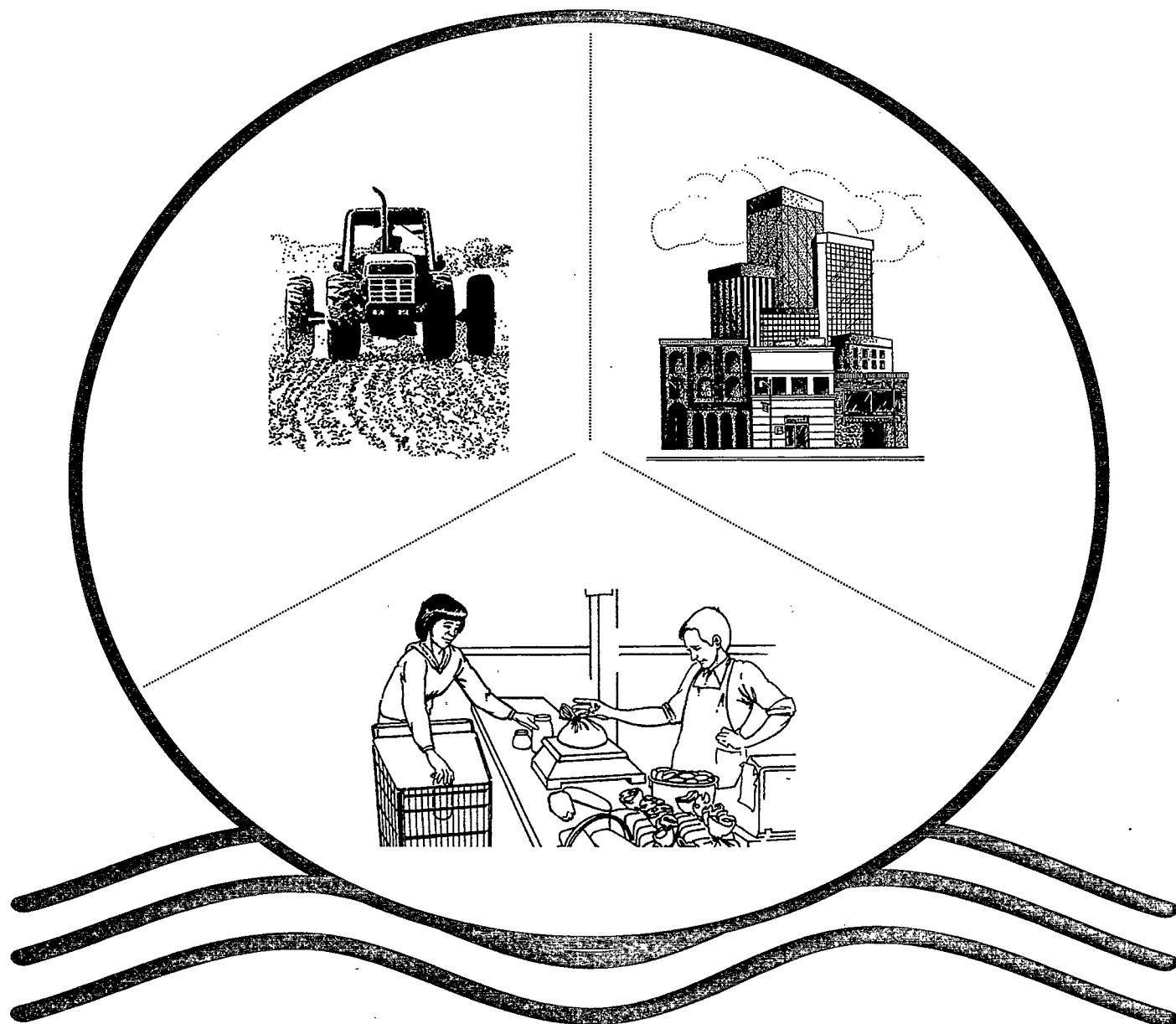
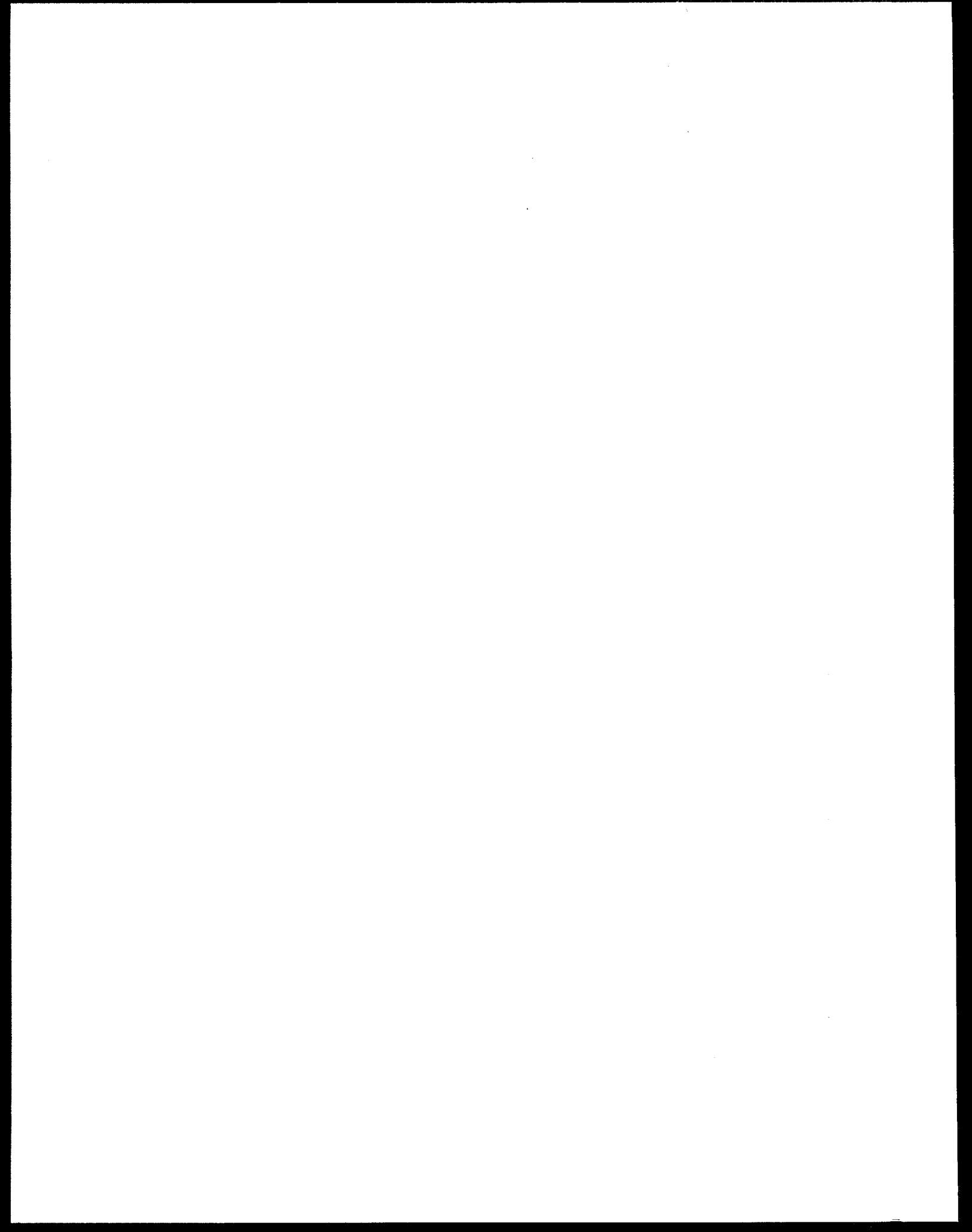




Food Production And Environmental Stewardship

Examples Of How Food Companies Work With Growers





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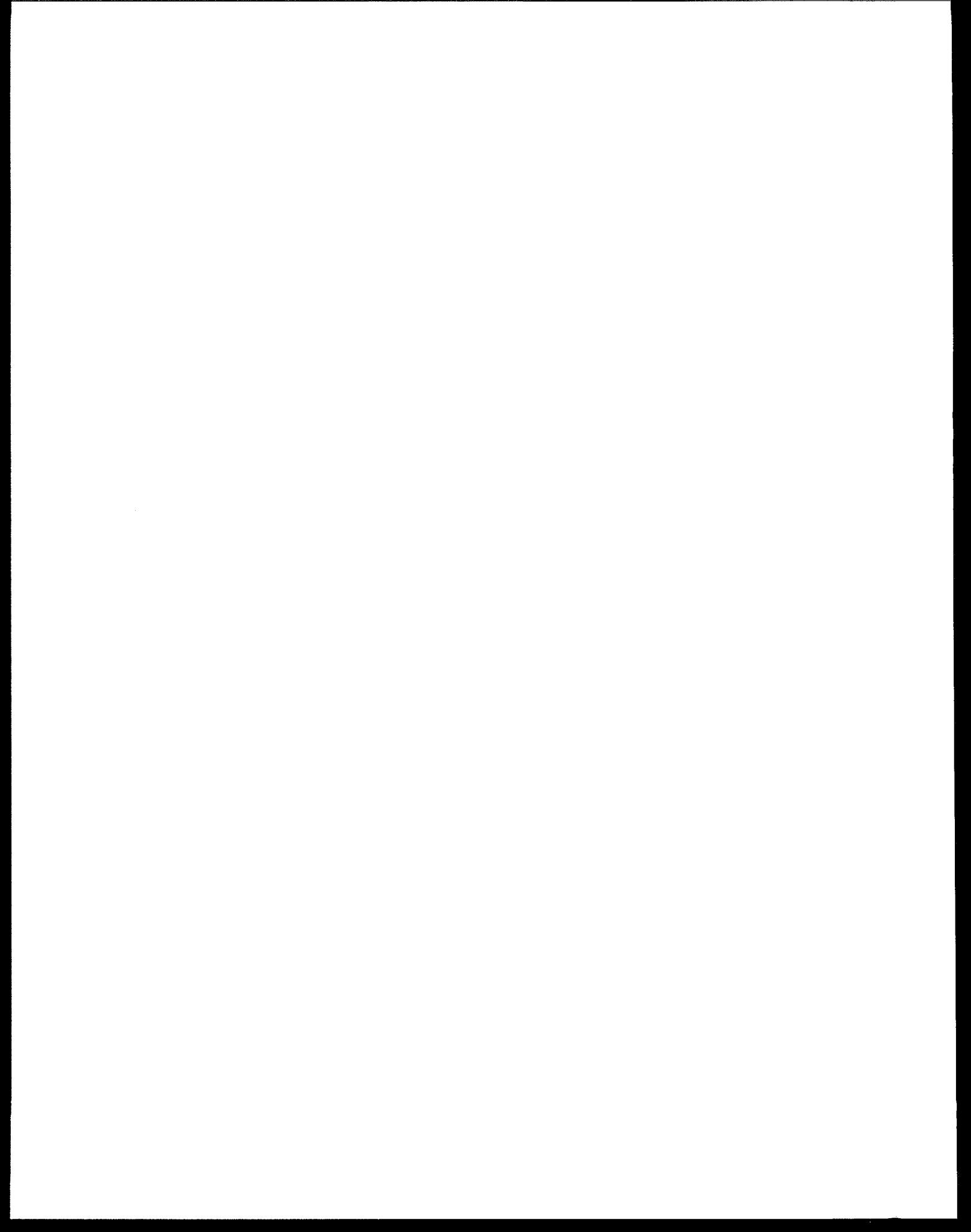
David Hilde, Richard Watkins, American Crystal Sugar Company	Ann Woods, Midwest Organic Alliance
Greg Hoffman, Tom Elsen, American Pop Corn Company	Betsy Lydon, Mothers & Others for a Livable Planet
Ernest Cadenhead, Arrowhead Mills	Garth Boyd, Rod Hamann, Murphy Family Farms
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Craig Weakley, Cascadian Farm	Larry Goff, Poultry Water Quality Consortium
Dan Benedetti, Clover Stornetta	Thomas Kalchik, Pro-Fac Cooperative
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Cary Baird, Berry Treat, Coors Brewing Company	Stephen Caruana, Salmon Safe / Pacific Rivers Council
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George Rose, Fetzer Vineyards	Owen Belletto, Bob Elliott, Sunkist Growers
Phil Bava, E. & J. Gallo Winery	Barry Kriebel, Joe Kretsch, Sun-Maid Growers
Nicholas Hether, Gerber Products	Harold Jackson, Sunsweet Growers
Terry Sebastian, Health Valley Foods	Ann Wilson, Tallgrass Prairie Producers Co-Op
Jeff Heater, Hood River Grower/Shippers	David Granatstein, The Food Alliance
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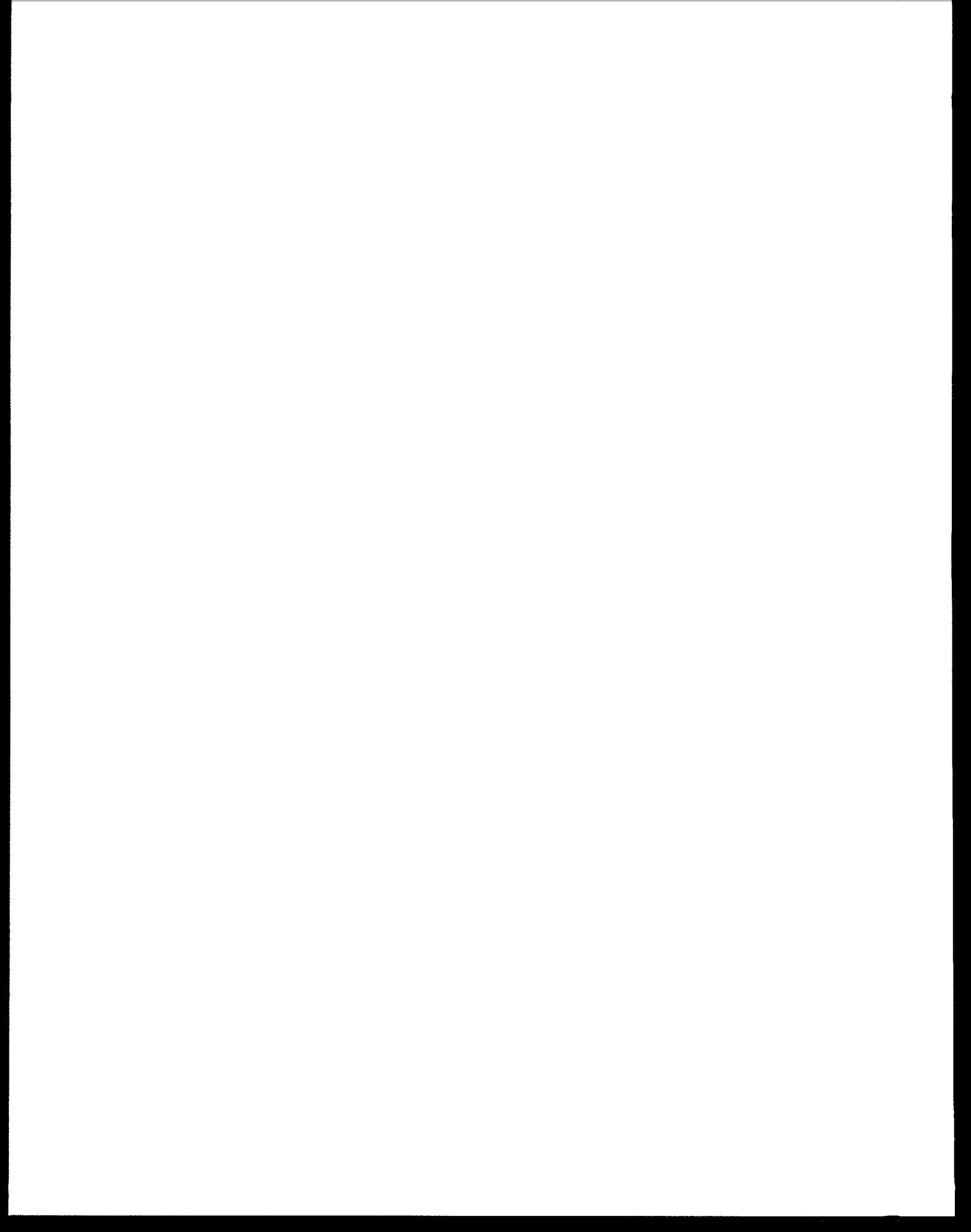
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DISCLAIMER

This report provides information on different ways that food companies encourage greater environmental stewardship by growers. Information about these companies was collected between September 1996 and November 1997 from published literature, as well as information provided by the companies. The companies contacted do not constitute an all-inclusive list of those working with growers to encourage greater environmental stewardship. The purpose of this report is to share information about the environmental stewardship efforts between food companies and growers, rather than to compare the relative environmental soundness of their products, services, or practices between them or other companies, or to judge which are superior. The mention of a particular industry, company, or product does not imply endorsement of use or verification/testing of the company or product claims, nor the industry's or company's overall practices or past compliance history, by the U.S. Environmental Protection Agency. Any views expressed represent preliminary staff assessments and do not necessarily reflect those of the Agency or the Administration.



FOOD PRODUCTION AND ENVIRONMENTAL STEWARDSHIP

EXAMPLES OF HOW FOOD COMPANIES WORK WITH GROWERS

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EXECUTIVE SUMMARY

Farmers have long understood how humans depend on nature. Recent changes in technology and the relationships between the parties involved in the modern food industry have left an imprint on the environment. However, while there is greater awareness of environmental impacts from agricultural practices, it is often difficult to implement practices that are more environmentally-protective.

With this in mind, EPA has prepared this report summarizing how 40 food companies work with growers to influence their choice of agricultural practices and to reduce the environmental impacts from farms, vineyards, and ranches. The principal purpose of the report is to share this information with the food industry and thereby encourage more companies to improve their environmental stewardship activities.

Public concerns also make it important to share the information in this report. Recent Congressional enactment of the Food Quality Protection Act in 1996, the Administration's Clean Water Initiative, and several EPA reports identifying agriculture as a major contributor to some of the nation's most widespread water quality problems have focused more attention on agriculture and the environment. News stories about particular instances of environmental and public health problems have amplified public concern about food production, food safety, drinking water quality, recreational uses of waterbodies, and water pollution more generally. Many people have raised questions and concerns about the role of farm operations and livestock companies in addressing these problems.

About This Report

The companies described in this report range in size from big, national companies, to smaller, local or regional companies. EPA

reviewed the published literature and company reports to collect information regarding the types of environmental stewardship activities that food companies encourage by growers. EPA also contacted companies directly, but did not attempt to verify directly all the information it gathered. EPA selected the particular companies to show a range of environmental stewardship activities rather than to give equal representation to different types of crops. The companies were identified through a variety of sources, such as reports and published literature, word-of-mouth contacts, observation of products sold in retail, and prior contacts with the poultry industry. Hopefully, this study and similar efforts will lead to the expansion of stewardship activities.

Stewardship Activities

Food companies work with growers to achieve environmental stewardship objectives through a variety of approaches, ranging from voluntary to mandatory measures. The voluntary measures include providing encouragement, information, price incentives, and supporting service. Mandatory approaches include establishing criteria for being a member of a cooperative and placing stipulations for specific environmental practices in the company contracts with growers.

The most common environmental stewardship activity is to provide information to the growers through newsletters, workshops, farm demonstrations, meetings, field agents, state university extension service, mentor growers, company libraries, or telephone hotlines. To a large extent, these information sources focus on the why, what, how, when, and where of farm/environmental practices.

The extent of such activities varies, influenced often by the size of the company and its mission. Many of the food companies have taken a more active role in working with growers, while others may rely more on the extension service, county agricultural agents, and others for much of the direct contact or information assistance involved in working with growers. This role is often influenced by the size of the company and its mission. That is, the larger the company, the more likely it is to have built environmental expertise in its field or grower-relations staff. In addition, the mission of some food companies is solely in marketing food products rather than affecting environmental performance.

There are also examples where food companies share the cost of developing and implementing environmental practices, and other examples where the practices and their costs are imposed on growers. Given the interest by several of the companies contacted to build a better partnership with growers, making demands on growers without providing incentives may not foster improved long-term relations with growers.

Motivations

The reasons why the companies engage in stewardship activities range widely. Typically, the motivation is either environmental or economic. In fact, some of the stewardship activities primarily aim to benefit the companies and/or growers economically -- the environmental benefit was secondary. Analysis of the information collected tends to indicate that if protecting the environment can work in conjunction with operating or expanding a business, grower use of more environmentally-protective practices will be greater. And the evidence further indicates that where flexibility and incentives are involved and the practices are more cost-effective or low-cost, the likelihood of use is even greater. Given the number of companies reporting economic motivations for

environmental stewardship, it is more than likely that many of their reasons are common to other companies that produce and market foodstuffs.

Implications

The broad implications of the report's findings for those concerned with increasing agricultural efficiency while also ameliorating environmental impacts and worker safety concerns from agriculture include:

First, using more environmentally protective approaches can also increase processing efficiency, profitability, competitiveness, market share, customer loyalty (linked to product differentiation and/or product quality), and the ability to reach new markets. In addition, these approaches can mitigate liability and risks. Whether environmental stewardship means lower costs for inputs such as fertilizers and pesticides, health, or insurance, mitigating liabilities and risks, increasing revenues, differentiating products, outdoing competitors, or protecting the company's reputation, these economic components emerge as very influential in supporting the environmental practices chosen. When comparing the size of food companies that are differentiating their products for environmental-related attributes, it appears that it is the smaller ones that are doing so at this point in time, due in part to their interest in developing a competitive edge. If they appear to be succeeding, this could encourage larger companies to emulate them to gain the same kind of differentiated product edge.

Second, food companies see improving and stabilizing the quantity and/ or quality of food inputs as being beneficial to them and growers. Growers become more productive and profitable. Food companies improve their productivity and reject less inputs for processing, and subsequently their profitability and competitiveness. In addition,

they reduce their need for land and inputs to produce their desired level of product output.

Third, the food companies see environmental stewardship as improving their relationships with growers and developing a team effort. They see working together this way helps reduce costs, boost profitability and sustainability, become better environmental stewards, reduce health and financial risks, avoid future pollution-related problems, keep small, family farms in operation, or improve their reputation. Better relationships with growers develops a team attitude and improved two-way business commitment, communication, and partnership. Both food companies and growers benefit.

Fourth forming partnerships with beneficiaries of the environmental improvements improves the likelihood that the stewardship practices will be adopted and that the food production system will be improved. Actually, environmental stewardship efforts can be led not only by food companies and growers, but also by non-profit organizations, local communities, the public sector, universities, and consumers. These beneficiaries can all become involved in changing growing practices. This complements the fact, as identified by a number of companies and third-party programs, that farms play an important role in a local, typically rural, community's economic, environmental, social, cultural, institutional, and visual landscape. In this context, they see protecting local farms as having broad dimensions that include environmental and other considerations.

Fifth, getting ahead of environmental regulations is also important, either to potentially reduce the need for certain ones to be implemented in the future or to help shape them in case they are implemented. In addition, protecting company and grower reputations was also an important consideration.

Barriers

EPA also obtained information regarding the barriers the companies encounter in working with the growers to encourage environmental stewardship. Knowing what barriers to expect and how these companies addressed these barriers can provide valuable lessons to others expanding into this area of environmental stewardship. Frequently reported barriers involve the availability of reliable and consistent information and access to sufficient resources to support changes in practices. Other barriers include the lack of financial or other incentives for growers to adopt environmental practices or the need to educate consumers about the benefits of these practices. While some of the barriers seem to reflect growing pains and growing market segments, a number of companies believe they have been or are being overcome.

Food for Thought

No two of the companies' stewardship efforts are identical. They believe they have adopted approaches that make sense for the growers and their relationships with them. What emerges from this study is that there is no one-size-fits-all approach. Environmental stewardship cannot be force-fit and then expected to reach its full potential. Instead, it needs to be tailored to the situation -- i.e., adapted to fit the relationship between the growers and food company, the intended market and associated product definition standards, acreage and processing needs, production and volume needs, and the supplier base. Although there are certain basic regulations related to federal and state laws that relate to food safety and protecting the environment and public health, common sense and partnership efforts are proving increasingly effective in the field of environmental protection. This report summarizes how 40 companies have

approached environmental stewardship with growers. It should be viewed not as a prescriptive handbook, but as a descriptive report providing food for thought.

1. INTRODUCTION

This report summarizes how 40 food companies work with growers to influence their choice of agricultural practices and reduce the environmental impacts from farms, vineyards, and ranches. The principal purpose of the report is to share this information with the food industry and thereby encourage more companies to improve their environmental stewardship activities.

Public concerns also make it important to share the information in this report. Recent Congressional enactment of the Food Quality Protection Act in 1996, the Administration's Clean Water Initiative, and several EPA reports identifying agriculture as a major contributor to some of the nation's and most widespread water quality problems have focused more attention on agriculture and the environment. News stories about particular instances of environmental and public health problems have amplified public concern about food production, food safety, drinking water quality, recreational uses of waterbodies, and water pollution more generally. Many people have raised questions and concerns about the role of farm operations and livestock companies in addressing these problems.

The food companies were contacted to understand the scope and variety of their environmental stewardship activities with growers. Information was collected regarding what activities the companies undertake and why they undertake them. The information showed that the companies are implementing various activities with growers to encourage them to adopt more environmentally protective practices and/or to improve their profitability. These activities reflect American agriculture's growing interest in protecting the environment, lowering costs, improving productivity, competitiveness, and profits, differentiating food products, and using eco-labels.

The information provided reflects some common threads in the stewardship activities. Most common to these activities is providing information to growers about environmental practices. The most common reason, or motivation, behind these efforts seems to be economic. By improving grower and company profitability, improving processing efficiency, reaching new or foreign markets, differentiating products, protecting worker safety, or improving working relationships with the growers, the food companies are promoting practices that better protect growers' and their own economic interests, as well as the environment.

1.1 Sources of Information

Reports and published literature from the 40 companies were reviewed and the companies were contacted to collect additional information on the types of environmental stewardship activities that they encourage on the part of the growers and which result from explicit or implicit incorporation into their crop growing and production/purchase decisions. The companies contacted (see Table 1) were selected to show a range of environmental stewardship activities rather than to give equal representation to different types of crops. They were identified through a variety of sources, such as reports and published literature (e.g., The National Geographic Society and The Conservation Fund, 1995; National Council of Farmer Cooperatives, undated), word-of-mouth contacts, observation of products sold in retail, and prior contacts with the poultry industry. This report relies on information as it was provided or published.

1.2 Companies Contacted

The food companies contacted (see Table 1) were selected to show a range of environmental stewardship activities between them and growers, rather than to give equal representation of different types of crops. Information, including company literature, was informally collected by telephone, mail, fax, and e-mail. For purposes of this report, a food company refers to food and beverage processing companies, grower cooperatives, produce packers, distributors, restaurants, and grocery store chains. In addition to the stewardship activities used by the companies listed in Table 1, there are also several "third-party" stewardship programs that work with growers to reduce their environmental impacts.

1.3 Purpose of Report

There is growing interest in the use of incentive-based measures to protect the environment and reduce pollution. There is also increasing attention paid to reducing environmental impacts from agricultural operations and protecting the food and water supplies. For example, agriculture is identified as a major contributor to some of the most widespread environmental problems in the U.S. According to the U.S. Environmental Protection Agency (EPA, 1995b), agricultural operations (including crop production, pastures, rangeland, feedlots, and other animal holding areas) represent a significant contributor to pollution of U.S. waterbodies (see Table 2). The types of water pollutants emanating from agriculture include nutrients, sediment, bacteria, pathogens, and toxic organic chemicals. Siltation (the "suspension and deposition of small sediment particles") and nutrients are the nonpoint source pollutants most often linked with water pollution problems. In addition, there have been recent occurrences of environmental degradation and public health impacts that

amplify a growing concern with agriculture, government, and the public about food and drinking water safety, recreational uses of surface waters, fish kills, and excess nutrient pollutant loads. Questions and concerns are being raised about the role of farm operations and livestock companies in addressing these problems.

This report is not a complete inventory of stewardship relationships between food companies and growers. However, it represents a cross-section of different sizes and types of food companies across the U.S. encouraging greater stewardship by growers. Discussing these companies' motivations (i.e., incentives) and obstacles (i.e., barriers) that influenced their use of environmental stewardship activities, as well as how they have overcome these obstacles, can lead other food companies to greater environmental stewardship. For example, the report discusses the motivations behind the companies' environmental stewardship, and the benefits from improved stewardship, in order to encourage other food companies to pursue similar efforts. The report is not intended to be a guidance manual for environmental stewardship. Indeed, as learned from the information collected regarding these companies' efforts, environmental stewardship activities need to be tailored to fit the dynamics between the company, the grower, and the market, or perhaps those dynamics need to be tailored to meet environmental concerns.

A variety of reasons are leading food companies and growers to accept greater environmental stewardship responsibilities, individually and collectively. There is, for example, more information on, and understanding of, the impacts of agricultural practices on the environment, growing recognition and acceptance of the role of food companies and growers in reducing these impacts, continuing experience in the use of the environmental practices, improved cost-effectiveness of these practices, and greater

Table 1: Food Companies Providing Information

<u>Field Crop</u>	<u>Company</u>	<u>Orchard</u>	<u>Company</u>
Grain Seeds Vegetable	American Pop Corn Co.	Fruit	Cascadian Farm
	Arrowhead Mills		Del Monte Foods
	Coors Brewing Company		Fetzer Vineyards
	Health Valley Foods		E. & J. Gallo Winery
	Arrowhead Mills		Gerber Products
	Curtice Burns Foods/Pro-Fac		Hood River Grower/Shippers
	Del Monte Foods		Lodi-Woodbridge Winegrape Com.
	Gerber Products		Ocean Spray
	Health Valley Foods		Pavich Family Farms
	Pavich Family Farms		Robert Mondavi Winery
Other	Seymour Canning	Stahlbush Island Farms	Stahlbush Island Farms
	Stahlbush Island Farms		Stemilt Growers
	Wegmans Food Markets		Sunkist Growers
	American Crystal Sugar Co.		Sun-Maid Growers
	Campbell Soup Company		Sunsweet Growers
	Hunt-Wesson		
<u>Livestock</u>	<u>Company</u>	<u>Livestock</u>	<u>Company</u>
Beef Dairy	Coleman Natural Products	Poultry	Butterball
	McDonald's Corporation		Draper Valley Farms
	Tallgrass Prairie Producers		Eberly Poultry Farms
	Clover Stornetta		Hudson Foods
	Horizon Organic Dairy		Tyson Foods
	Juniper Valley Farms		Murphy Family Farms
Dairy	Stonyfield Farm	Swine	
	The Organic Cow of Vermont		
	Vermont Milk Producers		

Table 2: Agriculture's Contribution to U.S. Surface Water Pollution

<u>Waterbody</u>	<u>Percent Assessed</u>	<u>Percent Impairment in Assessed Areas</u>	<u>Percent of Impaired Areas with Agricultural Pollution</u>
Estuaries	78 (of square miles)	37	34
Lakes, Ponds, Reservoirs	42 (of lake acres)	37	50
Rivers, Streams	17 (of river miles)	36	60

Source: U.S. EPA (1995b).

public pressure to reduce environmental impacts attributed to companies and growers. There is also greater public pressure on states and the EPA to ensure that states develop watershed-based strategies to reduce point and nonpoint source pollution (such as from agriculture) in order to achieve water quality objectives in a manner consistent with the Clean Water Act. Another key factor is the growing access to, and availability of, cost-effective new research, practices, and products/technologies. For example, there is greater availability of information on proper timing and quantity of nitrogen to apply, and the impacts on crop yield and quality from over-applying nitrogen. There is also greater availability of, and experience with, integrated pest management (IPM) strategies (Warrick, 1997).

