

Perceptions of Individuals With and Without Agricultural Experience on the Relation of Livestock Production and Environmental Quality¹

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Abstract

This study assessed whether agricultural experience influenced an individual's perceptions of the effect of livestock production on the environment. Survey data were collected (n=709) to assess public perceptions of the 1) effects of livestock production on air, water, soil, and food quality, 2) actions of livestock producers in protecting the environment, and 3) need for more laws and regulations to protect the environment from potential harm caused by raising farm animals. Respondents without agricultural experience (n=240) scored the overall effects of agriculture as slightly more harmful to the environment, and were not as confident that persons raising farm animals are responsibly protecting the environment. In addition the non-agricultural respondents would be more supportive of additional laws and regulations to protect the environment. Water quality was the highest concern among all respondents, with or without agricultural experience, of specific environment components mentioned in the study (air, soil, water, and food). This study cannot be generalized to a larger population because there was no randomization of participants; however, the findings can be used as baseline data for further investigations.

Introduction

As the U.S. population has increased, the percentage of individuals involved in production agriculture has declined steadily, with sharp decreases after World War II, to its current level of approximately 2 percent (American Farm Bureau, 1998). Because of advances in plant and animal sciences, agricultural mechanization and specialization, and increased use of fertilizers and pesticides, the U.S. produces enough food to feed its population as well as for export. Livestock production is a major component of agriculture in the U.S. As with other sectors of agriculture, the livestock industry faces environmental challenges which have increased due to the public's growing awareness of the association of aesthetics and environmental protection (Safley, 1994). Have producers met the demands of the public by addressing the environmental challenges of protecting the safety of the food supply and simultaneously preserving the quality of natural resources?

The first obstacle, which has little to do with production practices, is to understand what it means to improve environmental quality. As with many other topics, the public relies on "experts" to define these terms. However, the definition of environmental quality components that scientists use in communicating with the public and public perceptions of environmental quality may be two very different concepts (Doering, 1995). Yankelovich (1991) identified a communications gap between experts and the general public. According to Yankelovich, scientists view the public as "emotional" and the public thinks experts are "cold-hearted technocrats". Somewhere in this gap falls animal agriculturists who are working to maintain the economic viability of farming while trying to cope with public scrutiny.

How valid are public perceptions? Public perceptions are not always based on fact. The public is increasingly reliant on television as a primary source of news and informa-

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tion. Broadcast media is a commercial enterprise and subject to economic competition which is the driving force behind headlines (Roll-Hansen, 1994). This factor, along with time limitations, makes it difficult for journalists to pursue issues in-depth or acquire extensive technical knowledge. Roll-Hansen (1994) points out that the media makes certain assumptions about the public's preferences and that there is a natural tendency to overestimate the significance of events. Literature on journalism suggests that journalists are inclined to seek the most available news sources rather than the most knowledgeable sources. This in turn can affect public policy. If agencies are influenced by media-induced public pressure instead of objective scientific information, the effects on public policy can be negative (Smith, 1998).

One-sided views on agriculture have found their way into popular magazines. One example is the article "A Technopox Upon the Land" that appeared in Harper's Magazine (Ehrenfeld, 1997). In this article, the author maintains that the Green Revolution of the 1960's and '70s and genetic engineering innovations of the 1990's cannot be justified as "humane technology". Ehrenfeld suggests that the focus of genetic engineering is to increase farmer dependence on chemicals and bioengineered products hence increasing the sales of seed and ultimately oil, chemical, and pharmaceutical products to farmers. Ehrenfeld bases his case on the promotion of these biotechnologies by the companies selling these inputs. The public would consider Ehrenfeld, who teaches biology at Rutgers University (a land-grant university), an "expert". His view may be extreme, and there are many other extreme views at both ends of the spectrum, but the public is not made aware of these views or those of moderates in the same article. The public is then left with confusing and conflicting information that becomes the basis of their attitudes, perceptions, and decision-making.

This should be a concern of livestock producers because public perception is a powerful force. For example, in the late 1980's, Alar on apples became a highly publicized food safety/environmental concern. As a result, according to the Kiplinger Agriculture Letter (1989), there was a 14% drop in the number of shoppers who were completely or mostly confident about the safety of supermarket food. Perceptions of risk have been shown to influence the priorities and legislative agendas of agencies such as the U.S. Environment Protection Agency. In the event that there are environmental concerns, real or perceived, interacting social and institutional forces can trigger massive social, economic, and political consequences (Slovic, 1990). The importance of public perceptions, and the influence of the media, has led commodity groups to monitor and analyze media coverage of public issues (eg. NCBA Beef Industry Media Analysis, 1999).

