marquard-East Central)

1138 - B1, C5, E2
HOUSED CONFINEMENT - AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA,
E. W. Manthey.
Feedlot Management, Vol 14, No 2, p 10-16, February, 1972. 6 photos, 1 fig.

Descriptors: *Feed lots, *Waste disposal, *Farm wastes, California, Confinement pens, Cattle.
Identifiers: Cow toilet.

Physical facilities are described and pictured for a housed feedlot that takes advantage of northern California's market and feed supply and overcomes the problem of the wet season. Construction time/cost are cut by new methods of casting concrete slotted floors in place. The pit beneath the lot is scraped continuously by a cable driven blade and disposed of on 160 acre fields by sprinkle irrigation. Rain runoff and overflow of troughs are piped to a pond. (Marquard-East Central)

1139 - B1
HOW WEATHER AFFECTS FEEDLOT PERFORMANCE.

Feedlot Management, Vol 13, No 2, p 38-39. February, 1971.

Descriptors: *Mud, *Rain, *Winds, *Feedlots, Farm wastes, *Weather effects, Winter, Productivity.
Identifiers: Shelter.

Studies were made of weather factors associated with winter as possible causes of reduced feedlot performance. Tests were performed under artificially produced conditions. Mud was the most serious cause of reduced production. Rate of gain was reduced and the amount of feed required increased. Artificial areas are described and resulting data are given. (Fomby-East Central)

1140 - D2, E3
ANOTHER POSSIBLE PROCESS FOR MANURE.

Calf News, Vol 11, No 1, p 38, January, 1973.

Descriptors: Feedlots, Farm wastes, *Waste treatment, Fertilizers, Ammonia.

A theory has been developed for the processing of manure which could produce 1,000 tons of ammonia per day from the manure deposits of around 600,000 cattle. This theory proposes that the manure be partially oxidized in the presence of the correct amount of air so that a synthetic gas is produced in the correct ratios to be used for ammonia production. By this process, the manure would be converted into an easily transported fertilizer which then would go back to the land to insure high crop yields. This process may also prove an answer to the problem of cattle feedlot pollution. (Anderson-East Central)

1141 - A4, A9, C3
NITRATES DANGER FOR HUMANS, TOO,
J. E. Grundman.
Missouri Ruralist, p 24-25, February 27, 1965.

Descriptors: Feed lots, *Water wells, *Nitrates, *Farm wastes, *Missouri, Water pollution sources.
Identifiers: Nitrate cyanosis.

Nitrate contamination of well water in Missouri has been recognized in recent years. Although sampling is incomplete and data not totally conclusive, nitrate pollution appears to be closely linked with proximity to feed lots and livestock wastes, silo drainage, manure piles, and septic tanks. Infants not yet consuming solid foods are subject to nitrate cyanosis from the intake of high-nitrate water in feedlot areas. A high nitrate content also accounts for a number of maladies in livestock. Suggestions for combating nitrate pollution are given. (Anderson-East Central)

1142 - A6, A9, B1, C5
WASTE-CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS,
Illinois Univ., Urbana. Agricultural Experiment Station.
D. L. Lebeda, and D. L. Day.
Illinois Research, p 15, Fall, 1965.

Descriptors: Ventilation, *Farm wastes, *Feed lots, Air pollution, *Hogs.
Identifiers: *Tolerance levels, Gas concentrations, Threshold levels.

The practice of collecting swine waste under partially or totally slotted floors has created a need to discover what pollutants are produced and to determine the tolerance levels of the swine to these pollutants. Untreated ponded swine wastes could hypothetically be expected to produce the same gases that untreated municipal waste creates under anaerobic conditions. A study was undertaken to determine the concentrations of ammonia, hydrogen sulfide, carbon dioxide, and airborne bacteria, with and without forced ventilation, in swine buildings with fluid manure. None of the gas concentrations approached the threshold levels for human occupancy, and research is now being planned to determine the tolerance levels of swine. (Dudley-East Central)

1143 - A5, B1, C3
A LOVELY NEW SCENT FOR MANURE.
Calf News, Vol 9, No 10, p 4. October, 197.

Descriptors: *Air pollution, *Sagebrush, *Farm wastes, Odor, Water pollution control.

A method of reducing manure odor with a sage brush feed additive has been discovered. This additive, which causes continuous production of volatile oils in manure and urine, seems to improve the health of the cattle with no detectable change in the taste of the beef. Plans for future research include spraying of feedlots with sage oils. The oils can be synthetically produced, but there is an abundance of natural sage. The product is not yet commercially available. (Pomby-East Central)

1144 - B1, C5
CONFINEMENT FEEDING - PROS, CONS, AND TIPS,
Illinois Univ., Urbana.
D. G. Jedele.
Feedlot Management, Vol 13, No 1, p 21-23. January, 1971.

Descriptors: Runoff, Water pollution, Air pollution, Performance, *Feedlots, *Farm wastes, Illinois, *Confinement pens.

Advantages and disadvantages of confinement feeding are described. Aspects the feeder should investigate before beginning construction of confinement buildings are discussed. (Fomby-East Central)

1145 - E3
FEED RECYCLING SHOWING PROMISE.
Calf News, Vol 11, No 1, p 28-29, 52, January 1973.

Descriptors: Feed lots, *Farm wastes, *Recycling, *Feeds, Equipment, California, Feeds.

This is a progress report on the Feed Recycling Company, a company selling equipment that takes manure from feedlots and converts it into feeds. The equipment is capable of converting a ton of manure into sugars, fibers, and 400 pounds of protein. Initial cost for the unit is $180,000 and operating costs are five dollars a ton. The end product is worth thirteen cents a pound, which could mean returns up to $600,000 a year for wastes from a feedlot. Feeding tests for the feed are now being run at a California research station. (Marquard-East Central)

1146 - B3, C5, E3
FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS.
Oklahoma State Univ., Stillwater.

Agriculture at OSU, Summer, 1972, 1 p.

Descriptors: *Farm wastes, Sheep, *Feed lots, *Proteins.
Identifiers: *Digestibility.

Feedlot dry wastes from an open feedlot were fed to sheep. Though the wastes were high in digestible protein and nutrients, a potential hazard is the entry of toxic materials into the human food chain. These first tests were limited and need to be repeated more thoroughly before any recommendations will be available. (Lee-East Central)

1147 - A1, B1, D1, E1, F1
SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
J. M. Sweeten, W. S. Allen, and D. L. Reddell.
Cattle Feeders' Information, Publication No L-1094, (1973), 4 p.

Descriptors: *Solid wastes, *Storage, *Ultimate disposal, Groundwater, Pollutants, Aquifers, *Waste water treatment, Fertilizers, *Feed lots, Cattle, Farm wastes.

Information is presented for commercial cattle feedlots on methods and costs of solid feedlot waste management; equipment selection guidelines; and agronomic effects of applying feedlot manure to cropland. (Lee-East Central)

1148 - A4, B2, D4
DAIRY WASTE PONDS EFFECTIVELY SELF-SEALING,
Agricultural Research Service, Riverside Calif. Soil and Water Conservation Research Div.
S. Davis, W. Fairbank, and H. Weisheit.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper no 72-222, 10 p, 2 tab, 1 fig, 10 ref.

Descriptors: Groundwater pollution, Farm wastes, *Infiltration rates, *Farm lagoons, Sewage ponds, *Sealing, Cattle, Dairy Industry.

Infiltration rates of contaminated water from manure ponds are discussed. Infiltration rates of a dairy waste pond were measured with irrigation water before manure water was applied. Infiltration decreased from 48 inches per day with clean water to 0.2 inches per day with manure water after 4 months. (Lee-East Central)

1149 - A2, B2, E2, F1
MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. I. Sewell.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper no. 72-443, 13 p, 7 fig, 5 ref.

Descriptors: *Pollution abatement, Runoff, Groundwater, *Slurries, Irrigation systems, *Cattle, Farm wastes, Waste disposal, Management, Feed lots.

Plans for facilities and system design for a manure slurry irrigation system are presented. This system consisting of a storage tank, chopper-agitator-pump unit, flush pits, irrigation pipe and a large sprinkle performed durably in testing and offered possibilities for improved efficiency in manure management. It created a minimum of pollution problems. The operational plans and system costs are outlined. (Fomby-East Central)

1150 - B1, C5, D1, F1, F2
OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS,
Minnesota Univ., St. Paul. Dept of Agricultural Engineering.
D. W. Bates.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No 72-413, 3 p.

Descriptors: *Waste disposal, *Waste storage, *Farm wastes, Waste treatment, Cattle, Dairy industry.
Identifiers: Stall barn, Stacking system, Bedding, Solid alleys, Slatted alleys, Liquid manure systems.

Because of the need to reduce labor in handling manure, the cost of bedding, and regulations dealing with the handling and disposition of animal manure, old manure disposal methods are being replaced by new. Various systems for the daily hauling will depend somewhat on whether the farmer has a stall barn or free-stall barn. Slatted or solid alleys, automatic scrapers, and a new manure pump which forces manure from a collection point in the barn through a pipe to an external manure pit for storage and later removal are discussed. Storage capacity is an important facet for dairymen, particularly in the colder regions of the country. Advantages of figuring construction costs prior to building, and disadvantages of 'adding on' are discussed. (Dudley-East Central)

1151 - A6, A9, B1
IMPROVED BEEF CONFINEMENT FACILITIES THROUGH PIT VENTILATION AND TEMPERED AIR INTAKES,
Northern States Power Co., Minneapolis, Minn.
M. Nabben.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-449, 7 p.

Descriptors: *Ventilation, *Farm wastes, *Viruses, Animal diseases, Cattle.
Identifiers: Fogging, Velometer test.

The high incidence of virus pneumonia in animals with cough problems in a feeder beef cattle herd prompted the owner and veterinarian to seek the cause and solution. They believed that the ventilation system (which is described in detail) was the main factor causing illness. The air flow patterns in the building were rearranged; exhaust fans were installed to remove gases created in the liquid manure pit; and electric heaters were installed in every fresh air intake to eliminate fogging. Before these changes were made, there was a 10% death loss of cattle and frequent visits were made by the veterinarian. After the changes were made (during the 1971-72 winter), there were no deaths nor veterinarian trips. (Dudley-East Central)

1152 - B1, D4

PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIRONMENT DURING A FALL-WINTER PERIOD,

Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
G. W. A. Mahoney, A. F. Butchbaker, and J. I. Fryrear.
Paper presented at 65th Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-426, 18 p, 5 fig, 1 tab, 6 ref.

Descriptors: Production, Cattle, Windbreaks, *Oxidation lagoons, *Waste water treatment, *Farm wastes, Productivity, Feeds.
Identifiers: Crowding, Slotted floors, Weight gain.

Results of feed trials made in fall-winter periods of 1969-1972 are reported. The objectives of these trials were: (1) Compare production and feed consumption for 3 levels of crowding, (2) Compare production and feed consumption rates for cattle on slotted floors with wind breaks and shades with cattle in open cattle pens, (3) Determine performance of a cattle waste oxidation ditch for fall-winter operation in the Southwest. Corresponding results were: (1) Maximum gains and feed efficiency were obtained at approximately 20-22 square feet per animal. (2) Weight gain of cattle on slotted floors was not significantly greater than those in open pens, (3) Cold weather freezing indicated that enclosure of oxidation ditches might be necessary for their effective use in the Southwest. (Marquard-East Central)

1153 - B1, C5

MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS,

Oklahoma State Univ., Stillwater.
M. D. Paine, J. A. Witz, A. F. Butchbaker, C. M. Bacon, and J. E. McCroskey.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-510, 25 p, 8 fig, 2 tab, 26 ref.

Descriptors: *Feed lots, *Mathematical models, *Energy, Systems analysis, Farm wastes, Cattle, *Animal metabolism.
Identifiers: Bioenergetics.

A mathematical model is presented that determines the amount of energy gained and lost in a feedlot situation by using a systems approach. Validation of the complete model indicated that more experience with model parameters will be necessary. However, the model did show potential for making valid estimates of animal growth and feed consumption. Possible applications of the model are demonstrated and discussed. Figures and tables list feedlot variables considered and predictions vs. experimental data in determining the validity of this mathematical model. (Marquard-East Central)

1154 - B1, C5

WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA,

Louisiana State Univ., Alexandria. Dean Lee Agricultural Center.
J. Pontif, W. A. Nipper, A. F. Loyacano, and H. J. Braud.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No 72-425, 23 p, 6 fig, 7 tab, 6 ref.

Descriptors: *Feed lots, *Farm wastes, *Louisiana, Windbreaks, *Climates, Cattle, Feedlots.
Identifiers: Shelters, Fans.

The purpose was to learn what advantage in feedlot performance of fattening cattle could be attributed to winter shelter and summer shade and fans under Louisiana feedlot conditions. Experimental procedures are detailed. Findings are reported in figures and tables. It was found that (1) winter roofs did not improve gain, (2) windbreaks were detrimental to daily gains because they prevented drying of wet floors, (3) fans did not increase gains, and (4) summer shades were most beneficial in promoting gains. (Marquard-East Central)

1155 - C1

THE FATE OF SOLUBLE MUCHIN IN THE GASTRO-INTESTINAL TRACT OF SHEEP,

Cambridge Univ. (England). Dept. of Veterinary Clinical Studies.
J. F. Hecker.
Journal of Agricultural Science, Vol 80, p 63-69, 1973, 4 tab, 40 ref.

Descriptors: *Nitrogen, *Sheep, Enzymes, Hydrolysis.

Identifiers: *Soluble mucins, *T.C.A.-soluble mucin, Rumen liquor, Caecal liquor, Faecal liquor, Gastro-intestinal tracts, Fucose, Rhamnose, Hexose, Methyl pentose, Histology.

The fate of soluble mucins in the gastro-intestinal tract of sheep was determined. Incubation of a soluble mucin with liquor from large intestinal contents resulted in loss of mucin. Some of this loss was due to soluble enzymes. The loss of mucin was less when incubation was with rumen liquor and varialbe when with ileal liquor. The mean amounts of nitrogen in a soluble mucin fraction which was soluble in trichloroacetic acid (T.C.A.-soluble mucin) were 2.5, 7.3, and 20.0 mg per 100 ml in rumen, caecal and faecal liquors respectively. These amounts were only a small proportion of the total soluble nitrogen in these fluids. Amounts of T.C.A.-soluble mucin, measured by sugar content, were greatest in contents from the small intestine. When the amounts of T.C.A.-soluble mucin were compared with the amounts of lignin in the samples, there was an increase between the abomasum and the first part of the small intestine and than a decrease to the caecu. Amounts relative to lignin were low in other parts of the gastro-intestinal tract. The liquors was in ileal liquor. The presence of the methyl pentoses, fucose and rhamnose indicates that the T.C.A.-soluble mucin is derived from mucus and bacteria. (East-Central)

1156 - A2, C5, E1

SEEPAGE LOSSES AND FERTILIZER PRESERVATION IN MANURE STACKING PRACTICE,

Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
T. S. Hsu, C. O. Cramer, and J. C. Converse.
American Society of Agricultural Engineers, Paper No. 72-442, 1972. 23p, 8 tab, 11 fig., 15 ref.

Descriptors: *Seepage, *Farm wastes, Cattle, *Solid wastes, Organic matter, *Nutrients, Nitrogen, Physical properties, Chemical properties, Volatility, Degradation (Decomposition), Dairy, *Waste disposal, *Waste storage, Wisconsin, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Manure stacking, Bedding, Steam distillation method.

A model study of manure stacking using a 3x3 factorial design with two replicates was conducted to determine the effect of type and amount of bedding on seepage losses, manure degradation and volumes. Corn stalks and oat straw were utilized in the experiment at 3 levels: (1) the control (no bedding), (2) the addition of 1.5 lb. of bedding material per 60 lb of fresh manure, and (3) the addition of 3.0 lb. of bedding material per 60 lb. of fresh manure. The following conclusions were reached: the addition of bedding material to fresh manure decreases the losses of organic matter, solids, and nutrients in the seepage from the manure stacks; corn stalks significantly reduce the losses of seepage and nitrogen, COD, BOD, and solids in the seepage while oat straw does not; a high percentage of organic matter, nutrients and solids are preserved in the stacks; and higher quantities of BOD5, COD, solids, and nutrients were lost in the seepage from the stacks with a lower level of treatment before the freezing period and immediately after the spring thaw. Experimental procedures and results are outlined. (Dudley-East Central)

1157 — B1, D1, E1, F2, F4

CANADA ANIMAL WASTE MANAGEMENT GUIDE,

Canada Committee on Agricultural Engineering. Canada Animal Waste Management Guide, Canada Animal Waste Management Guide Committee under the authority of Canada Committee on Agricultural Engineering, 57 p, 1972, 9 tab., 4 fig., appendices.

Descriptors: *Farm wastes, *Livestock, *Production, *Design, *Management, Pollution, Manure utilization, Nitrogen, Farm lagoons, Aerated lagoons, Aerobic treatment, anaerobic digestion, *Waste storage, *Waste disposal, Dehydration, Incineration, Zoning, Regulations, Legal aspects, Equipment, Fertilizers, Canada.
Identifiers: *Canada legislation, Dead bird disposal, Composting.

Current Canadian practices which provide reasonable approaches to handling animal wastes were compiled with particular emphasis on using the land as a recycling system. Detailed information is given for (1) manure management, (2) utilization of manure in crop production, (3) site selection, zoning and building construction of manure handling systems, and (4) processing of animal wastes. Relevant legislation on animal waste management in each province and addresses of equipment manufacturers are also included. (Dudley - East Central).

1158 - A2, B2, E2

DO YOU HAVE TO MOVE 'EM OR CAN YOU LEAVE 'EM,

Agricultural Research Service, Lincoln, Nebr.
N. Swanson.
Nebraska Farmer, p 13, 15, February 3, 1973, 1 fig.

Descriptors: *Feed lots, Runoff, *Waste storage, *Waste disposal, *Water pollution control, *Irrigation systems, Flood protection, Dikes, Sumps, Basins, Nebraska, Cattle.
Identifiers: SCS Rural Environmental Assistance Program.

By using help from government agencies, it is possible to control runoff from feed lots which previously might have had to relocate. As an example, the Soil Conservation Service and agricul-

tural engineers developed a dike system for a problem feedlot on the banks of a stream. The dike prevents runoff and floods and provides weather protection for the cattle. A basin collects the runoff which is then pumped into a sump and then the water is disposed of by irrigation. The solids are spread across the top and slopes of broad-basin terraces or mounded in the feedlot. (Marquard-East Central)

1159 - B1, D1, E1

METHODS OF SWINE MANURE DISPOSAL,
Illinois Univ., Urbana.
A. J. Muehling.
In: Oregon State University, Corvallis, Agricultural Experiment Station, Special Report 316, p 10-13, December 1970.

Descriptors: *Farm wastes, *Management, *Waste disposal, *Hogs, Lagoons, Irrigation, Waste treatment.
Identifiers: Solid floors with bedding, Slotted floors.

Due to new anti-pollution laws, swine producers are compelled to plan ahead before enlarging or building new facilities for their swine. Guidelines for planning such facilities are accompanied by descriptions of the following manure handling systems: (1) solid floors with bedding - store and haul, (2) slotted floors - store and haul, (3) slotted floors - combination of lagoon and hauling, (4) slotted floors - oxidation ditch-lagoon, (5) flushing gutter-lagoon-irrigation. (Dudley-East Central)

1160 - A2, C2, C3, C4, C5

CHARACTERISTICS OF CATTLE FEEDLOT SURFACE RUNOFF,
J. C. Ward, E. M. Jex, and T. E. Norton.
Typescript, (1970), 4 p, 1 tab.

Descriptors: *Feed lots, *Surface runoff, Dissolved solids, Biochemical oxygen demand, *Cattle, Conductivity, Hydrogen ion concentration, Water pollution sources.
Identifiers: Volatile solids, Van't Hoff-Arrhenius relationship, Onsager equation.

This study has two parts: (1) the complete mixing of cattle manure with distilled water to obtain characteristics of the manure, and (2) examination of surface runoff samples from cattle feedlots in order to ascertain their characteristics as a function of several hydrologic variables. In part 1, the supernatant from samples was examined for conductivity, pH, dissolved solids, volatile solids, and BOD. In part 2, a simulated rainfall apparatus was utilized to obtain runoff samples. These samples were analyzed on the spot and in the laboratory for ultimate BOD, conductivity, alkalinity, settleable suspended solids, volatile solids, and dissolved solids. (Dudley-East Central)

1161 - A9

COMMON MISUNDERSTANDINGS ABOUT HEATED DISCHARGES,
Federal Water Pollution Control Administration, Southeast Region, Atlanta, Ga.
C. B. Wurtz.
In CLEAN WATER FOR THE NATION'S ESTUARIES, Transcript of Public Meeting, Biloxi, Mississippi, January 17, 1968, p 4.

Descriptors: *Hydroelectric plants, *Heated water, *Ecology, *Aquatic animals, *Thermal pollution, Predation, Pathogenic bacteria, Physiological ecology, Animal metabolism, Animal parasites, Water quality, Bacteria, Electric powerplants, Engineering structures, Industrial plants, Structures, Powerplants, Afterbays, Spawning, Wildlife, Dissolved oxygen, Fish, Animals, Aquatic life, Food chains, Water types, Fisheries, Public health, Microorganisms, Plants.