There is a major shift by many sectors in agriculture towards industrialization, where food companies may exert more influence over how food is grown, including the use of production and environmental practices, through contracts or vertical integration (Martinez and Reed, 1996; Welsh, 1997, 1996). A greater percentage of certain food commodities (i.e., crops and livestock) are produced under production and marketing contracts or integrated ownership. For example, 100 percent of broiler chickens, hatching eggs, and citrus, over 90 percent for turkeys, market eggs, fluid milk, processed vegetables, and potatoes, and over 50 percent of fresh vegetables and other fruit are produced under these arrangements (O'Brien, 1994). In addition, the pork industry is increasingly becoming industrialized (Hoban et al., 1997; Hurt, 1994; Barkema and Cook, 1993). As agriculture becomes more industrialized, there can also be greater negative environmental impacts through greater concentrations of these operations (Manale and Narrod, 1995, 1994). While the food industry is becoming more industrialized, it is unclear to what extent this is the result of environmental problems contributed to by

industrialization. For example, with the increased concentrations of livestock operations, e.g., a higher animal-to-acre ratio, there is greater potential for environmental problems (Manale and Narrod, 1995, 1994). It is also unclear whether this influence over the production side responds to, or avoids, environmental regulations. And with less money available from public sources, a more industrialized agriculture may exert more influence over growers.

At the other end of the spectrum from an industrialized agriculture is a category referred to by Welsh (1997) as direct marketing. This category includes farmers' markets and community-supported agriculture (CSA), and involves direct contact between growers and consumers. According to USDA figures reported in Welsh (1997), there are over 2,400 farmers' markets in the U.S. In addition, CSA represents a new production and distribution method where customers contract with at least one farm to provide them with products directly from the farms during the growing season. As reported in Welsh (1997), the number of these types of operations increased by 43 percent since 1993 to 523 in 1997. Direct marketing from growers to consumers provides greater opportunities for two-way communication between them, including sharing information about the type of practices used to produce the crops.

To date, much of the attempts to reduce agricultural pollution have relied on incentives paid by federal, state, and local governments (i.e., the public), whether through cost-share funds, conservation easements, low-interest loans, grants, etc. In this way, the pollution is not internalized -- the costs to reduce it are borne by society. On the other hand, if the market system provides mechanisms for these costs to be internalized by growers and food companies, a more efficient and sustainable outcome is likely for environmental protection. Given the opportunity, the consumer's role in protecting the environment can be enhanced (Granatstein,

1997). Indeed, there are indications from various surveys that more consumers are considering the environmental implications of the foods they purchase. However, it has not been determined what is the primary motivation (e.g., health, food quality, nutrition, taste, environmental, wildlife, or worker safety considerations) behind the increasing numbers of consumers buying organic foods. But according to several surveys summarized in Section 2.5, environmental considerations typically rank high in affecting consumer interest in purchasing organic foods. For food companies interested in communicating to consumers the environmental practices used by growers, the survey results can provide support.

Procurement or purchase decisions by the public sector, private sector, and consumers are important in influencing environmental impacts from harvesting or producing raw materials, processing and using them, and managing the leftover materials. For example, federal, state, and local governments, as well as companies, encourage the purchase of source-reduced products and products made from recycled materials (Langert, 1997; EPA, 1995a). These efforts have been most effective in the purchase of paper products. These procurement efforts influence the products' content, not necessarily the producers' behavior. Many consumers also incorporate environmental attributes in their purchase decisions (FMI, 1997; The Hartman Group, 1997, 1996; Ottman, 1993; EPA, 1990). To aid consumers in factoring environmental considerations into their purchase decisions, labeling information, such as through eco-labels, can be used (Erickson and Kramer-LeBlanc, 1997; van Ravenswaay and Blend, 1997; van Ravenswaay, 1996).

Stewardship relationships and agreements between food companies and growers can create incentives to prevent nonpoint source pollution and other environmental damage, oftentimes in

voluntary ways. Focusing on customer/supplier relationships between food companies and growers that encourage greater environmental stewardship may provide valuable insights to help foster these relationships in the food sector (Philips & Associates, 1996) and in other industries (e.g., BSR, 1997; the retail sector -- WBCSD, 1997; the paper, printing, and publishing supply chain -- BSR, 1995).

The activities described in this report may be transferable in some form to other food company/grower situations, whether they have or have not already implemented some environmental stewardship activities. The information in the report can help a company begin to craft its own stewardship efforts. In addition, other food companies could expand their efforts. For example, a vertically-integrated livestock company could expand its activities with livestock facilities to also include growers of livestock feed. Or a food company that encourages the use of nutrient management could also encourage the use of other management practices, such as irrigation management. Lastly, a company could expand its stewardship activities beyond a specific geographic region to also include its operations and growers in other regions.

1.4 Support for Voluntary Approaches

The concept of voluntary approaches is key to many new EPA initiatives. For example, in 1993, the Clinton Administration announced a goal for the use of IPM on 75 percent of U.S. cropland (Browner, 1993b). As part of the efforts to accomplish this goal, EPA announced a number of initiatives, including quicker review period for safer pest controls, removal of unnecessary regulatory obstacles, and incentives for research and development of safe biological alternatives. EPA's Administrator Browner (1993a) also stated EPA's interest in "foster[ing] markets that pay farmers higher prices for pesticide-free products."

In addition, in 1995, President Clinton and Vice President Gore announced their plans to reinvent environmental protection. They identified 10 principles for reinvention, including pollution prevention and market incentives, and announced 25 high-priority actions. The first set of priority actions was selected to address problems with the current regulatory programs. These actions provide flexibility, spark innovation, require accountability, cut red tape, encourage collaboration, discourage the use of Washington bureaucratic procedures, and focus on achieving environmental results in local communities. The second set of priority actions was designed to develop innovative alternatives to the current regulatory programs. Partnerships will be a key focus of the second set. According to Thrupp (1996), “[s]trong linkages among individuals and institutions working together as equal partners help to bring innovation and progress.”

With the reinvention and partnership approaches being encouraged by the federal government, there is likely to be a greater reliance on the types of stewardship activities or partnerships in the food industry discussed in this report to protect the environment. For example, several of the companies are members of EPA's Pesticide Environmental Stewardship Program (e.g., Campbell Soup Company, Del Monte Foods, Gerber Foods, Hood-River Grower/Shippers, Lodi-Woodbridge Winegrape Commission, and Sun-Maid Growers). In addition, a number of the companies have been recipients of the state of California's EPA's Department of Pesticide Regulation's IPM Innovators Program (Campbell Soup Company, Del Monte Foods, Lodi-Woodbridge Winegrape Commission, and Sun-Maid Growers).

In 1997, USDA published proposed rules for the National Organic Program, with a public comment period extending until April 30, 1998. The proposed rule addresses national standards governing the production, handling, and labeling of organically produced

food and fiber. Final rules will be drafted after the public comments are analyzed and addressed. Though the Proposed Rule contains regulatory impact analysis, the actual effect on the industry will not be clear until the final rules are implemented. Therefore, its implementation and impacts will not be discussed further in this report.

Though more regulatory than voluntary in its approach, in August 1996, the U.S. Congress passed the Food Quality Protection Act of 1996 (FQPA, P.L. 104-70). Significant provisions include:

- establishment of a health-based standard to evaluate pesticide residues in food
- protection of infants and children via stricter pesticide residue standards
- elimination of the use of economic benefits to justify risks that exceed the health standard for all non-carcinogenic pesticides
- establishment of a “right-to-know” requirement for pesticide tolerance granted using the benefits exemption
- prohibition of states from setting more stringent pesticide residue standards, unless they petition EPA based on local conditions

Several of the companies contacted pointed to the FQPA as one of the motivations behind their efforts.

The National Forum on Nonpoint Source Pollution, comprised of 35 representatives from the private and public sectors and environmental groups and convened by The National Geographic Society and The Conservation Fund, identified voluntary approaches to reduce nonpoint source pollution. The Forum launched 25 innovative initiatives that were selected based on the following criteria: voluntary approaches, pollution prevention, partnerships, cost-effectiveness, transferable, and long-term environmental benefits. Of the 25 initiatives identified, two included examples of food companies employing stewardship to influence

environmental practices used by growers. They were included in the categories of incentives to encourage land and water stewardship or innovative approaches (The National Geographic Society and The Conservation Fund, 1995). This demonstrates broad support and recognition for the type of stewardship efforts discussed in this report.

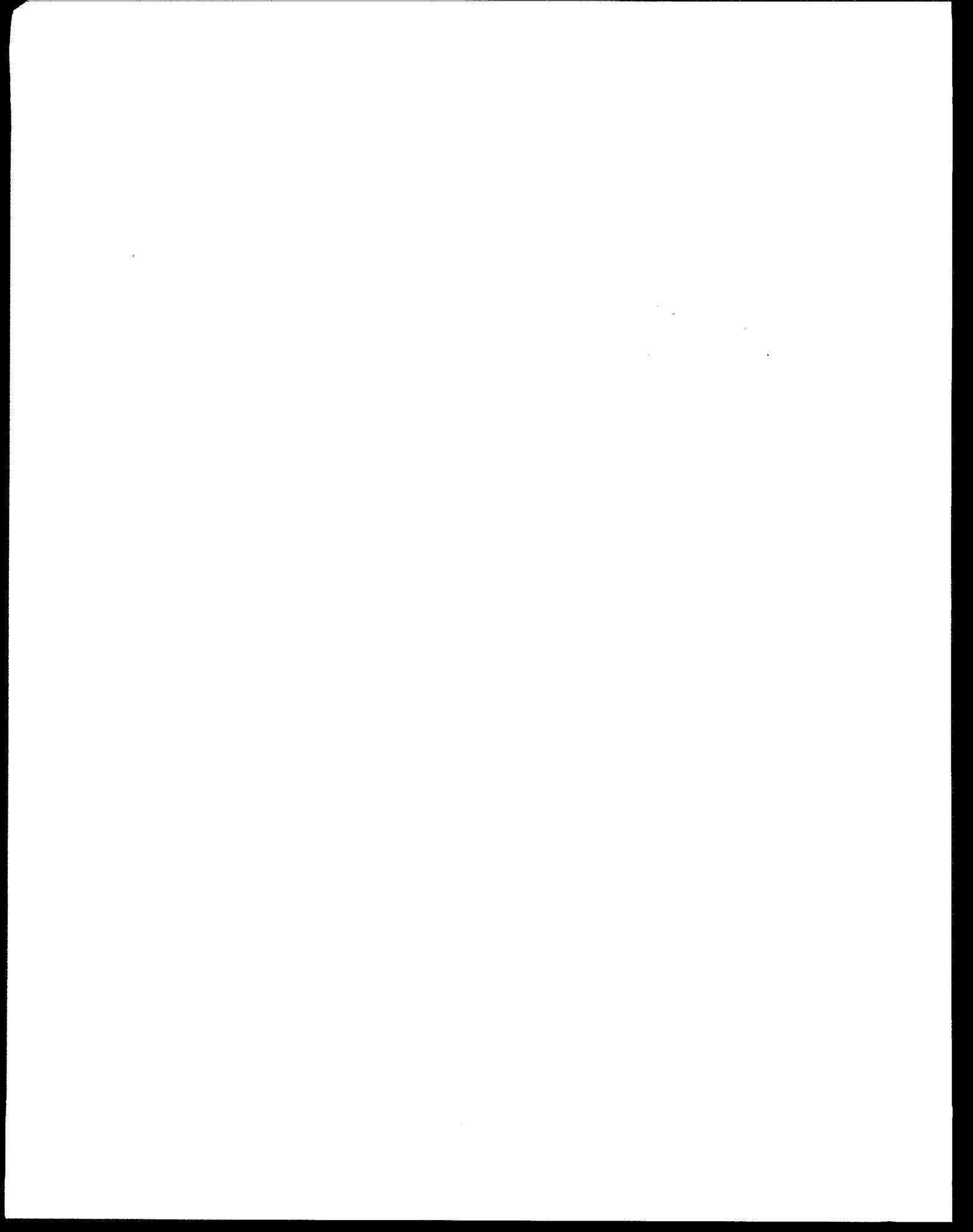
Further use of stewardship activities may improve the public's perception of the food sector, especially regarding its link to the environment. According to Smart (1992), "an industry's reputation tracks that of its least admired member ... [I]t is logical for the proactive company to look not only at its own processes, but up and down the chain of materials sourcing, production, distribution, and use -- a concept known as product stewardship." This can also provide a competitive advantage for individual companies or an industry sector. Indeed, according to the companies contacted by Smart, learning from each other can help companies achieve "continuous improvement toward the ideal of eliminating pollution." In addition, according to Makower (1994), "You must also be aware of what improvements your colleagues and competitors are making in environmental performance. The goal in watching them is to ensure that your own programs represent the best available knowledge and technological expertise." In addition, Makower encourages companies to take a holistic approach by looking at its whole system, including not only its workers, but also its suppliers, customers, and neighbors.

Several companies contacted expressed interest in reducing agricultural pollution through their own voluntary mechanisms, and protecting the environment in such a way as to potentially reduce the need for certain environmental regulations to be implemented in the future. This is a similar response reported by Makower (1994) and Smart (1992) from government agencies and companies in other industries. In addition, if a

company demonstrates that it is capable of encouraging or installing practices that protect the environment, and if regulations are implemented in the future, it may be able to help to shape them. Furthermore, if it shows its voluntary efforts to reduce agricultural pollution are successful, it can build up cooperation and trust with regulators. In addition, according to one of the companies profiled in Smart (1992), "[A]s long as our environmental philosophy is framed by the concept of compliance, we won't get much credit for our positive actions. Compliance means that the moral initiative lies elsewhere -- outside of industry. The time had come ... for the industry to move beyond compliance."

As evident from the information presented in Section 2.2 and Appendix A, several food companies have partnered with universities, trade associations, or others to leverage their resources, expertise, and insights. In addition, "third-party" stewardship partnership programs, show additional opportunities for partnering with growers. In these cases, the partners include non-profit organizations, environmental organizations, universities, or state and federal agencies.

It should be noted that these companies' efforts are not alike -- one size does not fit all. But, there are common threads that weave through a number of them. Furthermore, if the reasons for environmental stewardship activities between companies and growers are transferable to other situations, these stewardship activities can likely be tailored to fit other company/grower arrangements. Section 2.2 summarizes and reviews these stewardship activities, with more detail provided in Appendix A. Appendices B and C summarize "third-party" stewardship partnership programs with growers, as well as public/private partnership and awards programs, respectively.



2. FINDINGS OF STUDY

In this section, information is provided about the types of stewardship activities that various food companies use with growers and the reasons for these activities -- what they do, and why (see Table 3). What they do beyond encouraging growers to comply with existing state or federal environmental regulations is the focus of this table. In addition, when available, information is also included regarding the types of crops and livestock involved, the number of growers, number of acres or animals that the company deals with (though not all of them may be adopting these new practices), and the production levels. Many companies did not provide quantitative information for Table 3 because of confidentiality concerns. This selection of companies demonstrates a range of activities and reasons for them, types of crops and livestock, environmental/growing practices, types of food (e.g., fresh, processed), company configuration (e.g., processor, cooperative, integrator, packer, restaurant, or food store), and company size. Appendix A provides more detailed descriptions of these efforts, including information on the types of barriers that have been encountered and some of the methods used to overcome them.

It is important to understand that just because a food company buys from 100 growers, for example, and is encouraging these growers to adopt IPM, this does not necessarily mean that all 100 of the growers are adopting these practices to the same degree. For example, different growers may use IPM but may be at different points along the IPM continuum (discussed in Section 2.4). Furthermore, several of these programs or activities by companies are voluntary, and, unless enough convincing information and/or incentives are provided to growers, the percent of growers adopting these practices may be low. But, many of the food companies report a high participation rate. For example, they

may only buy certified organic raw food inputs, whereby each grower must follow certain practices that are certified by a state or private certifier. Many activities may be driven by the business the companies are in and possibly their need to meet certain production and processing standards. In other cases, growers may agree to be members of a group or cooperative, and environmental stewardship is one of the missions that they agree to follow. Finally, some companies require certain practices, or prohibit other practices, in their contracts with growers, so that use of practices is mandatory and expected to be followed by 100 percent of growers.

2.1 Types of Stewardship Activities

The companies accomplish their stewardship objectives through a variety of approaches (see Table 4 for a summary), ranging from voluntary to mandatory. The voluntary measures include providing information, offering price incentives, and providing services. The mandatory approaches include establishing criteria for being a member of a cooperative and placing stipulations in contracts with growers. One activity that all of these efforts have in common is the supply of information or technical assistance to growers, including newsletters, workshops, farm demonstrations, meetings, field personnel, state university extension services, mentor farmers, company libraries, or telephone hotlines.

If the stewardship practices lower yields and/or increase costs for growers, the technical assistance may need to be coupled with measures that raise revenues and/or lower costs to increase the use of these practices (van Ravenswaay and Block, 1997). For example, several of the food companies pay price premiums to growers to offset at least some

Table 3: Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	Number Acres or Animals	Production Level
American Crystal Sugar Company	<ul style="list-style-type: none"> • implemented quality payment program as incentive for growers to increase sugar production through use of BMPs, including nitrogen management • pays growers based on percent of sugar recoverable from sugar beets -- approximately 10% price premium • encourages planting of higher sugar varieties of sugar beets, and timely weed, insect, and disease control • requires soil testing • uses state university model and monitoring to help growers predict outbreak of pests and time pesticide spraying • encourages crop rotations • provides bimonthly newsletter and farm publications to transfer information to growers, fertilizer dealers, soil testing labs, and crop consultants • communicates to growers through data transmission network on agronomic crop information, company updates, legislation, and late-breaking pest problems • funds research through its Research Center to develop recoverable sugar quality measurements and with state universities on nitrogen fertility • formed partnership with two state universities/extension services to provide educational assistance to growers • implemented Certified Crop Adviser Program for company staff • holds meetings with growers 	<ul style="list-style-type: none"> • recoverable sugar from sugar beets related to amount of nitrogen applied • increase sugar production • increase factory efficiency • remain competitive in the marketplace 	2,500 (sugar beets -- MN, ND)	460,000 acres	8.3 million tons of sugar beets; >1 million tons sugar

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
American Pop Corn Company	<ul style="list-style-type: none"> requires that growers follow 15 steps to meet its guidelines, including using alternatives to pesticides, cultivation and farming techniques, crop rotations, field inspection, storage, multi-residue scan, cleaning out equipment before harvesting, and cleaning out storage areas provides information to growers on how to meet its guidelines meets with growers one-on-one to explain program pays approximately 15% price premium if grow specific variety of corn 	<ul style="list-style-type: none"> provide growers with alternative choice for cultivation and farming practices respond to growing market segment for organic 	15-20 (pop corn -- Iowa)	NDA	NDA
Arrowhead Mills	<ul style="list-style-type: none"> provides growers with information needed helps new growers identify what crops to grow and crop rotations to use helps new growers source organic seeds and beneficial insects helps new growers identify methods of weed control refers new growers to experienced organic growers for advice pays price premium for the crops purchased and help growers pay their organic certification fees helps growers market crops not purchased by finding other potential buyers 	<ul style="list-style-type: none"> company believes in organic system and interested in supporting the organic foods industry and philosophy (e.g., eliminating synthetic inputs, minimizing energy consumption, improving soil quality, and planting varieties of crops) the more organic growers kept in system by company, the more the organic foods industry will grow interested in persuading other growers to switch to organic farming 	> 100 (grains, beans, seeds [amaranth, flax, quinoa, sesame] -- United States, Canada, Mexico, South America; grains -- Colorado, Kansas, Nebraska, North Dakota, Texas; beans - - Colorado; amaranth, quinoa, sesame seeds, -- South America)	NDA	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

<u>Company/ Crop:</u>	<u>Types of Stewardship Arrangements</u>	<u>Reasons for Stewardship Activities</u>	<u>Growers</u>	<u># Acres or Animals</u>	<u>Production Level</u>
Campbell Soup Company	<ul style="list-style-type: none"> • encourages IPM in voluntary educational program • has IPM field specialists to provide technical assistance to growers and hold field meetings • conducts research and shares results with field specialists and growers to support IPM methods • funds state university research to develop IPM strategies • pays for reduction in yield quality and/or quantity that may result on grower test-IPM plots 	<ul style="list-style-type: none"> • address worker safety and environmental and regulatory concerns of growers • lower growers' pesticide risks • reduce likelihood of pesticide resistance • reduce financial risk to growers • lower growers' spray costs • enhance crop quality and yields • raise growers' revenues • address consumer, environmental, and regulatory concerns • meet consumer requirements of food safety and environmental protection • comply with the FQPA • anticipate rather than react to FQPA • enhance raw ingredient quality • reduce cost of raw ingredients • provide stable ingredient supply • meet product quality demands in foreign markets • foster good relations with growers • improve the company's operation efficiency • protect the company's reputation 	(carrots -- CA, NJ, OH, TX; celery -- CA, MI; cucumbers -- AL; mushrooms -- CA, GA, IL, IN, MI, OH, PA, TX; potatoes - OH; tomatoes -- CA, OH, Mexico)	NDA	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Cascadian Farm	<ul style="list-style-type: none"> • field representatives meet with growers to help them farm and stay organic, manage their nutrient applications and use of irrigation water, and find approved alternatives to synthetic pesticides • provides newsletters to its growers, distributors, and retailers, as well as some of its consumers • pays price premiums ranging from 35 to 100 percent, depending on crop type, to help compensate growers for their higher production costs and greater risks from farming organically 	<ul style="list-style-type: none"> • believes that organic farming is a better long-term, more sustainable farming system • wants to be a part of, and support, organic farming • protect family farms • provide benefits to environment and customers 	NDA (fruits and vegetables --California, Oregon, and Washington)	NDA	NDA
Coors Brewing Company	<ul style="list-style-type: none"> • provides technical assistance on BMPs through its malting barley research program, field agronomists, one-on-one meetings, and a newsletter • sponsors grower recognition events • provides newsletter to transfer information • funds university research on BMPs (e.g., nutrients, pesticides, irrigation) to share with company's barley growers and all barley growers • breeds and develops superior barley varieties, develops disease-resistant barley varieties, produce disease-free seeds to eliminate need for seed fungicides, and provides to growers • provides grower field-day meeting to feature in-house research programs • provides monetary incentives for high-quality barley • prohibits use of certain pesticides • funds state nonpoint source conference 	<ul style="list-style-type: none"> • improve quality of barley and optimize level of starch in barley, which is affected by amount of nitrogen applied, as well as tillage, and moisture • protect environment • lower or maintain costs and improve profitability for growers • protect quality of water used in processing • protect workers and consumers from pesticide exposure • strengthen relationship with growers • gain competitive advantage • improve relationship with regulators • protect company's reputation by protecting environment 	1,225 (Barley - CO, ID, MT, WY)	136,300 acres	12.5 million bushels

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Del Monte Foods	<ul style="list-style-type: none"> • encourages IPM • funds IPM research and share results with growers • breeds new vegetable varieties with disease and insect resistance and shares with growers • develops infrastructure to foster use and acceptance of IPM by growers and industry • leverages commodity groups to help spread word to growers about IPM • provides education about best available information on safe and effective pest control • establishes strict standards for pesticide use • specifies what pesticides can be used • requires and monitors growers to record pesticide use • sponsored training of growers and pest control advisors • provides IPM field staff to assist growers • holds annual meetings to update and educate growers 	<ul style="list-style-type: none"> • guarantee safety of products • losing pesticides to resistance by insects • high costs of pesticide reregistration • real and perceived external costs of pesticide use (e.g., food safety environmental impact, and worker safety) • long-term pest management stability • position company as leader in use of IPM • shape industry use of IPM 	<ul style="list-style-type: none"> 3,000 (apricots, cherries, grapes, peaches, pears, peppers, tomatoes, zucchini) -- CA; seeds for beans, corn, peas -- ID; beans, corn, peas -- IL; corn, peas -- MN; pears -- OR; beans, beets, carrots, potatoes, spinach -- TX; asparagus, beans, cherries, corn, pears, peaches -- WA; beans, beets, cabbage, carrots, corn, peas, potatoes -- WI) 	200,000 acres	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Fetzer Vineyards	<ul style="list-style-type: none"> • holds workshops with growers to provide technical assistance and share information on organic growing, cover crops (to extract atmospheric nitrogen and attract beneficial insects), IPM, and composting • formed organization of organic growers • works closely with state university and funds research to share findings with growers • shares findings from experimental vineyards with growers and other wineries • pays approximately 3% price premium 	<ul style="list-style-type: none"> • protect environment • protect water resources • improve soil health • reduce vineyard susceptibility to root rot disease • lower long-term costs • respond to consumer demand for more healthful products • improve taste of wine • protect farm workers • keep workers healthy and productive • reduce medical and insurance costs • reduced liability • concern for health of company's children and families • improve communications and relationships with growers 	<p>250, including 32-35 organic growers, 10 growers in transition to organic, and 60 uncertified organic growers (wine grapes - CA)</p>	2,460 certified organic acres; plus conventional acres	3 million cases (7.2 million gallons); 100,000 cases contain wine produced from organic grapes
E. & J. Gallo Winery	<ul style="list-style-type: none"> • encourages growers to adopt IPM and sustainable agricultural practices through informal approaches • shares information about cover crops, beneficial insects, and monitoring, through one-on-one meetings, taking groups from one vineyard to another, and showing growers results of company's own vineyards • co-sponsors meetings with state university representatives and company's field representatives 	<ul style="list-style-type: none"> • growers want to be better stewards of land • growers rely on company to help them address environmentally-related issues 	NDA (wine grapes -- CA)	NDA	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Gerber Products	<ul style="list-style-type: none"> funds agricultural research by state universities, mostly on lowering pesticide residues, and share results with growers works with growers to only apply enough nitrogen to get good crop, following growers' nutrient analysis of soil provides quarterly grower newsletter, with substantial focus on IPM provides annual grower newsletter to tell growers the company's expectations regarding what practices to use and not use, with most of the focus on IPM, but also on cover crops, irrigation, nutrient management, and pruning coordinates groups of growers to sequence crop rotations to meet processing needs organized crop management organizations to educate crop consultants that work with growers sponsors, and sometimes subsidizes, new agricultural techniques 	<ul style="list-style-type: none"> respond to customers concerned about pesticide residues concern for nitrate content in baby foods provide benefits to the environment want to maintain supply and quality of produce want crops to meet its production needs beginning to understand full potential of environmental stewardship want to encourage more intelligent use of pesticides care about the field and crop 	500-600 (16 fruits and vegetables -- 30 states)	NDA	NDA
Health Valley Foods	<ul style="list-style-type: none"> connects new growers with organic certifiers or Organic Trade Association to learn requirements associated with organic farming connects new growers with organic growers that company buys from for advice and who will not appear to be a competitor 	<ul style="list-style-type: none"> promote protection of the environment and conservation of resources promote purchase of healthy foods respond to growing consumer demand for organic foods 	15 (beans, carrots, celery, onions, peppers, tomatoes -- CA)	NDA	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Hood River Grower/ Shippers	<ul style="list-style-type: none"> • encourages IFP, including IPM, irrigation management, and nutrient management • provides information through education programs and newsletter to growers about economic and environmental benefits from IFP 	<ul style="list-style-type: none"> • IFP is sound agriculture • lower costs in short and/or long term • protect the soil and environment • amount of nitrogen applied can affect fruit storability and quality, runoff quality, and water quality • pesticide resistance management is very important to the pesticide industry • uncertainty with what will happen with FQPA, so want to get out in front • satisfy consumer concerns • expect that IFP will be a requirement to sell fruit in Europe in the future 	350 (apples and pears -- OR, WA) 4	15,000 acres	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Hunt-Wesson	<ul style="list-style-type: none"> • provides a field workforce that stays in close contact with growers to encourage use of varieties and techniques (e.g., IPM) that reduce grower costs and improve productivity, and shares information about production practices and environmental protection • works closely with tomato growers to share information about production practices and environmental protection • works closely with state University and shares findings with growers about IPM and improved irrigation methods • provides growers with a list of registered pesticides acceptable to company standards • requires a record of each grower's pesticide use and checks for compliance prior to harvest • funds and actively participates with the Processing Tomato Foundation to develop and disseminate information on tomato IPM techniques. • funds research to develop improved varieties that have pest resistance, disease resistance, greater tolerance to environmental conditions, improved on-farm productivity, and greater processing yield • screens all new seed company variety releases • consults with and provides quality data information to seed companies to assist in variety development 	<ul style="list-style-type: none"> • help growers be more profitable • achieve higher yields • produce more usable fruits for its products • protect quality of products • process and provide consumers with safe, wholesome food products that meet all USDA, EPA, FDA, and company requirements • reduce use of pesticides while protecting the crop • maintain efficacy of pesticides and have as many to draw from when needed • improve grower productivity, thereby reducing production cost and total land and inputs (land, capital, labor, fertilizers, pesticides) required to satisfy processing needs • improve processing productivity and recovery per ton, thereby reducing cost of the finished product and total land and total inputs needed to satisfy processing demand 	80 (tomatoes - CA)	NDA	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Lodi-Woodbridge Wine Grape Commission	<ul style="list-style-type: none"> • encourages IPM, nutrient management, drip irrigation, use of compost (instead of synthetic fertilizer), cover crops, and owl boxes • funds state University research aimed at solving local IPM and viticultural problems, and shares results with growers • conducts pest monitoring program on over 50 commercial vineyards as a demonstration project • provides bulletins, neighborhood meetings, breakfast meetings, workshops, and research seminars about IPM to growers, as well as workshops on IPM topics for Spanish-speaking workers • works with state University to provide information on various aspects of IPM <ul style="list-style-type: none"> • maintains library of viticulture and IPM literature for use of Commission members 	<ul style="list-style-type: none"> • IPM is best way to manage pests economically and environmentally <ul style="list-style-type: none"> • improve growers' ability to be sustainable • lower growers' costs for pesticides, nutrients, and water • find alternative approaches to substitute for environmental regulations • over-application of nitrogen can negatively affect grape quality <ul style="list-style-type: none"> • enhance wine quality • enhance marketability of LWWC's wine 	650 (wine grapes -- CA)	50,000 acres	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers or Animals	# Acres Production Level
Ocean Spray	<ul style="list-style-type: none"> • encourages use of IPM and BMPs • provides educational guidebook for growers regarding their environmental obligations • provides education from field staff to growers • trains consultants who work with growers • offers confidential, voluntary audit of pesticide use, storage, disposal, and cleanup • requires each grower submit annual pesticide records • together with information of relative risks, company quantified overall risk reduction and targets certain watershed for changes in pesticides • undertakes demonstrations and shares results with growers and rest of industry • holds workshops to share results of its in-house or company-funded university research on application technologies and better compounds • provides newsletter to growers in conjunction with state universities company works with • works with the Cranberry Institute to improve dissemination of environmental-related information to growers • stresses grower education to increases use of IPM and BMPs • establishes wildlife habitat enhancement program for growers • tests pesticide residue levels • may revoke grower's contract, or establish sanction or fine grower, if cause major environmental problem 	<ul style="list-style-type: none"> • protect food safety • protect environment • reduce growers' environmental risks • respond to growers' demands for IPM • growers want to protect the land and water • protect company's and growers' reputation • enhance trust between growers and company's management • comply with stricter market requirements in other countries • anticipate and stay ahead of changes in future regulations • develop capability to respond positively to inquiries from grocers about pesticides used • over-application of nitrogen can lead to excessive plant growth and insufficient fruit growth 	750 (cranberries -- MA, NJ, OR, WA, WI)	30,000 acres 360-420 million pounds

