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Perceptions of Agriculture by School Students and Teachers[1]

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Abstract

The purpose of this study was to assess the perceptions and concerns of school students and teachers about animal agriculture. Survey data were collected from 1,358 respondents (6-8th and 11-12th grade students and their teachers) regarding agriculture. To accomplish this goal, three objectives were defined: 1) to gauge student and teacher perceptions of the effects of animal agriculture on society and the environment; 2) to rank their concerns about animal agriculture; and 3) to identify the primary sources of agricultural information for younger students. The results indicated that respondents were generally positive about the benefits of animal agriculture to society and to the environment. Food safety issues were ranked as the greatest concern of all three groups and the younger students (grades 6-8) indicated their primary sources of information were family members, school, and television.

Introduction

"Agriscience" relates chemical, physical, and biological principles to the production of food and fiber. The application of advances in science and agriculture has allowed the US to produce enough food for its population as well as to participate in global food markets. These remarkable achievements have been accomplished while utilizing only a fraction (2%) of the US workforce in production agriculture (National Research Council, 1988).

Maintaining agricultural production at this level without the degradation of natural resources (air, soil, water) should be a topic of utmost importance for educators, consumer groups, and agribusiness. This goal can be achieved only through continued training of agriculturists and scientists, beginning at the middle and secondary school levels. Current enrollment of US high school students in agriculture-related classes is only 4.5% (Terry et al., 1992). In 1988, the National Research Council's Committee on Agricultural Education concluded that the agricultural education curriculum in secondary schools had "failed to keep up with modern agriculture." To compound this situation, studies indicated that large numbers of American students avoid taking basic science courses, the necessary foundation for studying agriculture, at the secondary school and higher education levels (Wirth, 1992). Integrating science and agriculture courses may help overcome this obstacle. Students enrolled in science-based courses using agriculture and natural resource applications have performed equally well or better than students enrolled in science units using traditional methods (Roegge and Russel, 1990; Connors and Elliot, 1995).

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Lack of interest on students' behalf is only part of the problem. Teachers may not posses the necessary skills to teach agriscience. Scofield (1993) addressed three separate studies on Iowa's formal education system with regard to agricultural instruction. These studies indicated students and teachers were "undecided" about conservation and environmental issues as they related to agriculture. Other barriers exist, including lack of time to implement agricultural information and insufficient access to supplies and materials necessary to integrate agriculture into curricula (Balschweid et al., 1998).

These combined factors are creating a society that is agriculturally illiterate. Peasley and Henderson (1992) indicated the extent of agricultural knowledge of the general public was similar to the level of 11th grade students. This suggests that our secondary school systems need to evaluate ways of increasing agricultural literacy. Wright et al. (1994) and Williams and White (1991) found that students in the 5th, 8th, and 11th grades enrolled in an Oklahoma school district possessed "low" levels of basic knowledge of agriculture.

General concern about food production, however, is increasing and special interest groups are influencing the public's impression (Lichte and Birkenholz, 1993). Public policy affecting agriculture is directly associated with public goals, and people with little agricultural knowledge have determined these goals (Deavers, 1987; Winter and Francis, 1997). A survey of Montana legislators found that they generally have a positive perception about agricultural policy, but one-third of the legislators lacked knowledge about the size of the agricultural industry and its contribution to the Gross National Product (Wearley et al., 1999). Agricultural literacy lies at the root of public actions and attitudes toward agriculture, affecting national and global economic development (Barton, 1990).

As food safety, animal welfare, and resource use continue to come into question, it is alarmingly apparent that agricultural instruction in our education system needs prompt attention. Concurring with our research, which indicates early exposure to agriculture education can result in a more responsible and knowledgeable public in food production, nutrition, and safety. Trexler and Suvedi (1998) recommend non-traditional programs should be developed at the elementary school level to educate students about food, agriculture, and renewable resources.

The purpose of this study was to assess the perceptions and concerns of Pennsylvania school students and teachers about animal agriculture. The objectives were to 1) gauge their general perceptions of animal agriculture; 2) rank their concerns about animal agriculture; and 3) identify the primary sources of agricultural information for younger students.