The author describes five common misunderstnadings about the effects of heated discharges on aquatic life. These misunderstandings relate to the belief that an increase in water temperature will: (1) Cause a reduction in the capacity of the water to retain dissolved oxygen. (2) Cause a deterioration in the 'quality' of the biological community, i.e., less desirable species of organisms will replace more desirable species. This is usually argued as an increase of only two or three degrees without any scale being mentioned. (3) Cause fish to spawn earlier, and at a time when suitable food organisms for survival of the young stages will not be present. (4) Change metabolic rates to the extent that individual organisms will be living under conditions of physiological stress, and thus be vulnerable to adverse conditions they may have otherwise resisted. (5) Cause an increase in the numbers of predators, parasites, and/or pathogens, and thus cause significant deterioration of a fisheries resource or create a public health hazard.

1162 - C3, E2

PERSISTENCE OF MANURE PHOSPHORUS AVAILABILITY IN CALCAREOUS SOIL,
Arizona Univ., Tuscon. Dept. of Soils, Water and Engineering.
J. L. Abbott, and T. C. Tucker.
Soil Science Society of America Proceedings, Vol 37, No 1, p 60-63, January-February, 1973. 1 fig, 5 tab, 11 ref.

Descriptors: *Fertility, *Waste disposal, *Phosphorus, Nitrogen, *Calcareous soils, Cotton, Barley, Alfalfa, Arizona, Cycling nutrients.
Identifiers: *Plant nutrition, Pollution control.

The contribution of P from manure to Calcareous soils was studied on a Mohave clay loam. Manure treatments involved different amounts and frequency of manure application, and were split with nitrogen variables of 0, 84, and 168 kg/ha. Total P content of manures ranged from 3-5 kg per metric ton during the course of study. The results indicated that manure is an effective source of P as illustrated by the increased P content of cotton, barley, and alfalfa tissue as well as soil analysis. Manuring at 2 or 3 year intervals at 22 metric tons/ha assures adequate P availability, while P availability from phosphate fertilizers may be negligible over the same period. (Marquard-East Central)

1163 - D2, D3, E3, F5

ACTIVATED SLUDGE AS A SOURCE OF PROTEIN,
Iowa State Univ., Ames. Dept. of Chemical Engineering.
A. S. Al-Zakri, and A. L. Frey.
Paper No. 72-581, presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972, 18 p, 3 tab., 19 ref.

Descriptors: *Activated sludge, Bacteria, *Proteins, Amino acids, Nitrogen, Iowa, *Sewage treatment, Freezethaw tests, *Extraction, E. coli, Recycling, *Waste treatment.
Identifiers: Bacillus megaterium, Biuret reaction.

Activated sludge from a municipal sewage treatment plant was extremely high in protein content. A clear solution obtained from settled activated sludge was frozen and then dried in an oven to yield a solid containing by weight 16.25% nitrogen. A purified protein form was derived through a complicated extracting process. This protein compared favorably with whole cow's milk in animo acid contents. Extraction methods involved are expensive, but another technique, treatment for bacterial breakdown as required with recycling to animals, is promising. (Frantz-East Central)

1164 - A9, E3

SALMONELLA IN THE LAYING HEN. I. SALMONELLA RECOVERY FROM VISCERA, FECES AND EGGS FOLLOWING ORAL INOCULATION,
Louisiana State Univ., Baton Rouge. Dept. of Poultry Science.
N. A. Cox, B. H. Davis, A. B. Watts, and A. R. Colmer.
Poultry Science, Vol 52, No 2, p 661-666, March, 1973, 3 tab, 21 ref.

Descriptors: *Salmonella, *Farm wastes, *Poultry, Bacteria, Diseases, Analysis, Tissues, *Contamination, Eggs.
Identifiers: Inoculation, Seftenberg, Thompson, Typhimurium.

A study was made to determine the fate of Salmonella organisms after ingestion by the laying hen. Three species of Salmonella were used, i.e., senftenberg, thompson and typhimurium. Approximately one million cells of each species were introduced into the crop of 12 White Leghorn type laying hens for 10 days. The trials involving each species were carried out consecutively with thorough disinfection of equipment between trials. From each hen, feces and eggs were analyzed daily for Salmonella for the 10 day period. At the end of the 10 day trial a sample of blood was drawn from each hen for Salmonella analysis. In addition, the hens were slaughtered and a sample of the ovaries, kidneys, heart, liver and lungs was aseptically removed for analysis. Approximately 25% of the fecal samples contained the species of Salmonella under study. The percentage of positive recoveries from egg shells was less than 10% for all three species studied. Among the egg contents examined for all three species, only one egg yielded a positive recovery. All tissue samples were negative. It was concluded that there was no contamination of body tissues even after continuous ingestion of large doses of Salmonella organisms. Neither was there a problem of egg meat contamination among intact eggs. (East Central)

1165 - A7, A8

FLY CONTROL AND CHRONIC TOXICITY FROM FEEDING DURSBAN (0,0-DIETHYL 0-3, 5, 6-TRICHLORO-2-PYRIDYL PHOSPHOROTHIOATE) TO LAYING HENS,
Hawaii Univ., Honolulu. Coll. of Tropical Agriculture.
M. Sherman, and R. B. Herrick.
Poultry Science, Vol 52, No 2, p 741-747, March, 1973, 3 tab, 3 fig, 12 ref.

Descriptors: *Pesticide toxicity, *Farm wastes, *Poultry, Larvae, Feeds, Additives.
Identifiers: Dursban, *Fly control.

The effects of administering technical Dursban at concentration of 25, 50, and 200 ppm in the feed of laying hens were studied over a 52 week period. The estimated mean daily intake of Dursban was 2.48, 5.12, and 20.44 mg. per hen for those receiving 25, 50, and 200 ppm, respectively. Dursban at 50 ppm resulted in excellent control of larvae of Musca domestica L., Fannia pusio (Wiedemann), Chrysomya megacephala (F.), and Boettcherisca peregrina (Robineau-Desvoidy) but only moderate control of Parasarcophaga argyrostoma (Robineau-Desvoidy). No hen mortality occurred that could be attributed to the insecticidal treatment. There was a direct relationship between Dursban concentration and blood plasma cholinesterase inhibition. However, overall feed consumption, body weight, egg production, feed efficiency, egg weight, interior egg quality, and shell thickness were normal. Eggs from treated hens had no detectable off-flavors or off-odors. (East Central)

1166 - A1, E2, F2, F4

HOW MUCH MANURE PER ACRE.
E. D. Anderson.
The Farm Quarterly, Vol 27, No 5, p 44-45, Fall, 1972, 2 tab.

Descriptors: *Farm wastes, *Waste disposal, Hogs, Cattle, *Cycling nutrients, *Fertilizers, Groundwater pollution, *Legal aspects, Nitrates, Productivity, Potassium, Phosphorus, Regulation, Toxicity.

The laws of many states reflect concern over the harmful effects of manure on soil and water. Specific regulations for Kansas, Missouri, and Indiana are discussed. Concern is also reflected in university studies. One study was conducted at Michigan State University to determine a feasible rate of manure application. Manure applications at rates of 10, 20, and 30 tons per acre were made annually from 1963 to 1971 to Conover-Hodunk loam and Metea sandy loam. Soil samples were taken, corn yields were recorded, and mineral analyses of the corn were made. The optimum rate for applying manure to sandy loam was 10 tons per acre. Higher rates posed the hazard of nitrate contamination of ground water and buildup of available nitrogen and potassium. (Dudley-East Central)

1167 - A1, B1, F3

AGRICULTURAL WASTES--A MANAGEMENT PROBLEM,
Ohio State Univ., Columbus.
E. P. Taiganides.
In: Frontiers in Conservation, Proceedings, 24th Annual Meeting, Soil Conservation Society of America, Colorado State University, Fort Collins, August 10-13, 1969, p 90-92, (1969) 2 fig.

Descriptors: *Farm wastes, *Pollution, *Waste disposal, Subsidy, Chemicals, Confinement pens, *Municipal wastes, *Management.
Identifiers: Urban-rural interface.

Our nation's fundamental problems are poverty, pollution, population, and politics. It is necessary to have integrated and coordinated management of resources at the urban-rural interface to prevent environmental pollution. Although particular attention is given to waste management from animal confinement units, all production systems create waste. Regardless of the source-urban or rural- all of these wastes are either organic or inorganic and either solid or liquid. The wastes from all rural and urban areas must be considered as a regional problem whose solution will need the cooperation of the agricultural, industrial, urban, and other political sectors of the nation. A need exists to demonstrate the benefits of cooperation between the rural and urban sectors with an integrated regional scheme of using agricultural soils and nonproductive rural land for waste disposal. (Dudley-East Central)

1168 - A2, A4, A5, E2, F2

CALIFORNIA WASTE PONDS ARE PASSING THE TEST,
M. L. Elam.
Hoard's Dairyman, Vol 118, No 5, p 311, 362, March 10, 1973, 3 fig.

Descriptors: *Irrigation storage ponds, Leaching, Effluent, Nitrates, Salts, Leakage, Pump, Recycling, Dairy industry, *California, *Waste water (Irrigation), Fertilizers, *Farm wastes.

Three California researchers have supported waste ponds as safe and legal means by which dairymen may eliminate waste drainage problems. It is doubtful if the use of waste ponds harms other water supplies. They have little odor and insect production. may be minimized. In a wide variety of soils tested, seepage and transfer of nitrogen and salts into soil were not problems. Farm wastes were easily applied to adjacent cropland. The researchers recommended the use of fifty gallons of water per cow each day and the partial emptying of waste ponds every four to six months. (Frantz-East Central)

1169 — A1, E2

CROP YIELDS FROM LAND RECEIVING LARGE MANURE APPLICATIONS,
Texas A & M University, College Station, Texas, and Texas Agricultural Experiment Station, El Paso, Texas, and Texas Agricultural Experiment Station, Pecos, Texas, respectively.
D. L. Reddell, P. J. Lyerly, and J. J. Hefner, Presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972, 14 p., Paper No. 72-960, 7 tab,, 2 fig., 9 ref.

Descriptors: *Application methods, *Cultivation, *Crop yield, Nitrates, Forage, Salinity, *Farm wastes, Cattle, *Waste disposal, Texas, Ground water, Irrigation, Aquifer, *Fertilizers, Moisture content, Nutrients.

The objectives were to evaluate the pollution and crop growth due to deep plowing large amounts of beef manure. Two problems faced by feed lot operators have been finding sufficient land on which to use large quantities of feed lot waste and contending with the excessive salinity of such waste. Three locations with Hoban silty clay loam, and Vinton fine sandy loam were used and graduated amounts of waste up to 900 tons per acre were applied at depths of 14 to 36 inches. Rates of application and nitrate contents of crops yielded are recorded. Results of the study show peak yield and nitrate composition of crops to be on those acres with 25 and 50 tons of farm waste. However, in all locations researchers found that acres with 900 tons per acre yielded more than the check plot (0 tons per acre) and that those most heavily laden plots presented no major surface water pollution problem. (Frantz - East Central).

1170 - A4, B1, C3, E2

POLLUTION LOADS IN PERCOLATE WATER FROM SURFACE SPREAD SWINE WASTES,
Maryland Univ., College Park. Dept. of Agricultural Engineering.
H. L. Brodie. Water Resources Research Center, University of Maryland, College Park, Technical Report No. 13, October 1972. 25 p, 1 fig, 6 tab, 21 ref. OWRR A-019-MO (1).

Descriptors: *Groundwater pollution, *Farm wastes, *Hogs, *Percolation, *Flood irrigation, *Waste disposal, Nitrogen, Chemical oxygen demand, Phosphates, Chlorides, Sulfates, Maryland.

The effectiveness of the soil as a receptor for the concentrations of nutrients and organics in periodic high rate flood applications of liquid swine wastes was investigated. A lysimeter was used for collecting soil percolate waters after flood application of liquid waste or tap water and after rainfall in order to test the soil as a high-rate physical and biological filter for liquid swine wastes. Samples of the saturated flow were removed at depths of 25, 50, and 75 centimeters in the profile and tested for concentrations of chemical oxygen demand, ammonium nitrogen, chloride, total phosphate, and sulfate. The concentrations were compared with the concentrations of the applied liquid to determine net decrease of concentration through the soil profile. Results indicated that flood irrigation can lead to groundwater pollution. (Marquard-East Central)

1171 - E3

MONFORT LOOKS AT TREATED MANURE FOR TILE AND PLASTIC.
Calf News, Vol 10, No 8, p 4, August, 1972.

Descriptors: Feed lots, Plastics, *Tiles, Insulation, *Farm wastes, *Recycling, Waste disposal, *Waste treatment, *Ohio.
Identifiers: *Pyrolysis, Building materials.

Because future laws may restrict land application of feedlot manure, one feedlot has decided to use its wastes in a pyrolysis process to manufacture tile. While this will be the first commercial field test, laboratory results show that the product is superior to conventional tile. By using different proportions of manure and ground glass most building materials or insulation can be made. (Marquard-East Central)

1172 - D4, E3, F2

OXIDATION DITCH IS CATTLE FEED SOURCE.
Beef, Vol 8, No 2, p 24, October, 1971.

Descriptors: Oxidation lagoons, *Feeds, *Effluent, Cattle, Aerobic bacteria, Proteins, *Waste treatment, *Recycling, Iowa.

Effluent from an oxidation ditch was used as a feed source. A feed acceptance test found that animals on the effluent ration consumed significantly more feed. The United States Department of Agriculture and the Food and Drug Administration found the carcasses acceptable but warned that further tests must be run before commercial operators can use the effluent as a feed source. One limiting factor has been the protein level: regular feed rations contain under 20% protein while this effluent contains 46.8% protein. (Marquard-East Central)

1173 - A5, D1

NEW ODOR CONTROL PROJECT.
Calf News, Vol 10, No 7, p 22, July, 1972.

Descriptors: *Odor, Waste disposal, *Feed lots, *Lagoons, Oxygen, Nitrogen, Phosphorus, Potassium, Ash, Cattle, *Farm wastes, *Air pollution, *Waste treatment, *Oklahoma.

A new product to control odor and reduce manure volume from feedlots is now being produced by RAD Limited, Inc., of Yale, Oklahoma. The product works on dead organic matter only; and in treated lagoons, no odor gases are produced. On the feedlots, dry solids are decomposed to nitrogen, phosphorus, potassium, and ash. Further tests will determine the proper amounts to be used to prevent a cracking problem which is now encountered in the lagoons. (Marquard-East Central)

1174 - B2, D2, E2, F1

LIQUID WASTE SEEPS FROM ONE BASIN TO ANOTHER.
Feedlot Management, Vol 13, No 6, p 56-57, June, 1971.

Descriptors: Aquifer, Cattle, *Farm wastes, Feed lots, Fertilizers, Irrigation systems, *Settling basins, *Lagoons, *Waste treatment, *Waste disposal, *Water pollution control, Nebraska.

In the waste handling system manure solids and liquids go into a 'debris basin' where solids settle to the bottom. The liquid passes through a rock-filled retaining wall, seeps through a median strip to the 'blackwater basin,' and is pumped back up hill onto land. It is then channeled through irrigation outlets to surrounding croplands where it seeps into the ground, gives up its plant food nutrients, goes to an underground aquifer, and eventually deposits pollution-free water into the Missouri River. Total cost of the feedlot, including the $400 per acre cost of the pollution control system (built with farm labor and equipment most farmers have available) amounted to $27,000-$27 per animal. (Hisle-East Central)

1175 - F2

ANIMAL WASTE DISPOSAL,
Montana State Dept. of Health, Helena. Div. of Environmental Sanitation.
C. W. Brinck.
In: Montana Agriculture - Focus on Improving the Environment, (Proceedings), College of Great Falls, December 3-4, 1970, p 41-43. (1970).

Descriptors: *Water law, *Regulation, *Permits, *Feed lots, Waste disposal, Waste treatment, Water pollution control, Cattle, *Montana.

Montana water pollution laws are traced from 1907 through the 1970 regulation attempt to require feedlot location permits by 1973. Permits are to be issued on the basis of proximity of the feedlot to its neighbors, the possibility of odors being carried toward urban areas, fly problems, prevention of drainage to streams, the pollution of underground water and the potential for good feedlot maintenance. Permits will be required for all new construction. For existing feedlots, it is proposed that a permit be required for any feedlot located closer than one mile to the boundary of an incorporated city or town within one year after passage of the regulation. (Hisle-East Central)

1176 - E1

ANIMAL WASTE DISPOSAL,
Connecticut Agricultural Experiment Station. New Haven Dept. of Soil and Water.
C. R. Frink.
Compost Science, p 14-15, November-December. 7 ref.

Descriptors: *Farm wastes, *Waste disposal, Water pollution, Nitrates, Nutrients, Sewage treatment, *Fertilizers, *Farm practices.

Recent data show that manure applied to field crops does not improve yields enough to offset the cost of hauling and spreading. Alternatives are (1) stop producing manure, (2) hide it on the 'back forty,' or (3) place it in a sewage treatment plant. These are not acceptable because we need the food produced by the animals, 'hiding it' may contaminate drinking water, and sewage treatment is too expensive. With alternative methods exhausted, the data must be re-examined for application of manure to field crops. Studies indicate that improved agronomic practices will increase the efficiency of nitrogen utilization and reduce the total nitrogen imparted on the farm. It is also suggested that, when feasible, animal wastes be applied to forest lands. (Marquard-East Central)

1177 - A2, E2

DISPOSAL OF BEEF FEEDLOT WASTES ONTO CROPLAND,
Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
H. L. Manges, L. S. Murphy, and E. H. Goering.
Paper No. 72-961, presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972, 12 p, 5 fig, 1 tab, 6 ref.

Descriptors: *Farm wastes, *Waste disposal, Cattle, *Feed lots, Runoff, *Rates of application, *Irrigation, Corn (Field), Soil properties, Nitrogen, Phosphorus, Potassium, Sodium, Salinity.
Identifiers: Greensberg silty clay loam, Plant population, Forage yields.

A series of field plots were established to determine the influence of waste loading rates on corn forage yield and on soil properties. Separate field plots of Greensberg silty clay loam soil were established for disposal of runoff and manure. Runoff was applied to the land during the irrigation season; manure was spread after corn harvest and plowed under to a depth of 12 inches. Corn was surface planted on these plots with no pre-irrigation. Herbicides were used to control weeds, and irrigation water (from a well) supplemented runoff treatments and provided adequate moisture for the manure plots. The plants were counted to evaluate effects of treatments on population; the forage was weighed when ready for ensiling; and soil samples were taken at a depth of 10 feet, with additional samples at 3 feet in the manure plots, prior to corn planting, to assess decomposition of the manure. Conclusions were that corn plant population decreases linerily with increasing accumulated feedlot waste loadings; annual application of 10 inches of feedlot runoff gave maximum corn forage yields; and land disposal of feedlot wastes can lead to saline soil conditions and high nitrate-nitrogen concentrations in the soil profile. (Hisle-East Central)

1178 - A5, B1, C5

ODOR CONTROL MAY BE A BIG CONCERN,
Wisconsin Univ., Madison.
J. C. Converse.
Hoard's Dairyman, Vol 118, No 13, p 819, July 10, 1973.
U.S. Patent No 3,744,637, 5 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 912, No 2, p 550, July 10, 1973.

Descriptors: *Patents, Equipment, *Aeration, Separation techniques, *Waste water treatment, Water pollution control, Pollution abatement, Water quality control, *Baffles.
Identifiers: Clarification.

A waste treatment tank has a baffle dividing it into an aeration and a clarification section. Air flow is introduced into the tank at the bottom of the baffle in the aeration section and at the top of the baffle in the clarification section. Aeration section air flow creates a circulatory mixture flow upward along the lower wall surface of the baffle. Air introduced into the clarification section skims sewage solids from that section and forces solids into the aeration tank section. (Sinha-OEIS)

1179 - A2, B2, D2, E2, F1

THE PRICE TAG TO STOP FEEDLOT RUN-OFF,

Beef, Vol 8, No 8, p 6-7, April, 1972, 4 tab.

Descriptors: *Farm wastes, *Waste disposal, *Feed lots, Settling basins, Lagoons, Irrigation, Nutrients, Runoff, Diversion structures, Terraces (Agricultural), Missouri, *Installation costs, *Operating costs, Cattle.

A Missouri engineer calculates the cost of a system to prevent feedlot run-off at $1,000 to $3,500 plus $300 to $600 yearly operation costs. His system consists of a diversion terrace to catch run-off, a settling basin to eliminate most solid waste in run-off, and a lagoon to hold run-off water. Irrigation equipment to pump run-off to adjacent farmland is included in the cost. Pumping rates vary and liquid may be distributed by gated pipe, hand carried sprinklers, or traveling Big Gun systems. The lagoon, ranging from 110,000 cubic feet upward, requires an earthen dam. Costs on all aspects of the system have been itemized in tables according to capacity lot sized from 200 to 1,200 head. (Frantz-East Central)

1180 - A2, B1, C5, D1, F1

CATTLE FEEDLOT POLLUTION STUDY,
Texas Tech Univ., Lubbock. Water Resources Center.
D. M. Wells, E. A. Coleman, W. Grub, R. C. Albin, and G. F. Meenaghan.
Interim Report No. 1 to Texas Water Quality Board, November, 1969. 34 p, 6 fig, 11 tab.

Descriptors: *Cattle, *Feed lots, *Farm wastes, *Waste disposal, *Waste treatment, Runoff, Precipitation, Water pollution, Irrigation, Percolation, Waste storage, Ponds, Management, Biochemical oxygen demand, Nitrogen, Aerobic treatment, Anaerobic digestion, Field crops, Germination, Texas, Cattle.
Identifiers: Flushing.