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Pavich Family Farms	<ul style="list-style-type: none"> • requires growers contact an organic certifier and comply with its standards, registers with the state of California as an organic grower, and meets company's product quality standards (e.g., size, eating quality) • meets with growers and advises them on their problems • product coordinators facilitate between growers and marketers (e.g., what, when, and how much to grow) and growers and contracts • research and development department supports growers about how to grow organic • helps growers find markets for crops not marketed by company 	<ul style="list-style-type: none"> • protect environment • maintain company's reputation as organic producer • interested in clean water, soil, plants, and products, sustainability of land, and prevention of soil erosion • protect worker safety • believe organic farming increases nutritional content by improving the health of the soil and plant • believe organic foods taste better • have recognized natural foods industry as growth industry • respond to growing consumer demands and interests in purchase of products to protect the environment and stores' interest in responding to consumer demands • believe organic foods appeal to different consumer segments (e.g., "green" consumers, baby boomers, senior citizens) for different reasons (e.g., protect environment, healthier, more nutritious, better tasting) 	<ul style="list-style-type: none"> 20 (56 fruits and vegetables, with another 23 added in 1997 -- CA) 	<ul style="list-style-type: none"> 5,000-6,000 acres 	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers or Animals	# Acres or Animals	Production Level
Robert Mondavi Winery	<ul style="list-style-type: none"> • forms teams with growers, university extension service, government agencies, and environmental groups to respond to consumer requests in a consensus-building process • develops a positive point system to measure changes and improvements by growers in pest management, soil management, water management, viticultural management, wine quality, and continuing education • meets one-on-one with growers and holds workshops to spread information about its program • shares findings with other growers 	<ul style="list-style-type: none"> • respond to consumer concerns to reduce environmental impacts and not charge more for wine • identify and promote growing methods that are the most environmentally protective, effective for winegrape growing, and sustainable • maintain or improve the quality and flavor of winegrapes • protect company's reputation • increase customer loyalty • protect worker safety • develop model program for other growers to follow • increase public trust and view of winegrape growing 	many dozens (winegrapes -- CA)	NDA	NDA
Seymour Canning	<ul style="list-style-type: none"> • pays 30% price premium for organically grown beans, peas, and sweet corn • pays 10% price premium for beans, peas, and sweet corn in transition to being organically grown • provides technical assistance and information to growers on weed control, cover crops, equipment, fertilizers, etc. • rents specialized equipment to growers -- if new type of equipment, allow farmer to use free for up to one year • recommends crop rotations • identifies market for alternative crop grown as part of rotation 	<ul style="list-style-type: none"> • protect environment • improve soil quality • meet increasing consumer demand for organically grown food 	11 (beans, sweet corn, peas -- WI)	900-1,200 acres	400,000-600,000 lbs beans, 200,000-400,000 lbs corn, 200,000-400,000 lbs peas

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Stahlbush Island Farms	<ul style="list-style-type: none"> • encourages annual crop rotations (a minimum of seven- year rotation sequences) and use of cover crops • requires new growers to conduct soil tests • eliminated use of pesticides on some crops or substantially reduced their use on other crops • worked with a state university on research to study the nitrogen movement in soil, and adapted findings to recommended growing methods shared with growers • encourages irrigation at optimal time to maximize water uptake by crops and minimize evaporation 	<ul style="list-style-type: none"> • interested in being better steward of the land to provide a better soil and protect ground water <ul style="list-style-type: none"> • do not want to sterilize the soil with chemicals -- company wants more productive soil • relying on less chemicals and more technology and labor fits in with how they want to farm and to be better stewards • it is often less expensive to adopt more environmentally protective methods rather than fight them <ul style="list-style-type: none"> • stay ahead of regulations so company can better shape them if they are implemented in the future • company believes these practices produce healthier and better products • expect that sales of products will increase • improve company's reputation • meet market requirements in other countries 	NDA (pumpkin, squash -- OR)	NDA	NDA
Stemilt Growers	<ul style="list-style-type: none"> • consults with growers regularly • provides monthly newsletter • provides each grower with handbook describing "Responsible Choice" program, including IPM, irrigation management, and nutrient management • conducted research to encourage use of biocontrols in post-harvest storage • established a point system to facilitate grower education and motivation 	<ul style="list-style-type: none"> • help growers • protect worker safety • avoid pesticide resistance • protect environment • differentiate product • ensure growers' ability to achieve sustained livelihood 	330 (apples, cherries, pears -- WA)	15,000 acres	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Sunkist Growers	<ul style="list-style-type: none"> • distributes monthly newsletter to growers to recommend practices • funds research demonstrations to show correlation between nitrogen application and growers' profits • sets up research foundation to aid citrus industry find alternatives to pesticides 	<ul style="list-style-type: none"> • maintain profitability of growers • achieve optimal yields • protect quality of product • protect company's reputation • meet product quality demands in foreign markets 	6,500 (oranges, grapefruits, lemons -- CA)	370,000 acres	1.6 million tons
Sun-Maid Growers	<ul style="list-style-type: none"> • provides technical assistance on IPM, nutrient management, irrigation methods, cover crops, and pruning through field representatives and meetings with growers • supplements extension role of University of California by sponsoring educational field days • interacts with pest control advisors to utilize their assistance in reducing pesticide use • provides newsletter to transfer information to growers • established phone line to provide timely pest control information • funds research to identify and develop BMPs • prohibits certain pesticides 	<ul style="list-style-type: none"> • meet product quality demands in foreign markets • lower grower costs • improve yields and quality of yields • improve pesticide effectiveness and selectivity • protect worker safety • protect ground water 	1,500 (grapes/ raisins -- CA)	50,000 acres	100,000- 125,000 tons

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Crop:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Sunsweet	<ul style="list-style-type: none"> • holds meetings to provide information to growers on environmental matters • provides advice to growers through field managers • relies on expertise of growers' own advisers for flow of environmental information to growers • encourages minimum use of inputs • requires growers to maintain logs of pesticide applications • assisted state of California in developing a BMP manual to reduce off-site movement of pesticides and distributed copies to growers • encourages use of owl boxes to control gophers and field mice 	<ul style="list-style-type: none"> • make sure everything is proper • make sure pesticides applied according to pesticide application label 	650 (prunes -- CA)	40,000-45,000 acres	100,000-112,500 dry tons
Wegmans Food Markets & Curtice Burns Foods/Pro- Fac Cooperative	<ul style="list-style-type: none"> • meets one-on-one with growers to discuss and review what will be involved in IPM program • store provides newsletter to its fresh vegetable growers in program • processor provides guidelines to processing vegetable growers concerning accurate record keeping for verification of the use of IPM practices • grower cooperative includes articles on environmental practices used by members in its member newsletter 	<ul style="list-style-type: none"> • reduce pollution to environment • educate public about decreased chemical use by growers • protect company's reputation 	10-12 (snap beans, beets, carrots, sweet corn, peas, sauerkraut -- NY)	1,500 acres	6,100 tons processing vegetables

Table 3 (cont.); Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Livestock:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
Butterball	Missouri: • pays 25% rebate for cost of new operations, with composting unit required to handle turkey mortalities • encourages existing facilities to compost mortalities • encourages growers to follow NRCS nutrient management guidelines • holds educational meetings with growers on composting mortalities • service people provide technical assistance to growers • developing a BMP manual for growers on handling manure • provides information to growers about who to contact for USDA cost-share funds	Missouri: • anticipate potential future regulations • get ahead of curve to control process if more regulations are developed in the future • avoid future environmental problems • knew use of burial pits would eventually be prohibited by state for handling mortalities, so supported composting as an alternative	Missouri: NDA (turkeys)	Missouri: NDA	Missouri: NDA
Clover Stormetta	• pays approximately 2% price premium for milk produced in compliance with its product and farm standards • develops scorecard to rate appearance of dairies; must score at least 90 -- includes points for corrals and manure piles • developing sustainable agricultural practices, as defined by the farms • encourages rotational grazing • audits each dairy and provides feedback • posts signs on property for members of "North Coast Excellence" program	• stewardship for the land • respond to growing consumer demand for natural foods • protect family farms • link consumers to growers with positive image and experiences • differentiate product and improve company growth • protect animal health • improve relationship with growers	18 (dairies -- CA)	14,000 head	19 million gallons per year

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

<u>Company/ Livestock:</u>	<u>Types of Stewardship Arrangements</u>	<u>Reasons for Stewardship Activities</u>	<u>Growers</u>	<u># Acres or Animals</u>	<u>Production Level</u>
Coleman Natural Products	<ul style="list-style-type: none"> • encourages rotational grazing through lectures • feed fed by feedyards tested for pesticides 	<ul style="list-style-type: none"> • respond to consumer concerns for pesticide residues • improve grass cover, watershed, wildlife, and quality of ecosystem • want family farms to continue to exist • raise animals in more respectful way • concern for total cost to society from producing low-cost food 	450 (cattle ranches -- CO, NE, ND, SD, and 13 other western states); and 9 (feedyards -- CO, NE)	NDA	NDA
Draper Valley Farms	<ul style="list-style-type: none"> • prohibits pit disposal of poultry mortalities in its contracts • requires composting or rendering of poultry mortalities • worked with individual growers about how to compost • does not allow poultry litter to be stored on-site or stockpiled uncovered 	<ul style="list-style-type: none"> • stay ahead of future regulations 	3.5 (broiler chickens -- WA)	20 million chickens per year	> 100 million pounds
Eberly Poultry Farms	<ul style="list-style-type: none"> • meets with growers by visiting their farms twice each year to provide updates on its program • pays price premium of approximately 33 percent paid to growers to compensate the higher labor costs needed 	<ul style="list-style-type: none"> • support sustainable agriculture • benefit growers (usually older operations) • protect small, family farms • respond to the growing marketplace for organic foods 	30-32 (broiler chickens -- PA)	average flock size -- 4,000	15,000-18,000 broilers per week

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Livestock:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
			Growers	# Acres or Animals	Production Level
Horizon Organic Dairy	To individual dairies: • provides field services and counsel • reimburses portion of first year's certification cost • provides access to certifying organizations for technical help To individual feed growers: • provides access to certifying organizations for technical help • provides contractual market for feed grown	<ul style="list-style-type: none"> reduce agricultural nonpoint source pollution build up and protect the soil provide a business opportunity to respond to growing consumer demand for environmentally-oriented and residue-free products keep small family dairies in operation produce better tasting milk raise animals in more respectful way 	125 (dairies -- IA, PA, WI); buys organic fruits from 20-25 farms (CA, CO, MI, OR, WA); owns dairy (ID) that buys organic feed from 30-40 farms (ID, UT)	≥ 5,000 cows; 50,000 acres to grow feed for company-owned dairy	buys 400,000 pounds of milk per week
Hudson Foods	Delmarva region: • provides cost-share for composting units to handle poultry mortalities • encourages use of manure sheds to contain manure until it is ready to be applied • provides information to growers through newsletter	<ul style="list-style-type: none"> share concern for water quality and Chesapeake Bay share concern for protection of farm property and soil 	Delmarva: 235 (broiler chickens)	Delmarva: 1 million birds per week	Delmarva: NDA
Juniper Valley Farms	<ul style="list-style-type: none"> pays 30-40 percent price premium for organically produced milk helps new growers locate suppliers of organically grown feed and refers them to existing dairies in case they have questions about farming organic encourages rotational grazing 	<ul style="list-style-type: none"> makes sense for environmental protection promote local sustainable agriculture protect local family farms respond to growing demand for organic foods respond to consumer concern about foods that may contain unnatural and unnecessary ingredients or residues provide cost-effective source of organic feed 	12 (organic dairies -- NY, VT)	about 800 cows	about 400,000 pounds per month

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

<u>Company/ Livestock:</u>	<u>Types of Stewardship Arrangements</u>	<u>Reasons for Stewardship Activities</u>	<u>Growers</u>	<u># Acres or Animals</u>	<u>Production Level</u>
McDonald's	• prohibits purchase of beef from cattle raised in areas that are or were in rain forest	• respond to customer concern about company's impact on rain forest	(Restaurants -- 50 states)	NDA	NDA
Murphy Family Farms	<ul style="list-style-type: none"> • helps new farmers write nutrient utilization plans • conducts weekly environmental assurance inspection of all farms by service people • requires soil testing by all its growers • requires growers in Midwestern states to work with consultant to conduct soil tests and determine application rates • provides dumpster and free pickup service for swine mortalities from operations in North Carolina • requires growers attend four-hour environmental training course, and courses are held every three months thereafter for new managers and operations • requires growers report weekly remaining capacity in manure-holding lagoons • provides newsletter to growers with information on nutrient management, water use, and general stewardship activities • funds and jointly conducts nutrient management research with universities and private corporations • conducts mock inspections of farms and provides feedback to growers • annually tests all contract farm wells for nitrate pollution • encourage protection of riparian areas and wildlife habitat through educational, voluntary, and regulatory efforts • assists state of North Carolina develop a course for regulated "operator in charge" irrigation training and then co-taught classes 	<ul style="list-style-type: none"> • support for sustainable agriculture • protect water quality • protect and enhance company's reputation through environmental proactivity • help growers become good environmental stewards • stay ahead of environmental regulations 	700 (swine -- IL, IA, MO, NC, OK, SD)	NDA	NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

<u>Company/ Livestock:</u>	<u>Types of Stewardship Arrangements</u>	<u>Reasons for Stewardship Activities</u>	<u>Growers</u>	<u># Acres or Animals</u>	<u>Production Level</u>
Stonyfield Farm	<ul style="list-style-type: none"> • pays 50% price premium for certified organic milk and 50%-100% for other certified organic inputs (e.g., fruits, sweeteners) • funds environmental grants to growers • funds educational workshops and conferences for growers to learn and share tools and skills to improve their practices 	<ul style="list-style-type: none"> • improve profits by increasing sales • protect environment • protect small farms • meet a standard of environmental performance to be certified organic 	NDA (organic dairies -- ME, NY, VT, Midwest); plus conventional dairies	NDA	NDA
Tallgrass Prairie Producers Co-Op	<ul style="list-style-type: none"> • holds meetings with ranchers two to three times each month to discuss production, environmental, marketing, and business issues • encourages rotational grazing where appropriate 	<ul style="list-style-type: none"> • avoid the negative effects from feedlots, e.g., water pollution • avoid the negative effects from large-scale feed grain production, e.g., soil erosion, use of fertilizers, pesticides, and energy • protect small, family ranches and local, rural communities • protect diversity in native land and keep in native state • make more money through receipt of price premium and become profitable and sustainable • want to give consumers a connection to the land and know how their food is produced • protect animal health • produce a leaner and tastier product 	9 (cattle -- KS)	200 cattle	5,000 pounds/month

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Livestock:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals	Production Level
The Organic Cow of Vermont	<ul style="list-style-type: none"> pays price premium does not take discretionary deduction from payments to dairies encourages rotational grazing and composting of manure by providing information to growers through newsletter and technical literature, as well as provides technical assistance and education through monthly workshops and meetings held around the state, site visits, and mentor farmers sponsors "pasture walks" for farmers to walk around other farms to learn about what each is doing works with certification organizations during the year tests soil on any additional fields and conducts site visits offers low-interest loans for farm improvements helps dairies find suppliers of organically grown feed 	<ul style="list-style-type: none"> protect family, regional farms as part of the local community, landscape, and economy protect the sustainability of local, rural areas provide responsible land and soil management provide more choices to consumers believe organic dairy is a better and more respectful treatment for the cows 	60 (dairies -- ME, NY, VT)	1,500 cows	< 2 million pounds per week
Tyson Foods	<p>Arkansas:</p> <ul style="list-style-type: none"> provides freezers and free pick-up service for poultry mortalities that they later render introduces growers to county extension agent, who works with growers to take soil samples, determines proper soil application rate for poultry litter, and develops site plans provides education in its area of expertise and relies on county extension agents for their expertise trains service people to answer grower questions related to environmental matters, or refers them to county agent 	<p>Arkansas:</p> <ul style="list-style-type: none"> protect environment do as much as it can to prevent pollution this is the best way to deal with the mortalities produce as high a quality product as they possibly can want to be fair to its growers and treat them well want to be accepted in community 	NDA (broiler chickens)	NDA	Arkansas: NDA

Table 3 (cont.): Summaries of Environmental Stewardship Activities Between Food Companies and Growers (mid-1997)

Company/ Livestock:	Types of Stewardship Arrangements	Reasons for Stewardship Activities	Growers	# Acres or Animals Level
Vermont Milk Producers	<ul style="list-style-type: none"> • pay 10% price premium for milk produced through use of sustainable practices (cows fed on grass and field corn), rotational grazing, crop rotations, and use of native plants • requires manure to be applied at appropriate rates • developed land and farm management guidelines 	<ul style="list-style-type: none"> • protect ground and surface water • prevent soil erosion • enhance soil fertility • protect the rural landscape and local economy of the region • protect farm ecology, human and animal health, biodiversity, the ecosystem, and wildlife • conserve water • reduce input costs • emphasize quality to consumer • protect small, family-owned dairies by improving competitiveness 	16 (dairies -- VT)	NDA

Notes: BMP: best management practice.

Delmarva:

FQPA: includes Delaware, nine Eastern Shore counties of Maryland, and two Eastern Shore counties of Virginia.

IPF: Food Quality Protection Act of 1996.

IPM: integrated pest production.

NDA: integrated pest management.

no data available.

NRCS: Natural Resources Conservation Service.

**Table 4: Environmental Stewardship Activities Between Food Companies and Growers:
Examples of What Food Companies Do**

Education/Information	Incentive	Service	Requirement
<ul style="list-style-type: none"> educational/technical assistance one-on-one meetings, workshops, grower meetings, mentor farmers, farm demonstrations, field days, newsletters form stakeholder teams to respond to consumer requests maintain library on practices or telephone line for timely pest control information identify crops to grow identify or encourage practices and crop rotations develop positive point system to evaluate performance and progress, and facilitate grower education and motivation share contact names with growers of those providing technical, financial, or other assistance share research findings with growers field/production staff provide information on growing/environmental practices 	<ul style="list-style-type: none"> cost-sharing, subsidies, grants, rebates, low-interest loans price premiums reimburse reductions in yield quantity/quality associated with practice reimburse portion of certification cost for first year grower recognition events, awards, and signs share research findings with growers field/production staff provide information on growing/environmental practices 	<ul style="list-style-type: none"> help growers find sources of organic feeds, seeds, beneficial insects, or markets for crops not purchased by company help growers write nutrient utilization plans provide guidelines on accurate record keeping provide inspections or audits and feedback to growers test wells for nitrate concentrations supplement role of university extension help develop industry infrastructure to encourage and support grower practices work with commodity groups or pest control advisors to disseminate information and research findings fund research and share results with growers and industry help growers predict pest outbreaks and timing of pesticide sprays develop or work with seed companies to develop pest-, disease-, or drought-resistant plant varieties assist state in development of BMP guidance manual and share with growers provide free pickup and storage containers for livestock mortalities 	<ul style="list-style-type: none"> soil testing monitoring reports purchase contract specifications prohibitions (e.g., certain pesticides, practices) and mandates (e.g., certain practices, reporting, training classes)

of the costs of environmental practices (or related practices primarily used to improve product quality), usually to help offset the potentially higher costs to adopt the practice(s). In most cases, the price premium is offset by higher prices paid by retailers and consumers. Currently, this is more likely with organic foods (e.g., Arrowhead Mills, Cascadian Farm, Health Valley Foods, Horizon Organic Dairy, Juniper Valley Farms, Seymour Canning Company, Stonyfield Farm, and The Organic Cow of Vermont). On the other hand, Fetzer Vineyards does not charge a higher price. In addition, for growers in transition from conventional to organic growing, there is a period when crop yields will probably be lower as the soil adjusts to this change in inputs. Yet, the costs may be higher for the growers. Price premiums are helpful for growers in these situations, especially if the company is able to recoup the higher payments. However, if the price charged to consumers is too high, the ability of these companies to gain consumer acceptance and further penetrate the market will be hampered. As an economic or marketing incentive, a few of the food companies (e.g., Arrowhead Mills, Pavich Family Farms, Seymour Canning) help growers find markets for organically grown crops that they do not directly handle, because they are interested in ensuring that the growers continue to farm organically.

There are also examples where higher prices are paid for crops that are not organically grown. In the case of American Crystal Sugar Company, higher prices are paid to growers to encourage greater recoverable sugar and increase revenues through use of nitrogen management. Coors Brewing Company also pays higher prices as incentive payments to produce high-quality barley, which is influenced by how growers fertilize, irrigate, and till. Similarly for Coleman Natural Products, where higher prices are paid than what the beef commodity market pays to reward the performance of the ranchers.

Eberly Poultry Farms and Vermont Milk Producers pay higher prices and are also paid higher prices if growers follow certain practices. American Pop Corn Company and Clover Stornetta also pay higher prices but do not charge higher prices if growers use certain practices. In a related example, Campbell Soup Company agrees to reimburse growers if they experience lower quantity or quality yields when using IPM. Similarly, Gerber Products covers the difference in cost between a new practice and a conventional practice, as well as loss to a crop that is part of a demonstration.

Based on responses from the food companies contacted, there is a pattern to the implementation of their environmental stewardship activities that generally applies to all of them. First, food companies identify an outcome or goal that they desire to achieve. Second, they ask growers through formal or informal surveys, questionnaires, and meetings about their current environmental practices and adaptability to improved practices. The information collected provides the companies with the baseline from which to measure improvements -- knowing where they are with respect to environmental stewardship makes it easier to know where they can go and how to get there. Third, a variety of arrangements is used to provide incentives, lower barriers, and/or otherwise increase grower use of these practices. Fourth, though this may not have often been explicitly mentioned, it is usually important for there to be a feedback loop from the growers to the companies to ensure that their needs are met. With feedback, delivery of information and/or incentives to the growers can be enhanced when and where needed.

2.2 Objectives of Stewardship Activities

There is a range of reasons for the food companies' stewardship efforts -- see Table 5 for a summary. Except for the first category in this list, "Protect Environment," the reasons given generally revolve around economic

Table 5: Objectives of Environmental Stewardship Activities: Examples of Why Food Companies Do It

Protect Environment	Assist Growers	Sustain Local Communities	Protect Company's Interests
<ul style="list-style-type: none"> reduce pollution and protect ground and surface water protect aquatic and wildlife habitat, grass cover, native grasslands, riparian areas, ecosystems, biodiversity, or watershed demonstrate land stewardship improve soil health and fertility, and prevent soil erosion promote resource conservation 	<ul style="list-style-type: none"> improve yields and quality of yields improve productivity and profitability through lower costs, higher revenues, or improved competitiveness, while reducing pollution and managing pests reduce susceptibility of crop to disease, reduce use of pesticides while maintaining or improving efficacy and selectivity, and achieve long-term pest manage respond to and reduce public pressure to protect environment, improve public's image of farming, and protect growers' reputation improve growers' ability to be better stewards and to be sustainable protect small, family farms help organic foods industry grow protect animal health 	<ul style="list-style-type: none"> protect local, rural economies and local, rural landscapes protect sustainability of rural areas 	<ul style="list-style-type: none"> increase profitability through increased production, improved company sales and growth, improved competitiveness, improved competitive advantage, lower costs of supply and processing, improved processing efficiency and productivity, improved supply and quality of crops and food inputs, protected or improved quality of company's end product, better match between crops and company's production needs, or protected water quality for use in food processing increase customer loyalty, differentiate products, provide more food choices to consumers, or respond to growing general consumer demand for organic and all-natural foods, and environmentally-oriented products and environmental protection reduce susceptibility of crop to disease identify and promote growing methods that are the most environmentally protective, sustainable, and effective for growing respond to consumer concerns to reduce environmental impacts and not necessarily charge more respond to consumer concern for food safety and pesticide residue content levels develop capability to respond to inquiries from grocers and consumers about pesticide use educate consumers about decreased chemical use by growers and about connection to land and how food is produced meet product quality demands or requirements in foreign markets improve or protect company's reputation by protecting environment and positioning itself as a leader respond to and reduce public pressure to protect environment help organic foods industry grow

Table 5 (cont): Objectives of Environmental Stewardship Activities: Examples of Why Food Companies Do It

Protect Environment	Assist Growers	Sustain Local Communities	Protect Company's Interests
• promote (local) sustainable agriculture	<ul style="list-style-type: none"> • be fair to growers, treat them well, and respond to their needs • lower growers' pesticide risks and protect worker safety and health • reduce likelihood of pesticide resistance • provide alternative farming and cultivation practices • foster good reputation with regulators • protect environment and potentially reduce the need for certain environmental regulations in the future • stay ahead of future environmental regulations and help shape them if implemented • develop model program for other growers to follow 		<ul style="list-style-type: none"> • support sustainable agriculture • remain consistent with company's philosophy • be accepted in local community • link greater reliance on technology and labor and less on chemicals with being better stewards of land and how to farm • find alternative approaches to substitute for environmental regulations • anticipate rather than react to Food Quality Protection Act • often less expensive to adopt more environmentally protective practices than resist them • protect environment to avoid potential need for, or stay ahead of, future environmental regulations; be proactive • foster good reputation with regulators • demonstrate company caring to growers, respond to grower needs, and improve relationship with growers • reduce medical and insurance costs and protect health of company's children and families • reduce company's liability

considerations (see Philips & Associates, 1996 for similar findings). While some of the activities primarily aim to benefit the companies and/or growers economically, and the environmental benefits may have been secondary, the overlap of economic and environmental benefits is good. If companies find that protecting the environment can work in conjunction with operating or expanding a business, this makes for a greater likelihood of long-term environmental protection. And if these environmental practices prove more cost-effective or low-cost, they are more likely to be voluntarily adopted by growers. However, there may still be a need to provide flexibility and incentives to improve the likelihood that such practices will be adopted. For example, according to a survey of tomato growers in a large producing region in California, the top two reasons for adopting IPM sampling methods are financial gain (63 percent) and the possibility of reducing damage loss from pests (52 percent) (Grieshop et al., 1988). And, voluntary acceptance is preferred to "command-and-control" methods to influence behavior change (Bolkan and Reinert, 1994; Frantz, undated).

In several instances, the food companies indicated an interest in helping growers be more competitive, profitable, and sustainable, become better environmental stewards, continue to be family farms, reduce their risks, protect their workers' health, and improve the public's image of them. Several food companies reported improved relationships with growers from such efforts, helping to build a better business partnership that benefitted both groups. Furthermore, recognizing links between growers and their communities, several food companies expressed an interest in protecting small family farms, not only to keep them in business, but to also sustain the local, rural community's economy, landscape, and environment.

The food companies often linked the environmental practices to improved and

stable quality of food inputs, increased quantity of food inputs, improved processing productivity, reduced need for land and inputs, improved competitiveness, increased customer loyalty, and/or expanded growth through domestic and foreign sales. Such companies benefit economically through support of these environmental practices. In some cases, these benefits are more likely to occur if the product is differentiated -- e.g., customer loyalty is built by informing the consumer of the environmental practices used by growers.

Several food companies expressed interest in protecting their reputation -- e.g., protecting their products' quality also protects the public's image of them. In fact, a company's reputation is a tangible asset, perhaps the only real long-term asset (Makower and BSR, 1994). There was also an interest from these companies in improving the public's perception of a product category or of farming in general. One way to change negative perceptions is to adopt practices which are more environmentally protective and communicate this information to the public. There was also an interest expressed to educate the public about how their food is produced and what inputs are used -- this is more likely to occur if the product is differentiated in the marketplace and information is provided to consumers.

Much of the environmental protection resulting from these stewardship activities benefits shared resources (e.g., water quality), other species (e.g., wildlife), and future generations (e.g., reduced nitrate pollution of ground water) (Lanyon, 1996). Thus, when a company funds research to benefit all members of its industry or shares the results with other industry members (e.g., Campbell Soup Company, Coors Brewing Company, Del Monte Foods, Fetzer Vineyards, Ocean Spray, and Sunkist Growers), the firm is acting on behalf of protecting the environment and perhaps also the public image of all growers in their product category and/or the public image of the product category itself. However, it can

again be difficult to separate environmental from economic motivations, since they can be closely intertwined.

As noted by several companies contacted (e.g., American Crystal Sugar Company, Coors, Fetzer Vineyards, Sunkist Growers, and Sun-Maid Growers), they have funded research that demonstrates that farming practices, like the application of nitrogen to provide nutrients to crops, can have a marked effect on the quality of the crop as an input, whether the crop is sugar beets, barley, oranges and grapefruits, or grapes. In the case of American Crystal Sugar Company, nitrogen affects the amount of recoverable sugar in sugar beets. Too much nitrogen lowers the amount of recoverable sugar and the revenues earned. So the grower cooperative offers quality payments as an incentive for growers to increase the amount of recoverable sugar through use of best management practices, including careful attention to the amount of nitrogen applied to grow the crop. In addition, American Crystal Sugar Company believes that the incentive payments would not be effective if they were not coupled with information and education provided to the growers.

The quality of Coors' barley (e.g., its starch content), and therefore the taste of its beer, is dependent on the type of tillage and quantity of nutrients and water used to grow the crop. Coors' is very concerned with protecting the quality of the barley and water that it uses in processing.

Fetzer Vineyards believes that its organically grown grapes are of a better quality (e.g., better flavor) than conventionally-grown grapes. It hopes to have all of its grapes grown organically by the year 2000. In addition, the amount of nitrogen affects the growth of the vine. Too much nitrogen leads to over-growth of the vine, causing a greater need for pruning. In addition, less of the vine's energy is devoted to grow grapes. As a result, yields would be lower and grower costs would be higher.

According to a Sunkist Growers newsletter, excessive amounts of nitrogen applied may make the orange and grapefruit trees look better (e.g., more leaf growth), but the sugar content of the fruit (and hence the taste) may be negatively affected. In addition, the condition of the peel may also be affected -- it may become spotty or peel off during shipment. Sunkist Growers is currently funding a five-year project to identify the relationship between nitrogen application practices and fruit quality and ground-water quality.

Sun-Maid Growers is concerned about the amount of zinc, potassium, magnesium, and boron applied, but also stated that too much nitrogen can lead to too much green growth in the vines, causing concerns similar to those mentioned by Fetzer's. Sun-Maid's March 1995 grower newsletter says "Problems created by too much nitrogen include: excess vigor, poor bud fruitfulness, excessive berry drop, bud necrosis, delayed crop maturity and increased levels of stem necrosis disorder, bunch rot and leafhopper activity."

Indeed, according to the California Fertilizer Association (undated), "in the decade following the demonstration of a negative effect of excess available nitrogen on fruit quality and the wider use of leaf analysis as a fertilizer application guide, the amount of nitrogen used on oranges in California decreased about 50 percent." Examples of other research demonstrating a link between over-application of nitrogen and crop yield/quality are summarized in Appendix D.