Understanding that perceptions and concerns of the public resulting from agricultural activity are very real and

powerful can be an invaluable tool in resolving current conflicts as well as in avoiding future problems. The next step is to identify specific concerns. According to Safley (1994), nutrients and odors are two primary concerns facing livestock producers. Odor is an inevitable consequence of animal agriculture and accepted as the norm by producers as confirmed by a study conducted at Penn State University in which livestock producers from Lancaster and York counties responded to a survey addressing producer assessments of production practices (Nordstrom et al., 1998). An average of 21% of the producers said they had received complaints; the top four complaints were odors, flies, animal waste disposal, and noise. In that same study, non-farm residents of the same geographical area responded to a survey asking if they had any complaints about the surrounding farms. Approximately one-third of the respondents had a complaint about a farm near them; major complaints were odors, flies, animal waste disposal, and water pollution caused by livestock (Goss and Barry, 1995; Jones et al., 1998). These results are in general agreement with earlier studies.

Purpose of the Study

The purpose of the study was to assess perceptions of both the farm and non-farm public about contemporary environmental issues and whether agricultural experience influences an individual's perceptions of the effect of livestock production on the environment.

Methods

Data for this study were collected from surveys distributed in 1996-1997 at various agricultural functions including the Pennsylvania Farm Show and Penn State's Ag Progress Days using survey instruments developed with the assistance of a specialist in program evaluation and instrument development in Penn State's College of Agricultural Sciences following guidelines set forth by Dillman and Salant (1994). Specialists in the fields of agriculture and education reviewed the surveys. The questionnaires used for the current study were revised and tested periodically since the development of the original instrument. A total of 709 responses were used to assess public perceptions about the effects of livestock production on air, water, soil, and food quality, the actions of livestock producers in protecting the environment, and the need for more laws and regulations to protect the environment from potential harm caused by raising farm animals. Because there was no randomization of participants, the results from the study cannot be generalized to a larger population; however, the findings can be used as baseline data for further investigations.

Respondents were requested to give their opinions about the general effects of raising farm animals on the environment, the extent they felt farmers were responsible in pro-

pecting the environment, and if more laws and regulations were needed to protect the environment. When assessing respondent opinions about the effects of different farm animal enterprises (beef, dairy, swine, poultry and veal) on different components of the environment (air, soil, water and food), a fixed format response framework with five options (very beneficial, slightly beneficial, no effect, slightly harmful, very harmful) was used (Salant and Dillman, 1994). A sixth option (not sure) was available, but was excluded when calculating means. The five responses were collapsed into three categories (beneficial, no effect, and harmful) when calculating percentages. The degree of respondent involvement with agriculture was assessed by determination of their occupation (if their job was in an agricultural area, either with or without animals) or if their occupation was not related to agriculture. Respondents were also asked about previous experience with agriculture, for example, had they ever lived or worked on a farm. Data were analyzed using SPSS 6.2 (Norusis, 1994); descriptive statistics including means, frequencies, and percentages were obtained.

Results and Discussion

Demographics

The majority of respondents indicated they had some type of agricultural experience; 66.1% had lived or worked on a farm at some point in their life. The remainder, 33.9% of the respondents, indicated they had no agricultural experience. When asked about their current occupation, 55.4% of the respondents indicated they worked in a field that was not related to agriculture, 32.4% worked in agriculture with animals, and 12.2% worked in an agricultural field but had no involvement with animals.

Males were in the majority, 52.5% to 47.8% female. Approximately 10% were less than 21 years old, 25.8% were between the ages of 22-34, and 45.1% were between the ages of 35-50 years. Slightly more than 2% had a grade school education, 7.2% had attended high school, but did not complete, 34.6% completed high school, 22.2% had some college, and 33.9% were college graduates.

Care of the Environment

Respondents were asked the effect they thought raising farm animals had on the environment, the extent to which persons raising farm animals act responsibly in protecting the environment, and the need for more laws or regulations protecting the environment (Table 1). The data were examined to determine if there were differences between the respondents who had agricultural experience and those who did not. Agricultural experience is defined as those individuals who had either lived or worked on a farm at some point in their life. Although some differences were observed between the two groups of respondents, the differences were generally small.