Methods

Data were collected in 1996-1997 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 education, dairy and animal science, nutrition, entomology, and agricultural economics reviewed the surveys. Questionnaires were distributed to students and teachers in five middle schools and two high schools in Pennsylvania. A total of 947 6-8th graders, 242 11-12th graders, and 169 teachers were surveyed. The schools represented both rural and urban populations surrounding Harrisburg. Since Pennsylvania has the largest rural population in the US, the researchers felt these schools represented a realistic profile of school students and teachers in Pennsylvania. Random sampling techniques were not employed; therefore, the results of the study cannot be generalized to a larger population, but they can provide baseline data for future study.

A combination of closed- and open-ended questions was included in the survey. The middle school student survey consisted of eight questions. Questions 1 - 3 were closed-ended demographic questions (e.g., gender, pet ownership, agricultural experience, and sources of agricultural information such as TV, school, and family). Question 4 was a multi-part question that addressed the level of agricultural literacy as it related to animal products, food safety, and knowledge of livestock animals, and contained a combination of closed- and open-ended components. Question 5 was a closed-ended question that addressed the students' perception of animal agriculture and how they felt about the effects of animals on the environment. Question 6 was also a multi-part question, using a Likert scale that addressed students' concerns about food safety, animal waste, and animal welfare. The students had four options ranging from "I don't care about it" to "I worry often" to indicate their level of concern. In addition, students had two additional options available, which were "don't know" or to choose not to answer the question. If the student did not answer the question, it was coded as a missing value. The "don't knows" and missing values were not included when calculating mean scores of the concern levels. In question 7 the students were asked to rank seven agriculture-related issues in order of importance. These issues were food safety, food distribution, storage and disposal of animal waste, chemical residues in foods, use of corn or other grains for farm animals (resource use), animal welfare, and biomedical research. The final opinion question asked students if they felt farmers tried to keep the environment safe and clean.

A combination of closed- and open-ended questions used for the high school student and teacher surveys was similar in design and content to the middle school surveys. However, unlike the middle school survey that framed the questions in the context of how the students were directly affected by different topics, the high school student and teacher surveys asked the questions in a sociological context. Since the wording of the middle school, high school, and teacher surveys were similar, direct comparisons could be made for many of the questions from the surveys of the three different groups.

Results and Discussion

The surveys were analyzed with SPSS 6.1 (Norusis, 1994) using descriptive statistics (frequencies, means, and standard deviations). These results were used to develop educational materials to address concerns about animal agriculture.

The majority of the respondents did not have any agricultural experience (68%, 79.8%, 91.2%) for teachers, students (11-12th grades) and students (6-8th grades), respectively. The gender breakdown for teachers was 34.9% male, 62.1% female, 3.0% no answer; students (11-12th grades) 45.5% male. 53.3% female, 1.2% no answer; students (6-8th grades) 42.1% male, 57.3% female, and .6% no answer (Table 1).

Table 1. Gender and Prior Agricultural Experience

Gender	Students (grades 6-8)[x]		Students (grades 11-12)[y]		Teachers[z]	
	%	f	%	f	%	f
Male	42.1	399	45.5	110	34.9	59
Female	57.3	543	53.3	129	62.1	105
Missing	.6	5	1.2	3	3.0	5
Do you have any agricultural experience?						
Yes	8.7	83	18.6	45	27.8	47
No	91.2	859	79.7	193	68.0	115
Missing	.1	5	1.7	4	4.2	7

[x]n=947.

[y]n=242

[z]n=169

Perceptions of How Animal Agriculture Affects the Environment and Society

To assess how teachers and students (grades 11-12) felt about animal agriculture, they were asked if they thought animal agricultural products and services were beneficial to society and to the environment (Table 2). Respondents were given five options: 1=very beneficial, 2=somewhat beneficial, 3=no effect, 4=somewhat harmful, and 5=very harmful.

Means and standard deviations were calculated. Missing cases and "not sure" answers were not included in calculating the means. The teacher and 11-12th student group mean scores were 1.43 and 1.74 with standard deviations of .908 and .907, respectively. The mean scores for the effects raising farm animals have on the environment were 2.41 and 2.63 with standard deviations of 1.30 and 1.10, respectively.