2.3 Barriers to Stewardship Activities

The implementation barriers faced by the food companies are listed in Table 6. Some of these barriers have been overcome and others continue to beset the companies. Some of the barriers may not completely fit in the categories chosen in Table 6 because they may overlap with at least one of the other categories. For example, an infrastructure

Table 6: Barriers Encountered by Food Companies in Implementing Environmental Stewardship Activities

Lack of Incentives	Behavioral Change	Lack of Resources	Communication Needs	Infrastructure Needs	Technical
<ul style="list-style-type: none"> financial lag-time of when funds are needed to implement practices and when market responds lack of positive recognition and support for growers lack of sufficient monetary returns for growers to reward their efforts 	<ul style="list-style-type: none"> resistance to change from established farming practices reaction of growers to environmental initiatives pesticides seen by many growers as cheap crop insurance proper operation and maintenance of practice due to tight budgets, some growers only able to focus on next growing season 	<ul style="list-style-type: none"> paperwork needs for organic certification cost and time to convert from conventional to organic compliance with labeling and processing requirements needed to provide label information time needed to document practices need for up-front funds to pay for use of new practices lack of sufficient access to financial resources if not considered “green” enough 	<ul style="list-style-type: none"> access by growers to consistent and reliable information on grower practices consumer and retailer awareness of, and communication about, grower practices education of consumers about benefits of organic growing and large grocery chains about how to sell organic foods proof of claims to consumers 	<ul style="list-style-type: none"> lack of guidelines for how to farm better and a method to measure progress in use of practices lack of national organic standards for meat and poultry; lack of infrastructure for organic foods; availability of growers; finding sources of enough crops, organic feeds, and quality land to meet the growing consumer demand for organic foods and production needs; lack of system to teach or train growers to be organic; need to identify facilities to process organic crops; affordability of organic foods; volatility of retail prices; and level of publicly-funded research on organic farming lack of formal state or federal guidelines for how growers are doing with respect to IPM; limited availability of, and information on, reliable and effective pest monitoring systems and alternatives; and lack of enough qualified IPM advisers sufficient quantity of growers and product to satisfy growing processing or retail store needs and meet growing consumer demand reliance on dairy industry generally unaccustomed to differentiate products 	<ul style="list-style-type: none"> inconsistent yields or production

Table 6 (cont.): Barriers Encountered by Food Companies in Implementing Environmental Stewardship Activities

Lack of Incentives	Behavioral Change	Lack of Resources	Communication Needs	Infrastructure Needs	Technical
		<ul style="list-style-type: none"> • constrained ability to grow and compete if higher price charged consumers to offset higher price paid growers • start-up costs for new company or venture, including learning business management • marketing against larger, more experienced companies, including paying slotting fees to sell on store shelves, which may be better absorbed by larger companies 	<ul style="list-style-type: none"> • availability of information from universities on their work to reduce use of chemicals 	<ul style="list-style-type: none"> • conventional agriculture's attitude about the benefits of IPM and organic farming, and incomplete grower support for IPM <ul style="list-style-type: none"> • difficulty in controlling and monitoring what happens in food supply chain • reluctance of manufacturers to register new materials for pest control because of significant research and development costs • society subsidization of regulation and/or clean-up of pesticides • workload, resource needs, and responsibilities in these efforts by university extension • distrust of government evaluation and concern that program may become regulatory 	

barrier, such as finding sources of organic feed, may also pose a resource barrier. A number of these barriers are similar to the barriers to use of IPM that were identified by growers and pest control advisors during five workshops held in 1993 in Illinois, Pennsylvania, Texas, and two in California (Sorensen, 1993b).

Some of these barriers reflect a growing market segment and its growing pains. For example, while the need to find new sources of organic feed is a barrier to increased production of organic foods (i.e., a bottleneck in the production chain), it is also a sign that the marketplace is responding to the product and that consumers and stores are sending a signal that they want to buy more. Other barriers serve to impede expansion of production or processing of crops grown with more environmentally-protective practices, such as the lack of proper incentives for growers to adopt the environmental practices or the need to educate consumers about the benefits of these practices. Some companies are using targeted incentives, marketing, and infrastructure-building efforts to address these barriers.

Some of the infrastructure barriers are being addressed by food companies who share research results (discussed in Section 2.2) or help to build connections within the industry to improve the flow of information and identify and address research needs. This improved support for environmental practices can also lead to greater grower use.

According to a 1993 national survey of organic growers, the most important marketing problem or concern (i.e., barrier) was the lack of consumer demand, awareness, and education. The top-ranked method to address their marketing problems/and concerns was more consumer education. This is consistent with their top research need - increasing consumer demand for organic products through improved marketing and education (OFRF, 1994). In the survey update in 1995, this was the third highest ranking

research priority (OFRF, 1996), perhaps reflecting two more years of increasing consumer purchases of organic foods (discussed in Section 2.5).

Many of these barriers relate to the availability of, and access to, information. In addition, access to sufficient resources to support these changes in practices is also a dominant theme. Depending on the specific barrier, different stakeholders can have a range of roles in helping to overcome them. Stakeholders include the growers, companies, suppliers, trade associations, university extension, investors, retailers, consumers, public officials, and non-governmental organizations. In several cases discussed in this report, some of these groups are working together in various combinations to overcome these barriers and achieve greater environmental protection and economic opportunities in the food sector.

2.4 Achievements of Stewardship Efforts

Table 7 lists the types of environmental practices that are being encouraged and supported by the food companies contacted for this report. These practices may be integral to the growers' production practices and examples of pollution prevention, e.g., the timing, targeting, and quantity of nutrients or irrigation water applied, or may be ancillary to their production practices, e.g., managing the mortalities (that result from growing livestock) through composting or rendering.

Irrigation water does not only supply water as an input but also delivers nutrients and is a potential carrier of pollutants. Optimizing the timing and quantity of water applied can reduce potential pollutant loads to ground and surface water, as well as reduce costs for this input (compared to the cost of the irrigation technology).

Depending on how livestock manure and mortalities are managed, the nutrients and pathogens they contain can affect ground or

Table 7: Environmental Practices and Objectives Targeted in Stewardship Activities with Growers

<u>Company:</u>	<u>Crop:</u>	Environmental Practice/Benefits:				<u>Pesticide Risk Reduction</u>	<u>Riparian Protection</u>	<u>Wildlife Habitat</u>
		<u>Livestock Mortality Management</u>	<u>Nutrient Management</u>	<u>Past/Range Management</u>	<u>Management</u>			
American Crystal Sugar Company	-	-	-	-	-	✓	-	-
American Pop Corn Company	-	-	-	-	-	✓	-	-
Arrowhead Mills	-	-	-	-	-	✓	-	-
Campbell Soup Company	-	-	-	-	-	✓	-	-
Cascadean Farm	✓	-	-	-	-	✓	-	-
Coors Brewing Company	✓	-	-	-	-	✓	-	-
Del Monte Foods	-	-	-	-	-	✓	-	-
Fetzer Vineyards	✓	✓	✓	✓	✓	✓	✓	-
E. & J. Gallo Winery	✓	✓	✓	✓	✓	✓	✓	-
Gerber Products	✓	✓	✓	✓	✓	✓	✓	-
Health Valley Foods	-	-	-	-	-	✓	-	-
Hood River Grower/Shippers	✓	✓	✓	✓	✓	✓	✓	-
Hunt-Wesson	✓	✓	✓	✓	✓	✓	✓	-
Lodi-Woodbridge Winegrape Commission	✓	-	-	-	-	✓	-	-
Ocean Spray	✓	-	-	-	-	✓	-	-
Pavich Family Farms	-	-	-	-	-	✓	-	-
Robert Mondavi Winery	✓	-	-	-	-	✓	-	-
Seymour Canning Company	-	-	-	-	-	✓	-	-
Stahlbush Island Farms	✓	✓	✓	✓	✓	✓	✓	-
Stemilt Growers	-	-	-	-	-	✓	-	-
Sunkist Growers	✓	-	-	-	-	✓	-	-
Sun-Maid Growers	✓	-	-	-	-	✓	-	-
Sunsweet Growers	-	-	-	-	-	✓	-	-
Wegmans Food & Currite Burns Food	-	-	-	-	-	✓	-	-

Table 7 (cont.): Environmental Practices and Objectives Targeted in Stewardship Activities with Growers

<u>Company:</u>	Environmental Practice/Benefits:						<u>Riparian Protection</u>	<u>Wildlife Habitat</u>
	<u>Irrigation Management</u>	<u>Livestock Mortality Management</u>	<u>Nutrient Management</u>	<u>Past/Range Management</u>	<u>Pesticide Risk Reduction</u>			
Livestock:								
Butterball	-	✓	✓	✓	-	-	-	-
Clover Stornetta	-	-	✓	✓	-	-	-	-
Coleman Natural Products	-	-	✓	✓	-	-	-	-
Draper Valley Farms	-	✓	✓	✓	-	-	-	-
Eberly Poultry Farms	-	✓	✓	✓	✓	-	-	-
Horizon Organic Dairy	-	-	✓	✓	-	-	-	-
Hudson Foods	-	-	✓	✓	-	-	-	-
Juniper Valley Farms	-	-	✓	✓	-	-	-	-
McDonald's Corporation	-	✓	-	-	-	-	-	-
Murphy Family Farms	-	-	✓	-	-	-	-	-
Stonyfield Farm	-	-	-	✓	-	-	-	-
Tallgrass Prairie Producers	-	-	-	✓	-	-	-	-
The Organic Cow of Vermont	-	-	-	✓	-	-	-	-
Tyson Foods	-	✓	-	✓	-	-	-	-
Vermont Milk Producers	-	-	-	-	✓	-	-	-

Table 7 (cont.): Environmental Practices and Objectives Targeted in Stewardship Activities with Growers

<u>Company:</u>	<u>Irrigation Management</u>	Environmental Practice/Benefits:					<u>Riparian Protection</u>	<u>Wildlife Habitat</u>
		<u>Livestock Mortality Management</u>	<u>Nutrient Management</u>	<u>Past/Range Management</u>	<u>Pesticide Risk Reduction</u>			
Third-Party Program:								
CORE Values Northeast	-	-	-	-	-	-	✓	-
Massachusetts Dairy of Distinction	-	-	✓	-	-	-	✓	-
Midwest Organic Alliance	-	-	✓	-	-	-	-	-
Partners with Nature	-	-	✓	-	-	-	✓	-
Platte River Project	✓	-	✓	-	✓	-	✓	-
River-Friendly Farmer	✓	-	✓	-	✓	-	✓	-
Salmon Safe	✓	-	✓	-	✓	-	✓	-
The Food Alliance	-	-	-	-	-	-	✓	-
Wisconsin Potato & Vegetable Growers Association & World Wildlife Fund	-	-	-	-	-	-	✓	-

surface water quality (EPA, 1995b). Manure is also a valuable source of crop nutrients, and may be beneficially utilized on the growers' fields or marketed off the farm. The management of the manure may include processing practices such as composting, dry stacking, or liquid handling; the management of the mortalities by the growers working with the companies contacted typically involves rendering or composting. If the soil lacks sufficient nutrients to grow crops, such as provided from on-farm raw or composted manure or "green manure" crops, off-farm nutrients, such as from fertilizers, may need to be applied. In either case, knowing how much nutrients are needed by the crop, where and when to apply them, and what cover crops to grow and take up nutrients in non-growing seasons, prevent soil erosion, and/or fix atmospheric nitrogen, etc., leads to overall better management practices.

"Pasture/Range Management" refers here to the practice of using rotational grazing to not only provide feed for livestock, but also to better manage the land to avoid overgrazing and the associated environmental impacts, e.g., lack of plant cover, increased erosion, and loss of productive soil. These grazing practices can also provide benefits to ground water by maintaining the filtering capability of plants and soil, avoiding erosion, and dispersing manure from the livestock rather than concentrating it in limited areas. However, depending on how the rotational grazing is managed, there may be significant loss of nitrogen to ground water or the atmosphere.

"Pesticide Risk Reduction" includes organic farming and the use of IPM, defined by EPA as "the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means, and with the least possible hazard to people, property and the environment." IPM is a holistic approach for dealing with unwanted insects, plants, and diseases. IPM

includes biological, chemical, cultural, and mechanical practices to suppress insects, diseases, and weeds. These practices include the use of field selection, scouting (to determine populations of unwanted and beneficial insects), mating disruption of damaging pests, beneficial insects, animal predators (e.g., barn owls to prey on rodents and bats to prey on flying insects), cover crops (to keep down dust and weeds and attract beneficial insects), crop rotations (to break up insect and weed cycles), composting (to kill pathogens and weed seeds), weeding, and using compost (to develop a healthier soil and suppress plant pathogens). The use of synthetic pesticides is kept to a minimum and only used when economic damage to the crop cannot be otherwise avoided (Freeman Long, 1996; McGill, 1996; Bolkan and Reinert, 1994; Hollingsworth et al., 1994). As discussed in Benbrook et al. (1996), there is a continuum for use of IPM. Starting from "No IPM," and then moving to "Low Level IPM," "Medium Level IPM," to "Biointensive IPM," there is a progression from use of synthetic pesticides to greater use of IPM and preventive practices. In addition, organic growers generally use a combination of the IPM practices, e.g., planting cover crops, manual or mechanical weeding, and attracting beneficial insects.

Integrated fruit production (IFP) encompasses all aspects of growing, harvesting, storing, and packing the fruit, and is intended to take the best of organic and conventional. An IFP program is a holistic approach that includes IPM, herbicides, pesticides, fertilizers, irrigation, post-harvest treatments, packaging, recycling, and marketing (Hollingsworth, 1995; Reed, 1995; Coli, 1992). IFP programs were first developed in Europe in the 1970s. Today, 42 percent of the acres used to grow apples and pears in Europe are grown under an IFP program, with 31 formal programs spanning 10 countries (Reed, 1995). According to Oberhofer (1993), the Italian market prefers IFP fruit (and growers have to be motivated by

economics) and growers in Tyrol, Italy highly regard their participation in the program. In addition, these growers participate in IFP for the following reasons:

- compete in the future (and respond to pressure from fruit packers)
- reduce the risk of pesticide resistance
- reflect environmental consciousness
- provide fairness towards consumers
- present positive image for growers (Oberhofer, 1993)

In addition, many growers in Europe must meet IFP standards in order to receive government support. Thus, monetary assistance is an additional reason for participating in IFP. While IFP is not explicitly included in Table 7, it is implicitly represented for Hood River Grower/Shippers and Stemilt Growers with the entries reported for them under "Pesticide Risk Reduction," "Irrigation Management," and "Nutrient Management."

Protection of riparian areas is important to not only protect water quality (e.g., stabilize streambanks, reduce erosion, filter pollution, and lower in-stream water temperatures), but also to protect aquatic and wildlife habitats (e.g., improve habitats, protect wetlands, and form protected and contiguous areas) and reduced potential for flooding (e.g., provide buffer through wetlands).

Finally, when growers take steps to protect wildlife habitat by how or where they farm, e.g., by growing crops to protect and support wildlife, using rotational grazing, protecting riparian areas, and protecting rainforest areas, the practices are represented in Table 7 under the category of "Wildlife Habitat."

Some stewardship efforts are voluntary, e.g., an environmental practice may not be a requirement for a food company to buy or obtain the crop from growers, or the practice may not be used by all of the growers. In several other cases, the growers follow a certain practice either because they

must (e.g., it is included in their contract, or they must follow certain practices to be certified organic or to be included in the food company's program). Whether the practices are voluntary or mandatory, growers still need to be convinced of the merits of certain practices, and this communication/demonstration need represents one of the main barriers identified by the companies contacted.

Some of the food companies have quantitative measures of the effects of their efforts on input use. For example, based on research at the University of Minnesota, American Crystal Sugar Company lowered their recommended nitrogen application levels from 170 to 120 pounds per acre. This led to annual reductions of 36 million pounds in nitrogen fertilizer, or \$5.8 million in lower input costs. Four years later, it was able to notice decreased levels of nitrogen in the soil. Its growers also reduced their fungicide applications by 1.5 per crop year due to weather monitoring and a disease prediction model. Through Campbell Soup Company's efforts, growers reduced their use of synthetic insecticides and fungicides for tomatoes by 30 percent, synthetic pesticides for celery by 40-90 percent, and soil fumigation for carrots by 60 percent (Bolkan and Reinert, 1994). Pro-Fac Cooperative, working with Wegmans, has seen the average number of insecticide sprays on sweet corn (processed into canned and frozen corn) lowered from four per crop at the start of the program to just over one as of mid-1997 (Shelton and Petzoldt, 1997).

2.5 Marketing Environmental Attributes of Food Products

If companies explicitly or implicitly inform consumers about the environmental impacts from their products, they are adding another attribute for consumers to consider when making purchase decisions. Several companies in this report differentiate their products with information about the environmental attributes. This section

discusses findings from this study regarding product differentiation, as well as corroborating studies that indicate that many consumers may be interested in such information.

Although company size should theoretically not affect whether a food company so differentiates its product(s), the study indicates that the smaller companies are more likely to do so at this point in time, and probably do so to develop a competitive edge (see also Welsh, 1996; Hamilton, 1994a, b; Heffernan, 1994). For example, one of the ways some of the small companies differentiate their products is to inform consumers that the raw food inputs are produced by small, family farms. One explanation for this observation is that the larger companies may be motivated to undertake their environmental stewardship activities by reasons other than product differentiation, though this may change over time if they believe it will provide a competitive advantage for them.

Benbrook (1997), Benbrook et al. (1996), and Kinsey (1994) contend that environmentally-directed food purchases are becoming more prevalent and more important to increased grower use of environmentally-beneficial farming practices. For example, the sale of organically grown food was \$3.5 billion in 1996 and has increased at least 20 percent per year between 1990 and 1996 (Scott, 1997). However, certified organic acreage represented .2 percent of U.S. cropland (including cropland that is harvested, pastured, idled, covered, or fallowed) and 4,050 farmers in 1994, but this may significantly underestimate organic acreage because non-certified organic acreage was not included (Anton Dunn, 1995); Lipson (1997) reported 10,000-15,000 certified and uncertified organic farmers working over one million acres of crop land and grazing land in 1996.

It is unclear whether the heightened consumer interest in organic foods is due

more to concerns about health and food quality, nutrition, and/or taste than protection of the environment and worker safety. For example, when Rodale Press (1994) asked the public about why they buy organic fruits and vegetables, questions about the perceived environmental implications were apparently not asked -- survey respondents stated their reasons included long-term health benefits, nutritional value, taste, and appearance. According to a survey of California consumers, the effect of organic farming on the environment was rated below food safety, freshness, general health benefits, and nutritional, when ranked according to importance (Jolly et al., 1989). However, according to Dye Gussow (1996), and due in part to the lack of "careful studies" about the nutritional qualities of organic foods, it may be more important and effective to promote organic foods based on environmental impacts and resource conservation, and this could perhaps also improve their market penetration. In fact, according to a recent national survey and given the public's current understanding of environmental issues and farming techniques, "Initiatives that have the potential to directly affect the consumer (e.g., water pollution-related) are of greater importance than those that are far removed from most consumers' experience (e.g., soil productivity-related)." (The Hartman Group, 1996)

If a company wants to differentiate its products, it is more likely to provide relevant information to consumers on the product, on the shelf, or in stores. However, as learned in this study and in Sorensen (1993b), communicating IPM to consumers can be difficult and a barrier to providing growers with incentives to use these practices. In another study, survey participants in California generally showed significant changes in attitudes regarding the environmental implications of IPM after watching two two-minute videos on IPM (Bruhn et al., 1992b). Similarly, Paschall et al. (1992) surveyed New England consumers and learned that most of

the general public does not know what IPM is, but the authors believe the public will support IPM when they understand it. Anderson et al. (1996) and Burgess et al. (1989) reported similar findings in surveys in Massachusetts (regarding the Partners with Nature program discussed in Appendix B) and New York, respectively.

In a 1990 survey in the Pacific Northwest, "responses ... indicate a moderately high level of public concern over the safety of pesticides for the food supply, a higher level of concern over their safety for their environment, and a very high level of concern over pesticide contamination of water supplies -- an issue involving both environmental and human health considerations" (Dunlap and Beus, 1992). In a survey of the U.S. public, over 90 percent were concerned about the presence of pesticides and fertilizers in water supplies and also with pesticides in the environment (McGrath Morris et al., 1993). These levels of environmental concern were comparable to concerns about the health impacts of pesticides. These levels of concern (90 percent) were higher than public concerns over secondary cigarette smoke and air pollution from cars and industries. There was also strong support for more product options offered in stores to encourage lower use of pesticides.

There were similar findings in a survey of shoppers in a food cooperative in New York -- protection of wildlife and water supplies from pesticides was rated the most important, followed by a tie between protection of drinking water supplies from fertilizers and protection of consumers from pesticide residues in food (Goldman and Clancy, 1991). In a survey of households in Pennsylvania, there was a dramatic increase in concern about the impact of pesticides on wildlife, farmers, and individual health between 1965 and 1984 (Sachs et al., 1987). Bruhn et al. (1992a) surveyed California consumers about pesticide-related information

and learned that they were most interested in information about the human health effects of pesticide use and the effects of pesticides on the environment. Over one-half were also interested in information about the effects of pesticide use on agricultural workers. Dittus and Hillers (1993) reported that survey respondents that had lower trust in pesticide regulations also had higher environmental concerns regarding pesticides.

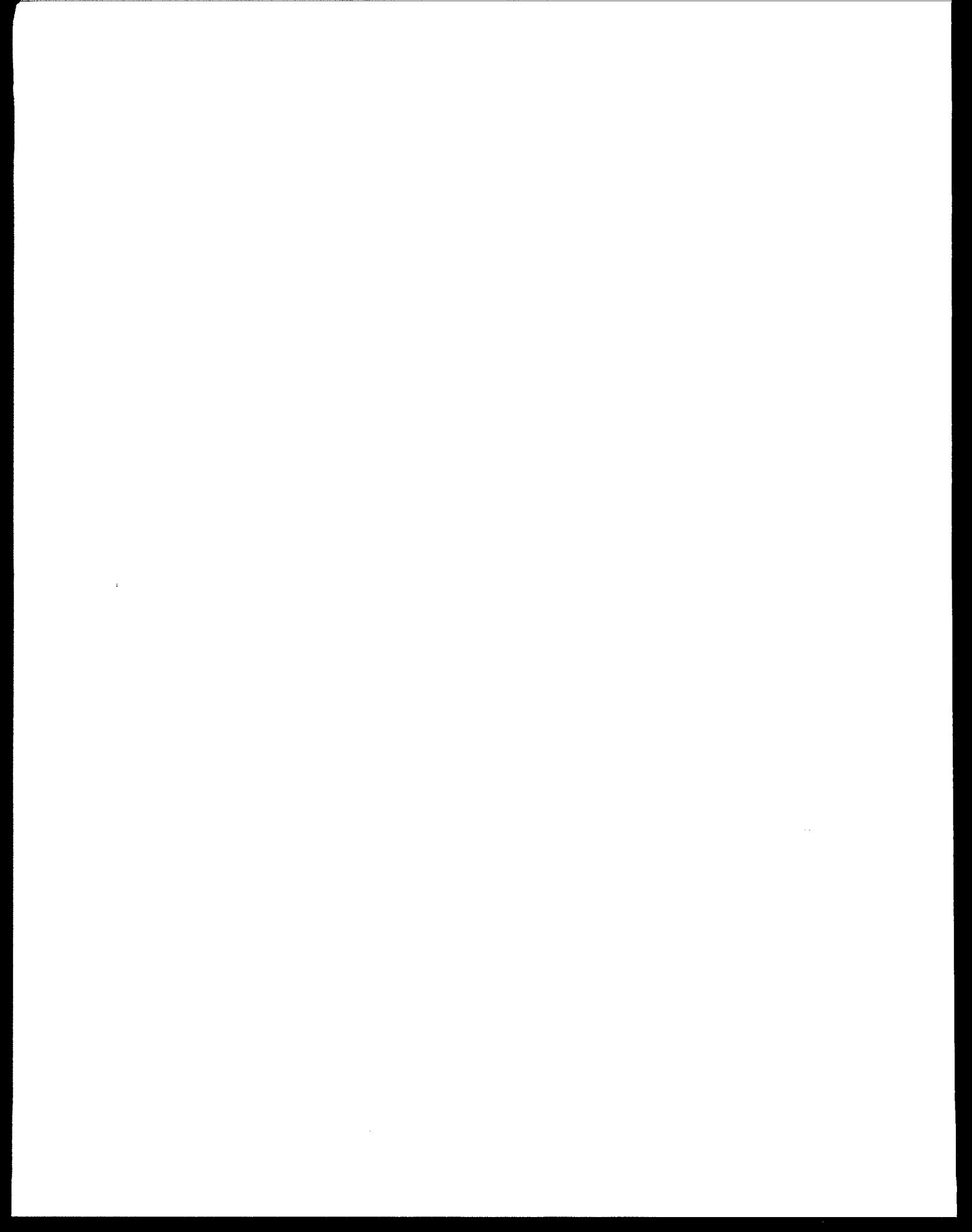
Paradoxically, many growers are concerned that informing consumers about the use of IPM will raise or support concerns of food safety concerns with consumers (Hollingsworth, 1994; Sorensen, 1993a; Grant et al., 1990). These growers therefore would not support including IPM-related information on food labels, especially since they believe that the U.S. food supply is the safest in the world. According to Hollingsworth et al. (1995), Hollingsworth (1994), Bruhn et al. (1992b), and Paschall et al. (1992), and some of the companies and programs contacted for this report, this concern can be avoided by stressing the environmental stewardship of IPM. According to Bruhn et al. (1992b), "Consumers commented that hearing about IPM practices did make them more aware of pesticide use, but also made them feel more secure because 'someone was doing something about it.' Others noted that they felt safer because they were more knowledgeable."

If documentation supports or validates a product claim, this can provide assurance to consumers that claims can be trusted and therefore influence the marketplace. If the validation process is overly burdensome, then it could perhaps be improved upon to reduce its cost, paperwork needs, etc. As reported by The Hartman Group (1997), at least 67 percent of U.S. consumers prefer that environmental claims be certified, and that more consumers trusted grower certification (34 percent) than food company (21 percent) or third-party (20 percent) certification.

More broadly speaking, many companies market their products' or processes'

environmental and non-environmental attributes to attract consumers, but also knowing that not all consumers will be interested. In addition, if information about these attributes is not conveyed to consumers, grower efforts will be unrecognized and unrewarded, a barrier to growers adopting these practices (discussed in Section 2.3; see also Bruhn et al., 1992b). And the public's attitude toward farming (as related to the environment) would not improve, a motivation for some of the companies' efforts. Indeed, if a food company does not intend to differentiate its product, it is less likely that it will have the opportunity to inform consumers of its environmental stewardship activities. van Ravenswaay (1996) advised caution in the wording of eco-labels, and to take heed to the lessons learned in the development of the Federal Trade Commission's 1992 (and the updated 1996) guidelines for environmental claims, such as compostable, degradable, environmentally friendly, recyclable, and recycled.

With the growth in direct marketing between growers and consumers, there will be increased opportunities for not only personal contact between the two groups, but also two-way communication and education. For example, growers can share information with consumers about their growing practices and the challenges encountered. Consumers can provide feedback and input, and also learn how their food travels from soil to shelf to table.



3. CONCLUSIONS

3.1 Study Needs

During this study, a number of issues emerged that can help guide future work on the topic of business-led environmental stewardship, especially in the food sector. As evident from the examples presented, there are several cases where a company's protection of its own and the growers' economic interests was consistent with protecting the environment. The primary objective behind some of the efforts that influenced grower practices may not have been to improve environmental protection, but rather to provide economic benefits. However, regardless of the primary motivation, this area of overlap is important. If companies find that protecting the environment can work in conjunction with operating or expanding a business, this makes for a greater likelihood of long-term environmental protection. Furthermore, if an environmental practice would lower growers' profits, it is generally uncertain whether a company would encourage this practice, or help the growers offset the lower profits. On the other hand, if consumers are informed about using the practice and their role in supporting its implementation and have an assurance that it will be implemented, consumers may be charged with greater responsibility through their purchase decisions. Consumers may also be willing to pay a higher price if they understand the relationships. Consequently, the role of consumers as a shaping force for environmental protection can be further explored and utilized.

Another issue that emerged is the level of environmental improvement resulting from these practices. Since a baseline level of environmental quality was typically not estimated in the examples discussed, there would also usually not be an ongoing measure of environmental quality. However, in some

cases, information was available about the level of inputs used before and after a practice was implemented, but not necessarily the level of pollutant loadings or environmental impacts. Whether and why environmental quality changes from the baseline become important considerations, as does the degree to which growers adopt environmental practices - e.g., how many growers adopt IPM and where they are along the IPM continuum.

The issue of changes from a baseline level takes on greater importance when the effectiveness and limits of such voluntary approaches, or business-led initiatives, are compared to regulatory approaches and hybrid approaches. The extent to which one approach may be preferred to another, and how these comparisons are measured, are additional considerations. Furthermore, barriers to the effective use of voluntary approaches should be determined in order to understand and develop the full potential of this approach. It may also be useful to collect information about the types of barriers that keep food companies from encouraging greater environmental stewardship by growers. Focusing on this group of food companies was outside the scope of this study.

3.2 Results and Discussion

The food companies included in this report accomplish their environmental stewardship objectives with growers through a variety of approaches, ranging from voluntary to mandatory measures. The range of voluntary measures include providing encouragements, information, and price incentives. The range of mandatory approaches include criteria for being a member of a cooperative and contract stipulations.

Based on the information collected about these companies, there is a range of

stewardship activities now in place. The most common is providing information to the growers -- through newsletters, workshops, farm demonstrations, meetings, field agents, mentor farmers, company libraries, or telephone hotlines -- on the why, what, how, when, and where of grower/environmental practices. In addition, though protecting the environment is an important motivation behind these efforts, perhaps the main motivation or incentive is economics. The economic reasons include assisting growers and local communities, and protecting the growers' and food companies' business interests. They also include reaching new or foreign markets, improving processing efficiency, mitigating liabilities and risks, improving grower profitability, protecting worker safety, differentiating products, or improving working relationships with the growers. In several examples, these activities achieve win-win situations, protecting both the growers' and companies' economic interests and also the environment. In comparing the size of companies that are differentiating their products for environmentally-related attributes, it is generally more likely to be the smaller ones at this point in time, due in part to their interest in developing a competitive edge. That is, the larger companies are more likely motivated to sponsor their stewardship activities for other reasons, though this may change over time if they believe product differentiation will provide a competitive advantage. In addition, the organic growers are more typically to be smaller ones.

Given the number of companies reporting economic motivations for environmental stewardship, it is more than likely that many of their reasons are common to other companies that produce and market foodstuffs. The broad implications of the report's findings for those concerned with increasing agricultural efficiency while also ameliorating environmental impacts and worker safety concerns from agriculture include:

First, increasing efficiency, profitability, competitiveness, market share, customer loyalty (linked to product differentiation and/or product quality), or ability to reach new markets are goals of many companies. Whether it means lowering costs for inputs, health, or insurance, increasing revenues, differentiating products, outdoing competitors, or protecting the company's reputation, the economic component is very influential in supporting the environmental practices chosen. In addition, it is typically cheaper and more profitable to create and keep loyal, long-term customers (e.g., through maintaining product quality and protecting the company's reputation) than gain new customers (Garber, 1994; Light, 1994).