The majority of the respondents indicated they felt raising farm animals had no effect on the environment (68.6% with agricultural experience and 64.0% without agricultural experience). The percentage of respondents who felt raising farm animals was harmful to the environment was small (9.5% of individuals with agricultural experience and 13% of respondents without agricultural experience). The remainder of respondents felt raising farm animals had no effect on the environment, was beneficial, or not sure.

Overall, the agricultural community has the support of the general public (as represented by this survey) for their production practices. Although the respondents without agricultural experience tended to score the effects of agriculture as more harmful to the environment, the differences in the average scores were generally minor compared to respondents with agricultural experience. This is in agreement with a study conducted by Arcury and Christianson (1993) which examined the rural-urban differences in environmental knowledge. They concluded that education, income, age, and gender accounted for more of the variation in environmental knowledge than rural-urban demographics. In our study, all non-agricultural respondents received the survey at an agricultural function, which may indicate they have more interest in agricultural issues than those who would not attend such events.

In response to the question of acting responsibly toward the environment, again the majority of both groups felt farmers acted responsibly (Table 1). Only 7.8% of the respondents with agricultural experience and 12.7% without agricultural experience felt that farmers acted irresponsibly toward protecting the environment.

Farmers acting as stewards of the land is neither a new nor unique concept. A 1992 poll conducted by the Gallup Organization for Sandoz Agro, Inc. concluded that a growing number of farmers were more concerned about environmental issues associated with agriculture and believed contamination of surface and groundwater are the most serious environmental concerns facing agriculture (Gallup Organization, 1992). At least 80% of all farmers believed safeguards in effect at that time were sufficient to protect consumers, farm workers, and the environment from possible harm caused by agricultural activities. However, 85% of the farmers responding felt that the public did not adequately understand the safeguards advocated and practiced by agriculture. Apparently aware of the public's concern, 68% of the farmers indicated that they felt public education programs could reduce the public's concerns. In addition, 36% of the farmers surveyed said they had participated in efforts to educate the non-farming public through organized farm group programs.

The results of the current study are in agreement with an earlier study by Molnar and Duffy (1988) who examined the national attitudes towards farmers and perceptions

Table 1. Opinions of Survey Respondents With and Without Agricultural Experience*

The effects raising farm animals have on the environment.

Response	Agricultural experience	No agricultural experience	Difference
Not sure	1.7	7.1	-5.4
Beneficial	20.2	15.9	4.3
No effect	68.6	64.0	4.6
Harmful	9.5	13.0	-3.5

The extent that persons raising farm animals act responsibly in protecting the environment.

Response	Agricultural experience	No agricultural experience	Difference
Responsible	86.1	69.5	16.6
Not sure	6.1	17.8	-11.7
Irresponsible	7.8	12.7	4.9

Necessity of additional laws & regulations to protect the environment from harm that might be caused by raising farm animals.

Response	Agricultural experience	No agricultural experience	Difference
Yes	23.5	39.0	-15.5
Not sure	10.4	17.4	7.0
No	66.1	43.6	22.5

*n=709; 469 with farm/agricultural experience and 240 without farm/agricultural experience

of the effects of agricultural production practices on the natural resource base. The data for this earlier study were obtained from a nationwide sample of American households based on automobile registrations and telephone subscribers (n=3,239: 602 respondents indicated they grew up on a farm and 175 respondents said they currently lived on a farm). The results indicated that almost two-thirds of the respondents believed that most farmers took good care of the soil. However, 57% believed that laws regulating excess soil erosion were badly needed.

Effects of Animal Industries on Air, Soil, Water, and Food Quality

Respondents were also asked to indicate their level of con-

cern about the effects of different farm animal enterprises (beef, dairy, swine, poultry, and veal) on air, soil, water, and food quality. A mean score of 3 indicated they felt there was no effect on the environment. A score greater than 3 indicated the effects were perceived as harmful. If the score was less than 3, the effects were perceived as beneficial (Table 2). Water quality was the only issue that had a mean score of more than 3 for all industries, indicating the respondents, on average, felt there was no effect to slightly harmful effects on water quality.