Table 2. Student (grades 11-12) and Teachers Perceptions of the Effect of Animal Agriculture on the Environment and Society

	Students[y]		Teachers[z]	
	Mean	SD	Mean	SD
Effect on society	1.74	.907	1.43	.908
Effect on the environment	2.63	1.10	2.41	1.30

[y]n=169,1=very beneficial, 2= beneficial, 3=no effect, 4=somewhat harmful, 5=very harmful

[z]n=242,1=very beneficial, 2= beneficial, 3=no effect, 4=somewhat harmful, 5=very harmful

The younger students (grades 6-8) were not asked to frame the questions in a sociological context. However, they were asked about the direct effect agriculture has on the environment. When asked if they thought farmers try to keep the environment safe and clean, the majority of the students, 62.8%, said yes, 12.5% said no, 23.2% did not know, and 1.5% of the students did not answer the question. The students were asked what effects raising farm animals have on the environment. The majority, 79.2%, said they thought the effect on the environment was beneficial; 5.0% said the effect on the environment was harmful; 14.7% said they did not know; and 1.1% did not answer the question. These results are consistent with both Frick (1995), who reported perceptions of agriculture are generally positive, and with a study conducted by Doane Marketing Research (1997) in which 80% of the general public identified farmers as the most important members of society involved in preserving the land and the environment.

Student and Teacher Concerns about Animal Agriculture

Teachers and students (grades 11-12) were asked to rank six agriculture-related topics using a Likert scale, 1=least important to 6=most important (Table 3). Missing cases and "not sure" answers were not included in calculating the means. On a scale of 1=not concerned to 6=very concerned, all issues had a mean of 2.3 or higher for both teachers and students. Food safety had the highest mean score of 5.3 for teachers and 4.9 for students. They were also asked to indicate their concern level about specific potential food contaminants (Table 4). On a scale of 1=not concerned to 4=very concerned, all of the contaminants had a mean of 2.4 or higher for both teachers and students. Pesticide residues and water contaminants had the highest mean scores of 3.2 and 3.1, respectively, for teachers. Students considered water contaminants and other

contaminants their primary concerns with mean scores of 3.3 and 3.1, respectively. The younger students (grades 6-8) were asked to rank seven agriculture-related topics (Table 4) on a Likert scale, 1=least important to 7=most important. The students' primary concerns were food safety and storage issues, with mean scores of 4.9 and 3.9, respectively.

Student Sources of Agricultural Information

Because early exposure to agriculture appears to be important, the researchers tried to determine some baseline agricultural literacy data for the students in grades 6-8, and how they received information about agriculture. These questions were limited to the younger students (grades 6-8) because the older students and teachers had more opportunities to be exposed to agriculture as evidenced by the increased percentage of respondents in each group citing agricultural experience.

Students in grades 6-8 were first asked a series of open-ended questions about the origin of some common animal-based products (milk, leather, wool, and hamburger). With the exception of leather, over 90% of the students correctly identified the animal from which the products originated; 61% of the students correctly identified the origin of leather (acceptable answers were cows, pigs, sheep, and horses). Students were then asked questions about food safety issues, how farm animals were raised, and where they learned about these topics. Family members were the primary sources for food safety information, with school and television the second and third sources, respectively. Students were asked if they knew how cows, pigs, horses, veal calves, beef cattle, and chickens were raised. Over 80% of the students said they knew how the animals were raised, with the exception of beef cattle and veal calves; 52.7% students said they knew how beef cattle were raised, and 33.3% knew how veal calves were raised. Again, the primary

Table 3. Ranking of animal agriculture issues by students (grades 11-12) and teachers

Issue	Students (grades 11-12)[y] Mean	Teachers[z] Mean
Food safety	4.9	5.3
Resource use for food production	3.5	3.0
Food storage	3.9	4.0
Chemical residues in food	3.7	4.0
Animal welfare	2.7	2.7
Animal waste disposal	2.5	2.3

[y]n=242;scale 1=least important to 6=most important

[z]n=169;scale 1=least important to 6=most important

Table 4. Ranking of animal agricultural issues by students (grades 6-8)

Issue	Students (grades 6-8)[z] Mean
Food storage	5.5
Food safety	5.3
Animal welfare	4.8
Biomedical research	4.8
Animal waste disposal	4.5
Chemical residues in food	3.2
Resource use for food production	3.2

[z]n=976;scale 1=least important to 7=most important

sources of information were family members, school, and television, though not necessarily in that order for each farm animal species.