Second, improving and stabilizing the quantity and/or quality of food inputs are seen as providing several benefits to food companies and growers. Growers become more productive and profitable. Food companies improve their productivity (e.g., less inputs rejected for processing), and subsequently their profitability and competitiveness. In addition, their need for land and inputs to produce their desired level of product output will be reduced.

Third, improving relationships with growers is very important, whether to help reduce costs, improve profitability, reduce health and financial risks, avoid future pollution-related problems, protect small, family farms, or improve their reputation. In addition, a few of the food companies help growers find markets for organically grown crops that they do not directly handle, because they are interested in ensuring that the growers continue to farm organically. One of the company's benefits from improved relationships with growers is the development of a team attitude and an improved two-way business commitment and communication. Both food companies and growers benefit.

Fourth, forming partnerships with beneficiaries of the environmental improvements will improve the likelihood that

the stewardship practices will be adopted and the food production system will be transformed. As evident from the information presented in this report, environmental stewardship efforts can be led by growers, food companies, non-profit organizations, local communities, the public sector, consumers, or other groups. These beneficiaries can all become involved changing growing practices, and the products will better reflect the performance of the food production system. In addition, as identified by a number of the companies and third-party programs, farms play an important role in a local, typically rural, community's economic, environmental, social, cultural, institutional, and visual landscape. As a result, protecting local farms has broad dimensions that include environmental and other considerations.

Fifth, getting ahead of environmental regulations is also important, either to potentially reduce the need for certain ones to be enacted and/or implemented in the future or to help shape them in case they are implemented. In addition, protecting company and grower reputations was also an important consideration to protect or improve product quality, consumer loyalty, the public's image, and neighbor support.

From the information collected, some food companies have taken a more active role in working with growers while other companies may rely more on extension service, county agricultural agents, and others to work with growers. This role is sometimes influenced by the size of the company and its mission. That is, the larger the company, the greater the potential likelihood that it can afford to build expertise with its staff on environmental issues. Furthermore, the mission of some food companies may solely be in marketing food products, and not affecting environmental performance. There are also examples where food companies share the cost of developing and implementing environmental practices, and other examples where the practices and their costs are imposed

on growers. Given the interest by several of the companies contacted to build a better partnership with growers, making demands on growers without providing incentives may not foster improved long-term relations with growers.

In comparing what was learned in this study to lessons learned in other environmental stewardship efforts, such as in protecting watersheds (EPA, 1997), there can be overlap. For example, some of the lessons learned about how to protect watersheds, including "education and involvement drive action" and "partnerships equal power," are consistent with what was learned from the food companies.

Information was also obtained regarding the barriers these companies encounter in working with growers. Barriers to expanded environmental stewardship often revolve around the flow of reliable and consistent information and access to sufficient resources to support changes in practices. Knowing what barriers to expect and how they were addressed can provide valuable lessons to others expanding into this area of environmental stewardship. Some of the implementation barriers identified have been overcome and others continue to beset the companies. Some of these barriers are indicative of a growing market segment and its growing pains. Other barriers serve to impede expansion of production, such as the lack of proper incentives for growers to adopt the environmental practices or the need to educate consumers about the benefits of these practices. But targeted incentives, marketing, and infrastructure-building efforts can possibly address these barriers, sometimes simultaneously.

From the companies contacted and the range of approaches they use, none of the companies' stewardship efforts are identical. They have adopted the approaches which make sense for the growers and their working relationships with them. As a result, environmental stewardship is not a one-size-

fits-all approach -- it cannot be force-fit and then expected to reach its full potential. Instead, it needs to be tailored to the situation - - i.e., adapted to fit the relationship between the growers and food company, the intended market and associated product definition standards (e.g., organic foods), acreage and processing needs, production and volume needs, and the supplier base. With this in mind, this report has been descriptive, rather than prescriptive, providing something of a road map to inform other companies why they may want to follow this path, and what to expect and do when they are on it.

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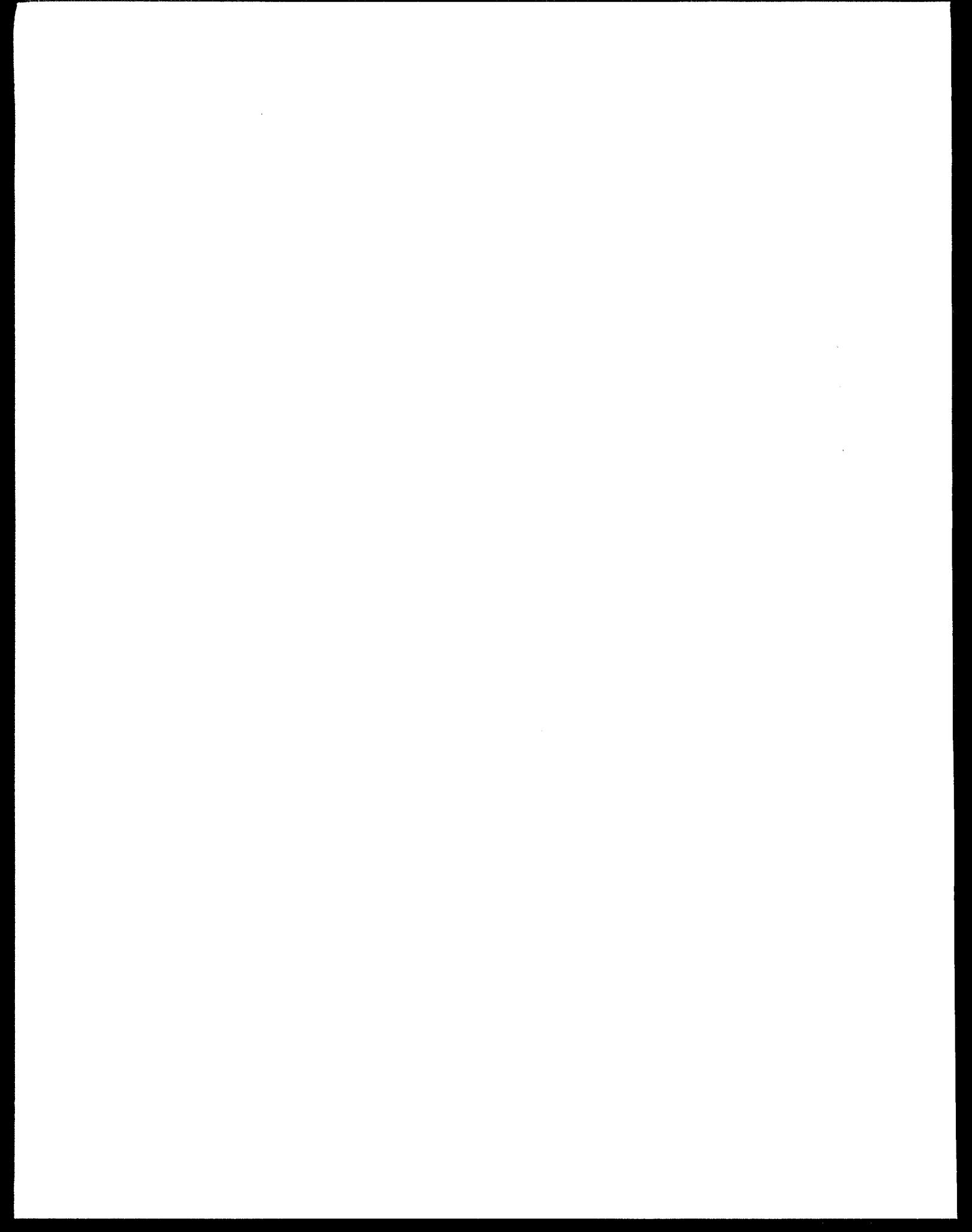
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APPENDIX A: SUMMARY OF ENVIRONMENTAL STEWARDSHIP ACTIVITIES BETWEEN FOOD COMPANIES AND GROWERS

A brief summary of the stewardship activities that the companies contacted have in place with growers follows, as well as the reasons for these activities and barriers encountered during implementation. This information is current as of mid-1997, and the companies are grouped under the categories of crop or livestock (including dairies and poultry).

1. Crop

American Crystal Sugar Company: In 1980, American Crystal Sugar Company, a grower cooperative today of 2,500 sugar beet growers in Minnesota and North Dakota, and the largest producer of beet sugar (8.3 million tons of sugar beets processed into over 1 million tons of sugar), started a program to improve the sugar content in its beets, and therefore increase their value. That is, it implemented a quality payment program -- whereby payments are based on recoverable sugar per ton -- as an incentive for growers to increase sugar production through use of best management practices (BMPs), including nitrogen applications which are the greatest determinant of sugar beet quality and subsequent quality payments. Indeed, its program was part of one of 25 projects launched by the National Nonpoint Source Forum. The price premium is approximately 10 percent. If growers over-apply nitrogen, the sugar content in the beets decreases and the amount of impurities increases. Excess nitrogen also leads to beets with a lot of green tops. Based on research at the University of Minnesota, recommended nitrogen application levels were lowered from 170 to 120 pounds per acre. Four years later, American Crystal

Sugar noticed decreased levels of nitrogen in the soil. If no residual nitrogen is observed in the soil, there is less chance for nitrogen to leach into ground water. Between 1980 and 1994, American Crystal Sugar paid \$750 million in higher payments to its growers. Growers benefitted doubly from this program through higher revenues and lower costs. American Crystal Sugar has benefitted by recovering more sugar, increasing sugar production, increasing factory processing efficiency, and remaining competitive in the marketplace.

American Crystal Sugar also works with growers to encourage integrated pest management (IPM) practices. For example, through the use of a University of Minnesota disease prediction model, field scouting for insects, and weather monitoring, it advises growers to only spray pesticides when necessary. Since it started this effort, fungicide use has been reduced by 1.5 applications.

To make this program work, American Crystal Sugar has held many meetings with its growers. It also distributes a bimonthly newsletter and contributes information about BMPs, especially precision nitrogen application, to local farm publications in order to inform growers, fertilizer dealers, soil testing labs, and crop consultants. It funds research through its Research Center to develop recoverable sugar quality measurements and also with North Dakota State University and the University of Minnesota on nitrogen fertility. It has formed a partnership with these two state universities/extension services to provide educational assistance to growers. Its own field staff has

been trained to be Certified Crop Advisers. American Crystal Sugar believes that the incentive payments would not be effective if they were not coupled with information and education. In addition, use of higher sugar varieties of beets are encouraged, as is timely weed, insect, and disease control. Soil testing is required, and crop rotations are encouraged to build pest resistance.

The biggest barrier American Crystal Sugar has faced was in convincing growers that their beet payments would actually increase in the quality payment program. So, for the first three years of the program, the growers were paid according to the old payment system, and these payments were compared to what would have been paid under the new payment system, i.e., higher payments for higher levels of recoverable sugar. After comparing the payment systems over the three years, the growers voted to accept the new payment system. (Based on materials provided by, and correspondence with, American Crystal Sugar Company, the National Council of Farmer Cooperatives, and the National Geographic Society and The Conservation Fund.)

American Pop Corn Company: The American Pop Corn Company sells two types of pop corn products, one made from conventionally grown pop corn, and, since 1990/1991, another made from pop corn grown without the use of pesticides. The company promotes the product as being "Good for the Environment" and "Grown Without Chemical Pesticides" -- no health claims are made. Growers must follow 15 steps to meet its guidelines, including use of alternatives to pesticides, cultivation and farming techniques, crop rotations, field inspection, multi-residue scan, cleaning out equipment before harvesting, and cleaning out storage areas -- for the no-pesticide version. Fertilizers are allowed to be used but not pesticides -- the program was created to respond to the growing market for organic foods and to provide

growers with more alternatives. Growers certify that no pesticides were used; then the delivered pop corn is tested for residue to confirm the certification. American Pop Corn's program can provide an outlet for pop corn grown in transition to being organic. The program is also educational, providing lots of information to the growers. American Pop Corn meets one-on-one with growers to explain the program to the 15-20 growers needed each year -- these growers are chosen from a pool of 300 growers.

American Pop Corn pays the growers a price premium of approximately 15 percent to grow a specific variety of pop corn and follow the above guidelines. This price premium compensates the grower for potential impacts from not using pesticides: the pop corn variety used produces a lower yield than a conventional pop corn variety due to the potentially greater prevalence of weeds and their competition with the crop; the grower accepts more risk; it costs more for labor to weed; and it costs more to keep the pop corn separate from conventionally grown pop corn -- i.e., growers must clean harvest equipment prior to harvesting and clean the storage areas prior to unloading the harvested pop corn there. However, its product is not priced higher because this is a new category for American Pop Corn. However, despite the lack of much brand loyalty for pop corn products, it believes the no-pesticide product line is building consumer loyalty, at least based on letters received from some of its customers.

One barrier faced by American Pop Corn on the consumer side is to prove its product claims. When it describes the program and the process to consumers, they are satisfied. It has also prepared a brochure for retailers to explain the program. American Pop Corn has also faced barriers on the grower side. Initially, they had to be sold on the merits of the program. It was successful in doing this by convincing them of its economic benefits. This

is especially important to American Pop Corn so it can meet its production needs. Major events, such as weather and insects, particularly early in the season, can make it difficult to convince growers to remain in the program. However, later in the year, when the growers are closer to receiving the bonus payments, they are more willing to remain in the program. (Based on materials provided by, and correspondence with, American Pop Corn Company.)

Arrowhead Mills: Arrowhead Mills, started in 1960, buys organic grains, beans, and seeds (e.g., amaranth, flax, quinoa, and sesame) from over 100 growers and suppliers in the United States, Canada, Mexico, and South America. The size of these operations ranges from under 100 acres to several thousand acres. Most of its grains are grown in Colorado, Kansas, Nebraska, North Dakota, and Texas. Its beans are mostly grown in Colorado. All of Arrowhead's quinoa and sesame seeds, as well as some of its amaranth, are grown in South America. Many of the growers that it works with have been growing organic crops for a number of years. It sells bulk and packaged grains, beans, seeds, cereals, flours, and baking mixes, as well as packaged soup mixes, oils, and peanut butter.

Arrowhead is interested in supporting the organic foods industry and philosophy as a primary form of environmental stewardship -- e.g., eliminating synthetic inputs, minimizing energy consumption, improving soil quality, and planting varieties of crops. It helps the growers by providing them with the information they need. Its primary focus with growers is to assist new growers, helping them find sources of organic seeds and beneficial insects. Arrowhead works with new growers to identify what crops and crop rotations to use, as well as methods of weed control. In addition, it refers new growers to experienced organic growers who know the business well. Arrowhead is also interested in persuading

other growers to switch to organic farming. It pays a price premium for the crops purchased and helps the growers pay their organic certification fees. If Arrowhead does not buy all of the growers' crops, it helps them market them by finding other potential buyers. Arrowhead believes in the organic system, and that the more organic growers it keeps in the system, the more the organic foods industry will grow. Its main barrier is its difficulty finding enough crops to meet the growing consumer demand for organic foods. (Based on materials provided by, and correspondence with, Arrowhead Mills.)

Campbell Soup Company: Campbell's main environmental practice that it encourages its carrot (California, New Jersey, Ohio, and Texas), celery (California and Michigan), cucumbers (Alabama), mushrooms (California, Georgia, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Texas), potatoes (Ohio), and tomato (California, Ohio, and Mexico) growers to adopt is IPM. Its IPM program, started in 1989, is educational and voluntary, and includes three components: cultural practices (crop rotation, field selection, field sanitation, tillage), monitoring for pest populations, and treatment for those pests that would result in economic damage to the crop. Campbell's has IPM field specialists to provide technical assistance to growers and hold field meetings. It conducts research, and funds research with the University of California, sharing the results with its field people and growers to support the IPM methods. It has not yet encouraged nutrient management with the growers, but that may be coming in the future. Its reasons for encouraging IPM include several that support growers: address worker safety and environmental and regulatory concerns of growers; lower pesticide risks for growers; reduce likelihood of pesticide resistance; reduce financial risk to growers; lower spray costs; enhance crop quality and yields; and raise revenues. Campbell has several additional reasons for its IPM efforts that

support its business interests: address consumer, environmental, and regulatory concerns; meet consumer requirements of food safety and environmental protection; comply with the Food Quality Protection Act (FQPA); anticipate rather than react to FQPA; enhance raw ingredient quality; reduce the cost of raw ingredients; provide stable ingredient supply; meet foreign market product quality demands; foster good relations with growers; improve the company's operation efficiency; and protect the company's reputation.

Through Campbell's efforts, growers have reduced their use of synthetic insecticides and fungicides for tomatoes by 30 percent, synthetic pesticides for celery by 40-90 percent, and soil fumigation for carrots by 60 percent. It also shares its IPM information with the rest of the industry, demonstrating an interest to help all growers and other food processors.

Campbell has faced a number of barriers in its efforts. For example, growers are often risk averse, leading them to have a slower rate of use for new practices or use along the IPM continuum. To help overcome this barrier, Campbell encourages growers that are new to using an IPM practice to run split tests on their acreage, one-half of the acreage grown with their conventional practices and one-half of the acreage grown with IPM. If the yield quality and/or quantity from the IPM-half is less than from the conventional-half, Campbell's will reimburse the grower. Providing the appropriate evidence and incentives are critical to its efforts. Campbell also understands that when it visits growers, it is a guest, helping to improve its relationships with growers and easing grower acceptance of these practices. Another barrier faced is that growers may not always receive consistent information on the use of pesticides and IPM. Campbell works with pest control advisors, industry organizations, and the University of California to develop consistent

recommendations for growers. (Based on materials provided by, and correspondence with, Campbell Soup Company, Bolkan and Reinert [1994], and California Environmental Protection Agency.)

Cascadian Farm: Cascadian Farm was founded 25 years ago in Washington State, based on the belief that organic farming is a better long-term, more sustainable farming system. And Cascadian wants to be a part of, and support, it. It contracts with fruit and vegetable growers in California, Oregon, and Washington, paying them price premiums ranging from 35 to 100 percent, depending on crop type, to help compensate growers for their higher production costs (e.g., more labor) and greater risks (e.g., do not rely on chemicals to deal with diseases, insect pests, and weeds) from farming organically. While it may recoup this higher cost by the prices received from the stores it sells products to, the higher price in stores also establish a barrier to its growth -- i.e., a constraint because not all consumers are willing to pay higher food prices. Cascadian has been selling primarily to the natural foods industry, but has also started to penetrate large conventional grocery chains. Indeed, it has been growing 50 percent per year, and markets over 150 organic food products in seven major food categories -- frozen desserts, frozen fruit, frozen juices, frozen vegetables, fruit spreads, pickles, sauerkraut, and vegetarian meals.

Cascadian's field representatives meet with growers to help them farm and stay organic, manage their nutrient applications and use of irrigation water, and find approved alternatives to synthetic pesticides. New organic growers typically need more assistance. Cascadian supports growers that want to be a partner with it, and is interested in protecting family farms. In addition, it sends newsletters to the growers, distributors, and retailers, as well as some of its consumers. It believes that not only the environment benefits from its practices and policies, but also its customers.

Cascadian identified a number of barriers that it contends with. The biggest barrier is the price it pays to growers, and, as pointed out above, this constrains its ability to grow and compete against other companies. In addition, other barriers affect how it competes with other companies (i.e., other than organic). For example, while Cascadian funds research itself, and tries to network with state universities, it believes that USDA does not fund enough research on organic growing practices, as compared to other practices. Cascadian also believes that society subsidizes, at least in part, the costs of regulating and using synthetic pesticides and cleaning up pollution problems that may result from their use. (Based on materials provided by, and correspondence with, Cascadian Farm.)

Coors Brewing Company: Coors has had an ongoing program regarding environmental protection, natural resource stewardship, and nonpoint source pollution with its 1,225 barley growers (producing 12.5 million bushels for Coors on 136,300 acres) in Colorado, Idaho, Montana, and Wyoming. Its program has received top management support. Indeed, its project was one of 25 projects launched by the National Nonpoint Source Forum, leading Coors to survey the growers it works with regarding their use of environmental practices, understanding of nonpoint source pollution, and interest in being involved in its stewardship program.

In its Western Barley Growers Project, Coors provides the growers with technical assistance through its malting barley research program, field agronomists, one-on-one meetings, and a newsletter explaining BMPs (e.g., for nutrients, pesticides, and irrigation), developed in conjunction with state universities. It provides grower field-day meetings to feature in-house research programs. Coors shares with the growers and other barley growers the results of research on BMPs it funds with

universities. It also produces disease-free seeds to eliminate the need for seed fungicides. Coors only allows certain pesticides to be used and prohibits the use of others. If these prohibited pesticides are detected, the barley from that grower will not be purchased. It needs to know how much and what type of pesticides are used and the history of how the crop has been fertilized. It also develops disease-resistant barley varieties and provides them to growers.

The best growers in five regions in the four states are recognized by presenting "Environmental Conservation Awards" (including cash awards) on the growers' fields and identifying them in the company newsletter. In assessing award nominees, the totality of growers' accomplishments in environmental management and the impact of their farming, including effects on range management, riparian areas, and wildlife habitat are considered.

Coors is very concerned about protecting and improving the quality of the barley and water that it uses to produce beer. It provides incentives for high-quality barley. But, in addition, it also wants the growers to meet the environmental goals of the states and the public, and is interested in protecting workers and consumers from pesticide exposure. Indeed, there is a lot of outside pressure on the growers to improve their environmental performance. In addition, since it wants to optimize the level of starch over protein in the barley, e.g., the level of starch or sugar is dependent on the type of tillage practices and quantity of nutrients and water applied, Coors encourages growers to not over-apply nitrogen. It awards growers with high quality barley with higher prices. There are two ways quality is measured: kernel size and protein level (lower protein levels are preferred). And both of these quality measurements are related to how growers fertilize, irrigate, and till.

Coors is also interested in lowering or maintaining the costs of the growers and improving their profitability. Its relationship with the growers has strengthened through this program -- Coors demonstrates its interest in them. The company believes that this program gives them a competitive advantage. In addition, it believes that acting proactively improves relationships with regulators (especially when it faces a future environmental problem). Its interest in protecting the environment and sponsorship of a state nonpoint source pollution conference help protect its corporate reputation -- it believes that environmental protection probably has the greatest impact on a company's reputation. One of the biggest barriers that Coors encountered in these efforts has been to change grower behavior -- as a result, three years of independent data are needed to support new practices and the research needs to be conducted in the university system, as an outside party. Another big barrier was the additional labor and expense needed because the conservation practices require more labor. (Based on materials provided by, and correspondence with, Coors Brewing Company, the National Council of Farmer Cooperatives, and the National Geographic Society and The Conservation Fund.)

Del Monte Foods: Del Monte Foods works with 3,000 growers of fruits (apricots, cherries, grapes, peaches, pears, pineapples, and tomatoes) and vegetables (asparagus, green beans, lima beans, beets, cabbage, carrots, corn, peas, peppers, potatoes, spinach, and zucchinis), farming on 200,000 acres in eight different states (California, Idaho, Illinois, Minnesota, Oregon, Texas, Washington, and Wisconsin). It encourages them to use IPM. Its initial steps in IPM began in the mid- to late-1970s to reduce pesticide use in vegetable operations, and it has gained greater importance in the last five years.

Del Monte works with the fruit and vegetable growers in different ways: it contracts with the fruit growers, but it takes over growing the vegetable crops after the growers plant the crops. Del Monte has a number of reasons for its interest in IPM. It is committed to guaranteeing the safety of its products, and is responding to the "loss" of pesticides due to resistance by insects, the high costs to re-register pesticides, the need to have long-term pest management stability, and the real and perceived external costs of using pesticides (e.g., food safety, environmental impacts, and worker safety). In addition, it wants to position itself as a leader in the use of IPM and shape the industry's use of IPM.

Del Monte works with or for the growers in a number of ways: establishes strict standards for pesticide use by the growers; requires and monitors the growers to record their pesticide use; funds IPM research (e.g., developing biological controls for diseases, and new monitoring techniques) and shares the results with the growers; breeds new vegetable varieties with disease and insect resistance and shares them with growers; provides education about the best available information on safe and effective pest control; sponsors IPM training of the growers and pest control advisors; provides an IPM field staff to assist the growers; holds annual meetings and workshops to update and educate the growers; and developed processing equipment to remove insects. It specifies what pesticides can be used and tests for pesticide residues as a backup check, with a goal of no observable residue in its final products.

Del Monte has also undertaken a number of activities to develop an infrastructure to foster the use and acceptance of IPM by the growers and the food industry, believing that every pesticide problem affects the entire industry. Its infrastructure-related activities include leveraging the commodity groups to help spread the word to the growers about IPM (it

has so many growers to work with that leveraging helps to reduce the enormity of its efforts), supporting the funding of research on IPM systems, and co-founding the Pear Pest Management Research Fund and Processed Tomato Foundation. Overall, Del Monte is a big supporter of IPM because it provides long-term pest management stability. That is, while it may or may not cost less, it provides a much better way to manage the pesticide resistance issue, avoids having to deal with a regulatory system, and bypasses the need for growers to look for new pesticides every two years or so.

Del Monte has also been involved in nutrient management efforts, though not to the extent of its work in IPM. For example, it encourages the minimum amount of nitrogen applied to green beans to produce a beneficial crop and protect ground water. It is also breeding for more nitrogen fixation in legumes.

Del Monte has faced a number of barriers in its efforts. First, it believes that pesticides are viewed by many growers a cheap crop insurance and used as a tool to manage business risks. Second, there is limited availability of, and information on, reliable and effective pest monitoring systems and alternatives. Third, it believes that there are not enough qualified, independent pest management advisors in the private sector. (Based on materials provided by, and correspondence with, Del Monte Foods and California Environmental Protection Agency.)

Fetzer Vineyards: Fetzer Vineyards, in California, plans to only grow and buy organically grown grapes by the year 2000. Currently, of the 250 growers it works with, 32-35 of them are organic, with 2,460 certified organic acres and 100,000 cases of wine made from organically grown grapes (compared to 3 million cases of wine made from conventionally grown grapes). Another 10 growers are in transition to entering the

organic certification program, and about a quarter of the growers do not want to get certified due to the time and paperwork requirements, associated fees, and bureaucracy. Fetzer was the first major American winery to offer a wine made from organically grown winegrapes, a line it started in 1993. It is interested in organic grapes due to its desire to protect the environment, including protecting water resources and improving soil health. It is also interested in helping out the growers by protecting farm workers, keeping them healthy and productive, reducing medical and insurance costs, lowering long-term costs, and improving communications and relationships with them. Fetzer is also interested in reducing the susceptibility of vineyards to root rot disease, responding to consumer demand for more healthful products, improving the taste of its wine, reducing liability, and protecting the health of the company's children and families.

To achieve these objectives and the transition to organic grapes, Fetzer holds workshops with the growers to provide technical assistance and share information on organic growing, cover crops (in between rows, to extract atmospheric nitrogen and attract beneficial insects), IPM, irrigation techniques, and composting. It also encourages owl boxes to control the population of gophers, field mice, and rabbits, and their damage to vineyards. Fetzer's biggest barrier is to interest growers to move into organic certification -- many of the growers want all options to be available. Also, many growers want to enter its program but want to continue to apply herbicides to keep down weeds. Indeed, it is difficult to change old behaviors. Fetzer continues to provide education and offer weeding equipment to help overcome these barriers. In addition, it pays approximately three percent extra as a price premium, but does not charge a higher retail price. It has also formed an organization of organic growers and works closely with the University of California and funds research to share findings

with growers. Fetzer also shares findings from its experimental vineyards with the growers and other wineries. To convert to organically grown grapes, Fetzer pays special attention to those vineyards in transition to organic growing. (Based on materials provided by, and correspondence with, Fetzer Vineyards.)

E. & J. Gallo Winery: Gallo Winery encourages its grape growers to adopt more sustainable agricultural practices, such as use of IPM, irrigation management, and nutrient management. It encourages these practices through informal approaches, such as sharing information about cover crops, beneficial insects, and monitoring, through holding one-on-one meetings with growers, walking with growers to different vineyards practicing these approaches, and showing them practices used in Gallo's own vineyards. A number of the meetings are co-sponsored with University of California representatives and Gallo's field representatives. Its program is an ongoing educational effort. When new vineyards are planted, Gallo is very conscious of protecting the environment and the surrounding habitat. For example, growers use native plants to cover the soil and protect wildlife habitat, install bird nesting boxes, and protect riparian areas to safeguard fish habitat. Growers are interested in these approaches because they want to be better stewards of the land, and Gallo supports this view. Growers rely on Gallo to help address what they can and cannot do. (Based on correspondence with E. & J. Gallo Winery.)

Gerber Products: Gerber, based in Michigan, works with 500-600 fruit and vegetable growers of 16 fruits and vegetables in 30 different states. It is the nation's top producer of baby food. Its environmental stewardship activities, started in the early 1970s and gaining intensity during the past 10 years, can be grouped into four categories: communication, research, stimulate diffusion, and subsidize new practices. Gerber provides

a quarterly newsletter to growers, including a substantial focus on IPM. It also provides an annual grower newsletter to tell growers the company's expectations regarding what practices to use and not use, with most of the focus on IPM, but there is also information on cover crops, irrigation, nutrient management, and pruning. Gerber also funds agricultural research at about 16 different state universities, with a primary focus on lowering pesticide residues, and lesser focus on other practices, such as ground covers for orchards. The results of this research is shared with the growers. Gerber also has sponsored, and sometimes has subsidized, new agricultural techniques if they are more expensive, e.g., pheromone traps as an alternative to insecticides, and then diffused the practices to the growers it works with. It has organized crop management organizations to educate crop consultants that work with the growers. Gerber also coordinates groups of growers to sequence their crop rotations to match its processing needs.

In undertaking these activities, Gerber is interested in responding to its consumers concerned about pesticide residues and maintaining a supply of quality produce. It wants to encourage more intelligent use of pesticides. It is also interested in nitrogen application levels because of the link to nitrate content in baby foods -- it is working with growers to apply only enough nitrogen to get a good crop, following growers' nutrient analysis of the soil. Gerber wants the crops to meet its production needs. It is also interested in providing benefits to the environment and is beginning to understand the full potential of environmental stewardship. It cares about the field and the crop.

With these efforts, Gerber has faced a number of barriers. Growers have often been skeptical that IPM works and the economics of it. They have also been concerned with the risk of losing their crops. To address these concerns,

Gerber has provided education and worked with lead growers to adopt IPM practices and serve as a demonstration site. Through these demonstrations, it documents the efficacy and economics of the practices. There has also been a need to convince the company to share the risk borne by growers. For example, it covers the difference in cost between a new practice and a conventional practice. Gerber also covers the loss of a crop that is part of a demonstration. However, it has never had any significant loss in yield or change in quality. (Based on materials provided by, and correspondence with, Gerber Products.)

Health Valley Foods: Health Valley Foods was founded over 25 years ago in California, selling "All-Natural" foods. Approximately one-fourth of its product sold is certified organic food -- baked goods, cereals, cookies, crackers, and soups, and then many of its other ingredients are also organic but the products that they are included in are not labeled organic because these ingredients do not represent at least 95 percent of the products' weight. Its line of products use more organic ingredients than any other food company. Health Valley primarily works with 15 organic growers of beans, carrots, celery, onions, peppers, and tomatoes, and buys most of its grain from a certified organic grain mill. It buys 50 different certified organic ingredients. It connects new growers with organic certifiers or the Organic Trade Association to learn about the requirements associated with organic. In addition, Health Valley connects its new growers with organic growers that the company buys from and who will not appear to be competitors. It also requires each crop to be certified organic -- the organic standards include crop rotation, IPM, and nutrient management. In promoting organic growing and the use of organic crops, Health Valley promotes the protection of the environment, water supplies, and fertile topsoil, promotes conservation of resources, promotes the

purchase of healthy foods, and responds to growing consumer demand for organic foods.