Alternative feedlot management and waste disposal systems were evaluated and agronomic studies were conducted for the economic utilization or treatment of feedlot wastes. Both dirt and concrete-surfaced feedlots were used in a conventional manner. It was tentatively concluded that conventional aerobic treatment processes are not economically feasible solutions to the problem of treatment and disposal of cattle feedlot runoff resulting from natural precipitation; that runoff from feedlots operated in a conventional manner is not suitable for direct application as irrigation on most field crops; that anaerobic treatment processes offer the best hope for treatment of feedlot runoff; and that storage of feedlot runoff in unlined ponds and treatment and disposal of feedlot runoff on agricultural lands may pose a hazard to groundwater pollution. Recommendations were that further study be given to the possibility of changing feedlot practices to provide for daily flushing and treatment by conventional means; that the agronomic studies be continued to determine safe rates of application and safe dilution factors for selected crops; and that the infiltration studies be continued and expanded to include the analyses of cores taken in the vicinity of storage ponds and the construction and operation

1181 - A2, C5, D4, E3

SALMON THAT NEED NEVER SEE THE SEA,
Rhode Island Univ., Kingston.
T. L. Meade.
The American Fish Farmer, Vol 4, No 5, p 9-10, April, 1973, 3 fig.

Descriptors: *Recirculated water, *Salmon, Rhode Island.
Identifiers: *Controlled environment, *Toxic wastes, Denitrification column.

A system capable of raising salmon in a controlled environment was developed. Salmon were cultured in this controlled environment from incubation of eggs through the grow-out phase. This facility is outdoors and consists of four insulated silo-like tanks, 5 feet in diameter and 12 feet high. These tanks provide two separate culture units, each consisting of two tanks and associated biological filters, pumps, refrigeration, heating, and oxygen units. The system is essentially closed with continuous reuse of the water until the buildup of nitrate nears an unacceptable level. The results of these studies have seen incorporated in the design of a denitrification column which, when placed in operation, should eliminate the need to discharge water from the system. (Hisle-East Central)

1182 - C4, C5, D2, E3

BACTERIOLOGICAL PROCEDURES FOR ANALYZING WET AND DRIED POULTRY FECES,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
H. C. Zindel, T. S. Chang, and G. R. Carter.
Journal Article No. 5928, Michigan Agricultural Experiment Station, College of Agriculture and Natural Resources, Michigan State University, East Lansing, 1972, 4 p, 2 ref.

Descriptors: *Farm wastes, *Dehydration, *Poultry, *Bacteria, *Chemical analysis, Recycling, Incubation, Michigan.

The accurate analysis of feces, both wet and dry, for chemical and bacteriological content is important since animal feces is a raw product which has

great potential if properly gathered, processed and utilized. When Michigan State University began a dehydration process several years ago, it obtained bacteria count and identification as well as chemical analysis for both wet and dry fecal samples. The bacteria present in the feces after the drying process were identified and recorded. Some bacteria were present after the drying process, but they were not thought to be significant because most of them were normal flora in the intestinal tract of chickens and some of them are commonly known contaminants. Their presence either suggested that the retention time of the feces in the dryer was not long enough to destroy all bacterial populations or that they were recontaminated while leaving the drying unit. (Hisle-East Central)

1183 - B1, C5, E2, F1

CONFINEMENT. IN ARIZONA.

Calf News, Vol 11, No 3, p 52-53, 68-69, March, 1973.

Descriptors: *Farm management, *Farm wastes, *Confinement pens, *Feed lots, *Cattle, Effluent, Waste disposal, Irrigation system, Fertilizers, Alfalfa, Arizona.

Arlington Cattle Company decided to expand their Arizona feedlot operations through confinement housing in order to make manure management easier. The following advantages were listed for confinement housing: (1) more economical, (2) easier to handle animals, (3) better working conditions, (4) better management of mud, dust, odor, and flies, (5) a savings in manure handling of about $13,000 yearly. The manure system for the new facility will be scrapers running lenghwise under the slotted floor barns. Gravity will take the effluent to a pumping station which will move it to cropland where it merges with the flood irrigation system. Alfalfa will be grown on this property owned or controlled by Arlington Cattle Company. (Dudley-East Central)

1184 - B1, D4, E3

ANIMAL WASTE MANAGEMENT IN HAWAII,

Hawaii Univ., Honolulu. Dept. of Civil Engineering.
G. L. Dugan, R. H. F. Young, and G. Takamiya.
Journal Water Pollution Control Federation, Vol 45, No 4, p 742-750, April, 1973, 1 fig., 4 tab., 22 ref.

Descriptors: *Farm wastes, *Livestock, *Waste disposal, *Waste treatment, Air pollution, Water pollution, Goundwater pollution, Waste water treatment, Biochemical oxygen demand, Nitrogen, Ponds, Drying, Incineration, Recycling, *Hawaii.
Identifiers: Subtropical environment, Land spreading, Composting.

The unavailability of land suitable for accepting animal excrement near large animal raising facilities is a very critical problem in Hawaii. The problem is intensified by the pollution potential caused by the close proximity of land to the ocean. Various methods of managing animal waste ranging from land spreading to drying and incineration are discussed. A waste handling system that seems to be adaptable to a subtropical environment is a hydraulic recycling system incorporating photsynthetic reclamation. The process is based on hydraulic handling of animal excrement; gravity liquid-solids separation; aerobic biological treatment in which oxygenation can be accomplished either by the photosynthetic activity of algae or by mechanical aeration; anaerobic biological treatment; and harvesting algae from the aerobic phase, which provides the potential for nutrient recovery in the form of a high-protein animal feed supplement. (Dudley-East Central)

1185 - A1, B1, F1

ECONOMICS OF WATER POLLUTION CONTROL,

Economic Research Service, Washington, D.C.
J. P. Biniek.
In: Frontiers in Conservation, Proceedings, 24th Annual Meeting, Soil Conservation Society of America, Colorado State University, Fort Collins, August 10-13, 1969, p 102-106 (1969) 1 tab., 10 ref.

Descriptors: *Pollution, *Water pollution, *Economics, Herbicides, *Water pollution control, Animal wastes, Waste disposal, Livestock, Feed lots, Runoff, Waste treatment, Percolation, *Management.

In broad, general terms many problems in the economic area of pollution control are discussed. Pollution is defined as 'the unfavorable alteration of our surroundings, wholly or largely as a by-product of man's action.' Many means of ridding ourselves of pollutants often result in further pollution. The difficulty of securing a balance between production needs and the externalities of economics (the beneficial) and diseconomies (the harmful) is discussed along with the costs of pollution control, the economics of agricultural pollution and the role of economics as a whole. (Dudley-East Central)

1186 - D1, E1, F2

TECHNICAL AND LEGAL CONTROLS FOR THE DISPOSAL OF ANIMAL WASTES,

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
Raymond C. Loehr.
Proceedings of the Industrial Waste Conference, 23rd, 1968, p 507-519. 2 fig, 5 tab, 21 ref.

Descriptors: *Animal wastes, *Runoff, *Management, *Farm management, *Aerobic treatment, *Water pollution, *Water pollution control, *Water pollution treatment, *Solid wastes, *Legal aspects, Runoff forecasting, Cattle, Hogs, Poultry, Farm wastes.
Identifiers: *Manure, *Agricultural runoff, Anaerobic lagoons.

Several alternatives exist for disposal of animal wastes: (1) land disposal of liquids and solids, (2) solids combustion with land disposal of liquid, and (3) discharge of solids and liquids to receiving waters. All these alternatives are potential sources of water pollution. The quality of treated and untreated animal waste waters, both from a legal point of view and a farmers point of view, are discussed. Animal wastes are normally semi-solid, thus high in BOD, COD, suspended solids, Na, NH3. If rainfall runoff is allowed to mix with the animal wastes, a larger volume of waste will need to be treated. Many states now consider large livestock operations to be industrial processes and require treatment of wastes in such a manner that receiving waters are not harmed by discharge of animal waste waters. Waste water runoff holding ponds are commonly used with intermittent discharge to receiving waters or land disposal. Several processes are used for treatment of animal wastes, the more common being anaerobic lagoons, aerobic lagoons, aerated lagoons, oxidation ditches, or a combination of anaerobic-aerobic treatment. In more arid areas, runoff holding ponds are sometimes satisfactory. Handling and treating animal wastes as a liquid usually involves less labor, less expense, and thus is more commonly found in large livestock operations where concrete pens are found and confinement is practiced. Since liquid wastes require more treatment, handling the animal wastes directly as a semi-solid with land disposal might be a more economic method. (Makela-Texas)

1187 - B1, D4, E3

THE MANAGEMENT AND DISPOSAL OF DAIRY MANURE,

Washington State Univ., Pullman. Coll. of Engineering.
Donald E. Proctor.
Proceedings of the Industrial Waste Conference, 23rd, 1968, p 554-566, 8 fig.

Descriptors: *Animal wastes, Management, *Farm management, *Dairy industry, *Algae, *Cattle, Slurries, Spraying, Activated sludge, Farm wastes.
Identifiers: *Manure, Anaerobic lagoon, Aerated lagoon.

Dairy manure can be either an asset or a liability depending on the farmer's management policies. Increased demand for livestock-derived products, specialization of farm operations, confinement rearing, cheaper chemical fertilizers, urban sprawl and farm area encroachment, and higher aesthetic standards are all facets of the changing problem of manure disposal. Of these changes, confinement rearing is most significant. Not only is the manure concentrated into a smaller area, but rainfall runoff can treble the waste volume to be handled. Two Washington State dairy farms received Federal Demonstration Project Grants, the Knott Dairy Farm of the Washington State University receiving a grant from the FWPCA, and the Monroe Honor Farm of the State of Washington Institutional Farm Industries receiving a grant from the Public Health Service. The two-year project at the Knott Dairy Farm proposed to (1) demonstrate the capabilities of an anaerobic lagoon for first stage treatment of dairy manure, (2) demonstrate the comparative capabilities and economics of activated sludge and naturally aerated lagoons for second stage treatment and (3) determine whether it is possible and practical to reduce the nitrogen and phosphorus content of the treated effluent by algae propagation and harvesting for use as cattle feed. The Monroe Honor Farm project proposed to (1) demonstrate the capabilities of an anaerobic lagoon for first stage treatment of dairy manure. (Makela-Texas)

1188 - A5, B1, C3

IDENTIFICATION OF BEEF CATTLE FEEDLOT ODORS,

Texas Tech Univ., Lubbock. Dept. of Chemical Engineering.
R. M. Bethea, and R. S. Narayan.
Transactions of the ASAE, American Society of Agricultural Engineers, p 1135-1137, 1972, 2 fig., 2 tab., 10 ref. (Order No. T 1135).

Descriptors: *Air pollution, *Odor, *Cattle, *Feed lots, *Farm wastes, *Gases, Gas chromatography, Solubility, Alcohols.
Identifiers: Amines, Aldehydes, Esters, Carbonyls.

The qualitative nature of the gases present in the atmosphere around a beef cattle feedlot was studied. The selective solubility method was adopted for identification of volatile organic compounds caused by cow manure. Gas chromatographic analysis extended the findings of the solubility tests. A feedlot chamber was set up for a 550 pound steer in order to obtain information about compounds present in the atmosphere of enclosed feedlots. The chamber was managed three ways. One week it was thoroughly cleaned and washed each day. The next week it was shoveled out, but not washed. The third week it was not cleaned at all. During the first phase, only a few odoriferous contaminants were generated. When daily washings were discontinued, indole and skatole were detected in the chamber atmosphere. The number of compounds present in this atmosphere increased threefold during the last phase. It is inferred that chamber management has tremendous influence on the organic compounds present in the atmosphere of an enclosed feedlot. (Hisle-East Central)

1189 - B3, C3, E2, F1

A FEEDER LOOKS AT ANIMAL WASTE DISPOSAL,
Miller Feed Lot, Shepherd, Mont.
A. L. Miller.
In: Montana Agriculture - Focus on Improving the Environment, (Proceedings), College of Great Falls, December 3-4, 1970, p 44-46. (1970).

Descriptors: *Farm wastes, *Waste disposal, *Feed lots, *Fertilizers, Cattle, Nitrogen, Phosphorus, Silage, Missouri, Montana.

January 1, 1970, figures are given for the number and size of the nation's feedlots. The possibility of using animal wastes as a fertilizer is emphasized. The Miller Feed Lot analyzed its animal waste to see if it would be profitable as a fertilizer. Its value from the nitrogen phosphorus alone was about $1.00 to $3.00 per ton, so the company decided to sell the fertilizer to the farmers at not over 50 cents per ton. In order to do this quickly, a five yard capacity front-end wheel loader was used to stack the fetilizer in expanded pens and to load it on the farmers' trucks. (Hisle-East Central)

1190 - C3

NUTRITIONAL INTERRELATIONSHIPS OF DIETARY CALCIUM, PHOSPHORUS, AND MAGNESIUM IN SHEEP,
Florida Univ., Gainesville. Dept. of Animal Science.
C. F. Chicco, C. B. Ammerman, J. P. Feaster, and B. G. Dunavant.
Journal of Animal Science, Vol 36, No 5, p 986-993, May 1973, 1 fig, 6 tab, 28 ref.

Descriptors: *Calcium, *Phorphorus, *Magnesium, *Sheep, Metabolism.
Identifiers: *Nutritional interrelationships, Plasma, Fecal excretion, Basal diet, Femur deposition.

Four experiments were conducted with 116 wethers to study dietary interrelationships of calcium, phosphorus and magnesium. Including all experiments dietary levels varied as follows: calcium 0.13 to 0.78%, phosphorus 0.12 to 0.36%, and magnesium 500 to 7,750 ppm. Treatment effects on fecal, urinary, plasma and bone mineral levels were observed. In two experiments, the utilization of oral Ca and P was measured. High dietary calcium increased calcium in plasma (P<.05) and feces (P<.10 to P<.01) and decreased magnesium in bone and plasma (P<.05). High calcium increased fecal phosphorus (P<.01) and tended to reduce plasma phosphorus. Excess dietary magnesium reduced plasma calcium (P<.01), appeared to increased fecal loss of calcium but had no effect on bone calcium. High magnesium increased the level of magnesium in urine (P<.01), plasma (P<.05 to P<.01) and bone (P<.05 to P<.01). High dietary phosphorus with a Ca:P ratio of 1:3 increased fecal calcium (P<.05), but, at a higher level of calcium with a Ca:P ratio of 1:1, phosphorus enhanced calcium retention. Supplemental phosphorus increased plasma phosphorus and reduced plasma calcium (P<.01). (East Central)

1191 - A5, A8, B1, D4, E2

MOVE TO NEW LOCATION SOLVES MANY PROBLEMS FOR CUSTOM FEEDER,
E. W. Manthey.
Feedlot Management, Vol 13, No 8, p 34-44, August, 1971.

Descriptors: *Relocation, *Farm wastes, *Feed lots, Arizona, Cattle.
Identifiers: Retention pond, Fly parasites, Biological fly control, Preconditioning, Feeding out and finishing.

Ecology and odor complaints from residents living near the Phoneix stockyards plus the problem of disposing economically of cattle wastes in an urban area were only two of the reasons why the Producers Livestock Marketing Association built a new feedlot of Maricopa. Another factor was plentiful nearby farmland which could absorb cattle-produced wastes in the new location at a fair return. The new feedlot was graded to include an anti-pollution pond for bacterial and anaerobic breakdown of animal wastes and for retention of the effluent on the land. A detailed description of the construction of the feedlot is given. Both the feeding out and finishing cattle process, and the preconditioning of stockers and feeders are discussed. Gnats (2 or 3 kinds that come from Africa) are used for biological fly control. (Dudley-East Central)

1192 - A2, B1, F2, F4

IMPLICATIONS OF WATER QUALITY LAWS FOR THE FEEDLOT INDUSTRY,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Economics.
Ron E. Shaffer, and Daniel E. Badger.
Oklahoma Current Farm Economics, March 1970, Vol 43, No 1, p 3-11. 2 tab, 19 ref.

Descriptors: *Water pollution control, *Pollution abatement, *Water management (Applied), *Water Quality Act, *Environmental effects, Lagoons, Water pollution effects, Waste disposal, Cost sharing, Legal aspects, Social aspects, Fertilizers, Benefits, Arid lands, Dry seasons, Waste dilutions, Stabilization, Dissolved solids, Oklahoma, Texas, Return (Monetary), Profit, Water utilization, Productivity, Streams, Legislation, Cattle, Water treatment, Waste treatment.
Identifiers: *Quality alteration, *Trade off, *Feed lot industry, *Beef feeding industry, *Feed Yards Act.

Agricultural water users historically considered the amount of wastes and impurities that could be discharged; recent emphasis is to keep pollutants from streams. Feedlot operators must integrate and coordinate the total production process to efficiently use resources for a profitable return. They must know what legal and social requirements they have in environmental protection through water management. Large-scale operations in Texas and Oklahoma, with up to 40,000 head capacity, predominate the beeffeeding industry. The Water Quality Act and Feed Yards Act require elimination of interstate water pollution and water-resource enchancement. Oklahoma requires feedlot licensees to provide reasonable waste disposal and drainage to avoid pollution. Feedlot runoff is discussed in terms of removing undesirable solids by stabilization lagoons and dilution. These methods present special problems in dry seasons and in arid lands. Waste disposal of manure as fertilize sales is not economical, but social and legal benefits of pollution-free rivers are high. Cost sharing waste control projects are outlined. Future feedlot locations must consider access to waste disposal as well as beef markets. Environmental quality is a dimension new to the industry, which will be developed when society can tradeoff between production efficiency and environment, or develop cost-sharing programs. (Popkin-Arizona)

1193 - A2, C2, C3, C4

CHARACTERISTICS OF MILKING CENTER WASTE EFFLUENT FROM NEW YORK STATE DAIRY FARMS,
Cornell Univ., Ithaca, N. Y. Dept. of Food Science.
R. R. Zall.
Journal of Milk Food Technology, Vol. 35, No. 1, p 53-55, 1972. 1 fig, 6 tab, 3 ref.

Descriptors: *Sewage effluents, *Waste identification, *Dairy industry, *Cattle, Effluents, Farm wastes, Biochemical oxygen demand, Water pollution sources, Nutrients, Nitrates, Nitrites.

Waste profile studies of milking center (milkhouse and milking parlor) wastes from twenty-four New York State dairy farms in 20 different countries were conducted to determine the characteristics and amounts of wastes. Composite samples were collected in small plastic swimming pools, and two-quart portions transported to the laboratory where biological and chemical analyses were performed. Waste volumes were physically measured at the farms. Sixty percent of the experimental sites sampled showed a sewage load of less than 10 lb. of BOD per day farm with approximately 4 gal of waste per cow per day from milking center operations. The amounts of nitrates and nitrites were no greater than the levels from sewage treatment plant effluents. Also, there were relatively small differences in soluble N and P compounds when compared with animals/farm or with pounds of BOD produced in milking centers. The principal solids in the wastes were manure, feed, bedding, and hood dirt. (Snyder-Battelle)

1194 - A2, F3, F4

REVIEW OF NATIONAL RESEARCH POLICY ON EUTROPHICATION PROBLEMS,
Water Pollution Research Lab., Stevenage (England).
A. L. Downing.
Journal of the Society for Water Treatment and Examination, Vol 19, Part 3, p 223-238, 1970. Discussion.

Descriptors: *Eutrophication, *Algal control, Financing, Plant growth, Toxicity, Nutrients, Water quality, Nitrates, Planning, Nitrogen, Phosphorus, Reservoirs, Fisheries, Water supply, Costs, Water demand, Economic justification, Aquatic weed control, Rivers, Agriculture, Rooted aquatic plants, Drainage, Runoff, Fertilizers, Livestock, Economics, Fish kills, Inhibitors, Water pollution sources, Human diseases.
Identifiers: *Research policy, *United Kingdom, *Future trends, Cladophora, Research strategy, Thames River (England), Lee River (England).

For new water supplies and for greater recreational exploitation of natural waters in the United Kingdom, appropriate levels of activity and lines of inquiry are needed. Cost incurred as a result of eutrophication will probably not increase to more than about double the present expenditures by this century's end. If algal and weed growth were fully understood, perhaps some comparatively simple preventive measures could be applied for eliminating these nuisances. A balanced program is required for basic research and for empirical investigations, especially on static waters. Since factors influencing algal growth vary geographically, examining the influences of location of water may show that one method of control may be more appropriate than another. Though it is unlikely elimination of phosphates from detergents would materially reduce algal problems, search for trouble-free substitutes should continue. Processes used in removing nitrogen and phosphorus from effluents should be examined for suitability of removing other substances (carbon adsorption, ozonization), and ability of effluents to support algal growth by unsuspected components is profoundly important. Growth of weeds in rivers and effect of sewage effluent on Cladophora needs investigation. Insuring that present efforts are well coordinated takes precedence over embarking on many new initiatives. (Jones-Wisconsin)

1195 - A2, A3

AGRICULTURAL POLLUTION OF WATER BODIES,
Agricultural Research Service, Washington, D.C.
William M. Edwards, and Lloyd L. Harrold.
The Ohio Journal of Science Vol 70, No 1, p 50-56, Jan 1970.