Conclusions and Implications

Food Safety

All participants indicated a high level of concern about the safety of the food supply (Table 3). This finding was not surprising because of the recent incidents involving contaminated food, particularly from animal origins. The American food supply is among the safest in world, but millions of Americans are stricken by foodborne illness every year. Approximately 9,000 (mostly very young and the elderly) die as a result of food poisoning annually (Hingley, 1997). A survey conducted for the Food Marketing Institute in 1988 revealed that 83% of the

respondents considered product safety an important factor in the selection of food (Jordon and Elnagheeb, 1991).

Because both middle school and high school students are very concerned about the food they eat, they need to have access to information about food production, processing, transportation, storage, and finally distribution to the consumer. In addition, text materials on the farm-to-table continuum, including the proper handling and preparation of food in the home, hands-on experiences, and field trips should be made available to students as part of their school curriculum.

Pesticide Residues and Water Contamination

Both older students and teachers were concerned about pesticide residues in food and water, in addition to water contamination from sources other than pesticides (Table 5). This concern reflects the perception of the general public that pesticides pose a high human health risk (Goss

Table 5. Ranking of potential food contaminants by students and teachers

Issue	Students (grades 11-12)[y] Mean	Teachers[z] Mean
Water contaminants	3.3	3.1
Other contaminants	3.1	3.0
Microorganisms	3.0	3.0
Pesticide residues	3.0	3.2
Antibiotic residues	2.8	2.8
Insects	2.5	2.6
Growth promotants	2.4	3.0

[y]n=242;scale 1=least important to 6=most important

[z]n=169;scale 1=least important to 6=most important

and Barry, 1995). However, Goss and Barry found that pesticide contamination in public drinking water was insignificant; the main contaminants were bacteria and nitrate. Educational programs for students and adults should address this misconception and provide information on public actions to prevent water contamination from any sources.

A review of consumer attitudes (Halbrendt et al., 1991) revealed concerns about food safety risks. Consumers felt the use of chemicals and pesticides along with antibiotics and hormones can cause health problems. This is a valid concern if they are misused at levels that threaten human health. However, inflated public concern may be a result of lack of understanding of the government-mandated safeguards in the use of pesticides, growth promoters, and antibiotics in agriculture that can be rectified with educational materials for consumers and students.

Farm Animal Practices

Student and teachers did not consider farm animal practices a primary concern, but they did rank these issues as possessing some importance to them and should still be addressed. This is especially true with regard to food safety issues in the farm-to-table continuum because what is being done at the farm level may affect the quality and wholesomeness of food products eventually delivered to the consumer. For example, if an animal is provided with a balanced diet, clean water, and is well-treated, it is less likely to become ill. In turn, if less medication is required due to low incidence of illness, there is less chance of antibiotic residue deposition in meat and milk products.

Farm animal management practices, if not understood, can be misinterpreted and considered cruel and inhumane. An understanding of management practices routinely used by farmers to enhance the animals' well-being, and the rationale for these practices, is necessary. Again, offering field trips to local farms as part of the school

curriculum would be beneficial in providing a better understanding of farm management practices, and instilling a positive association with agriculture.

Our findings indicate that family, schools, and television are the primary sources of information. Educational materials should be developed with this in mind. Without a doubt, television plays a very important role in students' lives, and should be used as a medium to deliver information whenever possible. Commodity producer groups and farmer associations should become integral parts of our educational system, along with parents and teachers, and should be willing and capable of providing instructional materials.

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A Follow-up Survey of 1996 Graduates from the College of Agriculture, The University of Arizona

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Abstract

The purpose of this study was to design and pilot a graduate follow-up survey to be utilized in an ongoing effort to determine the quality of the educational experience of the graduates of the College of Agriculture at the University of Arizona. This medium provides a route for institutions to ratify the quality of their programs. Realizing that graduates are in a unique position to judge the strengths and weaknesses of any given program, surveys are designed to evaluate the graduate and the product of a program. Of the respondents, 75 percent were employed and among those employed, 81 percent worked full-time. Eighty-six percent of

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