The effects of agriculture on water quality have been documented. The Environmental Protection Agency's National Water Quality Inventory: 1994 Report to Congress stated that 40% of the U.S. water bodies surveyed were too polluted for fishing, swimming, and other uses, and that agri-

culture is one of the five major sources of that pollution (Wallace, 1996). One of the five leading causes of poor to fair water quality includes excess nitrogen and phosphorus from fertilizers, manure, and detergents.

Water supplies come from both surface bodies of water (lakes, streams, rivers, etc.) and groundwater, and all of these sources are susceptible to pollution. Pollution is generally categorized as coming from two sources: point source pollution is from a localized source, while non-point or diffuse sources come from a widespread area. Developed and managed agriculture is the largest of all land-use systems (Goss and Barry, 1995) and of all human activity, agriculture most alters our global environment (CAST, 1992). Groundwater contamination on farms is from point as well as diffuse sources. Contamination of groundwater from livestock can originate from manure storage areas or feedlot runoff as well as manure spread on fields for fertilizer.

Of the four environmental components specifically mentioned in the survey (air, soil, water, and food), air quality was identified as generally not being affected or with only slightly harmful effects from farm animal production (Table 2). Averaged over both categories of survey respondents for beef, dairy, swine, poultry, and veal, air quality scores ranged from 2.80 to 3.10 which encompassed the "no effect" score. The beneficial nature of the replies regarding soil quality (range of 2.01 to 2.30) perhaps reflects the improvement in soil texture and fertility by the proper application of animal wastes. Food quality ranged from between 1.80 to 2.18 (beneficial) for beef and veal, respectively. The context within which food quality was considered by the respondents was more as a dietary component rather than as a food safety issue. If food quality was identified in the survey instrument as strictly an environmental consideration, food safety should have been a primary concern in the opinion and attitudes of both agricultural producers and the non-farm public (Halbrendt et al., 1991). Surveys of the general public, both adults and youth, livestock producers, and secondary level educators in Pennsylvania, identified food safety as the most critical issue (Nordstrom et al., 1998).

Summary and Recommendations

Overall, the agricultural community appears to have the support of the general public for their environmental practices.

Farmers tend to be critical of their own practices and the impact these practices have on the environment. The majority of those with agricultural experience (including current farmers) do not support additional laws and regulations to protect the environment. However, a higher percent of people with no agricultural experience support further regulations. The public may not be aware of science-based programs that are designed, conducted, and funded by industry

(including best management practices, animal care guidelines, and quality and environmental assurance programs), and may feel that their only recourse is government regulation. This indicates that educational and informational programs should be directed to respondents without agricultural experience, particularly in reference to water and air quality. In addition, preventive guidelines addressing potential environmental pollution should be included and emphasized in best management practices for all major livestock enterprises. Therefore, it is a continuing charge of farmers and the agricultural industry to educate the public, starting with school children, about improvements in their programs, guidelines, and management practices.

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Table 2. Perceived effects of farm animal enterprises on air, soil, water, and food quality.^{zy}

Item	Agricultural experience	No agricultural experience	Difference	Entire population
Beef				
air quality	2.77	2.85	-0.08	2.80
soil quality	1.94	2.16	-0.22	2.01
water quality	3.15	3.17	-0.02	3.16
food quality	1.74	1.93	-0.19	1.80
Dairy				
air quality	2.80	2.91	-0.11	2.84
soil quality	2.02	2.32	-0.30	2.11
water quality	3.17	3.14	0.03	3.16
food quality	1.77	1.94	-0.17	1.82
Swine				
air quality	3.07	3.17	-0.10	3.10
soil quality	2.15	2.63	-0.48	2.30
water quality	3.19	3.16	0.03	3.18
food quality	1.84	2.13	-0.29	1.94
Poultry				
air quality	3.01	3.02	-0.01	3.01
soil quality	2.11	2.55	-0.44	2.25
water quality	3.05	3.15	-0.10	3.08
food quality	1.86	2.14	-0.28	1.95
Veal				
air quality	2.83	2.91	-0.08	2.88
soil quality	2.21	2.47	-0.26	2.29
water quality	3.06	3.07	-0.01	3.06
food quality	2.01	2.27	-0.26	2.10

^zScale- 1=very beneficial, 2=slightly beneficial, 3=no effect, 4=slightly harmful, 5=very harmful;

^yn=709; 469 with farm/agricultural experience and 240 without farm/agricultural experience

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