Descriptors: *Water pollution, *Farms, *Livestock, *Phosphorus, *Nitrates, *Pesticides,

*Soil conservation, Runoff, Erosion, Percolation, Sediment, Waste.
Identifiers: Lake Erie, Barnyard, Solids, Liquids.

Pollution of Ohio's water bodies is of growing public concern; industrial, urban, and rural sources are becoming the subject of critical examination. Rural sources are soil sediment, plant nutrients, animal waste, and pesticides. Pesticides and phosphorus are absorbed rapidly and strongly to soil particles. Therefore reductions in sediment, phosphorus, and pesticide pollution are achieved by soil-erosion-control farming practices. More acres need to be brought under erosion-control practices. Nitrates dissolve in water and are carried by surface flow to streams and lakes, and by percolating water to underground aquifers. Increases in the use of nitrogen fertilizer, in evidence almost everywhere, could result in serious contamination of water bodies, if soil enrichment greatly exceeds the crop demand. Areas where large-scale livestock and poultry production is concentrated are also potential sources of serious pollution. In Ohio, animal-waste pollution problems are being studied at The Ohio State University, and movement of pollutants in surface and subsurface waters on drainage plots near Castalia are being studied by the Ohio Agricultural Research and Development Center and on agricultural watersheds by USDA Agricultural Research Service at Coshocton, Ohio. (Hurrold-USDA, ARS)

1196 - A2, B1, F2

CATTLE FEEDERS MUST COMPLY WITH ANTI-POLLUTION LAWS,
R. Reiman.
The Cattleman, Vol. 58, No. 2, p. 43, 58, July 1971.

Descriptors: *Legal aspects, *Pollution abatement, *Agricultural runoff, *Return flow, *Waste disposal, Cattle, Permits, Discharge (Water), Animal wastes (Wildlife), Feedlots, Texas, New Mexico, Oklahoma, Irrigation water, Pollutants, Surface waters, Water pollution control, Sediment discharge, Erosion, Salinity, Fertilizers, Pesticides, Water quality control, Taxes.

Current federal anti-pollution laws for cattle feeders are reviewed. The Environmental Protection Agency (EPA) now requires that a permit be obtained from the Army Corps of Engineers before any discharges or deposits can be made into a navigable stream. The ruling applies to feedlots with more than 1,000 animal units and all new feedlots. It applies to at least 306 lots in Texas, 45 in New Mexico and 48 in Oklahoma. It is estimated that 10,000 beef cattle on a feedlot produce 200 tons of daily waste, comparable to a 100,000 to 200,000-person city. Agricultural runoff, irrigation return flow and confined feeding operations concern the EPA. The greatest quantity of pollutants in the surface waters of the country is sediment caused by erosion. Increased salinity concentration in receiving waters is a problem, especially when coupled with fertilizers and pesticides. Management of polluted waters is a growing research area. Some practices qualify for tax breaks. (Popkin-Arizona)

1197 - A2, A4, A9, C3

NUTRIENT LOSSES FROM AGRICULTURAL LAND,
Imperial Chemical Industries Ltd., Jealott's Hill (England). Jealott's Hill Research Station.
T. E. Tomlinson.
Outlook on Agriculture, Vol 6, No 6, p 272-278, 1971. 2 fig, 8 tab 19 ref.

Descriptors: *Eutrophication, *Agricultural runoff, Fertilizers, Nitrates, Percolation, Farm wastes, Drainage water, Feed lots, Nitrogen, Phosphorus, Potassium, Rivers, Leaching, Soil erosion.
Identifiers: Britain.

Considering problems of eutrophication and high nitrate levels specifically toxic to infants, a review was made of known nutrient losses from agricultural land and how these relate to farming, especially in England. Nutrients are lost from farmland by drainage water percolating through the soil leaching soluble plant nutrients, by inefficient return of livestock excreta to the land, and by erosion of surface soils or movement of fine soil particles into subsoil drainage systems. Lysimeter studies indicate that the nature of the cropping greatly influences loss of nitrate in drainage and confirm the possibility of large losses from soil reserves in certain circumstances. Many soils contain large reserves of nitrogen which can be released as nitrate over long periods of time, even if the soils are not cropped or fertilized. Phosphate levels of drainage water from soils are low, as illustrated by lysimeter studies. There is little danger that a large proportion of potassium fertilizer application will be lost in drainage. It is concluded that, at the present time, there do not seem to be grounds for serious concern about a general nitrate level rise in English rivers. (Jones-Wisconsin)

1198 - A3, C2, C3

CHEMICAL AND DETRITAL FEATURES OF PALOUSE RIVER, IDAHO, RUNOFF FLOWAGE,
Eastern New Mexico Univ., Portales. Dept. of Biological Sciences.
Philip A. Buscemi.
Oikos, Vol 20, No 1, p 119-127, 1969. 3 fig, 3 tab, 30 ref.

Descriptors: *Runoff, *Groundwater, *Seston, *Sediments, Organic matter, Currents (Water), Water pollution sources, Surface runoff, Rainfall, Snowmelt, Surface waters, Streams, Hydrogen ion concentration, Iron, Magnesium, Nitrates, Phosphates, Algae, Detritus, Pulp wastes, Livestock, Idaho.
Identifiers: Tree bark, Charcoal, Algal growth, Stream concourse, Palouse River (Idaho).

Water and sediment samples were collected at four stations established on Palouse River, Idaho. Determinations included pH, nitrate, phosphate, iron, manganese, hardness, suspended detritus (drifting seston), and organic content of sedimentary deposits. The results show influence of rainfall, melt water, stream inflow, and mill pond on seston concentration. Variation in chemical composition of water indicated the effect of either melt water runoff or subterranean discharge. The increased pollution of water and sediment enrichment in organic matter were correlated with locations of lumber camps and cattle grazing. (Wilde-Wisconsin)

1199 - A7, C3, C4

IMPROVED PROCEDURES FOR THE DETERMINATION OF OXYTETRACYCLINE IN MILK, MILK PRODUCTS; CHICKEN MUSCLE, LIVER; AND EGGS,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Biochemistry and Microbiology.
S. E. Katz, and C. A. Fasebender.
Bulletin of Environmental Contamination and Toxicology, Vol 7, No 4, p 229-236, April 1972. 8 tab, 6 ref.

Descriptors: *Antibiotics (Pesticides), *Analytical techniques, *Evaluation, *Pollutant identification, *Milk, *Poultry, Organic pesticides, Methodology, Centrifugation, Bioassay, Pesticide residues, Methodology, Foods.
Identifiers: *Biological samples, *Oxytetracycline, Milk products, Tissues, Muscle, Liver, Eggs, Detection limits, Bioaccumulation, Recovery, Chlortetracyline.

The improved procedures for determining oxytetracycline in milk and dairy products, chicken muscle tissue and livers, and eggs are evaluated. The procedures used were based upon those developed for chlortetracycline in similar materials and are compared to the procedures listed in the FDA compendium of methods and protocols. The procedural improvements include pH adjustment, centrifugation, single agar layer, high temperature seeding and spreading of agar, and the use of a surfactant. A summary of the detection limits and analytical measurement for the individual procedures shows that the centrifuge modification, pH adjustment where applicable, and the use of surfactant when necessary have significantly improved the ability to measure residues of oxytetracycline in milk, eggs, and chicken tissue. (Holoman-Battelle)

1200 - A3, C1

PROGRESSIVE CHANGES IN THE CLADOCERAN AND MIDGE FAUNA DURING THE ONTOGENY OF ESTHWAITE WATER,
Indiana Univ., Bloomington.
Clyde E. Goulden.
Verhandlungen der Internationalen Vereinigung fur Theoretische und Angewandte Limnologie, Vol 15, p 1000-1005, 1964. 2 fig, 13 ref.

Descriptors: *Midges, *Lakes, Eutrophication, Pollen, Sediments, Climates, Productivity, Sheep, Hypolimnion, Anaerobic conditions, Daphnia.
Identifiers: *Esthwaite Water (England), *Cladocera, *Ontogeny, Chydoridae, Daphniidae, Bosminidae, Sididae, Polyphemidae, Leptodoridae, Deforestation, Chironomus, Sergentia, Tanytarsus, Ceriodaphnia.

Changes in total populations throughout Esthwaite Water's history and successional changes of Cladocera and midges associated with eutrophication are discussed. The Cladocera species were divided into the 'chydorids' and the 'non-chydorids,' mostly planktonic in habit. The Cladocera and midges suggest that Esthwaite Water was an oligotrophic lake during most of its development and only within the last 900 years became eutrophic under man's influence. Further, they indicate there were four periods of increased productivity during the lake's development associated with climatic or cultural changes in the drainage basin. Greater productivity is expected in these intervals, and the fact that the Cladocera correctly suggest this implies that they can be of great usefulness for determining past productivity in lakes. Cladoceran remains in lake sediments appear to be a valuable tool for paleolimnologists. They may be used to determine periods of climatic and cultural changes and for deducing past limnological conditions of a particular body of water. By studying the distribution and abundance of individual species in the sediment, we can estimate the ecological requirements of these species. This in turn will suggest fruitful areas of further research on living forms. (Jones-Wisconsin)

1201 - A2, A3, A4, F2

OKLAHOMA FEED YARDS ACT.
Oklahoma Statutes Ann Title 2, secs 9-208, 9-210 (Supp 1970).

Descriptors: *Oklahoma, *Water pollution, *Water pollution control, *Surface drainage, Surface waters, Surface runoff, Water pollution sources, Livestock, Pollutants, Water quality control, Domestic animals, Agriculture, Legal aspects, Legislation.

Each licensed feed yard operator is required by this statute to provide adequate drainage for surface waters; avoid pollution of any stream, lake, river, or creek; and provide reasonable methods for the disposal of animal excrement. (Madsen-Florida)

1202 - A3, A7, F2

OWENS V. UNITED STATES (LIABILITY OF UNITED STATES FOR NEGLIGENT APPLICATION OF INSECTICIDE, POLLUTING POND OF ADJACENT LANDOWNER).

294 F. Supp. 400-405 (S.D.Ala. 1968).

Descriptors: *Alabama, *Water pollution, *Insecticides, *Rainfall, Cattle, Ponds, Streams, Federal government, Administrative agencies, Rain, Legal aspects, Judicial decisions, Water pollution effects, Water pollution sources, Pollutants, Water wells, Damages, Remedies, Regulation.

Plaintiff cattle rancher sought to recover damages for injury to his herd from defendant United States under the Federal Tort Claims Act. Plaintiff's property included part of a small pond from which the cattle watered. The pond was supplied from rainfall and water drainage. A dry-bed drainage creek drained into the pond. Federal Department of Agriculture employees treated the property adjoining plaintiff's with a chemical insecticide. Thereafter, a heavy rainfall occurred which washed this insecticide into the dry-bed creek, and ultimately to plaintiff's pond. The pond was fenced off, and the cattle were not poisoned. Nevertheless, plaintiff claimed damages from loss of part of his pasture, reduced milk production, increased food cost, and the expense of drilling a well for water. Defendant contended that plaintiff's injury resulted from the rainfall, an act of God, and that it was not liable. The Federal District Court however, determined that under Alabama law an act of God would not render defendant immune where its negligence was also an acutal cause of plaintiff's injury. Since the court concluded that defendant's negligence was an actual cause of the injury, defendant was held liable. (Hart-Florida)

1203 - A2, A3, A4, F2

FOULING OF WATERS A MISDEMEANOR.

North Dakota Century Code Ann secs 61-01-12 thru 61-01-14 as amended (Supp 1969).

Descriptors: *North Dakota, *Water pollution sources, *Water pollution control, *Waste disposal, Water quality, Water quality control, Wastes, Industrial wastes, Refuse, Sewage effluents, Gasoline, Oil wastes, Farm wastes, Cattle, Sheep, Hogs, Sewage disposal, Streams, Rivers, Public health, Administrative agencies.

Section 61-01-12 provides that the fouling of public waters by depositing gas tars or other refuse from any gas house into streams, rivers or sewers that empty into public waters is a misdemeanor. Section 61-01-13 provides the fouling of public waters with dead animals, offal, or other refuse by depositing same on the banks or in any lake or stream within the jurisdiction of the state is a misdemeanor punishable by a fine of from $20 to $100. Section 61-01-14 provides that section 61-01-13 shall be construed to include: (1) privies and privy vaults; (2) any stable, shed, pen, yard, or corral where farm animals are located within sixty feet of the top of any lake or stream; and (3) any slaughterhouse, graveyard or cemetery within eighty feet of these waters. However, in an emergency, these provisions do not prevent any municipality from dumping untreated sewage into these waters provided they are not determined detrimental to public health. (Rees-Florida)

1204 - A2, F2

OHIO STOCK FOOD CO V GINTLING (STREAM POLLUTION BY UPPER RIPARIAN HOG FARM).

153 NE 341-345 (Ohio Ct App 1926).

Descriptors: *Ohio, *Municipal wastes, *Garbage dumps, *Pollution abatement, Water pollution, Wates disposal, Legal aspects, Judicial decisions, Streams, Hogs, Riparian water, Riparian land, Riparian rights, Farms, Farm wastes.

Defendant corporation owned a farm one mile from plaintiff's farm. Defendant, under contract with a municipality, received the city's garbage and disposed of it by feeding it to hogs. A stream flowed through defendant's property, then passed through plaintiff's land. Plaintiff brought a nuisance action for damages, alleging that during the operation of its farm, defendant polluted the stream through drainage of liquid, filth and refuse. Defendant contended that its acts in the operation of its farm were authorized by law, inasmuch as it had a contract with a municipality to dispose of the garbage. The Ohio Court of Appeals held that plaintiff was liable for damages, notwithstanding the municipal contract. An upper proprietor of land cannot by artificial means pollute a stream to the injury of a lower riparian owner. (Powell-Florida)

1205 - A2, F1

SUMNER V O'DELL (INJUNCTION TO PREVENT POLLUTION OF SPRING WATER BY CATTLE).

12 Tenn App 496-500 (1930).

Descriptors: *Tennessee, *Water pollution, *Streams, *Reasonable use, Cattle, Domestic water, Riparian rights, Water quality, Spring waters, Springs, Legal aspects, Judicial decisions, Water pollution sources, Remedies, Relative rights.

Plaintiff lower riparian landowner sought to enjoin defendant upper riparian landowner from polluting the stream bordering their property. Plaintiff's and defendant's tracts were previously owned by one person, who conveyed plaintiff's tract first, along with the right to use the spring water flowing from defendant's tract. When defendant purchased the upper tract, he began using the lot through which the stream flowed as a confinement for cattle. The cattle polluted the water so that it was unfit for plaintiff's domestic uses. Apparently defendant's actions were purposeful, and with some malice, since the evidence presented clearly showed that defendant could have erected his fences to prevent pollution of the spring water. The Tennessee Court of Appeals held that defendant was utilizing his property unreasonably with respect to plaintiff's rights, and enjoined use of the lot as a cow pasture and path. (Hart-Florida)

1206 - A2, B1, F2

POLLUTION OF STREAMS.

Del Code Ann tit 16, secs 1301, 1302 (1953).

Descriptors: *Delaware, *Water pollution, *Streams, *Water pollution sources, Pollution abatement, Public health, Wastes, Industrial wastes, Water quality, Chemcontrol, Sewage, Organic wastes, Legislation, Judicial decisions, Water supply, Hogs, Water quality control.
Identifiers: Dye-stuffs, Slaughter houses.

No person shall discharge or allow any dye-stuffs, drugs, or chemicals which cause the stream to become noxious to the health or disagreeable to the senses to escape into any stream used as a water supply. In addition to imposing a fine for violation, the court shall also issue an abatement order within 20 days after conviction. The abatement shall be enforced by the sheriff. No person shall place a privy, hog-pen or slaughter house so as to pollute any stream with the excrement or offal therefrom. Violators shall be fined and the court shall order the nuisance abated immediately. (Helwig-Fla)

1207 - A2, B1, F2

FAIRES V DUPREE (WATER POLLUTION FROM ANIMAL WASTES).

197 SW 2d 735-738 (Ark 1946).

Descriptors: *Arkansas, *Hogs, *Animal wastes, *Water pollution, Cold springs, Farm wastes, Impaired water quality, Public health, Seepage, Damages, Legal aspects.
Identifiers: *Damages (Legal aspects).

Plaintiff brought action for damages resulting from the operation of a hog ranch in an unsanitary manner on land situated adjacent to plaintiff's property. The court found there was insufficient evidence to show an ascertainable monetary loss to plaintiff's spring from defendant's operation of a hog farm near plaintiff's land in such a manner that seepage from garbage washed down filling plaintiff's spring, polluting the water, and infecting it with maggots. However, evidence that plaintiff had periods of vomiting, nausea, and general debility presented a question for the jury as to whether plaintiff's illness was caused by the imposition of stench, flies, and filth or whether plaintiff was overstating the corrupting causes. Therefore, case was reversed and remanded for new trial. (Reed-Fla)

1208 - A3, F2

GREEN V MCCLOUD (ACTION TO ENJOIN SEWAGE FLOW).

303 Ky 267, 197 SW 2d 258-261 (1946).

Descriptors: *Kentucky, *Domestic wastes, *Water pollution, Prescriptive rights, Sewage sludge, Sewage effluents, Livestock wastes, Disposal, Farm wastes, Decomposing organic matter, Riparian waters, Dairy industry, Distribution systems, Nuisance (Water law), Legal aspects, Judicial decisions, Poultry.

Plaintiff brought suit to enjoin defendant from interfering with a sewer line which belonged to plaintiff and another. Defendant filed a counterclaim, consolidated with an action against two others to enjoin them from allowing sewage from residences and outbuildings to run through open ditches or buried pipes in the bed of small stream near defendant's property. From adverse judgments, defendant appealed. While there is no prescriptive right to maintain a nuisance, the fact that defendant moved onto the land upon which the nuisance existed is an important factor to be considered in determining the equities. The court found that the evidence authorized a finding that the sewer line emptying sewage from residences and outbuildings into the small stream did not constitute a nuisance which would be enjoined and consequently affirmed the judgments. (Reed-Fla)

1209 - A2, F2

ATKINSON V HERINGTON CATTLE CO (FEED LOT OPERATOR'S AND CATTLE OWNER'S JOINT LIABILITY FOR CATTLE WASTE RUNOFF).

436 P2d 816-828 (Kan 1968)

Descriptors: *Cattle, *Waste water (Pollution), *Damages, *Kansas, Water pollution sources, Farm wastes, Pollution abatement, Surface runoff, Water pollution effects, Water pollution control, Remedies, Legal aspects, Judicial decisions, Livestock, Stock water, Water supply, Water wells, Coliforms, Sewage bacteria, Nitrates.

In an action for damages arising from the pollution of plaintiff dairy farm owner's water supply by defendant cattle rancher's feeding operations, the Kansas Supreme Court held that the evidence was sufficient to support a judgment for actual, but not punitive, damages. The court agreed with plaintiff's contention that there was ample evidence to find that the waters of a creek and plaintiff's well were contaminated with coliform bacteria and nitrates

following a runoff of rains from defendant's premises. The supreme court construed the lower court's ruling to mean that runoff becomes a harmful substance when it consists of contaminating bacteria and chemicals in such amounts as to produce excessive pollution which results in injury. The fact that a business is lawful does not exempt it from liability when contaminated or polluted water escapes onto the land of another in such quantities as to cause injury. The owner of the cattle being fed by defendant rancher was held jointly and severally liable since the bailment contract with defendant rancher vested essential control over the operation in the cattle owner-bailor. (Gallagher-Florida)

1210 - A2, A3, F1, F2

MEASURE AND ELEMENTS OF DAMAGES FOR POLLUTION OF A STREAM,
W. R. Habeeb.
49 ALR 2d 253-314.

Descriptors: *Judicial decisions, *Damages, *Water pollution, Reasonable use, Value, Market value, Depreciation, Economic rent, Water utilization, Odor, Trees, Crops, Recreation, Boating, Swimming, Fish, Livestock.

Elements to be considered when measuring damages for stream pollution are examined. Where permanent or irreparable damage results, recovery may be had for the depreciation of market value of the property. However, where the damage can be remedied at a cost lower than the loss in market value, the cost of such repair becomes the measure of damages. Where the pollution is temporary or abateable, the measure is the depreciation in the rental or usable value of the property. Special damages may also be recovered, as may punitive damages, depending upon the particular circumstances. Particular items of damages such as impairment of use and enjoyment of property, noxious odors, discomfort and inconvenience, sickness, trees, crops, deprivation of use of water, recreation privileges, fish, death and injury of livestock, injury to business, expense of repairing injury, fencing, procuring water, expense of mill operations, and others are also examined. (S. Scott-Fla)

1211 - B1, C5

ELECTRIC POTENTIALS AND DOMESTIC WATER SUPPLIES,
Washington State Univ., Pullman.
L. B. Craine, M. H. Ehlers, and D. K. Nelson.
Agricultural Engineering, Vol 51, p 415-417, July 1970, 2 fig, 1 tab.

Descriptors: *Water supply, Agricultural engineering, *Cattle, Electrical grounding, Water consumption, Electrical networks, Electric currents.
Identifiers: *Electrical potential, Voltage.