Health Valley has faced a number of barriers in its efforts, including making organic foods more affordable. As a result, and given its interest in expanding its business opportunities, it is starting to work more with its existing larger and more experienced growers to increase their acreage and/or yields, and lower their costs. Health Valley also looks for partnerships with growers that are of like-mind. It currently pays a 25-50 percent price premium for these crops because of their higher costs to produce. It wants to lower the price premium to 15-25 percent, making its products more affordable to consumers. An additional barrier includes education -- of consumers to give them a full appreciation of the impact of organic growing on the environment and increase the willingness to pay a higher price, and of large grocery chains to learn how to sell organic. However, it believes that the public is beginning to understand the impact of organic growing on the environment and retailers are becoming more sophisticated in marketing organic foods. Health Valley also believes that the public is becoming more concerned about what is in food. (Based on materials provided by, and correspondence with, Health Valley Foods.)

Hood River Grower/Shippers: Since 1994, Hood River Grower/Shippers of Oregon-Washington has been working with its 350 apple and pear growers, covering 15,000 acres, as well as packers, state universities, and agricultural chemical dealers, to encourage them to adopt integrated fruit production. Its integrated fruit production (IFP) program is basically an educational program that continues to evolve and improve. It provides growers with information through education programs and newsletters about the economic and environmental benefits from IFP. Hood River believes that IFP is based on sound agriculture, and will lower grower costs in the

short- and/or long-term. Indeed, it believes that if the program does not make economic sense for growers, it would be hard to get them interested. Its IPM practices include softer programs, such as the use of beneficial insects. In fact, the broad spectrum, harsh chemicals are not as available as they were. Pesticide resistance management is very important to the pest industry. In addition, since over-application of nitrogen can affect fruit storability and quality, runoff quality, and water quality, Hood River also advises growers to reduce fertilizer applications. These practices will also protect the soil and environment. Additional reasons for its IFP program include satisfying consumer concerns and Hood River's expectation that IFP will be a requirement to sell fruit in Europe in the future -- it currently exports 40 percent of its fruit. It also does not know what will happen with IFP, so it has chosen to get out in front.

Hood River has faced a number of barriers in its program. One of the biggest barriers is how to measure progress in adopting IFP and its components, and how the district growers have changed their practices. Another barrier is the availability of incentives for growers. An incentive is expected because the growers are considered to be doing the right thing, but no one has said that they can sell at a higher price, so they, at a minimum, hope to be able to sell more by reaching new markets. (Based on materials provided by, and correspondence with, Hood River Grower/Shippers.)

Hunt-Wesson: Hunt-Wesson, a division of ConAgra, Inc., works closely with its 80 tomato growers in California to encourage their use of IPM, which it started doing in the early 1970s. Its field representatives work closely with growers on a one-on-one basis to assist them with their growing practices to encourage use of seed varieties and growing techniques (e.g., IPM) that reduce grower costs and improve productivity. It also shares information with growers about production

practices and environmental protection. In addition, it also provides growers with a list of registered pesticides acceptable to its standards, and requires a record of each grower's pesticide use and checks for compliance prior to harvest.

Hunt-Wesson also works closely with the University of California and shares the research findings with growers regarding, for example, the use of higher-yield hybrids, IPM, and improved irrigation methods. Hunt-Wesson funds and actively participates with the Processing Tomato Foundation to develop and disseminate information on IPM techniques for growing tomatoes. It funds research to develop improved varieties that have pest resistance, disease resistance, greater tolerance to environmental conditions, improved on-farm productivity, and greater processing yield. It also screens all new seed company variety releases, and consults with and provides quality data information to seed companies to assist in developing new varieties. Hunt-Wesson also works with growers to synchronize their crop rotations so that its production needs are met.

Hunt-Wesson's reasons for these efforts include economic factors that affect the growers (e.g., lower production costs [including land, capital, labor, fertilizers, and pesticides] to achieve processing demand, improve productivity, improve profitability, protect the crop, achieve higher yields, maintain the efficacy of pesticides and have as many to draw from when needed) and the company (e.g., produce more usable fruits for its products, protect the quality of its products, process and provide consumers with safe, wholesome food products that meet all USDA, EPA, FDA, and company requirements, improve processing productivity and recovery per ton, lower total cropland area and inputs used to meet processing needs, and reduce cost of consumer products). Its reasons also include environmental factors (e.g., environmental

responsibility). (Based on materials provided by, and correspondence with, Hunt-Wesson.)

Lodi-Woodbridge Wine Grape

Commission: Lodi-Woodbridge Wine Grape Commission is a wine grape grower cooperative that represents 650 growers, covering 50,000 acres. Lodi-Woodbridge encourages the use of IPM, nutrient management, drip irrigation, compost, cover crops, and owl boxes in order to improve the growers' ability to be sustainable and lower their costs for pesticides, synthetic fertilizers, and water. It considers IPM to be the best way to manage pests economically and environmentally, and views its stewardship efforts to be integral to enhance the quality and marketability of its wine. Its IPM program continues to evolve and improve. In addition, to avoid over-application of nitrogen which can negatively affect grape quality, Lodi-Woodbridge recommends the use of compost instead of synthetic fertilizer to slowly release sufficient nutrients and a mulch-like cover.

Lodi-Woodbridge provides information about the practices to use and their timing to the growers through bulletins, neighborhood meetings, breakfast meetings, workshops, and research seminars. Lodi-Woodbridge shares its research results and findings from its demonstration vineyard with growers. It is also funding research by the University of California aimed at solving local IPM and viticultural problems. Its outreach to growers is improved through its association with the University to provide information on various aspects of IPM. It conducts a pest monitoring program on over 50 commercial vineyards as a demonstration project. It also maintains a library on viticulture and IPM literature for use by the growers, and provides workshops on IPM topics for Spanish-speaking workers.

Lodi-Woodbridge has faced a number of barriers in developing this program, e.g.,

convincing conventional agriculture about the benefits of IPM and demonstrating the impact of IPM on crop quality and yield, changing grower behavior, and having growers receive consistent information on the use of pesticides and IPM. Each of the growers uses some form of IPM. Its program is five-years old, and the Commission provides 20 percent of the California grapes used in wine production, much of it blended with other grapes/wine in the state. It is currently considering development and use of an IPM or sustainable agriculture label on its product. (Based on materials provided by, and correspondence with, Lodi-Woodbridge Wine Grape Commission.)

Ocean Spray: Ocean Spray is a grower cooperative, representing 750 cranberry growers in Massachusetts, New Jersey, Oregon, Washington, Wisconsin, British Columbia, Chile, and Quebec. It is the top producer of cranberries, grown on approximately 30,000 acres. Ocean Spray started its environmental program in 1985, and launched its IPM program two to four years later. It encourages the growers it works with to adopt IPM for a variety of reasons -- to protect the environment, food safety, the company's and growers' reputations; to respond to growers request for IPM practices, and growers' desire to protect the land and water; to reduce growers' environmental risks; to anticipate and stay ahead of changes in future regulations; to comply with stricter market requirements in other countries; and to develop the capability to respond positively to inquiries from grocers about the pesticides they use. In addition, since over-application of nitrogen can lead to excessive plant growth and insufficient fruit growth, Ocean Spray also encourages the use of BMPs. It is also investigating cost-effective improvements to irrigation methods to improve crop production and produce beneficial water quality impacts.

To accomplish these objectives, Ocean Spray established a Board of Directors' level Environmental Committee, comprised of growers, to help management develop and implement new policies and potentially controversial programs, and to also help overcome grower concerns regarding new environmental initiatives (a barrier to their acceptance and use). Ocean Spray also provides an educational guidebook for growers regarding their environmental obligations, and provides a field staff and trains consultants who work with growers and provide assistance to them. In fact, Ocean Spray stresses education (not only what to do, but why to do it) and low-cost implementation to increase grower use of these practices. Confidential, voluntary audits of pesticide use, storage, disposal, and cleanup are provided. Each grower is required to submit annual pesticide records; together with information about relative risks, Ocean Spray quantifies the overall risk reduction and targets certain watersheds to recommend changes in pesticides. It also tests pesticide residue levels.

Ocean Spray undertakes demonstration projects and shares the results with the growers as well as the rest of the industry. Workshops are held to share the results of its in-house or company-funded University of Massachusetts research on application technologies and better compounds. Ocean Spray also works with the Cranberry Institute to improve dissemination of environmental-related information to growers. A newsletter is distributed to growers in conjunction with state universities affiliated with Ocean Spray. It recently started a new program to establish a wildlife habitat enhancement program for growers. If a grower causes a major environmental problem, the grower's contract may be revoked or the grower may be sanctioned or fined. Growers using improper practices are reviewed by the Environmental Committee. In total, its program has enhanced

the trust between growers and company management. Its program was recognized as an example of cooperative stewardship by the National Nonpoint Source Forum. (Based on materials provided by, and correspondence with, Ocean Spray, the National Council of Farmer Cooperatives, and the National Geographic Society and The Conservation Fund.)

Pavich Family Farms: For over 25 years, Pavich Family Farms has been marketing organic fruits and vegetables. It currently sells 56 different certified organically grown fruits and vegetables, including apples, beans, broccoli, carrots, cauliflower, celery, corn, cucumbers, grapes, lettuces, kiwis, melons, onions, oranges, peppers, prunes, raisins, spinach, tomatoes, turnips, and zucchini. Pavich expects to add another 24 fruits and vegetables in 1997. As an organic seller, it requires various conditions by growers -- growers are required to contact an organic certifier and comply with its standards, register with the state of California as an organic grower, and meet the company's product quality standards (e.g., size, eating quality). Pavich meets with the growers to advise them on their problems. It also has product coordinators who are facilitators between growers and marketers, and growers and its contract overseers. It funds research and development to support growers about how to grow organic crops. Pavich also helps growers find markets for crops they grow in their rotations but it does not market. It meets with its 20 growers to help them with their problems; if it cannot answer a grower's question, it asks around in the organic foods industry until an answer is found. The growers grow up to three or four crops each year; collectively, they grow on about 5,000-6,000 acres.

Pavich is interested in protecting the environment and maintaining the company's reputation as an organic producer. Pavich is

also interested in clean water, soil, plant, and products, sustainability of the land, and preventing soil erosion. It is concerned about protecting worker safety. It believes that organic growing increases its foods' nutritional content by improving the health of the soil and plants. It uses beneficial insects, compost, and cover crops to improve the soil and crops. Pavich also believes that organic foods taste better. Pavich recognizes the natural foods industry as a growth industry, and it is responding to growing consumer interest in purchasing products for environmental reasons and the interest of stores to respond to consumer demands. Pavich also believes that organic foods appeal to different market segments (e.g., "green" consumers, "baby boomers", senior citizens) for different reasons (e.g., protect environment, healthier, more nutritious, better tasting). One barrier that it has faced is the volatility in retail prices for organic foods, which is influenced by their supply and demand. (Based on materials provided by, and correspondence with, Pavich Family Farms.)

Robert Mondavi Winery: Robert Mondavi Winery buys winegrapes from many dozens of growers spread through California. Collectively, these growers farm thousands of acres in winegrape production, though some of their grapes are sold to other wineries. From market surveys and its own sales staff, Mondavi has learned that its customers are requesting that the environmental impacts from growing winegrapes be reduced and the price of its wine should not be increased -- a level price is also important to withstand foreign competition. Consumers are also concerned about worker safety. To address these and other consumer concerns, since 1990 Mondavi has formed teams with growers, university extension service, government agencies, and environmental groups to respond in a consensus-building process. Through such a team-building process, it spent two years developing a positive point system -- an

integrated program building on the Partners with Nature point system (see Appendix B) -- to measure changes and improvements by growers in pest management, soil management, water management, viticultural management, wine quality, and continuing education. To spread information about this program to the growers, Mondavi meets one-on-one with them and also holds workshops. It also shares information about its program with other growers to gain broader industry support.

One of the environmental issues Mondavi will be increasingly confronted with is airborne particulates, a growing air quality concern in California. However, its IPM efforts to encourage cover crops to prevent the spread of dust mites and attract beneficial insects can also help to reduce the transmission of airborne dust. Mondavi's environmental efforts are motivated by its interest to identify and promote growing methods that are the most environmentally protective, effective for winegrape growing, and sustainable. In addition, it is interested in maintaining or improving the quality and flavor of winegrapes, protecting its reputation, and improving customer loyalty. By working with growers, it hopes to develop a model program for winegrape growers and increase public trust of winegrape growing.

The winery undertakes other activities with its internal vineyards, where it is protecting riparian habitat and restoring wildlife habitat. For example, a creek that runs alongside one of its vineyards had an endangered species of fairy shrimp. Mondavi restored the creek from having a seasonal flow to being a year-round stream. This was achieved through a combination of practices -- using cover crops to reduce erosion from the vineyard, planting trees to stabilize streambanks, and recreating the stream channel. Now, the shrimp thrive in the creek.

The only significant barrier it has faced is the availability of money to develop the positive point system. Fortunately, through a grant from the state of California's Department of Pesticide Regulation, Mondavi was able to initiate its IPM efforts. In addition, use of new practices has faced minimal resistance because growers understand the requests of consumers and want to improve the public's image of grape growers. In addition, Mondavi is interested in identifying cost-effective practices that will improve the likelihood of their sustained use by growers. (Based on materials provided by, and correspondence with, Robert Mondavi Winery.)

Seymour Canning Company: The Seymour Canning Company, based in Wisconsin, added an organic line of canned vegetables (beans, sweet corn, and peas purchased from one grower) to its product line of conventionally grown vegetables in 1989. In 1991, it made a large commitment to organic and expanded its production. In 1996, it worked with 11 growers, farming on 900-1,200 acres, and producing 400,000-600,000 pounds of beans, 200,000-400,000 pounds of sweet corn, and 200,000-400,000 pounds of peas. Its organic products are sold under store-brand private labels. To encourage and support organic growers to grow these organic crops, Seymour pays a 30-percent price premium -- it also receives about a 30-percent price premium for its products. It hopes to increase the price premium by increasing its market penetration. In addition, it pays a 10-percent price premium for growers in transition to become organic. Growers on average have yields about one-third less than conventionally-grown crops, and the costs to grow the organic crops are about the same as the costs to grow conventional crops, with the costs of inputs slightly less and the cost of labor slightly more. Seymour helps the growers find markets for other crops used in their crop rotations that it does not market, e.g.,

organically grown soybeans, in order to help them remain organic.

To respond to growers' questions about organic growing, Seymour provides technical assistance and information to the growers on weed control, cover crops, crop rotations, equipment, fertilizers (e.g., "green manures"), etc. It also rents specialized equipment to growers -- if it is a new piece of equipment, Seymour allows growers to use it free for up to one year. Seymour is interested in protecting the environment, improving soil quality, and meeting the increasing consumer demand for organically grown food. It believes that the organic market is growing and expects that for the foreseeable future it can increase acreage by 10 percent per year, but it also recognizes that a key part of organic farming is marketing. One of the barriers it has faced is the availability of research and information from universities on what they are doing to reduce use of synthetic inputs. Another barrier is the lack of access to information on organic farming -- it is hard for growers to get this information at the grass-roots level. Seymour believes the situation is improving, but it takes awhile for the flow of information to match the availability of new technologies. (Based on materials provided by, and correspondence with, Seymour Canning Company.)

Stahlbush Island Farms: While Stahlbush Island Farms grows most of the fruits and vegetables that it sells (broccoli, green beans, sugar beets, sweet corn, green peas, pumpkins, spinach, squash, strawberries, and wheat), it also works with growers in Oregon to source additional corn and squash. Stahlbush encourages annual crop rotations and cover crops, and requires new growers that it contracts with to conduct soil tests -- then it lays out a growing strategy for them. It has also eliminated herbicides, fungicides, and insecticides for growing pumpkins and squash (as well as its own beans and corn), and has reduced by 85 percent the chemicals applied

to its broccoli, spinach, and strawberry crops. When pesticides are used, Stahlbush strives to use those that are on the organically approved chemical list. It encourages the growers to use compost -- e.g., it composts its food processing by-products and uses the compost, as well the "green manure" from cover crops and livestock manure, to fertilize its crops and build up the soil's organic matter. Stahlbush is interested in being a better steward of the land to provide a better soil and protect ground water. It wants a productive soil. It also encourages the use of irrigation water to occur at the optimal time to maximize water uptake by crops and to minimize evaporation. It has worked with Oregon State University on research to study the nitrogen movement in soil, and adapted the findings to its recommended growing methods shared with the growers.

Stahlbush believes that it can often be much cheaper to adopt more environmentally protective methods rather than fight them, e.g., they can often lower costs. It has moved from use of chemicals to reliance on more technology- (e.g., mechanization and computer technology) and labor-intensive methods. These methods fit in with how it wants to farm and to be better stewards. By staying ahead of regulations, it expects that it can better help to shape them if they are implemented in the future. Stahlbush believes that these practices will provide a healthier and better product. It also has its food products tested for pesticide residues. These attributes are expected to help in the sales of its products, especially since some of Stahlbush's customers request them. As a result, it expects that its company's reputation is improved. Stahlbush also markets products to other countries, and its growing practices help it to meet these foreign market product quality requirements.

Stahlbush has been working with the Pacific Rivers Council, and had its own farm certified as Salmon Safe (see Appendix B). However,

before it considers working with growers to include them in this program, it needs to develop a more direct relationship with consumers and be convinced that the Salmon Safe program will create an incentive for growers to adopt additional practices. (Based on materials provided by, and correspondence with, Stahlbush Island Farms.)

Stemilt Growers: Stemilt Growers, based in Washington, contracts with 330 growers to store, pack, and market apples, cherries, and pears grown on 15,000 acres. It has a line of organic produce and another line as part of its "Responsible Choice" program, which it formally started in 1991. The "Responsible Choice" program is based on IFP, the backbone of which is the use of IPM. However, the IPM program does not stop in the field, since it is part of Stemilt's IFP program that deals with growing, harvesting, storing, and packing their fruit. Stemilt's reasons for the IFP program include environmental protection, product differentiation, and avoidance of insect resistance. It is also interested in helping growers through protecting worker safety and ensuring growers' ability to achieve a sustained livelihood. Stemilt provides information to growers about the components of its programs through regularly consulting with growers, providing a monthly newsletter, and providing growers with a handbook to describe the Responsible Choice program, the availability of new, "softer" (i.e., less toxic) pesticides, grower sprayer records, and irrigation scheduling. It has conducted a substantial amount of research to reduce water use from irrigation and also encouraged monitoring of soil moisture as a BMP in the orchard. In addition, it has conducted research to encourage the use of bio-controls during post-harvest storage.

Stemilt would like to see creative incentives used to recognize what the growers do, or provide them with a monetary return, and

reinforce the concept of IFP. It would also like to see guidelines for how to farm better, and formal state or federal guidelines for how growers are doing with respect to IPM. Another barrier is that some growers are only able to focus on the next growing season due to their tight budgets. It is difficult for these growers to spend money today to benefit the future.

Stemilt established a point system to facilitate grower education and motivation, that is, a scorecard is used to rate growers' progress, as compared to recommended point totals for the three fruit crops. It hopes that growers will become interested in not only knowing about yields, expressed in tons per acre, but also environmental costs, perhaps expressed by points per yield ton. Indeed, Stemilt considers communication to be the key to successful implementation of IFP programs. Stemilt has condensed its information to the consumer about its program with the use of fruit stickers and box labels that feature a ladybug symbol and the words "Responsible Choice". Conveying thorough information to consumers about its program remains a challenge. (Based on materials provided by, and correspondence with, Stemilt.)

Sunkist Growers: Sunkist Growers is a grower cooperative based in California that markets 1.6 million tons of oranges, grapefruits, and lemons on behalf of 6,500 growers, growing on 370,000 acres. Through its environmental practices, it is interested in not only helping its growers by improving their profitability, but also protecting the quality of its products and its company's reputation, and meeting foreign market product quality demands. Sunkist is currently funding research demonstrations to show the correlation between the application of nitrogen inputs and the growers' profits -- for example, over-application of nitrogen may negatively affect the quality of the fruit and lower the price received, and also result in higher than

necessary costs. Growers are already showing a willingness to reduce nitrogen use. Indeed, its program was part of one of 25 projects launched by the National Nonpoint Source Forum. It has established the Sunkist Research Foundation to aid the citrus industry in finding alternatives to the use of pesticides. Sunkist distributes a monthly newsletter to its growers to recommend nutrient application, irrigation, pest management, pruning, root protection, and other practices, as well as the relationship of these practices to fruit quality and grower returns. Sunkist also shares research results through the newsletter. (Based on materials provided by, and correspondence with, Sunkist Growers, the National Council of Farmer Cooperatives, and the National Geographic Society and The Conservation Fund.)

Sun-Maid Growers: Sun-Maid Growers is the largest grower cooperative in the raisin industry, representing 30 percent of the industry, and also the largest in raisin sales in the world, with exports to 35 countries. It has about 1,500 growers as members based in California, who grow grapes on approximately 50,000 acres and produce 100,000 to 125,000 tons of raisins. In 1989, Sun-Maid developed a "do not use" list for pesticides that was later adopted by the rest of the raisin industry.

Sun-Maid provides technical assistance through its own field representatives to encourage IPM, nutrient management, irrigation efficiency, cover crops (to attract beneficial insects and their food supplies), owl boxes (to control the vertebrate pest population), and also provides pruning demonstration workshops. Sun-Maid also supplements the role of the University of California Cooperative Extension by sponsoring educational field days for raisin growers. In addition, it interacts with pest control advisors to utilize their assistance to encourage growers to reduce pesticide use.

Sun-Maid funds research to identify and implement alternative BMPs. Over 1,600 newsletters are distributed to growers and monthly meetings are held to educate growers in BMPs. A phone line has been established to provide timely pest control information.

Through these efforts, Sun-Maid is attempting to lower grower costs, improve the quantity and quality of yields, improve pesticide effectiveness and selectivity, and protect worker safety. Additional objectives are prevention of ground water pollution and increased development of biological materials for pest control.

One barrier Sun-Maid has faced is the resistance of growers to changes in established farming practices. In addition, manufacturers have been reluctant to register new materials for pest control in the past because of significant research and development costs. Recent changes in the FQPA have seen the registration of several new biological materials for disease and insect control within the last year. The cost of research and development can now be recovered more rapidly due to the fast-track registration process for environmentally-protective products. The increased cooperation between industry and the regulatory agencies indicates that barriers to use of IPM are being reduced. (Based on materials provided by, and correspondence with, Sun-Maid Growers, and the National Council of Farmer Cooperatives.)

Sunsweet Growers: Sunsweet Growers is a grower cooperative in California whose main market is prunes. It works with 650 prune growers, covering 40,000-45,000 acres and producing 100,000-112,500 dry tons of prunes. It has smaller markets for apples, apricots, dates, peaches, pears, and prune juice. It has a policy to not advise its growers on their growing practices. The growers have their own advisers to provide this expertise, which Sunsweet does not have the expertise to contribute. However, Sunsweet does hold

meetings with its growers to provide information on environmental matters and its field managers provide advice to growers. It also assisted the state to develop a BMP manual to reduce the off-site movement (i.e., in runoff to surface water and spray drift) of pesticides sprayed on orchards during the dormant season. Sunsweet then distributed copies of the manual to its growers. It also encourages the use of barn owl boxes made from scrap lumber -- the owls prey on gophers and field mice that find cover in the cover crops and can destroy large numbers of trees. Sunsweet does encourage minimum use of inputs -- fertilizers, fungicides, pesticides -- on prunes. It also requires its growers to maintain logs of pesticide applications. Through these efforts, Sunsweet wants to ensure that its growers do everything that is proper and to adhere to the pesticide application labels. (Based on materials provided by, and correspondence with, Sunsweet Growers.)

Wegmans Food Markets & Curtice Burns Foods/Pro-Fac Cooperative:

Wegmans is a food store chain in upper New York and northern Pennsylvania. In 1996, it started an eco-labeling program with fresh sweet corn to encourage the use of IPM. Based on positive consumer responses, it later entered into a three-way partnership with Curtice Burns Foods (a wholly-owned subsidiary of Pro-Fac Cooperative) and Cornell University to expand the program to Wegmans-brand canned snap beans, beets, carrots, sweet corn, peas, and sauerkraut, and frozen snap beans, carrots, sweet corn, and peas -- these products will receive an IPM label.

The canned IPM corn and peas were introduced in November 1996, the canned IPM corn and peas are in stores as of March 1997, and the frozen vegetables are expected to be labeled in summer 1997. All of these crops are grown in New York. Pro-Fac is a grower cooperative and works with the 10-12

growers in the program with a total of 1,500 acres -- it developed guidelines for site preparation and selection, planting, pest monitoring and forecasting, pest management (including whether growers use lower risk pesticides), and post-harvest. Curtice Burns Foods does the processing, currently 6,100 tons per year. Cornell developed the IPM guidelines for each individual crop type, with a series of practices based on the crop and associated points -- it is continually trying to improve the guidelines. Growers need to score at least 80 percent of the available points to be certified as IPM growers. Cornell also developed an IPM logo (a blue ribbon with the letters "IPM" and an outline of the state of New York) that Wegmans pays a license fee to use, though Wegmans has developed its own logo that would not be restricted to New York-grown crops (as is the use of Cornell's logo). The evaluation of practices is done by a private consultant, which is highly preferred by the growers to government evaluation -- they do not want the practices to become required. And Wegmans has responsibility for the marketing -- it uses brochures, circulars, in-store video tapes, radio, television, and newspaper ads -- to educate its customers about the environmental benefits of IPM. These foods are marketed as environmentally sound, not as safer food -- they bear an IPM logo and are part of Wegmans' "Food You Feel Good About" labeled line of foods. Wegmans provides a newsletter to its fresh vegetable producers in the program.

Pro-Fac Cooperative provides a newsletter to its members. Each issue includes at least one article about a member-producer who follows sound environmental practices. Curtice Burns Foods meets one-on-one with each grower producing processing vegetables for the IPM program to discuss and review the program requirements. It also provides guidelines to the processing vegetable producers concerning accurate record keeping for verification of the use of IPM practices. Wegmans' interests in

this area include decreasing impacts on the environment and protecting its reputation. It is also interested in educating the public about decreased chemical use by growers to change public perceptions about farming. In addition, growers have been supportive of this program to lower their costs and environmental costs. For example, the average number of insecticide sprays on sweet corn (processed into canned and frozen corn) has been lowered from four per crop at the start of the program to just over one as of mid-1997. This three-way partnership has proved to be quite effective and has helped to overcome past antagonisms that may have existed. The growers appreciate that they have co-ownership in the program, and elements of the program have not been imposed on them.

Wegmans is currently expanding the program to include asparagus, popcorn, and tomatoes grown in states other than New York. It is looking into also expanding into fresh cucumbers and peppers. It may eventually expand the program to include fruit, possibly berries. However, it also informs its customers that "as consumer demand increases, IPM methods will be developed for more and more crops," defining a role for consumers in supporting greater grower use of IPM. Presently, it is too early to quantify consumer response, but other companies are watching this program. If the program is successful, other companies may follow suit. In addition, Curtice Burns Foods has asked some of its other customers to consider developing a similar program with their private labels. And various grower groups are becoming interested in developing similar programs. In the past, Wegmans has marketed organic produce but learned that its customers did not want to pay higher prices, given their understanding of organic farming (its IPM vegetables are priced lower than their organic versions).

A number of barriers have been encountered during the development of Wegmans' program. First, some members of the agricultural community do not support its program because they are concerned that it will lead the public to raise food safety issues with non-labeled food. As a result, Wegmans has focused on the environmental benefits of its program. Second, consumer awareness of IPM is low -- only 20 percent of its customers knew what IPM is. As discussed above, Wegmans has used a variety of approaches to educate its customers. Third, growers inherently do not like to document their practices, especially during harvest time -- the partnership has tried to make the documentation easy and has notified growers up-front what they are responsible for in the program. Fourth, all member groups of the program were leery of government evaluation, because of their concern that the program would become regulatory. The evaluation verification is done by an independent, third party consultant. Fifth, some members of the university extension service consider this program to be more work for them, but with no increase in resources. Extension was also concerned that it would have, or be perceived to have, an enforcement role. However, this responsibility belongs with Cornell and Wegmans, and the verification is done by a consultant. Sixth, due to Wegmans' high quality standards, twice the tonnage needed for processing purposes is grown. In addition, the coordination of timing crop maturity with processing plant capacity has also been important. (Based on materials provided by, and correspondence with, Wegmans Food Markets, Curtice Burns Foods, Pro-Fac Cooperative, Cornell University, the National Council of Farmer Cooperatives, and Shelton and Petzoldt, 1997.)

2. Livestock

Butterball: Butterball has five turkey growing/processing complexes in the U.S.

Three of them buy their turkeys from individual companies that themselves have contracts with growers. At another facility, Butterball owns all of the turkey grower operations. At the remaining facility, in Missouri, it contracts out all of its turkey growing. New growers are required to compost their turkey mortalities. To help defray the costs of building new facilities (as well as the cost of the composting unit), Butterball pays a 25 percent rebate for the construction costs. It encourages existing facilities to also add composting units. Butterball holds meetings with the growers to educate them about how to compost the mortalities. With respect to handling nutrients from the manure, growers are encouraged to follow USDA nutrient guidelines. The company's service people provide technical assistance to the growers on composting and nutrient management, and is currently developing a BMP manual for the growers for handling manure that is based on a similar manual developed by the National Turkey Federation. Butterball works closely with growers to better ensure that they properly maintain and operate the practices.

Butterball is interested in avoiding future environmental problems and staying ahead of potential future regulations. If it gets ahead of the industry, it can better influence the potential future development of environmental regulations. For example, the use of burial pits to handle turkey mortalities was expected to be prohibited in the state of Missouri. As a result, Butterball began to encourage the existing growers, and require its new growers, to compost them. (Based on correspondence with Butterball.)

Clover Stornetta: Clover Stornetta, based in northern California, developed its "North Coast Excellence" program in 1996 to undertake a number of activities with the 18 dairies it buys milk from (with 14,000 cows producing 19 million gallons per year), who

are also members of a dairy cooperative. The program was designed to achieve a number of objectives: encourage stewardship of the land; protect family farms from increased competition from larger dairies; protect animal health; respond to growing consumer demand for natural foods; link consumers to growers with a positive image and experiences; differentiate its milk products based on how the milk is produced and its quality (rather than be "faceless"); improve the company's growth; and improve its relationship with its dairies. A scorecard has been developed to rate the appearance of the dairies -- this serves as an educational tool for how dairies can look and work. Dairies must score at least 90 points, and are judged based on a variety of factors, including corrals and manure piles. Clover is currently identifying sustainable agricultural practices to protect land, water, and business for the long term. For example, it is taking steps to reduce erosion and hopes to encourage its dairies to fence off streams from access by cows. It is also encouraging rotational grazing to protect the landscape. These sustainable practices will be defined for each individual dairy, because each one is different at least in part due to different local environmental conditions. Clover expects that the sustainable agriculture component will continue to evolve, with each farm plan looked at each year to see where improvements are possible.