Electric potentials on domestic water systems affected water consumption and productivity of cattle. The problem of annoying voltage resulted from a single-phase two-wire multiple-grounded system with primary distribution and secondary utilization neutrals solidly bonded together. The problem was solved by separation of grounded neutrals of the primary distribution system from the farm secondary system. An electrified fountain system was built to test effects of controlled water system voltages on animal water consumption. At current levels of 19 ma and at a level of 8 volts the cattle would not drink for an 8 hour period. (Galwardi-Texas)

1212 - A3, C4, C5

EFFECTS OF MULTIPLE USE ON WATER QUALITY OF HIGH-MOUNTAIN WATERSHEDS: BACTERIOLOGICAL INVESTIGATIONS OF MOUNTAIN STREAMS,
Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
D. G. Stuart, G. K. Bissonnette, T. D. Goodrich, and W. G. Walter.
Applied Microbiology, Vol. 22, No. 6, p 1048-1054, December 1971. 6 fig, 2 tab, 15 ref.

Descriptors: *Water quality, *Watersheds, *Mountains, *Bacteria, *Water pollution sources, *Watershed management, Coliforms, Enteric bacteria, Cultures, Sampling, Nutrients, Montana, Recreation, Animal wastes, Streams, E. coli, Lumbering, Camping, Water supply, Wildlife, Chemical analysis, Salmonella, Pathogenic bacteria, Shigella, Filtration.
Identifiers: Enterobacter aerogenes, Hyalite watershed, Mystic watershed, Proteus, Streptococcus faccium var durans, Streptococcus faecalis var liquefaciens, Streptococcus bovis.

Bacteriological studies in 1968 and 1969 corroborated earlier findings that a municipal watershed which had been closed to public entry since 1917 yielded water with four to six times the coliform count found in an adjacent mountain watershed open to recreational activities. Similarly, chemical investigations showed higher concentrations of most ions in water from the closed area. Physiological differentiation of coliform and enterococcal bacteria revealed similar types of organisms in both animal droppings and stream, with fecal coliforms accounting for as much as 70 percent of the coliform counts observed in the closed area in 1969. Opening of the closed drainage for limited recreation and expanded logging operations in the spring of 1970 coincided with an unexpected decrease in bacterial contamination of that stream. It is postulated that these human activities drove from the watershed a large wild animal population which had contributed substantially to the previous bacterial pollution. It would seem that the practice of closing high-mountain watersheds to public entry is questionable if governmental standards for water quality are to be met, and it also seems that the standards themselves should be reexamined. (Jefferis-Battelle)

1213 - C4

A COMPUTER PROGRAM FOR IDENTIFYING MICROORGANISMS,
Quincy Coll., Ill.
W. Gasser, and K. M. Gehrt.
BioScience, Vol. 21, No. 20, p 1044-1045, October 15, 1971. 3 tab, 7 ref.

Descriptors: *Pathogenic bacteria, *Enteric bacteria, *Computer programs, Programming languages, *Pollutant identification, Microorganisms, Computer models, Automation, E. coli, Data processing, Pseudomonas, Salmonella, Streptococcus.
Identifiers: Proteus vulgaris, Pseudomonas aeruginosa, Alcaligenes faecalis, Serratia, Serratia marcesens, Salmonella typhosa, Klebsiella, Klebsiella pneumoniae, Staphylococcus, Staphylococcus aureus, Sarcina lutea, Diplococcus pneumoniae, Streptococcus pyogenes.

A computer program has been developed to identify microorganisms from test results. Results from standard microbiological tests (e.g. gram stain, glucose fermentation) are used in the program. Where many organisms are identified from limited test results, results from additional chemical tests may be entered for complete identification. Some of the advantages of the program are: ability to handle several sets of input data, easy program modification, and the need for minimal programming knowledge. An identification matrix is included for E. coli, Proteus vulgarus, Pseudomonas aeruginosa, Alcaligenes faecalis, Serratia marcesens, Salmonella typhosa, Klebsiella pneumoniae, Staphylococcus aureus, sarcina lutea, Diplococcus pneumoniae, Streptococcus pyogenes. (Mackan-Battelle)

1214 - A2, A3, A4, C5, F3

THE DISPOSAL OF AGRICULTURAL WASTE,
Douglas Gowan.
Effluent and Water Treatment Journal, p 303-308, June 1971. 2 tab, 10 ref.

Descriptors: *Waste disposal, *Farm wastes, Water pollution, Fertilizers, Farm management, Livestock, Economics, Copper, Arsenic compounds, Odor, Sewers, Biochemical oxygen demand, Slurries, Chlorides, Ammonia, Nitrogen, Dairy industry.
Identifiers: United Kingdom, Farm income.

The present United Kingdom laws make it unlawful to discharge farm drainage into a stream without consent of river authorities; river authorities also have power to control pollution of underground water. Over 131,000 farm discharges to watercourses in the United Kingdom are known, the combined effect posing serious consequences. The basic need is cheaper methods of dealing with manure and other wastes from large animal concentrations. Cattle wastes have quite different characteristics from domestic wastes and chemical residues from feed additives can give rise to serious difficulties in the effects on biological treatment processes. To control odor of animal excreta, ammonium persulphate has proven effective. Farm wastes disposal onto land and into public sewers are discussed and population equivalents are considered. Every farm is different and must be treated individually for assessing charges for reception and treatment in the public sewer. Discharges from dairy farms and from mixed farms are tabulated. Today local authorities have the means of obtaining relatively accurate information for design of treatment plants as well as for the assessment of charges. (Jones-Wisconsin)

1215 - C3

AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES,
Agricultural Research Service, Kerryville, Tex. Toxicological Research Lab.
L. M. Hunt, and B. N. Gilbert.
International Journal of Applied Radiation and Isotopes, Vol 23, No 5, p 246-249, May 1972. 1 fig, 2 tab, 8 ref.

Descriptors: *Digestion, *Tritium, *Automation, Chemical analysis, Bioassay, Pollutant identification, Suspension, Quenching, Aqueous solutions, Animal wastes, Solvent extractions, Water pollution sources, Thiocarbamate pesticides, Sheep.
Identifiers: *Biological samples, *Combustion, Ferbam, Tissue, Recovery, Liquid scintillation, Sample preparation, Lungs, Pancreas, Bone, Heart, Brain, Spleen, Muscle, Liver, Kidneys, Feces, Blood.

In order to find the most feasible method for analyzing tritium-tagged biological samples, the more frequently used techniques for noncombustion preparation, digestion, suspension, and extraction were compared with the automated combustion method. Sheep tissues were collected and prepared, and ferbam, a dithiocarbamate fungicidal compound, was used for recovery determinations. With the automated combustion method, the mean recovery for the first eight tissues at the 25 milligram level was 95 percent compared to 69 percent using digestion. When the sample sizes were increased, a notable difference in the comparison was apparent, as the percentage recovery was 82 percent for combustion and 40 percent by digestion. It appeared that digestion rather than combustion of the 25 milligram muscle samples was superior. No corrections were made for quenching in order to get a true comparison of the two methods of analysis. The disparity in

methodology became marked with sample sizes of 50 and 100 micorliters with combustion maintaining a high efficiency, while digestion significantly decreased as sample size increased. Combustion had the advantage of speed (8-10 minutes per sample) with no clean-up between combustions. (Byrd-Battelle)

1216 - C3

IDENTIFICATION OF METABOLITES OF N - (1, 1-DIMETHYLPROPYNYL) - 3,5 DICHLORBENZAMINE IN RAT AND COW URINE AND RAT FECES,

Rohm and Haas Co., Springhouse, Pa., Research Labs.
Roy Y. Yih, and Colin Swithenbank.
Journal of Agricultural Food Chemistry, Vol. 19, No. 2, 1971 p 320-324, 3 fig., 3 tab., 7 ref.

Descriptors: *Farm wastes, Laboratory tests, Chemical analysis, Metabolism, Radioactivity techniques, *Pollutant identification.
Identifiers: *Metabolic pathways, Chemical structure, Metabolites.

This is the continuation of studies to determine the comparative metabolism of N- (1,1-dimethylpropynyl)-3,5-dichlorobenzamide in soil, plants, and animals. Nine metabolites were identified in soil and alfalfa treated with this compound. This study concerns the isolation, identification and synthesis of these metabolites in rat and cow urine and rat feces. Tentative metabolic pathways and its comparative metabolism in soils, plants, and mammals are postulated. (Christenbury-Iowa State)

1217 - A2, A3, C4

APPLYING BACTERIOLOGICAL PARAMETERS TO RECREATIONAL WATER QUALITY,

E. Geldreich.
Journal of the American Water Works Association, Vol 62, No 2, p 113-120, Feb 1970. 8 p, 53 ref.

Descriptors: *Recreation, *Bioindicators, *Water quality, *Bacteria, Aquatic bacteria, Aquatic microbiology, Aquatic microorganisms, Coliforms, Salmonella, Streptococcus, Water pollution, Water pollution sources, Pollutant identification, Path of pollutants, Animal wastes (Wildlife), Public health, Standards, Farm wastes, Water zoning, Sediment-water interfaces, Domestic wastes, Legal aspects, Sewage bacteria, Pathogenic bacteria.
Identifiers: *Fecal pollution.

Fecal contamination from all warm-blooded animals is the natural link to pathogenic microorganisms in polluted water. The fecal coliform test accurately detects and measures such fecal contamination. Use of the fecal coliform test as a measure of recreational water quality is recommended. Data and tables are given to show a correlation between fecal coliform and the probable occurance of Salmonella, an easily detecting pathogen. Court hearings are cited that establish the legal status of the fecal coliform test. The water-sediment interface of a stream or lake bottom can serve as a reservoir for fecal pollution 'fallout' from overlying water. The fecal-streptococcus group's diverse survival rates and specific fecal origins make them specific indicators for nonhuman, warm-blooded, animal pollution. Various minimal bacterial densities are suggested to insure good recreational water quality. (Cuevas-Florida)

1218 - A2, A3, A4, A9, F4

FUTURE WATER QUALITY DESIGN,

California State Department of Public Health, Berkeley.
Frank M. Stead.
Journal of the American Water Works, Vol. 59, No 12, December 1967, pp. 1497-1501.

Descriptors: Water quality, *Water pollution, *Water quality management, Stream conditions, Standards, Industrial wastes, Public health, Water pollution sources, Municipal wastes, *Waste water disposal, Benefits.
Identifiers: Pathogens, Pesticide pollutions, Total management, Aquatic system.

Pollution control alone will not preserve water quality in the U.S. because it is based on a concept of disposal of wastewaters from municipalities and industries. In both cases the sewage is no longer wanted, and most often put back into the rivers. With half the total annual water replenishment put to use and converted to wastewater, it is important to consider how much dilution is necessary to keep waters up to present standards. There are three basic choices; (1) discharge the entire waste stream to the ocean or evaporate it, (2) through treatment bring the wastewater up to a sufficient level of quality so that when it is diluted it meets standards for all uses, (3) through treatment bring each individual waste stream up to the standard of quality for a specific use and put resulting 'reclaimed' water to that use directly, without returning it to either surface or ground waters. Current standards concerning pathogens and pesticides have not been given enough study to really indicate possible impairment of human health. What is needed is a new water policy for the U.S. -a policy involving total management of water resources. The entire aquatic system must be analyzed and a new system of distribution in terms of benefits must be devised. (Gargola-Chicago)

1219 - A2, A3, A4, A9, F4

NITRATES IN THE ENVIRONMENT,

Wisconsin Univ., Madison. Dept. of Civil Engineering.
M. Starr Nichols.
Journal American Water Works Association, Vol 57, No 10, p 1319-1327, 1965. 25 ref.

Descriptors: *Nitrogen, *Atmosphere, *Biosphere, Fertilization, Nitrogen fixation, Denitrification, Wastes, Nitrogen fixing bacteria, Ammonia, Odor, Aquatic plants, Groundwater, Toxicity, Waste treatment.
Identifiers: Nitrogen deposits, Mineralization, Methemoglobinemia, Livestock poisoning, Silage gas, Odor prevention.

Atmospheric nitrogen, supplying 1600 pounds of elemental nitrogen per square foot of the world, is the most important source of nitrogen fertilizer. Nonsymbiotic and symbiotic nitrogen-fixing organisms fix nitrogen in the biosphere from atmospheric supplies. These organisms include 10 species of bacteria and 6 strains of blue-green algae. Denitrifying organisms cycle nitrogen back to the atmosphere. Nitrifying organisms, such as Nitrobacter, oxidize organic nitrogenous compounds in waste matter to nitrate after ammonification occurs. Mineralization of nitrogen in waste matter is responsible for most nitrogen mineral deposits found in the world. Slightly alkaline buffered environment and aerobic conditions will produce nitrates at enormous rates to supply nutrient needs. Aquatic growths in lakes from overfertilization may be nature's method of conserving nitrogen fertilizer. Presence of nitrogen compounds can indicate pollution. Nitrate concentration above 45 ppm might cause methemoglobinemia. Livestock is susceptible to nitrate poisoning. Sodium nitrate added to waste treatment lagoons limits odors and enhances biochemical oxygen demand reduction. Nitrates are added to natural water by leaching and runoff from wastes and poorly managed fertilizing practices. (Bannerman-Wisconsin)

1220 - A3, A4, A7, A9, F4

WATER POLLUTION RESULTING FROM AGRICULTURAL ACTIVITIES,

Clemson Coll., S.C. School of Agriculture.
H. J. Webb.
Journal of the American Water Works Association, Vol 54, No 1, p 83-87, January 1962. 2 tab, 10 ref.

Descriptors: *Water pollution sources, *Farm wastes, *Pesticides, *Farm lagoons, *Fertilizers, Chlorinated hydrocarbons, Nitrates, Insecticides, DDT, Sewage lagoons, Waste disposal, Fertilization, Farm management, Crop production, Lime, Phosphates, Livestock, Hogs, Confinement pens, Fish, *Feed lots.

Farm practices are changing to grow more crops on less land, and produce more animals in a smaller area. More fertilizers and pesticides are needed to do this with the result that water quality is affected. Animal wastes will increasingly be a problem in terms of disposal and treatment. Feed yard waste treatment facilities often lack adequate design. Pesticides, especially the chlorinated hydrocarbons, pose increasingly serious problems for fish life. Traditional treatment methods are not effective in removing many of these pollutants from domestic water supply systems. More research and information is needed on the effects of the evolving farm practices on water quality. (Flack-AWWARF)

1221 - C3

DETERMINATION OF MERCURY IN FOOD PRODUCTS AND BIOLOGICAL FLUIDS BY AERATION AND FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY,

Michigan Dept. of Agriculture, Lansing.
V. A. Thorpe.
Journal of the Association of Analytical Chemists, Vol. 54, No. 1, p 206-210, 1971. 3 fig, 4 tab, 4 ref.

Descriptors: *Mercury, *Pollutant identification, Foods, Fish, Chemical analysis, Acids, Chemical reactions, Oxidation, Feeds, Milk, Poultry, Reduction (Chemical), Calibrations, *Aeration.
Identifiers: *Biological samples, Potassium permanganate, Stannous chloride, Sulfuric acid, Reagents, Blood, Urine, Meat, Eggs, *Atomic absorption spectrophotometry, Precision, Sample preparation, Chemical recovery.

A modification of a method developed at the Fisheries Research Board of Canada has been used for determining mercury in fish, water, other food products, and biological fluids such as meat, poultry, eggs, milk, urine, blood, and animal feeds. Samples were wet digested at 50 C with sulfuric acid, oxidized with strong potassium permaganate solution, and reduced with stannous chloride. Flameless atomic absorption spectrophotometry was used to measure vapor, and to compare sample results with prepared standards and standard curves. Replication of analyses on different days showed good precision, and in testing samples spiked with known amounts of mercury results showed adequate recovery. (Mackan-Battelle)

1222 - C2, C3, C4

PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS. 1971 COLLABORATIVE STUDY,

Moorman Mfg. Co., Quincy, Ill.
A. J. Gehrt.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 702-706, 1972. 1 tab, 4 ref.

Descriptors: *Digestion, *Filtration, *Analytical techniques, *Protein, Centrifugation, Poultry, Nitrogen compounds, Organic compounds, Chemical analysis, Methodology, Quality control.
Identifiers: *Pepsin, *Interlaboratory tests, Collaborative studies, Biological samples, Method validation, Data interpretation.

Twenty collaborating laboratories evaluated a new method of filtering residues from a pepsin digesti-

bility test of animal proteins. When the first action method was modified by more detailed filtering instructions, the analysts found increased sensitivity and reproducibility. Based on the data from the collaborative studies the method has now been adopted as official first action for poultry by-product meal and hydrolyzed feathers and as final action for other animal proteins. (Mortland-Battelle)

1223 - A2, A7, A9

EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS,
Manitoba Univ., Winnipeg. Dept. of Entomology.
R. A. Brust, S. Miyazaki, and G. C. Hodgson.
J Econ Entomol. Vol 64, No 5, p 1179-1183. 1971. Illus.
Identifiers: *Poultry, Blood, *Dursban, Cholin esterase, Water pollution effects.

The insecticide Dursban (0,0-diethy 0- (3,5,6-trichloro-2-pyridyl) phosphorothioate), was added to the drinking water of young Leghorn cockerels at 8 levels ranging from 0.08 to 1280 ppm active ingredient. Experiments were begun with chicks 3 or 5 days old and were concluded after 3 and 4 wk. Mortality at 80 ppm was 20%, and mortality at 320 and 1280 ppm was 100%. No adverse effects were apparent at lower levels. Solvent and inert ingredients of Dursban emulsifiable concentrate had no adverse effect on the chicks up to 717.7 ppm. Cholinesterase activity in whole blood was monitored at all treatment levels, and the activity decreased at 80 ppm Dursban and above. At lower levels there was no significant difference from the controls. Weight gain/day diminished with increased levels of Dursban. Starvation of treated chicks did not affect blood-cholinesterase activity.--Copyright 1972, Biological Abstracts, Inc.

1224 - A3, A4, B1, C4, C5

FACTORS AFFECTING THE CONCENTRATION OF FAECAL BACTERIA IN LAND--DRAINAGE WATER,
West of Scotland Agricultural Coll., Auchincruive (Scotland). Dept. of Microbiology.
M. R. Evans, and J. D. Owens.
Journal of General Microbiology, Vol 71, No 3, p 477-485, August 1972. 4 fig, 8 ref.

Descriptors: *Drainage water, *Farm wastes, *Environmental effects, *Subsurface drainage, *Enteric bacteria, Subsurface waters, Hogs, Flow rates, Equations, Water pollution sources, Percolation, Soil water movement, Seepage, Pollutant identification, Biochemical oxygen demand, E. coli, Filtration, Membranes, Discharge (Water), Weir gauges, Clay loam, Sands, Surface runoff.
Identifiers: Enterococci, Biochemical tests, Fecal coliforms.

The rate of discharge and the concentration of faecal bacteria in the water from a subsurface field drain were monitored by standard techniques initially for one winter without application of animal excrement to the pasture, and, subsequently, for two winters when pig excrement was sprayed over the pasture. The concentrations of Escherichia coli and enterococci in the water were affected by three main factors: the flow rate of the drain discharge; the number of bacteria in or on the soil and vegetation; and the application to the land of large volumes of semiliquid animal excrement over short periods of time. In the absence of excrement application, the concentration of faecal bacteria in the water was related to the flow rate and to time by an equation of the form: log bacterial concentration equals a plus b log flow rate minus c days, where a, b and c are constants. The concentrations of bacteria in the water declined with time, the 90 percent reduction times being 57 days for E. coli and 96 days for enterococci. The spraying of pig excrement over the pasture resulted in a 30- to 900-fold increase in the concentrations of faecal bacteria in the drain discharge within 2 h of the start of the spraying. The concentrations of faecal bacteria returned to their normal levels over a period of 2 to 3 days. (Byrd-Battelle)

1225 - A2, A3, F3

CONSERVING RESOURCES AND MAINTAINING A QUALITY ENVIRONMENT,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
Cecil H. Wadleigh, and Clarence S. Britt.
Journal of Soil and Water Conservation, Vol 24, No 4, p 172-175, Oct 1969. 4 p, 4 ref.

Descriptors: *Water resource development, *Water pollution, *Eutrophication, Government supports, Soil conservation, Industrial wastes, Municipal wastes, Fertilizers, Pesticides, Soil erosion, Animal wastes, Economics, Nitrogen, Water conservation.
Identifiers: *Soil runoff, Livestock.

Some of the problems involved in natural resource conservation are presented, with particular emphasis on the water pollution caused by agricultural runoff and livestock production. It is pointed out that the economics of the farming and livestock industry are often in conflict with the conservationists' interests. It is suggested that the Dept of Agriculture adopt a cost-sharing program to encourage solutions to some of the problems. The article emphasizes the dangers of eutrophication induced by animal wastes. The author concludes with a statement of some of the accomplishments of the conservation movement in the area of soil and water resources. (Murphy-Rutgers)

1226 - A2, A4, C3

PHOSPHORUS AND WATER POLLUTION,
Agricultural Research Service, Beltsville, Md. Soils Lab.
Alan W. Taylor.
Journal of Soil and Water Conservation, p 228-231, November-December 1967. 4 tab, 26 ref.

Descriptors: *Phosphorus, *Groundwater, *Water pollution sources, Sewage effluents, Eutrophication, Irrigation, Water pollution control, Water chemistry.
Identifiers: Manure, Feedlots, Phosphorus sources, Agricultural fertilizers.

Phosphorus, an important nutrient in natural water, will stimulate excess growth at 0.05 ppm. It is quickly converted to insoluble form in soil and strong sorbtion by soil particles almost completely immobilize it. Pollution from groundwater phosphorus is therefore minimal even though irrigation drainage may cause phosphorus concentration of .08 ppm in groundwater. Eroding topsoils can contribute phosphorus to natural water. Unlike spasmodic erosion flow, manure in stockyards and manure piles supply a steady flow of relatively high phosphorus concentration in available form. Phosphorus pollution from feedlots is significant because concentration of output. Measuring total phosphorus concentration in a water body does not indicate phosphorus available for growth, which is a small fraction of the total. Continuous monitoring of total and available phosphorus concentrations are necessary to assess nutrient sources. One pound of phosphorus dissolved in one acre-foot of water yields a concentration of 0.03 ppm. Phosphorus contamination from sewage effluent is significant, based on a per capita consumption of 2.5 lbs of phosphorus. (Bannerman-Wisconsin)

1227 - F4

AGRICULTURAL (LIVESTOCK) WASTES (LITERATURE REVIEW),
Water Pollution Control Federation, Washington, D.C.
J. R. Miner.
Journal of the Water Pollution Control Federation, Vol 42, No 6, p 1171-1179, June 1970. 59 ref.

Descriptors: *Agriculture, *Industrial wastes, *Waste water treatment, Odors, Cattle, Crops, Biological treatment, Dairy industry, Poultry.
Identifiers: Manure, Feed lots.

Recent literature concerning agricultural waste disposal is reviewed. The problems associated with water pollution control related to cattle feed lot runoff were discussed in relation to the characteristics, handling, treatment, utilization, disposal and odor problems of livestock manure. A review of research pertaining to swine waste management includes discussions of manure properties, application to cropland, treatment technology, alternatives for disposal or utilization, and gases and odors related to manure storage. The production, value, use, and disposal of poultry manure is also included. The value of poultry manure as a fertilizer for specific crops is discussed. A great deal of study has been made on the gases and odors evolved from manure decomposition and a court case is sited in which an award of $36,000 was made due to water pollution and odors. Some wastes which are characterized are from steer, sheep, poultry, and storm runoff from a variety of cropland. A great deal of study was done on cattle feed lot wastes and various methods of treatment. The application of partly treated livestock wastes to cropland has been of growing interest. The largest problem occurring with this type of disposal is the contamination of the groundwater by nitrogen mostly in the form of nitrates. A variety of biological treatment processes were studied including lagoon, aerated lagoons, extended aeration, anaerobic digestion, and aerobic digestion. (Hancuff-Texas)

1228 - B1, D1, E1

ALTERNATIVES FOR THE TREATMENT AND DISPOSAL OF ANIMAL WASTES,
Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
Raymond C. Loehr.
Journal Water Pollution Control Federation, Vol 43, No 4, p 668-678, 2 fig, 2 tab, 10 ref.

Descriptors: *Farm wastes, *Disposal, *Treatment, *Systems analysis, Runoff, Pollutant, Nutrients, Aerobic treatment, Anaerobic digestion, Dentrification, Nitrification, Effluents, Legal aspects, Waste water treatment, Waste disposal.
Identifiers: Options, Land disposal, Oxidation ditch, Pollutional characteristics alternatives.

The various systems for treating wastes from enclosed confined animal production operations are discussed. There is no one process or waste management system that will be adequate for all animal production operations. Aeration systems such as oxidation ditches are gaining acceptance for waste handling and treatment. It is unlikely that current liquid waste treatment systems for treating concentrated animal waste water will produce effluents that can be discharged to surface water. Land disposal is an integral part of feasible animal waste treatment systems. (Christenbury-Iowa State)

1229 - C5, D4

ANAEROBIC LAGOON TREATMENT OF MILKING-PARLOR WASTES,
Kansas Univ., Lawrence. Dept. of Civil Engineering.
Raymond C. Loehr, and John A. Ruf.
Journal of the Water Pollution Control Federation, Vol 40, No 1, p 83-94, Jan 1968. 5 fig, 4 tab, 14 ref.

Descriptors: *Anaerobic conditions, *Industrial wastes, *Lagoons, Dairy industry, Animals, Biochemical oxygen demand, Coliforms, Efficiencies, Sewage treatment, Sludge, *Waste water

treatment.
Identifiers: *Dairy cattle, *Field study, Milking parlor, Waste characteristics.

A field study of an 80-cow milking parlor and its waste treatment facilities determined that the average flow and BOD5 of the milking parlor waste were 760 gpd (2870 l/d) and 1030 mg/l. The flow varied considerably through the day. The first cell was loaded at 9 lbs BOD5/d/1000 cuft (144 g BOD5/d/cu.m). The summer BOD reduction was 85% while during the winter it was only 70%. The BOD5 of the supernatant from the second cell during the summer ranged from 50 to 100 mg/l. Removal of solids from the lagoons during cold weather adversely influenced the performance of the lagoons. Solids assumulated in the first cell during winter and were degraded during spring. Coliform reductions in the system exceeded 99%. (Aguirre-Texas)

1230 - B1, D4, F4

LAGOONS AND OXIDATION PONDS (Literature Review),
W. C. Boyle.
Journal of the Water Pollution Control Federation, Vol 42, No 6, p 910-916, June 1970. 39 ref.

Descriptors: *Waste water treatment, *Lagoons, *Ponds, Oxidation, Biological treatment, Sewage treatment, Aeration, Temperature, Industrial wastes, Nutrients, Coliform, Efficiency, Poultry, Tertiary treatment.

A review of the 1969 literature on lagoons and oxidation ponds is presented. The review includes discussion of principles of aerated lagoon design. A pilot plant study to treat box-board white water and paper-board mill waste waters is outlined. Discussion of several full scale aerated lagoons is presented and includes the design and cost of treatment. A variety of industrial wastes are treated through pond and lagoons: Kraft mill wastes, pulp and paper mill wastes, refinery and chemical wastes, poultry wastes, hog slaughter house wastes, animal wastes, dairy manure wastes and phenolic wastes. Data are presented on the design, power requirements, organic loadings, efficiencies, effects of temperature, aeration requirements, nutrient requirements, coliform and pathogen removals, and influence of detergents. The use of ponds as tertiary process is also discussed for a variety of wastewaters. (Hancuff-Texas)

1231 - A3, F4

POLLUTION AND EUTROPHICATION PROBLEMS OF GREAT SOUTH BAY, LONG ISLAND, NEW YORK,
New York State Dept. of Conservation, Ronkonkoma.
Jack Foehrenbach.
J Water Pollut Contr Federation, Vol 41, No 8, Part 1, p 1456-1466, Aug 1969. 11 p, 4 fig, 1 tab, 16 ref.

Descriptors: *Eutrophication, *Bays, *Farm wastes, Poultry, Water pollution sources, Water pollution effects, Dissolved oxygen, Oxygen demand, Streamflow, Sport fishing, Commercial fishing, Recreation, Ecology, Economics, Fisheries, Pesticides, Waste water disposal.
Identifiers: *Great South Bay, Long Island (NY).

Great South Bay is located midway between New York City and Montauk Point. Each year sport fisheries gross $4,539,000. In addition, 53,400 lb of finfish ($12,000) and 4,792,000 lb of shellfish ($4,250,000) are harvested. Because of poor recirculation and small inflow of tidal waters, the creek flows of 24 million cu ft/day and groundwater flows of 28 million cu ft/day are helping to increase the nutrient content of the 92-sq mile bay, much of which is less than 8 ft deep. Although the bay has a large assimilative capacity for some forms of pollution, it is reaching a point where additional loads will affect adversely its ecology, economic, and recreational value. (Knapp-USGS)

1232 - C2, C3, C4, F5

WASTE WATER FROM SIMIAN PRIMATE FACILITIES,
Tulane Univ., Covington, La. Delta Regional Primate Research Center.
E. W. Fritschi, and F. W. Macdonald.
Journal Water Pollution Control Federation, Vol 43, No 5, May 1971, p 883-889.

Descriptors: *Laboratory animals, *Waste water treatment, Design criteria, Sampling, Analytical techniques, Evaporation, Biological oxygen demand, Urine, Coliforms, Pathogenic bacteria, Animal parasites, Disinfection, Chlorination, Louisiana, *Treatment facilities.
Identifiers: *Primates, *Bacteriological analyses, Feces.

Water and waste water balances were performed on the Delta Regional Primate Research Center in Covington, Louisiana. Total input of both food and water was measured for selected animals and urine, feces, and vomitus of the animals were also collected and analyzed. Average food consumption was 3.0% of body weight, and an estimated 50% of the food is wastes. Measurement of the BOD of the collected waste materials established primate wastes as being 3 to 6 times higher in BOD than conventional municipal wastes. No correlation of total solids with genera, age, weight, or sec of the animals was discovered. Primate feces were found to be cruder than human feces, also and considerable difficulty in finding a suitable feed for the dilution water. Further study of this phenomenon has been planned. Monitoring of daily water usage revealed a fairly constant flow. There was little daily fluctuation in cage washwater, since the animal population was fairly constant, and all cages had to be washed. Bacteriological analysis revealed a wide variety of organisms including several nonspecific parasites and numerous pathogens. This discovery neccessitated that particular attention be given to chlorination and disinfection. (Lowry-Texas)

1233 - A2, A4, C3, E2

LOSSES OF NITROGEN AND PHOSPHORUS FROM AGRICULTURAL LAND,
Rothamsted Experimental Station, Harpenden (England).
G. W. Cooke, and R. J. B. Williams.
Journal of the Society for Water Treatment and Examination, Vol 19, Part 3, p 253-276, 1970. 7 tab, 34 ref, discussion.

Descriptors: *Water pollution sources, *Nitrogen, *Nitrates, *Agricultural watersheds, Phosphorus, Leaching, Soils, Drainage, Lysimeters, Fertilizers, Rainfall, Model studies, Analytical techniques, Arable land, Grasslands, Clays, Liquid wastes, Livestock, Solubility, Phosphates, Subsoil, Domestic animals, Erosion, Wind erosion, Suspended load.
Identifiers: *United Kingdom, Plowing, Nitrogen losses.

Nitrogen and phosphorus is introduced to water supplies by leaching of drainage water through agricultural land, by liquid wastes from stockyards and surface runoff from saturated or frozen soil, by movement of fine soil particles down profiles and entering drainage systems, and by erosion of surface soil by wind and water. Drainage from well-farmed arable land in England contains, on the average, 10 mg/l of nitrate-nitrogen. Nitrate loss in drainage from productive land cannot be prevented because more nitrogen will be mineralized from soil reserves and crop residues by microbial action than arable crops can absorb at times. Drainage passing through permeable subsoils to deep water tables carries nitrate that persists in the water. Soluble phosphate fertilizers leach down soil profiles in podzols developed from Bagshot beds which contain only 1-2% clay in the surface while insoluble phosphates are better retained in these topsoils. Phophorus in manure applied in large amounts annually for 20 years penetrated the subsoil of light land at Woburn, the only example of soluble phosphates in arable soils reaching drainage systems. Watercourse contamination may occur where stock are kept on small areas. (Jones-Wisconsin)

1234 - A2, B1, C2, C3, C4

SOME OBSERVATIONS ON THE LIMNOLOGY OF A POND RECEIVING ANIMAL WASTES,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
Dale W. Toetz.
Proceedings Oklahoma Academy of Science, Vol 51, p 30-35, 1971. 4 fig, 2 tab, 11 ref.

Descriptors: *Oxidation lagoons, *Water pollution effects, *Farm wastes, Oklahoma, Cyanophyta, Chlorella, Ions, Phytoplankton, Nitrates, Nitrogen fixation, Algae, Conductivity, Chlorophyll, Pigments, Dispersion, Runoff.
Identifiers: *Feedlots, Lemna.

A small pond receiving runoff from a hog yard was dominated by a large population of blue-green algae and phytoflagellates during summer and by Chlorella sp during winter. Heavy rainfalls decreased the ionic concentration of water and altered the phytoplankton composition. Occasional concentration of oxygen below 5 mg/l and high ammonia content suggested that the pond is unsuitable for warm-water fish culture. (Wilde-Wisconsin)

1235 - A2, C4

BOD DETERMINATIONS ON FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
T. J. McGhee, R. L. Torrens, and R. J. Smaus.
Water and Sewage Works, Vol 119, No 6, June 1972, p 58-61. 7 fig, 1 tab, 20 ref. OWRR A-022-NEB (2).

Descriptors: *Analytical techniques, *Biochemical oxygen demand, *Pollutant identification, *Cattle, Organic matter, Chemical oxygen demand, Oxygen demand, *Feed lots, *Farm wastes.
Identifiers: *Cattle feedlot runoff, Ultimate BOD.

During laboratory studies of the aerobic treatment of feedlot runoff it was observed that significant reductions in the COD of the waste were not reflected in a similar reduction in BOD as determined by the standard 5-day tests. The rate at which the oxygen demand was exerted, the duration of the BOD test necessary to actually measure the pollution effect of such wastes and the general applicability of the standard BOD test to feedlot wastes were investigated. It was concluded that the standard 5-day BOD determination was not an adequate measure of the pollution potential of feedlot runoff as feedlot runoff contained slowly degradable organic materials which would exert a significant oxygen demand over periods in excess of 20 days. The chemical oxygen demand test was a superior technique although it usually yielded higher results than the actual ultimate BOD. (Galwardi-Texas)

1236 - A4, C4

MIGRATION OF POLLUTANTS IN A GLACIAL OUTWASH ENVIRONMENT,
Washington State Univ., Pullman.
James W. Crosby, III, Donald L. Johnstone, and Robert L. Fenton.
Water Resources Research, Vol 7, No 1, p 204-

208, February 1971. 5 p, 5 fig, 11 ref. OWRR Project B-005-WASH (3).

Descriptors: *Path of pollutants, *Glacial drift, *Farm wastes, *Confinement pens, Coliforms, Nitrates, Nutrients, Solutes, Soil water movement, Groundwater, Washington, Water pollution sources, Chlorides, Soil moisture.
Identifiers: FeedlotsCattle), Outwash (Glacial).

A test drilling program was conducted at a dairy in the Spokane Valley, Washington, to determine the effects of feedlot operation on groundwater quality. Coliform bacteria, enterococci, and fecal coliforms were found to disappear within a relatively few feet of the ground surface. Chlorides and nitrates, however, were persistent in depth and may actually reach the groundwater body. The low natural moisture content of the soil, coupled with the apparent high moisture tensions, suggests that soil moisture is not presently moving downward in the system. It is concluded that the downward migration of inorganic chemicals from the feedlot environment must represent an early phase of the operation, which is arrested as organic mattes are formed in near-surface layers. (Knapp-USGS)

1237 - A2, B1, C1

POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES,
Kramer, Chin and Mayo, Seattle, Wash.
Paul B. Liao.
Water and Sewage Works, Vol 117, No 12, p 291-297, 1970. 6 fig, 3 tab, 15 ref.

Descriptors: *Water pollution sources, *Fish hatcheries, *Salmonids, Water requirements, Temperature, Nutrients, Algae, Weeds, Taste, Odor, Pathogenic bacteria, Organic wastes, Solid wastes, Chemicals, Michigan, California, Tubificids, Colorado, Water pollution control, Washington, Chemical oxygen demand, Biochemical oxygen demand, Dissolved oxygen, Hydrogen ion concentration, Ammonia, Nitrates, Phosphates, Suspended load, Dissolved solids, Effluents.
Identifiers: Settleable solids, Hatchery effluents, Parasites, Jordan River (Mich), San Joaquin River (Calif), Rifle Falls (Colo), Fish fecal wastes, Residual food, Green River (Wash), Cowlitz Trout Hatchery (Wash).

Water pollution problems associated with salmonid hatchery operations include nutritional enrichment, algae and weed growth, taste, odor, settleable solids, pathogenic bacteria, parasites, organic matter, chemicals and drugs. Fish fecal wastes and residual food are most serious because they are encountered continuously under normal operating procedures; after field testing, these wastes are classified into organic, nutrient and solid pollutants. The average biochemical oxygen demand (BOD) concentration of hatchery effluents during pond cleaning is several times greater than during normal operation; closely related to BOD, is the dissolved oxygen level. The nutrient pollutants, nitrate and phosphate, are end-products of decomposition of fish food. The hatchery effluent tested may stimulate algal growth and cause algal blooms under certain conditions. The high percentage of suspended and settleable solids indicates that most solids in the cleaning water will be deposited on the stream bottom below the hatchery. Proper feeding would greatly reduce rate of pollutant production. The pollution potential of hatchery cleaning water is comparably to domestic sewage when diluted with infiltration water. Hatchery operating improvements should include proper fish loading techniques, proper feeding procedures, and water supply adjustments. (Jones-Wisconsin)

1238 - B1, D2, D4, E3

CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK,
Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
P. O. Ngoddy, J. O. Harper, R. K. Collins, G. D. Wells, and F. A. Heidar.
Copy available from GPO Sup Doc EP2.10:13040 DKP 06/71, $1.25; microfiche from NTIS as PB-211 022, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, June 1971, 110 p, 28 fig, 21 tab, 19 ref. EPA Program 13040 DKP 06/71.

Descriptors: *Farm wastes, *Water reuse, *Separation techniques, Screens, Suspended solids, Particle size, Sludge, Odor, Economic feasibility, Technical feasibility, Performance, Cattle, Hogs, Analytical techniques, *Waste water treatment.
Identifiers: *Waste management.

A vibrating screen separator has been developed for liquid-solid separation of livestock wastewater. Pilot tests on swine and beef cattle wastewater have shown that the resistant or slowly biodegradable solids are effectively removed on vibrating screens ranging in mesh size from no. 60 to no. 120. Although measurably less efficient than conventional dewatering devices such as centrifuges and vacuum filters, the gravity dewatering vibrating screen separation is better suited to the economic scale of the average livestock operation. The removal of resistant solids from wastewater prior to stabilization substantially improves the performance of biological treatment systems by enhancing the controlling transport and kinetic mechanisms in such processes. Screened solids are odorless, stable, and storable over long periods without an odor nuisance or pollutional problem. The liquid fraction can be partially reclaimed by biodegradation and recycled as transport water. A number of candidate livestock waste management designs integrating the salient features of the study have been proposed. (Lowry-Texas)

1239 — A4, B1, D4

DRAIN INSTALLATION FOR NITRATE REDUCTION,
Southwestern Irrigation Field Station, Brawley, California; Soil Conservation Service, Fresno, California; and U. S. Bureau of Reclamation, Sacramento, respectively.
L. S. Willardson, B. D. Meek, L. E. Grass, G. L. Dickey, and J. W. Bailey.
Paper presented at the 1969 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 9-12, 1969, Paper No. 69-734, 8 p., 2 tab., 2 fig.

Descriptors: *California, *Drains, *Installation, *Nitrates, Permeability, Sumps, *Irrigation, Electrical conductance, Leaching, Percolation, *Groundwater, *Denitrification.
Identifiers: *San Joaquin Valley, Panoche silty clay.

Because farmers remove more nitrates from the soil than they put into it, denitrification or reducing nitrates to nitrogen gas, is sometimes desirable. A field experiment was installed in California's San Joaquin Valley to test submergence of drains as a means of denitrification. The Panoche silty clay area was irrigated four times during the months of July and August. Samples made of the soil showed that the side of the drain oriented toward the ground water source had the highest reading of nitrate content. This indicated that soil denitrification depends ultimately upon saturation from irrigation as well as sufficient presence of organic carbon matter and a shortage of oxygen. Along with soil denitrification, ground water with high nitrate content was also diluted. (Frantz - East Central(.

1240 - C4

THE PHYSIOLOGY OF THE COLIFORM GROUP,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio. Div. of Water Supply and Pollution Control.
Harold F. Clark, and Paul W. Kabler.
Proc Rudolfs Res Conf, Rutgers Univ, New Brunswick, NJ. Principles and Applications in Aquatic Microbiology, Heukelekian, H and Dondero, Norman C (eds), John Wiley and Sons, Inc, New York, pp 202-229, 1964. 1 fig, 2 tab, 52 ref, disc.

Descriptors: *Bacteria, *Coliforms, *Pollutants, Sanitary engineering, Water, Foods, Soils, Gases, Hydrogen, Carbon dioxide, Fermentation, Plants, Cattle, Grains (Crops), Biochemistry, Microorganisms, Milk, Acid bacteria, Carbohydrates, Physiochemical properties, Animals, Statistical methods, Birds, Human diseases, Sheep, Geographical regions, United States, Inspection, Spores, Hydrogen sulfide, E coli.
Identifiers: *Physiology, *Bacillus coli, Taxonomy, Health, Aerobacter aerogenes, Feces, Glucose, Morphology, Bacterium coli, Bacterium aerogenes, Motility, Coli communis, B lactes-aerogenes, Sucrose, Lactose, Dulcitol, Raffinose, Mannitol, Methyl, Indole, Tryptophan, Ehrlich reaction, Vibrio cholera, Pigs, Types, Acetylmethyl-carbinol, Citrate, Uric acid, Cellobiose, Liquefaction, Eijkman test.