Clover pays approximately a two-percent price premium for milk produced in compliance with its product and farm standards. It does not receive a price premium for its product, and believes this has improved consumer acceptance and sales growth. Dairies can post signs on their property showing that they are members of the program. The county agricultural commissioner is the third-party certifier of the program, reviewing all paperwork (e.g., rating sheets submitted by each dairy), and the cooperative and Clover audit each dairy to provide feedback. Since it

started this program, Clover has experienced the fastest growth in its history and has expanded its market area. It is currently considering developing an organic line of dairy products, and perhaps transitioning all of its milk into organic production. (Based on materials provided by, and correspondence with, Clover Stornetta.)

Coleman Natural Products: Coleman was started in 1979 and its stewardship principles have been a part of the company since then. Coleman encourages the over 450 ranchers who provide it cattle to use rotational grazing to improve the grass cover, watershed, wildlife, and the quality of natural ecosystems. These ranchers are in the 17 western states, with the majority in Colorado, Nebraska, North Dakota, and South Dakota. The ranchers are typically paid a premium for their cattle for following Coleman's cattle raising and ranching protocols. In this fashion, Coleman helps support the continued existence of family farms. It is also interested in raising animals in a more respectful way. Coleman also works with nine feedyards (seven in Colorado and two in Nebraska). Responding to Coleman's customers' concerns for pesticide residues, the feeds used by the feedyards are tested for pesticides. However, where the feedyards purchase their feed is considered their prerogative, and is typically locally grown. Overall, Coleman is concerned about the total cost to society from producing low-cost food.

One key barrier that Coleman has faced is building a bigger supply pool of ranchers who support its philosophy in total. It has overcome this barrier by remaining a constant purchaser in the market and developing good, long-term relationships with ranchers. It also rewards their performance by paying higher cattle prices than the commodity market would pay. So through use of an economic incentive, Coleman has been able to attract and retain ranchers that remain closest to what

it believes in -- being "true to the trail." (Based on materials provided by, and correspondence with, Coleman Natural Products.)

Draper Valley Farms: Draper Valley Farms in Washington allows composting or rendering of poultry mortalities through the contracts with its 35 growers, who annually produce 20 million birds. It has allowed composting for at least five or six years. Most of the growers have accepted composting because it is easier to deal with than incinerators are. Grower skepticism was alleviated when growers visited other growers with composting units and saw how effective it is in handling mortalities. Draper's contracts prohibit the use of pits or incinerators for disposal of the mortalities. It has worked with individual growers on how to compost. Since none of the growers have enough land to apply the poultry litter, litter is not allowed to be stored on-site or stockpiled uncovered. The growers are composting the manure and marketing the compost off the farm, with sufficient interest in the product so that all of it is successfully marketed. Draper prefers to stay ahead of future environmental regulations through requiring these types of practices. (Based on correspondence with Draper Valley Farms.)

Eberly Poultry Farms: Eberly buys free-range chickens from 30-32 Amish and Mennonite growers in Pennsylvania. Their flock size is 4,000 chickens, with 15,000-18,000 chickens produced per week. Eberly's program with the growers started first with production without the use of stimulants, then the use of free-range growing, and then organic production in 1985 with the addition of organically grown feed purchased from a grain broker. Poultry mortalities are typically composted on-site and the manure is applied to their crops. Technically, Eberly has produced organically-grown chickens for 10 years but has been unable to put this information on a label since chickens are inspected by USDA

and there is no national standard for organically- grown red meats or chickens. Eberly expects that the next step in the evolving program is organically produced chickens, once USDA releases its national organic labeling standards. In fact, its biggest barrier has been the lack of national organic standards for poultry (and red meat). Furthermore, another barrier is where to get the organic poultry processed. If the organic livestock operation is too small, it may find processing plants too far away to justify the transportation costs or its production not large enough for the processing plant to receive the meat.

Eberly meets with the growers by visiting their farms twice each year to provide updates on its program. A price premium of approximately 33 percent is paid to the growers to compensate the higher labor costs needed; in turn, this price premium is offset by higher prices paid by retailers. However, without being able to use an organic label, it is not able to receive a higher price premium from retailers. Eberly's efforts reflect its interest to support sustainable agriculture, benefit growers (who usually have older operations), protect small family farms, and respond to the growing marketplace for organically produced foods. (Based on materials provided by, and correspondence with, Eberly Poultry Farms.)

Horizon Organic Dairy: Horizon Organic Dairy buys about 30 percent of its organic milk (400,000 pounds per week) from 125 dairies, primarily in Iowa, Pennsylvania, and Wisconsin, and mostly small family farms. These dairies have at least 5,000 cows. These dairies usually have enough land to apply their manure, and many of them grow their own organic feed. However, Horizon does not purchase all of the milk produced by these dairies. The rest of Horizon's milk is produced by its own dairy in Idaho, with another one scheduled to open in Maryland.

Horizon also has six processing plants to produce organic fluid milk and another seven processing plants to produce its other organic dairy products, e.g., butter, cheese, sour cream, and yogurt. Its growth has led to a substantial increase in organic crop production.

Horizon estimates that it is responsible for over 150,000 acres being certified organic, i.e., the dairies, and cropland and orchards for the feed for the cows and fruits for the yogurt. Indeed, its own dairy buys organic feed from 30-40 growers in Idaho and Utah, farming on 50,000 acres. It also buys organic fruits from 20-25 growers in California, Colorado, Michigan, Oregon, and Washington. Horizon believes its greatest contribution to environmental protection is the organic practices it influences to be used on these acres, due to its purchase of their products. For the individual dairies, it provides field services and counsel, as well as access to certifying organizations for technical help. It also reimburses a portion of their first year's certification cost. For the individual feed growers, Horizon provides access to certifying organizations for technical help, as well as a contractual market. In addition, it provides whatever help it can to the growers, including having the organic certifying agent talk with them and provide supporting materials.

Horizon's program is based on its environmental interest in reducing agricultural nonpoint source pollution and building up and protecting the soil, and its economic interest in developing a business opportunity to respond to growing consumer demand for environmentally-oriented and residue-free products. It is also helping to keep small family dairies in operation -- Horizon pays them a higher price (about \$3 to \$4 per hundredweight) for their milk to help offset their higher costs to produce organic milk. It also believes that it raises the animals in a more respectful way, and that its product tastes better than conventional milk products. The

biggest barrier it has encountered has been the cost to convert the land from chemical to organic -- during the time when the cropland is in transition for three years, it also has a decline in yield. So while the land is being farmed organically, the crops are sold at conventional crop prices and yields are lower during this transition period. Additional big barriers have been finding sources of organic feed and good land to grow the feed on, and producing enough organic milk to meet the growing consumer demand -- Horizon continues to increase the number of dairies it works with and its production levels to respond to the growing demand. Its sales have doubled each year since it was founded in 1991. (Based on materials provided by, and correspondence with, Horizon Organic Dairy.)

Hudson Foods: In the Delmarva region (includes Delaware, nine Eastern Shore counties in Maryland, and two Eastern Shore counties in Virginia), Hudson Foods contracts with 235 growers of broiler chickens, producing approximately 1 million birds per week. With its concern for the water quality of Chesapeake Bay and the protection of farm property and the soil, it encourages the growers to use manure sheds to cover and contain manure until it is appropriate to be applied to the land. Over the past 2-3 years, it has also been providing its own cost-share funds to supplement federal and state money in order to encourage the growers to compost their bird mortalities, rather than use burial pits or incinerators. Hudson uses its newsletter to growers to provide information on these preferred practices. Growers have accepted the use of manure storage sheds and composters, especially after being convinced about their effectiveness through farm demonstrations. (Based on materials provided by, and correspondence with, Hudson Foods.)

Juniper Valley Farms: Juniper Valley Farms buys organic milk from 12 dairies in

New York and Vermont, with approximately 800 cows producing milk -- currently, about 400,000 pounds per month. It helps the new dairies locate suppliers of organic feed and also refers them to its existing dairies in case they have questions about being organic. Juniper Valley pays a 30-40 percent price premium for the organic milk, and is paid a price that is 40-50 percent higher than the price paid for conventional milk. It started selling organic milk in April 1996. Its refrigerated line of milk products is sold along the East Coast, with the bulk of it sold in the Northeast. Its non-refrigerated line of milk products is sold nationally. Its program is based on its interest in finding sensible approaches to protect the environment (e.g., much of its watershed provides drinking water to New York City and is part of a program to reduce agricultural pollutant loads to improve drinking water quality), respond to consumer concern about foods that may contain unnatural and unnecessary ingredients or residues, respond to growing consumer demand for organic foods, support local sustainable agriculture, and protect local family farms. The dairies have enough cropland to apply their manure, and rotational grazing is encouraged to provide a cost-effective source of organic feed. Indeed, Juniper Valley's biggest barrier is finding sources of organic grain. In addition, Juniper Valley needed funds to be available to finance some of the dairies, who were not doing well financially, to get started in its program. (Based on material provided by, and correspondence with, Juniper Valley Farms.)

McDonald's Corporation: In response to consumer inquiries regarding the impact of McDonald's purchase of beef and its impact on the world's tropical rain forests, the company established a corporate policy statement in 1989 to "use only locally produced and processed beef in every country where [it has] restaurants." If beef needs to be imported, it will only be purchased from those

suppliers approved in other countries. "In all cases, however, McDonald's does not, has not and will not permit destruction of tropical rain forests for [its] beef supply. [It does] not, [has] not and will not purchase beef from rain forest or recently deforested rain forest land. This policy is strictly enforced and closely monitored." All suppliers of beef to McDonald's must comply with these requirements or lose their business to it. One barrier that it has faced is the difficulty in controlling and monitoring what happens along the food supply chain. Integrating a change in its policy through the supply chain can oftentimes lead to diverse strategies for working with different links in the chain. Furthermore, since McDonald's is one of several links in this chain, possibly including international components, its influence can be limited. (Based on material provided by, and correspondence with, McDonald's Corporation.)

Murphy Family Farms: Given its interest in supporting sustainable agriculture, protecting water quality, protecting and enhancing its reputation through environmental proactivity, helping growers become better environmental stewards, and staying ahead of environmental regulations, Murphy Family Farms has taken a number of steps for about the past 10 years to prevent pollution from its 700 swine operations. Contracts with growers require them to comply with their state's requirements -- it has operations in Illinois, Iowa, Missouri, and North Carolina, and new operations in Oklahoma and South Dakota -- and it may have additional requirements that are independent of the state. It also helps growers prepare their nutrient utilization plans, and requires soil testing based on nitrogen needs for all the growers. In the midwest, Murphy requires growers to work with consultants to conduct soil tests and determine application rates. Growers in different climatic regions may differ in the timing of when they apply

the manure, leading to different approaches encouraged by Murphy.

All of Murphy's contract growers are required to attend a four-hour environmental training course. Every three months thereafter, new managers and new contract growers are trained. Growers must also report on a weekly basis the remaining capacity in the manure-holding lagoons, which Murphy keeps a computerized record of. Murphy's service people undertake weekly environmental assurance inspections of all the farms. Mock inspections of farms are conducted and feedback is provided to growers. It assisted the state of North Carolina develop a course for regulated "operator in charge" in irrigation training for land application from the liquid manure holding ponds and then co-taught classes. It annually tests all company and contract farm wells for nitrate pollution. In addition, growers in North Carolina are provided dumpsters to store swine mortalities that are then picked up by Murphy for free and taken to a rendering plant; the growers in Iowa contract with a renderer to take the mortalities.

Murphy shares information with growers about nutrient management, the relationship between farm management and wildlife management, riparian protection, general stewardship activities, and relevant industry information in a quarterly newsletter. Its efforts to protect riparian and wildlife areas are mostly educational. It encourages through education, newsletters, and meeting with growers the importance of protecting water quality and wildlife habitat through leaving a filter or buffer strip between the edge of an irrigation spray field and a ditch, stream, pond, lake, etc. Murphy also provides blue bird boxes to growers for a nominal fee. In its efforts, Murphy has faced typical barriers associated with changing behaviors, including the growers' willingness to adopt new practices or methods (given their past experience), understanding the need for the recommended

change, and their education level. (Based on materials provided by, and correspondence with, Murphy Family Farms.)

Stonyfield Farm: Since 1995, Stonyfield Farm, based in New Hampshire, has been transitioning its dairy products to be certified organic. It currently sells organic lines of yogurt, frozen ice cream, and frozen yogurt. Currently, it pays approximately a 50-percent price premium for organic milk, produced by dairies in Maine, New York, Vermont, and the Midwest. It also pays 50-100 percent for other certified organic inputs (e.g., fruits and sweeteners). Its organic products also receive a higher price in stores -- e.g., six ounces of organic milk is sold at the same price as eight ounces of conventional milk. Its packaging includes information related to the organic production. It funds educational workshops and conferences for growers to learn and share tools and skills to improve their practices. Stonyfield also funds a sustainable agriculture grant program for growers (approximately \$8,000-\$10,000 per funding cycle) -- any dairy that sells milk to it can apply. Projects are rated based on positive environmental impacts (such as through using fewer pesticides, decreased runoff and erosion, improved nutrient cycling, stream fencing, and expanding pasture management) and how replicable the project is -- grant recipients typically receive \$1,000-\$2,000. Its products are sold in all 50 states, and it has experienced annual growth rates of between 20 and 60 percent. It recognizes that its interest in protecting the environment is also good for profits. Stonyfield is also interested in protecting small farms and supports organic agriculture because it agrees with the standard of environmental performance.

Stonyfield has faced numerous barriers in its efforts. First, the lack of national organic standards has constrained its growth, particularly in export markets. Second, it is concerned about the amount of research on

organic farming (e.g., animal health care and herd management issues) funded or conducted by USDA and the land grant universities. Third, there is a lack of understanding by retailers and consumers of what organic means. Fourth, there have been misconceptions and doubts in the farm community about what organic is. Fifth, there is a lack of an infrastructure for organic foods, e.g., access to feed and availability of organic growers and products. (Based on materials provided by, and correspondence with, Stonyfield Farm.)

Tallgrass Prairie Producers Co-Op: The Tallgrass Prairie Producers Co-Op is a nine-member cooperative of small, family ranchers in Kansas seeking to differentiate their beef product to enable them to remain farming. Instead of feeding grain to cattle confined in feedlots, TPPC keeps all its cattle on pasture, never confined, and the animals are finished on grass. These ranches hope to market 200 head by the end of 1997, 400 by the end of 1998, and can potentially go as high as 1,000. They meet two to three times each month to discuss production, environmental, marketing, and business issues. The TPPC also encourages them to use rotational grazing when and where appropriate. Reliance on natural grazing and native grasses uses less overall energy to feed the cattle.

TPPC is interested in avoiding the negative effects that may result from feedlots (e.g., water pollution) and the negative effects that may result from large-scale feed grain production (e.g., soil erosion, and use of fertilizers, pesticides, and energy). It is also interested in protecting small, family ranches and communities. In addition, it is interested in protecting native land -- the hilly, rocky Flint Hills Tallgrass Prairie is the largest area of native tallgrass prairie left in North America -- and keeping it in a native state. The pasture grazing keeps the soil covered and protected from water and wind erosion, benefits from the

filtering of the native grasses, and disperses the manure, unlike confined feedlots. It believes that the ranches can make more money through receipt of a price premium and become profitable and sustainable. TPPC wants to give consumers a connection to the land and know how their food is raised. It believes that its system is consistent with sustainable agriculture and better protects animal health and produces a tastier and healthier (leaner) product.

TPPC has faced a number of barriers, such as re-educating consumers about the benefits of lean beef, the marketplace and institutional acceptance of lean beef, the legal requirements in labeling and processing to document the validity of any claim made about the beef, marketing challenges when competing against larger companies, marketing volume needs for stores (larger store chains have larger beef needs that a small company may have a hard time satisfying), complete business management (over time, it is getting better with the inventory control, accounting, and marketing), marketing the entire animal, and start-up costs. TPPC has lined up local buyers for its products and hopes to expand its market area. (Based on materials provided by, and correspondence with, Tallgrass Prairie Producers Co-Op.)

The Organic Cow of Vermont: The Organic Cow of Vermont started to buy organic milk from other dairies in November 1994, and currently buys organic milk from 60 dairies in Maine, New York, and Vermont. It also produces some of its milk. It targets dairies that are small and family-owned. The 34 dairies it currently works with have about 1,500 cows, with sizes ranging from 12 to 125. It is currently producing almost two million pounds of milk per week. It ranks at the small end of the large organic milk producers/processors. The Organic Cow is interested in protecting the regional, family

farms, and their role in the local community, landscape, and economy. It believes that if these dairies can stay in operation, the region's sustainability will be improved. It also believes in organic growing methods and that organic dairying is part of a better and more respectful treatment for the cows. The Organic Cow also strongly believes in what it is doing.

To support organic dairying, The Organic Cow pays a price premium -- as well as additional premiums and bonuses. The base price does not fluctuate, while the premiums can, but the farmer has control over them. The Organic Cow does not take any discretionary payment deductions from the dairies -- e.g., most regional dairies pay the hauling costs to deliver their milk to market. It instead absorbs that cost for their farms. Additionally, The Organic Cow purchases 100 percent of the dairies' production year-round and contracts with the farms for two years. Since it is far more costly to farm in the Northeast and to farm organically, the price to the farms must be sustainable. Some of the added cost is absorbed by The Organic Cow, i.e., not all of it is passed on to the stores because this may price its product out of too many markets. It is currently extending its product line to expand its sales, production levels, and the number of dairies it buys milk from. This is consistent with another of its objectives, providing more choices for consumers.

In addition, The Organic Cow encourages rotational grazing and composting of manure. Crop rotations are used. On the hay fields, animals and crops are rotated. The dairies try to manage the land (e.g., add back nutrients) and the woodlands. Bird feeders/boxes are used for pest control. To provide information to the growers about these methods, information is included in the newsletters sent to them. The Organic Cow also provides technical assistance and education, holds monthly workshops and meetings around the

state to improve grower access to them, and helps sponsor "pasture walks" for farmers to walk around other farms and to learn about what each is doing. A field person is dispatched when a problem exists at a farm and/or mentor farmers are on call for a site visit or by phone. Every year as part of the organic certification process, the certifying organization inspects each farm. Yearly re-application is necessary and soil tests on any added land is automatic. Its biggest barrier is access to sufficient supplies of organic feed. It helps its dairies locate these suppliers and also tries to find local, new sources of feed, and helps them in the organic certification process. (Based on materials provided by, and correspondence with, The Organic Cow of Vermont.)

Tyson Foods: Tyson Foods has 28 broiler chicken complexes around the U.S. whereby each facility takes care of its own breeding, hatching, growing, and processing. These complexes process approximately 34 million birds per week. Tyson also owns two rendering plants with another one scheduled to open. One of the stewardship activities encouraged by Tyson for the past four to five years is for growers to store poultry mortalities that die during their usual growing process in freezers that it provides and maintains. It schedules regular pick-ups of the contents of these freezers, and takes them to one of its rendering facilities, or another one if it is closer. One barrier Tyson has faced in this effort is for growers to properly operate the freezers.

Tyson also provides education in its area of expertise, e.g., through its service people who are trained to answer grower questions not only about production matters, but also environmental matters, or they will refer the growers to the appropriate county extension agent. Tyson relies on these agents for their expertise. It introduces the growers to their county extension agent, who works with them

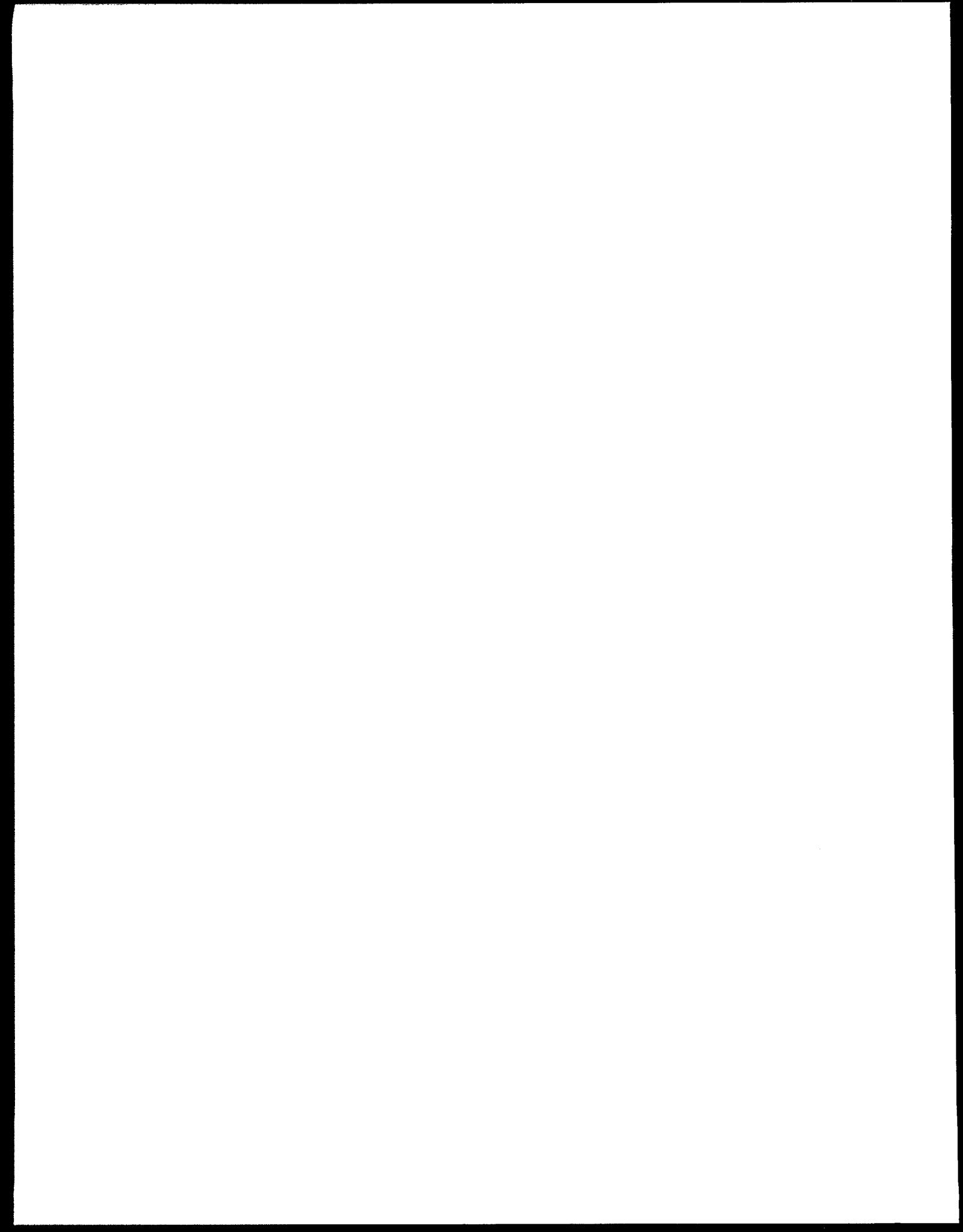
to take soil samples, determine proper soil application rates for poultry litter, and develop site plans. Tyson is interested in protecting the environment and to do as much as it can to prevent pollution. In addition, it believes its approach to handling mortalities is the best possible way to deal with them, though it may be more expensive. Tyson also wants to be accepted in the local community, produce as high a quality a product as possible, and be fair to all the growers and treat them well. (Based on materials provided by, and correspondence with, Tyson Foods.)

Vermont Milk Producers: Vermont Milk Producers (VMP) is a dairy cooperative that represents 16 dairies in Vermont with about 1,000 cows to produce a line of "premium" milk. It considers that the practices its dairies adopt are more sustainable than organic dairies in the region. The cows are fed on grass (through rotational grazing) and corn -- the objective is to rely on more naturally occurring species. Crop rotations are also used to produce the feed, while also suppressing weeds, preventing soil erosion, and enhancing soil fertility. In addition, VMP requires that manure be applied at appropriate rates to protect ground and surface water. VMP also has developed a set of land and farm management guidelines, including economics, soil health and fertility, water management, pest control and weed management, manure management, biodiversity, plant and animal selection, use of renewable versus non-renewable resources, and general appearance of the operation.

Through these practices and other production practices, VMP is able to reduce the dairies' input costs, emphasize the quality of the milk to the consumer, and protect these small, family-owned dairies from encroaching larger dairies by keeping them competitive. It is also conserving water, and protecting farm ecology, human and animal health, biodiversity, the ecosystem, and wildlife. As a

result, it is also protecting the landscape and local economy of the region. VMP believes that its practices also provide a more humane treatment of the cows. A 10-percent price premium is paid for the milk produced through the use of these practices, with a reliance on the consumer to pay more for their creatively marketed product. VMP has built up a strong loyal following among its customers. Since February 1995, its milk sales have steadily risen, to an annualized total of 25 million pounds. As its markets grow (they currently include over 150 upscale food stores in New England, New York, and New Jersey), VMP expects to add more "neighborhoods" of dairies to its program.

VMP has encountered a number of barriers along the way, since it started its program in 1993. According to VMP, the "green" community has criticized it for not being organic -- VMP believes that green investment sources have not been as interested in lending it money. Because of this, as well as because these dairies are already substantially tied up with loans for capital, VMP has had to seek additional loans to finance changes by the dairies. Another barrier faced is that due to its size and need to cut down on capital costs, VMP relies on the existing dairy infrastructure, which bases its production, processing, distribution, and marketing on milk being a generic product, and not encouraging a higher quality product. VMP believes that the dairy industry has not tried to differentiate its product, and is therefore more interested in the selling price than in milk quality and customer loyalty. VMP has spent a lot of time working with a processor to demonstrate how valuable milk is to it and that it needs to emphasize milk quality. In addition, VMP has been hurt by stores that demand payment of slotting fees to sell in their stores, a cost which is better absorbed by larger companies. (Based on materials provided by, and correspondence with, Vermont Milk Producers.)



APPENDIX B: THIRD-PARTY ENVIRONMENTAL STEWARDSHIP PARTNERSHIPS WITH GROWERS

Based on what he learned from companies that he contacted, Smart (1992) advised companies to increase "partnerships with environmentalists and others, including governments, to communicate and to solve environmental problems." A number of "third-party" stewardship programs between growers and non-profit, academic, and/or governmental organizations are summarized below. The information is current as of mid-1997.

BuyGreen Virginia Partnership: The Virginia Association for Biological Farming formed the BuyGreen Virginia partnership with Mothers & Others for a Livable Planet in 1997 to save Virginia farmland and protect the environment through the sale of locally grown foods. The crops will be grown with the use of practices that "conserve and protect the land for current and future generations." The partnership promotes healthy food choices that are ecologically sustainable. The program supports growers that use practices that are more environmentally protective and provides guidance to growers interested in adopting these practices.

The BuyGreen Virginia program is developing labels to designate three types of growers: C for soil and water conservation methods, IPM, and low-input sustainable practices; O for organic growing methods; and E for ecological/biological methods (including crop rotations and compost applications). Standards for the O and E labels have been established, and standards for a more comprehensive labeling program, including the C label, are being developed. The labeling program will inform consumers and empower them to support growers that use these practices.

To be accepted into the program, each grower must pledge a commitment to use sustainable growing methods. For example, the Ecological Production Pledge (EPP) is a commitment to adopt and follow soil improvement practices (e.g., maintain high levels of organic matter, conserve soil moisture, and plant cover crops) and pest control measures (e.g., maintain organic matter and healthy soil, rotate crops, and use natural pest management). Growers are required to attend and participate in at least one event each year dealing with the use of sound, ecologically-based growing practices. In return, growers receive information about accepted production methods and permission to use the BuyGreen logo for marketing their products.

Thus far, the program includes 29 certified organic growers and 27 "ecological" growers who have made the EPP pledge. Another 60 growers have expressed interest in participating in the program. The majority of the crops included is in vegetables and specialities (e.g., herbs, shiitake mushrooms). Meats, milk, and cheese are also included. Most of the products are sold directly to consumers and restaurants.

The main barrier faced by the program is that while most of the interested growers are relatively small, it needs large quantities of crops to attract buyers. By pooling growers together, BuyGreen can better deal with production and marketing risks by having sufficient quantities of quality crops. Another key barrier faced by the program is having sufficient funds to better organize and coordinate the program, recruit more growers, and establish regional chapters. There also needs to be improved confidence and trust

between retailers (who are interested in consistent quantity and quality) and the growers (who are interested in consistent sales). (Based on materials provided by, and correspondence with, the Virginia Association for Biological Farming.)

CORE Values Northeast: As a collaboration of apple growers in the Northeast, Mothers & Others for a Livable Planet (a consumer education organization), Cooperative Extension, state university agriculture scientists, state departments of agriculture, produce brokers, and food retailers, the Northeast Stewardship Alliance was formed in 1996 to develop a three-year consumer education and marketing program for apples grown in the New England and New York in accordance with "ecologically-based production guidelines." Apples grown according to these guidelines can receive the label "CORE Values Northeast" -- CORE means Communities Organized in Respect for the Environment. The primary goal is to maintain a healthy agricultural base and environment in the Northeast region of the U.S. This collaboration recognizes the important environmental (e.g., drinking water protection), scenic, open space, air quality, and community economic benefits from agriculture, and provides education and conducts on-farm research to achieve its goal. Greater environmental benefits are sought through this alliance -- greater reduction in soil erosion and water pollution -- from using integrated pest management (IPM), as well as soil, nutrient, and crop management techniques.

The CORE program is currently implementing a certification/verification process (during its second year) whereby an independent consultant would be in charge of inspection and certification/verification. It has chosen to not use an IPM-specific and point-based system, given its concern that IPM practices can be farm-specific, and more narrower than

crop-specific IPM practices. CORE has also developed integrated fruit production (IFP) guidelines to deal with cover crops (between tree rows), IPM, irrigation management, nutrient management, soil erosion, and tree management (e.g., pruning). Through achieving a balanced, well-managed farm system, it is expected that growers will resist the potentially severe negative economic effects from pest problems. Improving the profitability of apple growers through market-based incentives provides long-term economic and environmental benefits to the region. Currently, 28 apple growers are enrolled in the program. (Based on materials provided by, and correspondence with, Mothers & Others for a Livable Planet.)

Massachusetts Dairy of Distinction: The Massachusetts Farm Bureau Federation started the Massachusetts Dairy of Distinction program in the late 1970s/early 1980s. The program was later duplicated in other northeastern states. The motivation for the program was to encourage dairies to take pride in their operations, improve their appearance, and increase sales of milk. To receive the Dairy of Distinction award, a dairy must receive at least 90 points from a 100-point rating system based on its appearance. The criteria are buildings (25 points), grounds/surroundings (25 points), and farm operations (50 points), including manure handling. The annual award received by recipients is a sign that can be posted on the premises for one year, and the dairy can announce receipt of the award in subsequent marketing. The program recognizes the benefits from dairy farms, not only the products produced, but also their contribution to the rural landscape, local economies, local tourism, and protection of open spaces. (Based on materials provided by, and correspondence with, the Massachusetts Farm Bureau Federation.)

Midwest Organic Alliance: The Midwest Organic Alliance was established in 1995, and

funded through a grant from The Pew Charitable Trusts. The Alliance is a pilot project which will be expanded to other regions if it is successful. The Alliance's goal is to increase the supply of certified organic food products grown and processed in the five-state Midwest region of Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin, and increase the demand for organic foods in the Minneapolis/St. Paul, Minnesota area.

Approximately 80 percent of the Alliance's focus is on the demand side, working with supermarket chains, food cooperatives, and food brokers, and includes advertising, media, and promotions. The other 20 percent of its focus is on the supply side, working with growers to encourage or support them to farm organically. Its environmental objective is to keep agricultural chemicals off the soil and out of the water supply. In February 1996, the Alliance introduced its campaign in area stores with over 120 certified organic food products coming from its five-state land base (there are about 270,000 certified organic acres in the upper Midwest) and the licensed use of its Midwest Organic™ logo on products, shelf labels, and store signs. It is currently working with over 70 stores in grocery chains and food cooperatives representing 80 percent of the grocery market share in the Twin Cities market. Tracking data show a 74 percent increase in sales in Midwest Organic™ licensed product between 1995 and 1996. As part of this project, the Alliance works with 15 regional food companies and over 20 national food companies.

One barrier encountered by the Alliance was that retailers did not want to exclusively promote organic products from the Midwest, but they wanted to promote all organic products. As a result, an umbrella campaign was developed to promote all organic food products, but an emphasis was placed on those products from the Midwest Region. The Alliance currently works with both regional

and national organic food manufacturers. Another barrier is meeting the increasing demand for organic products. The Alliance has expanded the focus of its program to encourage conventional growers to transition to organic farming. To aid their transition to organic farming, the Alliance is developing a curriculum on organic farming, and is coordinating an effort in the 12-state region to establish a regional network to provide educational assistance to current organic growers and those growers transitioning to organic farming. (Based on materials provided by, and correspondence with, the Midwest Organic Alliance.)

Partners with Nature: The University of Massachusetts Extension, Massachusetts Department of Food & Agriculture (MDFA), and the USDA Farm Service Agency (FSA) collaborated in 1993 to establish "Partners with Nature," an IPM certification program, to encourage Massachusetts growers to adopt IPM, educate the public about agriculture, create a market for IPM-grown produce, and improve farm-community relationships. All three agencies participate in verifying grower compliance with crop-specific guidelines and promote the program to growers. Extension develops and refines the guidelines and educational materials. FSA assists in the grower enrollment, and, through the federal integrated crop management cost-share program, has provided growers with funds to offset the expenses of private IPM consultants (in 1994, 103 growers qualified to receive up to \$20 per acre in the program). MDFA licenses growers who fulfill the requirements of the program by meeting specific IPM guidelines, documenting their practices and participating in a verification process. The "Partners with Nature" logo is primarily used at roadside stands and farmer markets.

Enrollees in the program pay a \$20 fee, plus \$15 for each additional crop. Growers receive a workbook for each crop they register in the

program. The workbook includes information on the certification process, a resource directory, IPM fact sheets, and sample record forms. Growers follow a numerical scoring system for practices that are best suited to their operation and total up their points in the following categories: soil and nutrient management and cultural practices; pesticide application and records; insect management; disease management; weed management; and education. The practices are weighted based on the importance of the practice in an IPM program; bonus points are also available. The crops included in the program are sweet corn, cole crops, peppers, potatoes, pumpkins, winter squash, strawberries, and tomatoes, with a total of 49 farms participating in 1996. Growers receiving at least 70 percent of the scoring points for a crop, with points recorded in each management category, are licensed to use the Partners with Nature logo. They also receive official recognition from the state, publicity via press releases and consumer listings, and IPM information brochures and promotional leaflets. A mid-season progress review is undertaken pre-harvest to determine the growers' performance and review their records. The use of crop consultants is encouraged to help growers identify and implement appropriate practices.

Some of the barriers that have been faced in the development of this program include separating the use of IPM from "business as usual," uncertainty by industry and public support for IPM, impact on sales from using IPM, hostility by some growers to IPM (e.g., concern about drawing public attention to pesticides and possibility about creating a negative perception of conventional agriculture), grower distrust of government intervention, increased paperwork and time invested by growers for IPM documentation, concern about the increased labor needs, and the level of inherent bureaucracy. Despite these concerns, participation has continued to grow. Apple growers in the region in and

around Massachusetts are interested in developing their own similar program (see CORE Values Northeast). (Based on materials provided by, and correspondence with, University of Massachusetts Extension.)

Platte River Project: With funds provided by the Nebraska Environmental Trust Fund and The ConAgra Foundation, and assistance from the University of Nebraska, The Nature Conservancy, started a five-year demonstration project in 1995 to purchase a site that is an operating farm and a major roost site for the Sandhill crane, as well as for a rare prairie butterfly along the Platte River, near Grand Island, Nebraska. Prior to the start-up of this program, the land was cropped for field corn, popcorn, and soybeans. In this program, the environmentally sensitive soils have been turned to meadow to provide livestock hay. The objective of the project is to show what lands can be compatibly farmed by putting crops that need to be intensively managed (e.g., grains) on better soils and find economic crops (e.g., alternative native prairie grasses and legumes) to provide forage crops and also serve as a filter strip for the sensitive soils to prevent erosion. Cattle will also graze on part of the land. It is expected that the project will lead to wiser use of fertilizers and pesticides, which may result in reducing their use. These groups hope to demonstrate the compatibility between economics and the environment, and protect the riparian zone and the roosting habitat for the Sandhill crane. A wetland will also be constructed to filter water and attract invertebrates, amphibians, and migratory shorebirds.

It is hoped that this approach can be replicated elsewhere along the Platte River to protect wildlife habitat. If the approach is applied elsewhere, a key barrier may pop up -- how to provide enough education for growers about the project so they can emulate the practices. Since the project is being conducted locally, it is more likely to gain nearby acceptance,

especially through the scheduling of field tours and plot field days. (Based on materials provided by, and correspondence with, Con Agra.)

River-Friendly Farmer Program: To publicize and promote farming practices that improve Minnesota's river water quality and the profitability of farming, while also informing the public about the farmers' positive contributions to improving the rivers of the state, the Minnesota Alliance for Crop Residue Management (MACRM), the program's lead organization, developed the River-Friendly Farmer Program. A farmer can be designated as a River-Friendly Farmer if 10 criteria are met, as determined by their detailed responses to a questionnaire that is co-signed by a USDA Natural Resources Conservation Service (NRCS) district conservationist, a local county extension educator, or a member of the Alliance. The questionnaires are then judged by a panel of Alliance members. These criteria deal with crop residue, soil erosion from highly erodible land, nutrient applications, manure handling and application, pesticide application, and water quality, while maintaining crop yields and profitability. The public recognition takes place by the presentation of a River-Friendly Farmer sign for placement on the farm property and the issuance of a certificate at a public event. This state coalition includes the University of Minnesota Extension Service and 10 other government agencies, agricultural organizations, private firms, and a supporting Foundation.

The program has faced a number of barriers. For example, symptoms common to starting a new program have been encountered. Skepticism surfaced as to whether the program would work, especially since at least one other program already existed to recognize one conservation farmer each year at the county level. However, the River-Friendly Farmer Program wants to recognize any grower that

meets the criteria. Also, some growers nominated by a third party may not be interested in receiving publicity and not want to participate in the program. Finally, due to resource constraints by some of the program cooperatives, it has been important that government agencies have been involved to provide staff time for administrative and review support. If a grower does not meet the criteria, the MACRM developed a series of fact sheets to help him/her recognize problem areas and to suggest remedial practices.

In 1996, approximately 70 farms from 14 counties were recognized as River-Friendly Farmers. The program was initially focused on the lower Minnesota River, which encompasses approximately the bottom one-third of the state and one-third of its counties (it has a total of 87). The program is now being expanded to cover the entire state. As of June 1997, 25 counties have participated in the program. In addition, a number of other states have expressed interest in developing similar programs. (Based on materials provided by, and correspondence with, the University of Minnesota Extension Service.)

Salmon Safe: The goal of the Salmon Safe program, started in January 1995 by The Pacific Rivers Council (PRC) as part of its Stream Care program, is to identify market incentives that reward growers who install conservation practices that reduce pollution from private farms and improve salmon habitat in the Pacific Northwest. The program currently focuses on farms in the Willamette and Hood River valleys of Oregon and the Sacramento valley of California. Another objective of the program is to increase consumer awareness about the need to purchase products grown by farms that use conservation practices that protect salmon habitat. Two dozen growers -- apples, wine grapes, pears, and white and wild rice -- are currently included in the program. The products -- fruits, wines, and wild rice -- were

introduced in April 1997 with the eco-label in the Pacific Northwest and the Seattle area of Washington. The initial consumer audience will be in the Pacific Northwest, but some of the growers market nationally. The initial product launch includes products being marketed without a price premium. Such a premium would be desirable in the future to help cover the cost of installing the needed conservation practices.

The program includes four broad management guidelines developed by PRC, working with fisheries and agricultural scientists: riparian and wetland area management (e.g., buffer areas, stream crossings), water use management (e.g., irrigation management), erosion and sediment control (e.g., vegetative cover, controlling water runoff), and chemical use management (e.g., maintaining soil productivity, fertilizer use management, and minimizing pesticide use). Based on the use of these practices, growers are rated on a point system. Various issues have been identified: what products will be sold to the consumer through this program; what type of market segment will the program appeal to; and how to make ecological practices profitable or cost-effective. The largest barrier faced thus far is connecting the product on the grocery store shelf with the farms that produced it. (Based on materials provided by, and correspondence with, The Pacific Rivers Council.)

The Food Alliance: The Food Alliance was formed in 1993 as a unique partnership of food system stakeholders (growers, farm workers, processors/packers, distributors, environmentalists, consumers, and educators) in the Pacific Northwest. The Alliance supports greater use of sustainable agricultural systems by identifying, developing, and using market-based incentives and providing education, technical support, and on-farm research. Its objectives are to improve the environment (e.g., dealing with water use, ground and surface water quality, soil erosion,

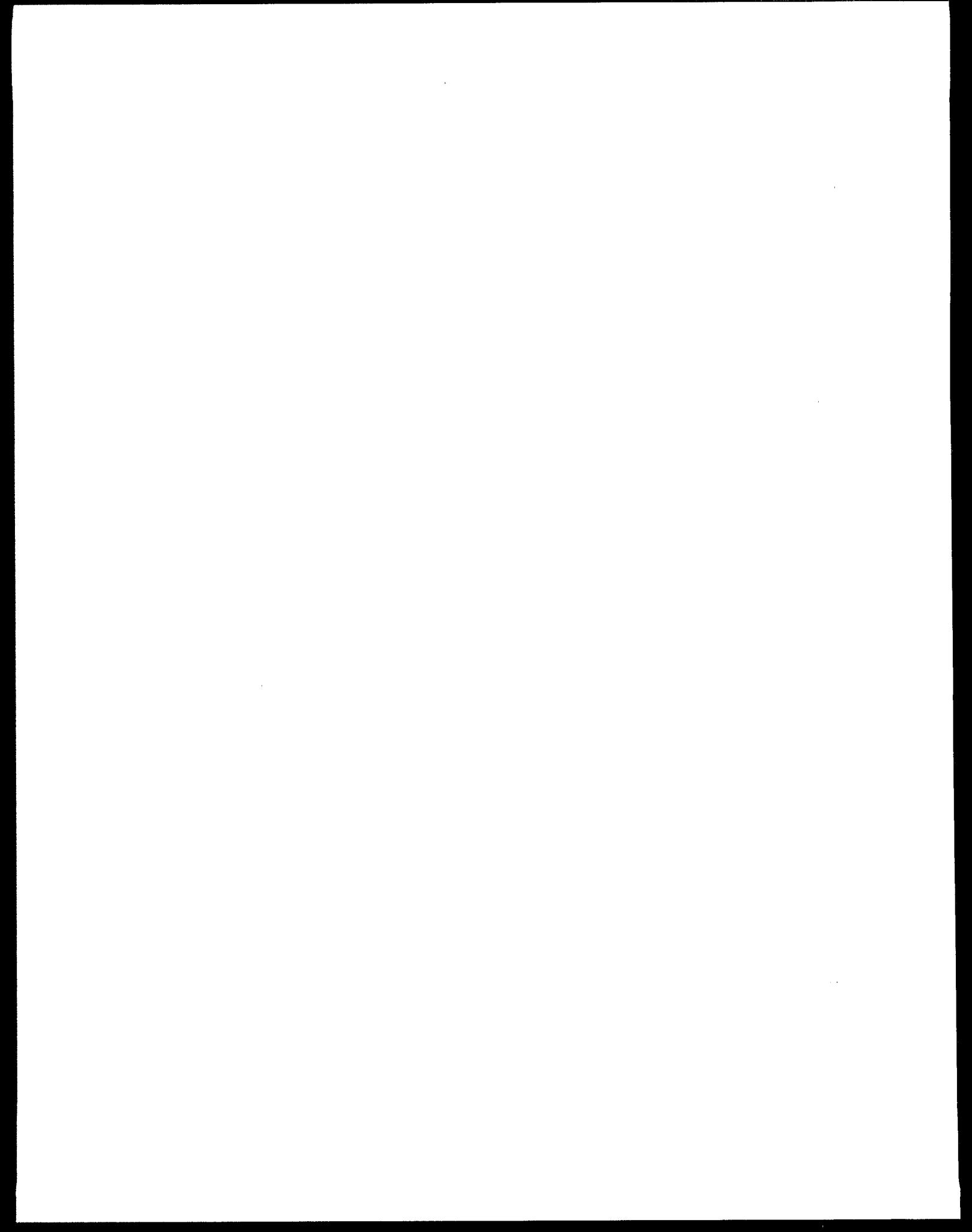
toxicity of agricultural chemicals, and habitat management), improve the quality of life for farmers and farm workers, and conserve natural resources for future generations. The Alliance has a key focus on the use of IPM to reach a wider audience of growers than if it were to focus solely on organically grown food, which is already being encouraged through other eco-labeling efforts. Its stewardship activities include education, support for on-farm experimentation and innovation to address apple orchard issues in central Washington and vegetable row crop issues in Oregon's Willamette River valley, and development of incentives, including an eco-label on food products. Following its sponsorship of two national surveys of consumer attitudes about environmentally improved food products, the Alliance will develop an eco-label (The Good Earth Seal) to help consumers identify its food products. One of its challenges is to balance being generic and uniform enough in the design of the eco-label, while identifying the individuality and specificity of a crop or product. In addition, the eco-label would need to be substantive and transparent enough so that it would not be considered vague. (Based on materials provided by, and correspondence with, The Food Alliance.)

Wisconsin Potato & Vegetable Growers

Association/World Wildlife Fund: The World Wildlife Fund started a program in October 1996 working with the Wisconsin Potato and Vegetable Growers Association, with approximately 280 growers in the Central Sands region, to eventually eliminate the use of toxic pesticides (endocrine disruptors, carcinogens, and those most acutely toxic to humans and wildlife) within five years and implement the use of IPM within 10 years. The potato growers typically use three-year rotations. Common crops include alfalfa, beans, carrots, sweet corn, onions, peas, and soybeans. In any given year, there are usually 75,000 acres in potatoes.

The goals of their program are: (a) to promote safe food for consumers and safe farming systems for farm families; (b) to enhance the habitat for the Sandhill crane, Karner blue butterfly, and other wildlife that reside in these agricultural fields; (c) to develop a third-party certification system to test residue content in potatoes and wildlife habitat; and (d) develop a packaging label to inform consumers about the project and provide incentives for growers for enrolling in it and protecting the environment. The project is currently determining its baseline and starts the implementation phase in 1997. The project has 1-, 3-, 5-, and 10-year milestones.

A number of barriers have been overcome, including misunderstanding and differences of emphasis of the goals of the program and an inherent lack of trust between the two groups. It took time for the WWF to convince the growers that it wanted to help them achieve the goals that were important to them, that it would do its best to fulfill its promise to help them without exposing them to other risks (e.g., their voluntary practices becoming mandatory). In addition, WWF had to overcome the perception from the growers that it (or environmentalists in general) lacked knowledge about agriculture in general and the production systems of potato growers in particular. The growers also had to convince WWF that they were committed to take more ambitious steps to bio-intensive IPM practices than they would have adopted without the partnership program. They also had to convince WWF that they had a strong programmatic interest in IPM that goes beyond eco-labeling marketing opportunities. Critical to overcoming these barriers is a willingness of the principals to take risks. (Based on materials provided by the World Wildlife Fund.)



APPENDIX C: EXAMPLES OF PUBLIC/PRIVATE PARTNERSHIP PROGRAMS

As pointed out in Smart (1992), "A voluntary program frees participating organizations from the restraints normally caused by government regulation and bureaucracy and, most importantly, it is the most cost-efficient way to stimulate change." Several voluntary, public/private sector partnership programs that influence grower choice of practices and/or address market and institutional barriers to choice of more environmentally protective approaches are summarized below.

AgSTAR Program: The AgSTAR Program is a voluntary program sponsored by EPA, USDA, and the Department of Energy. The program is a business venture strategically designed to overcome market and institutional barriers to technology use. AgSTAR was launched in 1993 as a component of President Clinton's Climate Change Action Plan to promote energy efficiency and reduce greenhouse gas emissions from anthropogenic sources. The program is designed to encourage the collection and utilization of methane, a greenhouse gas, produced from livestock manure storage structures such as lagoons, tanks, basins, ponds, and other types of containment structures for the liquids and slurries. These structures are typically found at confined or partially confined livestock production facilities and generally add costs to animal production. In some cases these structures also become environmental liabilities because of odor events and water quality issues. The AgSTAR program is designed to enhance gas production and recovery from these types of containment systems for energy applications to offset purchased energy costs. In many cases energy offsets greatly improve the cost effectiveness of traditional manure handling. The biological

process also stabilizes waste streams from confined animal facilities and controls odor.

The AgSTAR Program estimates that about 2,000 confined livestock farms can use biogas technology cost-effectively. As of the end of 1997, there were over 400 farms participating in the program. Under the program guidelines, these farms pledge to evaluate their facilities for opportunities to recover methane and install systems where cost-effective and/or environmentally beneficial. Since 1996, about seven farms (dairies and swine operations) have installed systems representing about a 40 percent increase in the number of systems installed since 1980 and an additional 10 farms are in the construction planning phase. The operating systems currently reduce greenhouse gases equivalent to about 40,000 metric tons of carbon dioxide and provide about four million kilowatt-hours of renewable energy annually. (Based on materials provided by, and correspondence with, the AgSTAR Program.)

Integrated Pest Management (IPM)

Innovators Program: California's Environmental Protection Agency, Department of Pesticide Regulation (DPR), established the IPM Innovators Program in August 1994 as part of its commitment and legal mandate to encourage the development of programs that increase the benefits and reduce the risks of pest management. The program was also established to recognize achievements by individuals and groups in being leaders as voluntary users of IPM. In 1994, 10 groups were recognized as award recipients, including the Lodi-Woodbridge Winegrape Commission; four additional groups were award recipients in 1995; and an additional five groups were award recipients in 1996, including Campbell Soup Company, Del Monte Foods, and Sun-

Maid Growers. DPR also provides pest management grant funds as incentives to help groups interested in investigating IPM practices that will lead to reduced-risk pest management systems. In 1997, DPR funded 25 grant projects. (Based on materials provided by, and correspondence with, the IPM Innovators Program.)

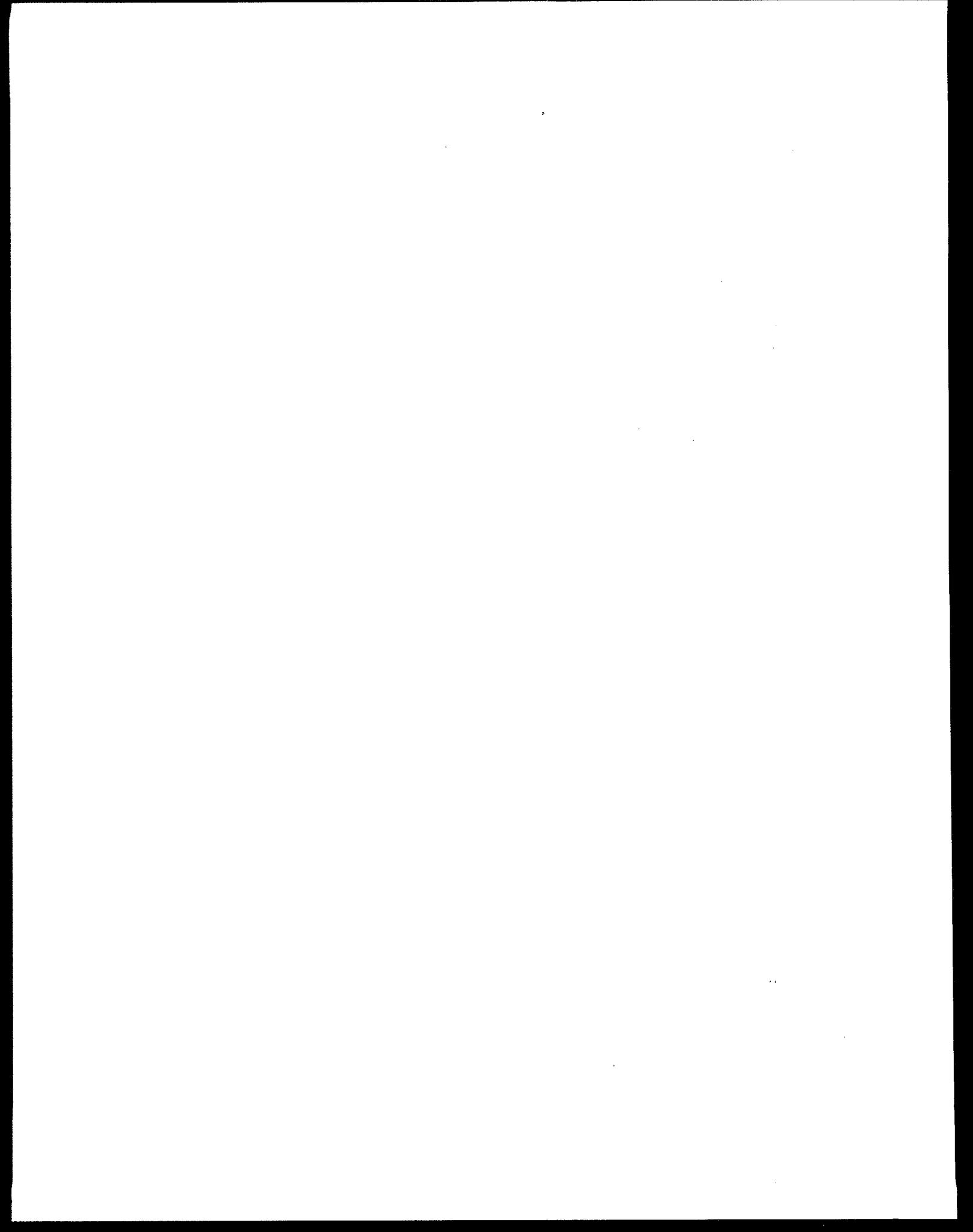
NPS Partners in Prevention: The U.S. EPA has formed partnerships with various agricultural stakeholder groups to foster watershed-based environmental stewardship efforts. Thus far, partnerships have been formed with the National Association of Wheat Growers, National Pork Producers Council, National Cattlemen's Association, U.S. Poultry & Egg Association (through the Poultry Water Quality Consortium), and the Atlantic Dairy Cooperative so that they may promote voluntary implementation of nonpoint source management practices by their members. In general, these groups have prepared manuals and held numerous workshops for their members. This program was one of 25 projects launched by the National Nonpoint Source Forum. (Based on materials provided by, and correspondence with, NPS Partners in Prevention, and the National Geographic Society and The Conservation Fund.)

Pesticide Environmental Stewardship Program: The Pesticide Environmental Stewardship Program represents a joint effort between EPA, USDA, and the Food and Drug Administration to reduce agricultural and non-agricultural pesticide use and risk. PESP, started in 1994, contains two main goals: develop specific use/risk reduction strategies that rely on IPM, and have IPM used on 75 percent of U.S. cropland acreage. As of January 31, 1997, 57 Partners (organizations that use pesticides or represent pesticide users), including Hood-River District and Sun-Maid Growers, and 11 Supporters (organizations that do not use pesticides),

including Campbell Soup Company, Del Monte Foods, and Gerber Products, have become members of PESP. It publicly recognizes the program's Partners and Supporters. In 1996, eight grants were funded with PESP Partners, as well as 14 grants for Regional Pollution Prevention Initiatives primarily with state land grant universities. (Based on materials provided by, and correspondence with, the Pesticide Environmental Stewardship Program.)

Poultry Water Quality Consortium: The Poultry Water Quality Consortium is a partnership between EPA, USDA/Natural Resources Conservation Service, Tennessee Valley Authority, and the U.S. Poultry & Egg Association. This partnership between federal agencies and the poultry industry (twenty states -- AL, AR, DE, FL, GA, KY, IN, LA, MD, MS, MO, NE, NC, OH, PA, SC, TN, TX, VA, and WV -- have affiliations with the Association) seeks to improve environmental management at the grower level. The Consortium was originally organized in 1991 and a new agreement was signed in 1996. The Consortium was formed at the request of the poultry industry through the U.S. Poultry & Egg Association to keep the industry informed of laws and regulations affecting the industry, promote good environmental management, identify research needs, and develop a proactive position for the industry on environmental issues. A liaison position for the Consortium is supported in Chattanooga, Tennessee with national responsibility for forwarding its objectives. Since inception of the Consortium, the liaison has had contact with the majority of poultry integrators, federal and state agencies, state universities, and state poultry organizations dealing with environmental issues. This contact occurs through meetings, seminars, trade shows, personal requests, and on-site assistance to integrators and growers.

The Consortium has promoted the composting of dead birds. Based on a national survey by the PWQC and their best professional judgment, it estimates that approximately 20 percent of poultry mortalities are being composting nationally. This progress has occurred since 1991 with the Consortium being a significant player. The use of nutrient management plans, litter storage facilities, testing of litter for nutrient content, site selection of facilities, and other items are areas it recommends to the poultry industry. The Consortium prepared a handbook for growers to promote proper use and management of poultry by-products. (Based on materials provided by, and correspondence with, the Poultry Water Quality Consortium.)



APPENDIX D: RESEARCH LINKING NITROGEN USE WITH CROP YIELD/QUALITY

Much research has demonstrated links between nitrogen applications and the crop yields and quality of almonds (Teviotdale, 1996; Bryant, 1995), tree fruits and nuts (Doerge and Klaas, 1996; Daane et al., 1995), citrus fruits (Bender, 1994; Witney, 1994; Embleton et al., 1975), and walnuts (Kelly, 1995). Proper nutrient application, nutrient application history, testing sampling techniques (leaf testing instead of soil testing), timing and levels of irrigation, and pruning are often all important to produce the best quality crop and protect fruit- and nut-bearing trees. These practices can also affect the environment. Below are brief summaries of the findings from this research.

- Bender (1994): Over-application of nitrogen to grow oranges may cause low sugar levels, aggravate small fruit size for Valencia oranges, and also cause them to "regreen"; in addition, rinds for navel oranges may stain, and the reduced peel thickness and coarseness. In addition, over-application of phosphorus may cause smaller fruit size, reduced peel thickness and coarseness, an increase in the percent juice and regreening, and lower the ability for the tree to absorb two micronutrients, copper and zinc. This needs to be balanced with an effect from under-application of nitrogen -- decreasing the total number of fruits on the trees. Also, lemon fruit quality so far has not been shown to be sensitive to nitrogen applications.
- Bryant (1995): Over-application of nitrogen to grow almonds may cause poor shell seal, greater worm damage, and hull rot, extra costs for the grower, and higher levels of nitrates leaching into ground water, especially with
- sandy soils and high ground water tables. This needs to be balanced with an effect from under-application of nitrogen -- young almond trees may be unable to get established.
- Daane et al. (1995): Over-application of nitrogen can lead to overly vigorous growth, increased shade within the tree canopy, delayed maturity of fruit, and increased susceptibility of nectarines to attack by brown rot disease and insect pests. In addition, overapplication can affect the fruit's nutrient composition, as well as its color (less red), firmness, susceptibility to bruising, storage life, and cause greater water-loss rates. Over-application can also lead to greater potential for leaching to ground water.
- Doerge and Klaas (1996): Over-application of nitrogen to grow tree fruits and nuts may cause poor fruit quality, excessive vegetative growth and shading, and limb breakage, reduced profits, and negative environmental impacts.
- Embleton et al. (1975): Over-application of nitrogen to grow valencia oranges can cause regreening, leading to lower uniformity in color. In addition, lower fruit size can also result, along with more quantity of fruit harvested. Over-application of nitrogen to grow navel oranges can cause rind staining after the fruit is packed. Over-application of nitrogen to grow oranges can increase peel thickness and the coarseness of peel texture, and decrease juice percentage and the vitamin C content in the juice.
- Kelly (1995): Over-application of nitrogen to grow walnuts may cause

excessive vegetation growth, resulting in extra shading and pruning costs, as well as higher handling and application costs and pollution of ground water (particularly with sandy soils). The extra shading can slow flower bud development and nut set. This needs to be balanced with an effect from under-application of nitrogen -- poor growth and lower yields.

- Teviotdale (1996): Over-application of nitrogen to grow almonds may cause more brown rot blossom blight.
- Witney (1994): Over-application of nitrogen to grow citrus may cause lower fruit quality, aggravate rind stain, less fruit to pack, and make them more vulnerable to rind stain during handling (especially in combination with mild winters).

In addition, Stivers et al. (1993) and Weinbaum et al. (1992) conducted surveys of the literature concerning nitrogen applications to four vegetable crops (broccoli, cauliflower, celery, and lettuce) and orchards, respectively. As reported in Stivers et al., over-application of nitrogen to grow:

- broccoli may negatively affect quality and yield, delay maturity, and cause greater numbers of immature heads, hollow stems, and decreased strength of stalks
- cauliflower generally did not lead to adverse impacts, although one study showed increased length and diameter of hollow stems
- celery may cause more severe impacts of blackheart (i.e., burn spots)
- lettuce may negatively affect growth, reduce yields, and cause tip burn and a root disease; there was also concern expressed about human consumption of vegetables high in nitrate-nitrogen

Weinbaum et al. (1992) reported similar information from the literature for a

variety of fruit crops. Over-application of nitrogen to grow the following fruits can cause excessive vegetative growth (which may result in greater yield, especially with young trees), and affect their product quality as well as water quality:

- apples -- tend to be larger; generally quality is lowered; can develop cork spot and bitter pit before harvest, and may show greater occurrence of scald, bitter pit, internal browning, and internal breakdown after storage; reduced firmness at harvest and during storage; greater susceptibility to fire blight
- golden delicious apples -- tend to be more green and less yellow
- red apples -- tend to be larger; less red coloration
- apricots -- delayed maturity and increased variability of maturity, causing uneven coloring; increased susceptibility to pit-burn while on tree
- citrus -- greater susceptibility to fruit scarring
- grapes -- greater susceptibility to infection of vines
- nectarines -- delayed maturity and increased variability of maturity; greater susceptibility to brown rot and peach twig borers; smaller fruit size; loss of color
- olives -- delayed and uneven maturity, causing uneven coloring
- oranges -- tend to be smaller; greater amount of regreening; generally lower quality
- navel oranges -- greater likelihood of rind-staining during storage
- valencia oranges -- greater amount of regreening
- peaches -- tend to be smaller; delayed maturity and increased variability of maturity; less red coloration; greater occurrence of split pits; reduced taste quality

- pears -- greater susceptibility to fire blight; reduced taste quality

In addition, pistachios showed little response and lemons showed no change in fruit color from over-application of nitrogen.

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