Although the methodologies for distinguishing between the coliform strains of fecal and non-fecal origin are adequate for pollution, the perfect test has not been developed. The gas ratio (Hydrogen:Carbon dioxide) differential test seemed to solve the problem of differentiating the coliform bacteria of fecal origin from those of plant or soil origin but was unadaptable as a routine method. As laboratory procedure, the methyl red test was recommended as of equal value. Since certain assumptions were not valid, its use as a reference procedure was rejected. The property of producing indole from tryptophan has been extensively applied. The indole reaction by coliform bacteria from feces of warm-blooded animals is generally positive in excess of 90 percent, although approximately one-fifth of the coliform bacteria from unpolluted soils can also produce indole. The Voges-Proskauer test, traditionally used as a taxonomic characteristic, is useful in separating fecal from non-fecal coliform group when the data are interpreted statistically. The citrate utilization reaction is useful, on a statistical basis, for separating fecal and non-fecal types. The tests, methyl red, indole, Voges-Proskauer, citrate, none entirely satisfactory individually, combined (IMVIC test), yielded the best classification. The elevated temperature test was superior to other procedures in simplicity. (Jones-Wisc)

1241 - C3, C4

PHYSIOLOGY OF THE RUMEN PROTOZOA,
Agricultural Research Center, Beltsville, Md. Animal Husbandry Research Div.
J. Gutierrez, and R. E. Davis.
Proc Rudolfs Res Conf, Rutgers Univ, New Brunswick, NJ. Principles and Applications in Aquatic Microbiology, Heukelekian, H and Dondero, Norman C (eds), John Wiley and Sons, Inc, pp 394-404, 1964. 2 fig, 1 tab, 17 ref, disc.

Descriptors: *Ruminants, *Protozoa, *Bacteria, Cattle, Reproduction, Metabolism, Amino acids, Tracers, Proteins, Chromatography, Fermentation, Digestion, Lipids, Manometers, Streptococcus, Alfalfa.
Identifiers: *Rumen, *Physiology, Casein, Isotrichs, Holotrichs, Paramecium, Isotricha prostoma, Isotricha intestinalis, Dasytricha, Diplodinium ecaudatum, Entodinium simplex, Ophryoscolex caudatus, Starch, Epidinium ecaudatum, Diplococcus, Peptostreptococcus.

Some functions carried out by rumen protozoa are: producing fatty acids which are absorbed yielding energy to the host; aiding digestion of ingested substrates--starch, cellulose, and bacteria; serving as a source of protein for the host. Tracer experiments showed they are able to incorporate amino acids. As a source of protein, the protozoa furnished 20%

of the host requirement. Protozoan protein was found to have a higher nutritive value than bacterial or yeast protein. Protein contributed to the host was calculated for several protozoa with the cellular nitrogen content experiments. Paper chromatography of acid-hydrolyzed suspensions has indicated a long list of amino acids contained in the protozoal protein, available to the host. The quantitative experiments on ammonia production from casein show that, for some rumen protozoa, ammonia can be an important product of nitrogen metabolism. They contribute to lipid metabolism of the rumen. All the common genera of protozoa are bacteria feeders. Protozoan requirements for growth were studied by in vitro culture work. Of the several media developed, ground rice starch, alfalfa, and Streptococcus bovis, made a successful medium. Attempts to grow the protozoa without living bacteria have been unsuccessful.
(Jones- Wisc)

1242 - A9, C4, E2, E3, F5

THE MOVEMENT OF DISEASE PRODUCING ORGANISMS THROUGH SOILS,
California Univ., Davis, Dept. of Civil Engineering.
R. B. Krone.
Symp on Munic Sewage Effluent for Irrig, July 30, 1968, Louisiana Polytech Inst, Ruston, p 75-104, 1968. 30 p, 2 fig, 55 ref.

Descriptors: *Water reuse, *Pathogenic bacteria, *Viruses, *Groundwater movement, Municipal wastes, Irrigation water, Artificial recharge, Filtration, Sorption, Infiltration, Percolation, Soil disposal fields, Soil contamination, Soil physical properties.
Identifiers: Municipal waste recharge.

The movement of pathogenic organisms through soils recharged with contaminated water is discussed. Pathogens have a wide variety of physical and biological characteristics, including wide ranges of size, shape, surface properties, and die-away rates. The processes of filtration by soil include straining at the soil surface, straining at intergrain contacts, sedimentation, and sorption by soil particles. Straining of pathogens at the soil surface and sorption of viruses near the soil surface is desirable because it limits travel of pathogens most, and it is subject to wide variations in temperature and moisture, and it will assure aerobic conditions. A soil containing clay should therefore be used for irrigation with treated sewage. Wide experience in irrigation with treated sewage indicates that it is safe provided that at least primary treatment is used, and provided that the crops are not consumed directly by humans. Secondary treatment and chlorination is recommended for aesthetic reasons. (Knapp-USGS)

1243 - A2, F4

THE IMPACT OF ANIMAL WASTES ON WATER RESOURCES ACTIVITIES,
Kansas Univ., Lawrence, Kans.
Raymond C. Loehr.
Proceedings of the Third Annual American Water Resources Conference, 1967, pp 314-324, 11 p, 2 fig, 2 tab, 28 ref.

Descriptors: *Animal wastes, Wastes, Water pollution sources, Cattle, Fishkill, Waste disposal, Kansas, Runoff, Nitrogen, Drainage, Diseases, Water pollution effects.
Identifiers: Animal production trends, Animal confinement trends, Organic pollution, Inorganic pollution.

Until recently animal wastes have been considered as part of the 'natural' pollution of a region. Animal production is changing from small farm operations into large scale industrial enterprises. There is an increasing trend to confine animals within small areas to produce the greatest weight gain in the shortest period of time. Under such conditions, it is not possible for these animals to drop their wastes on pastures where the wastes can be absorbed by nature without adversely affecting the environment. Animal wastes have been shown to be a major source of surface water pollution. This paper mentions cases of pollution that have been caused by animal wastes and animal production operations. It discusses the trend toward confinement feeding operations and the magnitude of the problem in the future. It also demonstrates the need to consider animal wastes when developing or protecting water resources. (Seneca-Rutgers)

1244 - A9, C4, F5

SURVIVAL OF PATHOGENS AND RELATED DISEASE HAZARDS,
Colorado Univ., Denver. Dept. of Microbiology.
Stuart G. Dunlop.
Symp on Munic Sewage Effluent for Irrig, July 30, 1968, Louisiana Polytech Inst, Ruston, pp 107-121, 1968. 15 p, 1 tab, 62 ref.

Descriptors: *Hazards, *Irrigation water, *Reclaimed water, *Municipal wastes, Pathogenic bacteria, Viruses, Parasitism, Waste treatment, Environmental sanitation.
Identifiers: Waste water irrigation.

The hazards to health caused by irrigation with reclaimed municipal waste water are surveyed. No disease outbreaks have been traced to irrigation with properly treated and disinfected sewage, but many epidemics have been caused by irrigation with improperly treated wastes. The same standards are recommended for effluents as for any other irrigation water. Survival times of pathogenic organisms in water are discussed and tabulated. (Knapp-USGS)

1245 - A2, B1

EFFECTS OF FEEDLOT RUNOFF ON WATER QUALITY OF IMPOUNDMENTS,
Robert S. Kerr Water Research Center, Ada, Okla.
W. R. Duffer, R. D. Kreis, and C. C. Harlin, Jr.
Water Pollution Control Research Series, Environmental Protection Agency July 1971, 53 p, 13 fig, 7 tab, 9 ref, append. EPA Program 16080 GGP 07171.

Descriptors: Reservoirs, *Fishkill, *Ammonia, *Dissolved oxygen, Runoff, *Feedlots, Organic wastes, Nutrients, Phytoplankton, Light penetration, Zooplankton, Bethos, *Farm wastes, Water pollution sources, Cattle.
Identifiers: Solids concentrations.

Effects of rainfall runoff from a beef cattle feedlot on the water quality of a small impoundment were determined. Changes in chemical concentration of impounded water and changes in the community structure of aquatic organisms were measured and related to the amount and composition of feedlot runoff received. Water quality changes were also monitored in a nearby reservoir which received no feedlot runoff to serve as a control. Rainfall from feedlots was retained in collection ponds and pumped into the impoundment over a relatively short period of time, creating in effect a 'slug' discharge conditon. Changes in chemical concentration or population structure of organisms were not apparent for discharges of about one-part feedlot runoff to 40 parts receiving water. Runoff discharges for two pumping periods with each contributing one-fourth of the volume of the receiving water were shown to degrade water quality in the impoundment. Several significant chemical and biological changes occurred. The concentration of salts, solids, oxygen-demanding organic compounds and nutrients increased. Population levels decreased for organisms having negative tolerances for low dissolved oxygen and high ammonia concentrations. The most dramatic reduction in the biological community was the suffocation of about 90% of the game fish in the impoundment. Reduction in population levels of 'stressed' organisms was followed by increased productivity of phototropes in response to higher nutrient concentrations. (Dorland-Iowa State)

1246 - A1, B1, F2

FEEDLOT WASTE MANAGEMENT.
Missouri River Basin Animal Waste Management, Kansas City, Mo. Pilot (Steering) Task Group.

Environmental Protection Agency, June 1971. 45 p, 2 fig.

Descriptors: *Water pollution control, Confinement pens, Cattle, Pollutants, Non-structural alternatives, Path of pollutants, Water law, Legislation, Regulation, Farm wastes, Livestock, Management, Financing, Missouri River, River basins.
Identifiers: Technical assistance.

Basic information on the problem of beef cattle feedlot waste management and the pollution arising from these operations is presented in a non-technical manner. The factors that cause feedlots to pollute and the magnitude pollutants may reach are discussed along with some management factors and structural and mechanical means to help control water pollution. Sources of technical and financial assistance in design and layout of control facilities and the water pollution control agencies for the ten Missouri River Basin states are listed. Existing animal waste control regulations are also furnished for these ten states. (EPA abstract)

1247 - A1, F2, F5

DISPOSAL OF INDUSTRIAL WASTES.

Oregon Administrative Rules Compilation, ch 340, secs 43-005 thru 43-025 (1970).

Descriptors: *Oregon, *Industrial wastes, *Waste disposal, *Pollution abatement, Water pollution, Ultimate disposal, Regulation, Administrative agencies, Liquid wastes, Organic wastes, Solid wastes, Pollutants, Waste water disposal, Legislation, Legal aspects, Farm wastes, Confinement pens, Hogs, Cattle, Canneries, Industrial plants, Foods, Poultry, Livestock.

Unless the Department of Environmental Quality provides an exemption, all fruit and vegetable processing plants shall provide efficient facilities to remove all suspended and floating materials from the wastes resulting from canning and freezing processing. All solids retained by a standard twenty mesh screen shall be removed from liquid wastes by screening or other approved method and disposed of in a non-polluting manner. Wastes from slaughterhouses and meat packing plants shall be disposed of in a manner that will prevent direct or indirect entry into public waters. All blood shall be collected and disposed of separately from other wastes. Manure and hog stomach contents shall be collected separately and used as fertilizer, land-fill, or in some other approved manner. All fleshings, grease particles, hair and other solid materials shall be collected by dry cleaning of floors and by screening of wastes. Adequate grease recovery basins shall be installed. Similiar provisions govern the disposal of wastes in poultry killing and packing plants. To prevent water pollution from solid wastes, hog feeding yards and holding pens shall be constructed so that they can and will be dry cleaned before being washed down. (Gallagher-Florida)

1248 - A2, A4, F4

LIVESTOCK INDUSTRIES IN TEXAS AS RELATED TO WATER QUALITY, REPORT NUMBER ONE,

Texas Water Quality Board, Austin.
D. Pittman, and P. Harris.
Texas Water Quality Board, Austin, 1970. 30 p, 5 tab, 10 ref.

Descriptors: *Texas, *Water quality, *Livestock, *Farm wastes, *Waste treatment, *Poultry, Wastes, Solid wastes, Cattle, Hogs, Sheep, Waste disposal, Farm management.

Trends are discussed in animal populations in Texas, management techniques employed by animal producers, and characteristics of animal wastes and treatment methods used. In addition, typical and/or economical animal producing units in Texas are described, with an explanation of current practices used to control water pollution caused by animal wastes. A number of conclusions are made from the material presented. The numbers of beef cattle, sheep and poultry in Texas are increasing. There is a trend to confine animals and feed them for more efficient production. Characteristics of animal wastes are variable making it difficult to determine the pollutional effects of the wastes and to recommend adequate treatment. Biological and chemical changes often occur in wastes from confined feeding areas. Conventional domestic waste treatment systems are as yet not feasibly adaptable to animal wastes. Current animal waste management for controlling runoff from confined feeding areas include the use of diversion terraces, ditches and retention ponds with irrigation facilities for dewatering the ponds. (Poertner)

1249 - B1, F2
AGRICULTURAL AND RELATED WASTES CONTROL.
Regulations No. 28-18-1 thru 28-18-4, Kansas Department of Health, Environmental Health Services, Topeka, Kansas, May, 1967. 4 p.

Descriptors: *Waste disposal, *Kansas, *Domestic animals, *Water pollution control, Water pollution, State governments, State jurisdiction, Administration, Regulation, Administrative agencies, Legal aspects, Permits, Standards, Water pollution sources, Treatment facilities, Public health, Cattle, Sheep, Farm wastes, Farms.

The operator of any newly proposed or existing confined feeding operation must register with the department of health. All application forms shall contain information regarding general features of topography, drainage course, and identification of ultimate primary receiving streams. If a confined feeding operation constitutes a water pollution hazard the operator must provide water pollution control facilities which shall be constructed in accordance with plans and specifications approved by the department. Such water pollution control facilities shall not be placed in use until a permit has been issued by the board of health. If a water pollution control facility's permit is revoked, the owner or operator of the confined feeding operation involved shall be allowed to finish feeding existing animals, but may not place any more animals in the feeding area until the minimal requirements are met. The regulation establishes the minimum requirements for water pollution control facilities used for the confined feeding of cattle, swine, sheep, and other animals. All such facilities must be operated and maintained so as to prevent water pollution and protect the public health and the beneficial uses of the state's waters. (Horwitz-Florida)

1250 - A2, A3, A4, A5, C3
DISTRIBUTION OF NITRATES AND OTHER WATER POLLUTANTS UNDER FIELDS AND CORRALS IN THE MIDDLE SOUTH PLATTE VALLEY OF COLORADO,
Agricultural Research Service, Fort Collins, Colo. Northern Plains Branch; and Colorado Agricultural Experiment Station, Fort Collins.
B. A. Stewart, F. G. Viets, Jr., G. L. Hutchinson, W. D. Kemper, and F. E. Clark.
U S Department of Agriculture, Agricultural Research Service, ARS 41-134, December 1967, 206 p. 31 fig, 25 tab, 13 ref.

Descriptors: *Nitrates, *Ammonia, *Water pollution sources, *Cores, Fields, Plants, Alfalfa, Cereal crops, Irrigated land, Colorado, Groundwater, Percolation.
Identifiers: Native grasses, Feedlots, Corrals, South Platte Valley (Colo).

Cores representing nonirrigated fields in native grass, cultivated nonirrigated fields, irrigated fields in alfalfa, irrigated fields in crops other than alfalfa, and corrals were obtained from northeastern Colorado during 1966. Cultivated nonirrigated fields usually contained small accumulations of nitrate below the root zone. Native grass fields, ordinarily, did not show nitrate accumulation in core profiles. Significant quantities of nitrate were found in most cores from irrigated fields with row crops or cereal grains. Alternately, cores from irrigated alfalfa fields generally contained insignificant amounts of nitrate. Amounts of nitrogen as nitrate found under corrals were extremely varied, ranging from almost none to more than 5000 pounds/acre in a 20-foot profile. Evidence disclosed that denitrification was occurring under feedlots, even at several feet below the surface, consequently, much of nitrate under feedlots will probably never reach the water table. Water samples beneath several corrals contained large amounts of organic carbon and ammonia and possessed offensive odor. Bacterial counts under corrals were considerably higher than under other areas, especially at lower depths. These findings indicate some pollution of groundwater by deep percolation is occurring from corrals, but more studies are required before significance and magnitude of this pollution can be assessed. (Keeney-Wisconsin)

1251 - A2, A6, C5
AIRBORNE AMMONIA EUTROPHIES LAKES.
Agricultural Research (USDA), Vol. 19, No. 2, p 8-9, August 1970.

Descriptors: *Ammonia, *Eutrophication, *Nitrogen, Algae, Water pollution sources, Colorado, Cattle, Urine, Path of pollutants, Farm wastes.
Identifiers: Feedlots.

Ammonia traps and rain gages were installed at five sites and in two control areas in Colorado to determine the rate at which ammonia is adsorbed directly from the air by water surfaces under different conditions of temperature and climate at various distances and directions from cattle feedlots. In one northeast Colorado lake a little over a mile from a large feedlot, the surface adsorbed about 30 pounds of nitrogen as ammonia per acre per year. This amount is sufficient to eutrophy a lake averaging 20 feet in depth to two or three times the concentration needed for algal blooms. Indications are that even small feedlots may release enough ammonia to have an effect on nearby water surface and that airborne ammonia from feedlots may contribute more nitrogen than runoff and deep percolation from the same sources. (Mortland-Battelle)

1252 - A2, A4, A9, C3, F4
NITRATE POLLUTION OF WATER,
Illinois State Water Survey, Urbana.
Julius H. Dawes, Thurston E. Larson, and Robert H. Harmeson.
In: Frontiers In Conservation, Proceedings 24th Annual Meeting Soil Conservation Society of America, August 10-13, 1969, Colorado State University, Fort Collins, p 94-102, 1970. 9 p, 8 fig, 6 tab, 6 ref.

Descriptors: *Water pollution sources, *Groundwater, *Surface waters, *Nitrogen compounds, Illinois, Hydrologic cycle, Fertilizers, Industrial wastes, Decomposing organic matter, Organic wastes, Domestic wastes, Livestock, Precipitation (Atmospheric), Water quality, Chemical analysis, Soils, Soil water, Seepage, Sorption, Crops, Nitrates.

Nitrogen levels in surface waters that exceed established standards are evidence of mans intrusion in the environment and the cause of deterioration in water quality. Thirty-nine million tons of chemical fertilizers were applied in the United States in 1967, of which approximately 6 million tons was nitrogen. In Illinois about 25% of all water samples from wells 50 feet deep or less have been found to contain an excessive concentration of nitrate, that is, above the 45 milligrams per liter level. The sources of nitrogen in Illinois surface and subsurface waters are varied and often difficult to identify. Known sources of pollution include precipitation, human wastes, crop residues, decomposing animal or plant tissue, industrial wastes, and nitrogen fertilizer. At the present time there is no known practical and economical way of recovering these excess nitrates. Membrane techniques and biological methods both have potential for preventing pollution of water by nutrients, salts, and minerals, whether the source is fertilizer, irrigation water, sewage, or industrial wastes.
(Woodard-USGS)

1253 - B1, C2, C3, C4, D4
WATER QUALITY CHANGES IN CONFINED HOG WASTE TREATMENT,
Kansas Univ., Lawrence.
Ross E McKinney, and Robert Bella.
Contrib No 24, Kans Water Resources Res Inst Proj Completion Rep, 1968. 88 p, 21 fig, 12 tab, 13 ref. OWRR Project A-011-KAN.

Descriptors: *Farm wastes, *Waste treatment, *Aerobic treatment, *Hogs, Farm lagoons, Settling basins, Soil disposal fields, Sewage treatment, Disposal, Environmental engineering, Sludge disposal, Waste storage.
Identifiers: Hog farm wastes.

Treatment methods for the wastes of confined hogs are examined. Confined-animal wastes are a major pollution problem. There are about 55 million hogs in the U.S., and their wastes are largely untreated. When they occupy a large area, foraging for food, this is no problem, but under confinement the problem is similar to that of municipal waste disposal. A facility consisting of an aerobic biological treatment system for 10,000 hogs was studied. An important consideration was odor control because of a nearby metropolitan area. Recycled effluent was used for raw-waste input dilution, and paddle-wheel aerators were selected for high oxygen transfer efficiency and low operating cost. Each building had an aeration ditch under its slotted floor for aerobic processing, and final disposal was by a 2-stage infiltration pond system and field spreading of solids. Measurements were made of DO, BOD, COD, pH, suspended solids, N, and trace metals. Chemical analysis results and cost data are tabulated. Operation expense is about 1-2 cents per hog per day. Stream pollution is prevented or greatly reduced and odors are no problem. (Knapp-USGS)

1254 - C4
ISOLATION OF ANAEROBES.
Academic Press, Inc., New York, N.Y. 1971. D.A. Shapton and R. G. Board, editors. 257 p.

Descriptors: *Isolation, *Cultures, Soil bacteria, Protozoa, Fungi, Photosynthetic bacteia, Sulfur bacteria, Nitrogen fixing bacteria, Soil microorganisms, Clostridium, Enteric bacteria, Bioassay, Animal wastes, Poultry, Ruminants, Sediments, Foods, Soils.
Identifiers: *Enumration, Enrichment, Cellulolytic bacteria, Lipolytic bacteria, Bacteriodaceae, Biological samples, Bacteroides fragilis, Sphaerophorus, Fusiformis, Zymomonas anaerobia, Fusobacteria, Spirochaetes, Microaerophilic vibrio, Anaerobes, Culture media, Feces, Tissue, Entodinium caudatum, Entodinium simplex, Epidinium ecaudatum caudatum, Polyplastron multivesiculatum, Actinomyces, Leptotrichia, Veillonella.

Methods are presented for culturing, isolating, and enumerating anaerobic microorganisms including Clostridia; enteric bacteria; anaerobic bacteria of man, ruminants, poultry, and horses; photosynthetic bacteria; nitrogen-fixing bacteria; sulfur bacteria; protozoa; and fungi. The methods are used for isolating the bacteria from animal tissue, food, feces, soil, intestines, bovine rumen and the human mouth. (Holoman-Battelle)

1255 - A2, A9, B1, E4

DISEASES OF FEEDLOT CATTLE,
R. Jensen, and D. R. Mackey.
Lea and Febiger: Philadelphia, Pa. 1971. 2nd Edition. 377 p.
Identifiers: *Animal diseases, Cattle, Feed lots, Farm wastes, Water pollution sources.

Emphasizing the diseases of feedlot cattle, this book brings together current literature pertinent to an expanding branch of veterinary medicine. Each disease is considered under the headings of definition, occurrence, etiology and pathogenesis, clinical signs, postmorten lesions, prevention and treatment. Autopsy findings are presented exactly as practitioners and students should have them to make accurate diagnoses. Carefully selected postmortem and antemortem photographs augment the test. In addition to individual treatments, mass treatments for numerous cattle in a specific lot are described. Many of the newer diseases are discussed, with advice on vaccinations and preventive methods found helpful in their control. Full consideration is given to the causes, clinical signs, diagnosis and treatment of viral bovine rhinotracheitis and other respiratory diseases which cause such serious losses to the cattle fattening industry. All chapters are revised for this edition, with up-to-date information added on treatments, including the use of thiamine hydrochloride for polioencephalomalacia. New preventive measures are discussed, such as the vaccine for the protection against shipping fever. The economic importance of each disease is given and the problems of feedlot pollution of water, soil and air are considered fully. New chapters cover such important topics as preconditioning, adapting cattle to the change in diet from roughage to concentrate, bluetongue, necrotic posthitis and high mountain disease. A subject index is included.--Copyright 1972, Biological Abstracts, Inc.

1256 — A4, C3, E2

MOVEMENT OF POLLUTANT PHOSPHORUS IN SATURATED SOILS,
University of Minnesota, Minneapolis, Department of Agricultural Engineering.
P. Goodrich.
PH D Thesis, Purdue University, Department of Agricultural Engineering, 1970, 135 p., 3 tab., 57 fig., 49 ref.

Descriptors: *Phosphates, Soil contamination, *Saturated soils, Isotherms, Sands, Diffusion, *Adsorption, Clay, *Soil Columns, Radioisotopes, Denitrification, Waste water (pollution), Electromagnetic waves, Instrumentation, Effluents, *Irrigation, *Water pollution, *Waste disposal, Nutrients, Farm wastes, *Monitoring.
Identifiers: *Radioactive tracer solutions, Scintillator, Automatic data collection, Sandy loam, Land disposal, Influent.

A laboratory experiment was carried out using uniform soil columns and radioactive tracer solutions to monitor movement of phosphorus inside soil columns. An electronic data acquisition system was developed to monitor long term study. Results were compared with adsorption models already developed. Simulated high-phosphate irrigation showed the limited capabilities of surface soil in preventing ground water pollution. Sand and sand loam soils were tested. Results emphasized the importance of clay minerals in phosphate adsorption. However, soils have a finite capacity for adsorbing phosphate, and continuous flushing as in irrigation may cause the phosphate to move quickly to great depths, thus affecting ground water. Therefore, the design of disposal fields must be considered in order to prevent overaccumulation of phosphorus in soil columns. (Frantz - East Central).

1257 - A2, B1, C1, D2, E1

EVALUATION OF BEEF CATTLE FEEDLOT WASTE MANAGEMENT ALTERNATIVES,
Oklahoma Agricultural Experiment Station, Stillwater.
A. F. Butchbaker, J. E. Garton, G. W. A. Mahoney, and M. D. Paine.
Environmental Protection Agency, Water Pollution Control Research Series, November 1971. 322 p, 61 fig, 51 tab, 94 ref. EPA Program 13040 FXG 11/71.

Descriptors: *Farm wastes, *Feedlots, *Management, *Agricultural runoff, Ultimate disposal, Cost analysis, Water pollution control, Cattle, Operation and maintenance, Separation techniques, Oxidation lagoons, Transportation, *Waste water treatment, *Waste treatment.
Identifiers: *Feedlot waste management alternatives.

Alternative beef waste management systems were examined to determine minimum cost systems for effective waste disposal. Design and cost information was obtained from feedlot visits and the literature. A computer program was developed for use with a Conversational Programming System (CPS) for calculating the sizes of equipment and facilities and for estimating the facility and machinery operating and investment costs. For open feedlots, two waste management systems, solid and runoff-carried, were considered. The total system investment cost for a 20,000 head unpaved feedlot with pollution control was approximately $420,000 with an operating cost of $0.133 per animal day (not including feed mill and storage, office or land costs). The pen facilities were about 65% of the total investment cost, the runoff control system about 10% and the solids handling about 25%. Confinement buildings with slotted floors using slurry handling methods or with solid floors using solid handling methods offer a high potential for completely controlling the animal waste and abating pollution. A promising system for near optimum pollution control is a cable scraper system underneath a slotted floor for daily removal and disposal of the wastes. A manure irrigation system costs about one-half as much as mechanically conveying the slurry to the fields. In semi-arid areas, evaporation lagoons offer another ultimate disposal alternative. (Lowry-Texas)

1258 - A3, A9, C4

RECOVERY OF BACTERIAL PATHOGENS FROM HIGH QUALITY SURFACE WATER,
Colorado State Univ., Fort Collins.
J. F. Fair, and S. M. Morrison.
Water Resources Res, Vol 3, No 3, pp 799-803, 1967. 5 p, 2 tab, 5 ref. Grant WP-00679.

Descriptors: *Water quality, *Aquatic microbiology, *Pathogenic bacteria, *Wildlife, *Livestock, Salmonella, Potable water.
Identifiers: Arizona group pathoginic organisms.

An investigation of the presence of enteric disease producing bacteria in a high quality mountain stream in Colorado yielded 11 isolants of members of the genus Salmonella and 51 isolants of organisms belonging to the Arizona group. An improved method for the recovery of these organisms from high quality water was developed and used successfully. The presence of these potentially pathogenic bacteria, which appeared to be the result of contamination by wild or domestic animals, may be a potential hazard to public health.

1259 - B2, D4

WASTE STABILIZATION PONDS FOR AGRICULTURAL WASTES,
California Univ., Davis; and Kansas State Univ., Manhattan.
Samuel A. Hart, and Marvin E. Turnet.
Advances in Water Quality Improvement, (Editors: Gloyna, E. F., and Eckenfelder, W. W., Jr.), Austin, Texas, Univ of Texas Press, 1968, p 457-463, 2 tab, 6 ref.

Descriptors: *Waste treatment, *Stabilization, *Ponds, *Design criteria, *Anaerobic digestion, Sludge, Disposal, Odors, Mosquitoes, Insect control, Subsurface waters, Infiltration, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD).
Identifiers: *Agricultural wastes, *Manure stabilization pond, *Livestock manure characteristics, *Pond loading rates, *Pond appearance and location, Sludge digestion, Sludge disposal.

In contrast to sewage and other wastewater stabilization ponds, manure disposal ponds are expected to accept very large amounts of organic solid matter, often with scarcely enough water to get the wastes into the pond. The objective is stabilization and disposal of organic matter rather than water purification; effluent is lacking; make-up water is often needed. Biochemical oxygen demand (BOD) loading ranges up to 1200 lbs/acre/day; anaerobic conditions predominate; and are functionally comparable to open unheated sludge lagoons or conventional sludge digesters. Research during the past 5 years confirms dependence on anaerobic processes to stabilize agricultural wastes. Major design criteria are: (1) control odors, (2) control fly and mosquito production, (3) prevent infiltration of pond liquor to subsurface natural waters, (4) proper siting for aesthetic purposes. Other important design considerations relate to: volume and depth criteria, summer sludge upwelling requirements and winter sludge submersion requirements, manure inlet location, sludge build-up rates and removal, pond water levels, effluent runoff control, pond geometry and, plant and insect control. (D'Arezzo-Texas)

1260 — A3, F4

NONPOINT RURAL SOURCES OF WATER POLLUTION,
S. Lin.
ISWS-72-CIR111, Illinois State Water Survey, Urbana, Department of Registration and Education, 1972, 36 p., 20 tab., 4 fig., 84 ref.

Descriptors: *Water pollution, *Rural areas, Fertilizers, Pesticides, Erosion, Sediment, Farm wastes, Nitrogen, Phosphorus, Runoff, Waste treatment, Waste disposal, Illinois.
Identifiers: *DDT, Soil conservation methods.

A literature survey of major sources of rural water pollution was made. Major pollutants are fertilizers, pesticides, erosion and sediment, and animal wastes. In commercial fertilizers, nitrogen and phosphorus pose the greatest pollution threat.. Pesticides are only slightly soluble in water and then only five percent of that applied reaches waterways. Soil erosion and

sediment, which carry the greatest threat for pollution, can be minimized by contour farming, terracing, cover crops and/or crop rotation. Farm animal waste treatment may be accomplished by aerobic digestion, lagoons, composting, land disposal, or chemical treatment, however, these are systems used in domestic waste treatment and the same degree of success had not been achieved with animal waste. (Marquard - East Central).

1261 — B1, F1
INTERREGIONAL COMPETITION IN THE CATTLE FEEDING ECONOMY WITH SPECIAL EMPHASIS ON ECONOMIES OF SIZE,

Texas A & M University, College Station, Department of Agricultural Economics and Rural Sociology.
R. A. Dietrich.
Interregional Competition in the Cattle Feeding Economy with Special Emphasis on Economies of Size, B-1115, Texas Agricultural Experiment Station (Project No. HM-2489) in cooperation with the U.S.D.A., September, 1971, 55 p., 39 tab., 8 fig.

Descriptors: *Feed lots, *Cattle, *Economics, *Size.
Identifiers: Regional production characteristics, Transportation rates, Least-cost shipment routes, Feed grains.

This study utilizes a multi-dimensional transshipment model to determine the least cost location and optimum levels of cattle feeding and fed-cattle slaughter among 27 specified regions in the 48 contiguous states to satisfy the demand for fed beef. Data showed that readily available supplies of feed grain and feeder cattle and economies of size in feedlot operations are of major importance in determining the optimum location and levels of cattle feeding. Models were also developed to systematically measure the effects of specified changes in regional feedlot size and projected 1975 regional feedlot sizes on the optimum regional location and levels of cattle feeding and slaughter. In addition, the study shows the least-cost shipment routes for feeder cattle, feed grains, fed slaughter cattle, and dressed fed beef to meet the demand requirements in the various sectors of the cattle feeding-fed-beef economy. (Wetherill - East Central).

1262 — B1, D1, E1, F1
CLIMATE AND THE SELECTION OF A BEEF WASTE MANAGEMENT SYSTEM,

Oklahoma State University, Stillwater, Agricultural Engineering Department.
A. F. Butchbaker, G. W. A. Mahoney, J. E. Garton.
Paper presented at 65th Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-410, 35 p., 1 tab., 10 fig., 28 ref.

Descriptors: *Climates, *Feed lots, *Waste disposal, *Cattle, Temperature, Moisture deficit, Aerated lagoons, Management.
Identifiers: *Site selection, *Beef housing system, Anaerobic lagoons.

Climate classifications are defined and climate effects on animals and waste management systems are discussed. As a result, two climatological models for beef housing and waste management were developed to serve as a basis for delineating areas that require different beef housing and waste management practices. One used January and July temperature limits for beef production and moisture deficit. Beef housing and waste management systems were classified by climatological areas. Essentially, more humid areas require more complete housing and waste management systems. Areas of high moisture deficit are optimum for open feedlots. Areas above 60°F require sunshades, and year-around disposal of wastes on croplands can be achieved. Areas below 45°F require a higher degree of housing and storage facilities for winter wastes. (Marquard - East Central).

1263 — B1, C5
CHROMIC OXIDE AND CRUDE PROTEIN EXCRETION IN THE BOVINE AS INFLUENCED BY WATER RESTRICTION,

University of Kentucky, Lexington.
D. L. Cross, J. A. Boling, and N. W. Bradley.
Journal of Animal Science, Vol. 36, No. 5, p. 982-985, May, 1973, 4 tab., 2 fig., 12 ref.

Descriptors: *Farm wastes, *Proteins, *Cattle, Metabolism.
Identifiers: *Chromic oxide,* Water restriction, Dry matter digestibility, Fecal dry matter.

Twelve yearling Angus steers were assigned to two periods and two treatments in an experiment designed to study the effect of water restriction on the excretion of chromic oxide and crude protein. Each steer was confined to a metabolism crate and received 4 kg. of a ration plus water free choice or 60% free choice daily. During each period, fecal samples were taken at 2 hour intervals for 48 hours followed by a 7 day total collection of feces. The percent recovery of chromic oxide averaged 103.1 and 102.3 respectively for the steers offered water free choice or 6% of free choice. There was no difference in the digestion of crude protein between treatments. There was an increase in dry matter digestibility and chromic oxide concentration in fecal dry matter when water was restricted. Water restriction did not affect crude protein concentration of fecal dry matter. These data suggest that water restriction has little effect on the excretion of chromic oxide and crude protein. (Marquard East Central).

1264 — A5, A6, B1, C1, D1
PRINCIPLES OF FEEDLOT ODOR CONTROL,

Texas A & M University, Texas Agricultural Extension Service, Department of Agricultural Engineering.
J. M. Sweeten.
Texas A & M University, Texas Agricultural Extension Service, Department of Agricultural Engineering, December 1, 1972, 8 p., 4 ref.

Descriptors: *Air pollution, *Feed lots, *Farm wastes, Aerobic bacteria, Moisture contents, Temperature, Waste treatment, Poultry, Lagoons, Waste disposal.
Identifiers: *Odor control, Odor measurement, Odor intensity, Odor quality.

The major obstacle to developing effective odor control techniques, writing guidelines for feedlot odor control, and litigation of feedlot odor cases is the lack of suitable quantitative methods for measuring the intensity and quality of odors. Measuring odor intensity is usually done by diluting with odor-free water; However, measurement of odor quality is difficult because of the lack of an accepted standard. The physical variables which affect the generation of malodors from manure are temperature and moisture content. Experiments with poultry manure have shown that manure odor intensities are proportional to moisture content. This has suggested two approaches to odor control of feedlots — (1) maintenance of aerobic conditions for decomposition, and (2) the chemical treatment of manure. Judicious site selection of feedlots with respect to surrounding land use patterns and climatic factors is a third alternative which has had some success. (Dudley - East Central).

SECTION VIII

ACKNOWLEDGEMENTS

This bibliography was prepared under the auspices of the School of Environmental Science, East Central State College, Ada, Oklahoma, under Environmental Protection Agency grant number R801454. Dr. Ralph H. Ramsey, the principal investigator, was assisted by project librarian Linda Merryman and by numerous student personnel at East Central State College.

The project staff extends its gratitude to the authors and publishers for use of their publications in these bibliographic entries. Special thanks is also extended to EPA Project Officer, R. Douglas Kreis for his assistance in the preparation of this bibliography.

SECTION IX

REFERENCES

(1) Miner, J. R., D. Bundy, and G. Christenbury. Bibliography of Livestock Waste Management. Environmental Protection Agency, Washington, D. C. Publication Number EPA-R2-72-101. December, 1972. 137 p.

(2) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 1, No. 10b, Oct. 15, 1968. Washington, D. C.: Government Printing Office, 1968

(3) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 2, Jan. 15, 1969. Washington, D. C.: Government Printing Office, 1969.

(4) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 3, Feb. 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(5) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 4, Feb. 15, 1969. Washington, D. C.: Government Printing Office, 1969.

(6) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 5, Mar. 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(7) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 7, Apr. 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(8) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 11, June 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(9) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 12, June 15, 1969. Washington, D. C.: Government Printing Office, 1969.

(10) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 13, July 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(11) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 18, Sept. 15, 1969. Washington, D. C.: Government Printing Office, 1969.

(12) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 19, Oct. 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(13) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 20, Oct. 15, 1969. Washington, D. C.: Government Printing Office, 1969.

(14) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 2, No. 23, Dec. 1, 1969. Washington, D. C.: Government Printing Office, 1969.

(15) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 2, Jan. 15, 1970. Washington, D. C.: Government Printing Office, 1969.

(16) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 5, Mar. 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(17) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 6, Mar. 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(18) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 9, May 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(19) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 10, May 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(20) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 11, June 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(21) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 12, June 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(22) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 13, July 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(23) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 14, July 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(24) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 15, Aug. 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(25) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 16, Aug. 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(26) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 17, Sept. 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(27) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 18, Sept. 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(28) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 19, Oct. 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(29) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 22, Nov. 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(30) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 23, Dec. 1, 1970. Washington, D. C.: Government Printing Office, 1970.

(31) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 3, No. 24, Dec. 15, 1970. Washington, D. C.: Government Printing Office, 1970.

(32) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 1, Jan. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(33) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 2, Jan. 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(34) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 3, Feb. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(35) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 4, Feb. 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(36) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 5, Mar. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(37) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 6, Mar. 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(38) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 7, Apr. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(39) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 9, May 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(40) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 10, May 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(41) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 11, June 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(42) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 12, June 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(43) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 13, July 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(44) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 14, July 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(45) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 15, Aug. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(46) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 17, Sept. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(47) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 18, Sept. 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(48) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 19, Oct. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(49) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 21, Nov. 1, 1971. Washington, D. C.: Government Printing Office, 1971.

(50) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 22, Nov. 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(51) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 4, No. 24, Dec. 15, 1971. Washington, D. C.: Government Printing Office, 1971.

(52) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 1, Jan. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(53) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 2, Jan. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(54) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 3, Feb. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(55) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 5, Mar. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(56) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 6, Mar. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(57) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 7, Apr. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(58) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 8, Apr. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(59) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 9, May 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(60) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 10, May 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(61) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 11, June 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(62) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 12, June 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(63) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 13, July 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(64) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 14, July 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(65) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 15, Aug. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(66) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 16, Aug. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(67) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 17, Sept. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(68) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 18, Sept. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(69) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 19, Oct. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(70) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 20, Oct. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(71) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 21, Nov. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(72) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 23, Dec. 1, 1972. Washington, D. C.: Government Printing Office, 1972.

(73) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 5, No. 24, Dec. 15, 1972. Washington, D. C.: Government Printing Office, 1972.

(74) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 1, Jan. 1, 1973. Washington, D. C.: Government Printing Office, 1973.

(75) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 2, Jan. 15, 1973. Washington, D. C.: Government Printing Office, 1973.

(76) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 3, Feb. 1, 1973. Washington, D. C.: Government Printing Office, 1973.

(77) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 4, Feb. 15, 1973. Washington, D. C.: Government Printing Office, 1973.

(78) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 19, Oct. 1, 1973. Washington, D. C.: Government Printing Office, 1973.

(79) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 22, Nov. 15, 1973. Washington, D. C.: Government Printing Office, 1973.

(80) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 23, Dec. 1, 1973. Washington, D. C.: Government Printing Office, 1973.

(81) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 6, No. 24, Dec. 15, 1973. Washington, D. C.: Government Printing Office, 1973.

(82) U. S. Department of Interior. Office of Water Resources Research. Selected Water Resources Abstracts, Vol. 7, No. 1, Jan. 1, 1974. Washington, D. C.: Government Printing Office, 1974.

*U.S. GOVERNMENT PRINTING OFFICE:1974 546-319/401 1-3

SELECTED WATER RESOURCES ABSTRACTS

INPUT TRANSACTION FORM

1. Report No.

2.

3. Accession No.

W

4. Title

LIVESTOCK AND THE ENVIRONMENT

5. Report Date

6.

8. Performing Organization Report No.

7. Author(s)

Ramsey, Ralph H.

10. Project No.

East Central State College, Ada, Oklahoma
School of Environmental Science

11. Contract/Grant No.

R801454

12. Sponsoring Organization

13. Type of Report and Period Covered

15. Supplementary Notes

Environmental Protection Agency report number, EPA-660/2-74-024, April 1974.

16. Abstract

Management and research information on animal wastes has expanded rapidly in recent years. This material has appeared in diverse sources such as journal articles, conference proceedings papers, university or government publications, magazine articles, books, and theses. This bibliography (an updated and revised extension of the BIBLIOGRAPHY OF LIVESTOCK WASTE MANAGEMENT EPA-R2-72-101 which was published by J. R. Miner, D. Bundy, and G. Christenbury at Iowa State University) was compiled in order to speed the flow of information on findings in one segment of the livestock industry to other segments that could benefit from this technology. Included in this publication are the following indexes: (1) title, (2) author, (3) keyword, (4) animal information categories. These indexes are followed by a section of abstracts of each reference entry found in the bibliography. Single copies of most articles can be obtained in hard copy or microfiche form at cost from the Animal Waste Technical Information Center, School of Environmental Science, East Central State College, Ada, Oklahoma 74820. (Ramsey-East Central)

17a. Descriptors

*Bibliographies, *Cattle, *Sheep, *Hogs, *Poultry, *Fish farming, *Feedlots, *Confinement pens, *Research and development, *Farm wastes, Waste identification, Waste treatment, Waste storage, Waste disposal, Agricultural runoff

17b. Identifiers

*Waste management, *Title index, *Author index, *Keyword index, *Animal information categories index

17c. COWRR Field & Group 05A, 05B, 05C, 05D, 05E, 05G

18. Availability

19. Security Class. (Report)

20. Security Class. (Page)

21. No. of Pages

22. Price

Send To:

WATER RESOURCES SCIENTIFIC INFORMATION CENTER
U.S. DEPARTMENT OF THE INTERIOR
WASHINGTON, D.C. 20240

Abstractor Dr. Ralph H. Ramsey

Institution East Central State College