

## STUDENT ATTITUDES TOWARD ANIMAL-DERIVED PRODUCTS AND SERVICES AND HOW THEY AFFECT SOCIETY AND THE ENVIRONMENT

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### Abstract

*The purpose of this study was to 1) assess the students' attitudes, perceptions, and interests in agriculturally related issues, 2) ascertain the differences in attitudes between scholars with and without prior agricultural experiences, and 3) determine if participation in a 2-week course on animal agriculture had an effect on the students' attitudes, perceptions, and interests through the use of pre- and post-course surveys. The students in this study were participants in the Pennsylvania Governor's School for Agricultural Sciences (PGSAS). Within the 5-week PGSAS program, students completed a 2-week unit titled "Contemporary Issues in Animal Agriculture." Results indicated that generally all students, with or without agricultural experience, had a more positive view of agriculture and increased knowledge of agriculture upon completion of the course. Results also indicated that the effects of the course were the greatest on students with no prior agricultural experience.*

### Introduction

Only a small fraction of today's population, approximately 2% is involved in production agriculture (Utah, Department of Food and Agriculture, 1997). However, because of the tremendous strides made in the fields of biology, genetics, chemistry, and the practical application of advances by agricultural scientists, the United States can produce enough food to feed its population and continue to export food around the world. Several authors (Coulter, 1985; Mallory & Sommer, 1986; National Research Council, 1988; Terry & Lawver, 1995) have alluded to the lack of agricultural literacy and relatively poor public image of agriculture, which may cause reluctance of students to enroll in agricultural curricula, as well as public skepticism of food safety and animal production methods. For food production and export to keep pace with global growth, universities must continue to recruit and educate

students to become professional agricultural scientists and technicians. Academic institutions must also continue to associate other academic fields with agriculture, and use learning models which require students to express and defend positions on agricultural issues (Kauffman, 1992; Boone & Newcomb, 1990; Walter & Reisner, 1994).

A major barrier facing agricultural education in high schools across the nation is access to educational opportunity. According to The Center for Rural Pennsylvania (1997), 35% of the state's high schools and vo-tech schools offer courses in agriculture. In many schools, if there are agricultural programs, they are designed for individuals who plan to enter the workforce directly after graduation and not necessarily for those intending to go to college.

Today's population continues to become

more urbanized and propagates concerns about food safety, biotechnology, and animal welfare. Non-agricultural groups cultivate these concerns into criticisms by harvesting value-based challenges toward conventional agricultural production (Walter & Reisner, 1994). One of the primary goals of the Pennsylvania Governor's School for Agricultural Sciences (PGSAS) has been to expose students to the diverse field of agriculture prior to graduation from high school. Participation in PGSAS has guaranteed access to educational opportunity, and has resulted in increased subsequent enrollment in colleges of agriculture (Hoover & Houser, 1991).

Public perception about agriculture can be, and frequently is, influenced by the media. A 1993 Harris poll found a decrease in newspaper science sections from 96 in 1990 to 47 in 1992 (Valenti, 1993). However, this same poll showed that 4 out of 10 people actively sought out science and 56% of the people sampled reported watching TV programs on science, technology, and nature. This suggests that the public wants science-based information, but the information gatekeepers (news editors) do not feel these stories are newsworthy or profitable and thereby withhold coverage (Valenti, 1993; Roll-Hansen, 1994). News editors, however, seem willing to include sensationalized stories, such as celebrities campaigning for animal rights or human health impairments resulting from voids in food safety knowledge. This view may create a discrepancy between public understanding and existing reliable information.

Disseminating truthful information and promoting agricultural literacy and interest to students are primary goals of educational programs such as the PGSAS. The PGSAS scholars are members of a distinct population who have contrasting values and differing perceptions of timely issues such as agriculture and the role it plays in our society. Bringing together persons with different backgrounds and outlooks to discuss agricultural issues often results in an exhilarating

learning experience (Barkley, 1995). Not only do those who participate reap the benefits of sharing knowledge, but they also retain accurate information and gain a better understanding of how agricultural production affects others in their daily lives.

Agricultural literacy seems to be the key to improving public perceptions about agriculture and the PGSAS actively supports agricultural education by providing programs above and beyond the school districts' capabilities in agriscience for academically-talented high school students. Through coursework involving guest speakers, field trips, role-playing, problem solving, and hands-on activities, scholars are able to study and research the professional and scientific nature of agriculture and its interaction with society and the environment.

### **Objectives of the Study**

The objectives of this study were to determine: 1) differences in attitudes and perceptions between students with agricultural backgrounds versus students without agricultural experience in animal agriculture production and management, and 2) if a 2-week unit in contemporary animal issues altered the perceptions and attitudes of students with differing levels of agricultural experiences. In order to meet the objectives of the study, the following questions and issues were investigated within the scope of the pre- and post-course surveys, as well as within the contemporary issues in an animal agricultural unit:

1. What effect do students think raising farm animals has on society?
2. What effect do students think raising farm animals has on the environment?
3. Do students think farmers try to keep the environment safe and clean?

4. Do students think the current laws and regulations provide adequate protection for the environment?
5. What was student's consumption of animal-based food products and the associated rationale?

## **Methodology**

### Sample and Instrumentation

The data for this study were collected from surveys distributed to students enrolled annually from 1996 through 1998 (three years) in the Pennsylvania Governor's School for the Agricultural Sciences (PGSAS). Student participation was limited to 1 year. Each year pre- and post-course surveys were administered to the 64 PGSAS scholars participating in the 2-week "Contemporary Issues in Animal Agriculture" course that was a mandatory part of their core animal science curriculum. Because this was a required course, all students, 192 over the 3-year period, completed the pre- and post-course surveys, resulting in a response rate of 100%.

The participants in this study represented a specialized population and no sampling techniques were applied. The results therefore cannot be generalized to a larger population, but the intent was to show general trends and provide baseline data for additional investigation in this area.

Students attending PGSAS were chosen through an intensive selection process. This process involved the Pennsylvania Departments of Education and Environmental Protection and Penn State University's College of Agricultural Sciences (Fivek & Reynar, 1996). Coordinators from these units were responsible for the promotion of PGSAS within their districts through informational programs, press releases, and by working with guidance counselors to recruit students. For the 1997 and 1998 programs, PGSAS recruiters also

distributed applications to county extension offices, guidance counselors, and high schools with agricultural education courses and FFA programs. The assistant to the state director for the Pennsylvania Governor's School for Excellence then reviewed completed applications and the state selection committee made final decisions.

The questionnaires were developed with the assistance of a specialist in program evaluation and instrument development in Penn State's College of Agricultural Sciences (Bennett & Wilson, 1992). The questionnaires used for the current study were revised and tested periodically since the development of the original instrument. Researchers administered pre- and post-course written questionnaires to determine attitudes and perceptions of PGSAS scholars about contemporary issues in animal agriculture. Participants in the course were given the pre-course survey during the PGSAS orientation.

During the 2 weeks that followed, students engaged in discussions and several hands-on activities based on current issues, concerns, and management practices of the livestock industries (beef, dairy, horse, swine, and veal). Course materials covered such topics as handling and transportation of farm animals, animal nutrition, housing, and waste management. Discussions with role-playing scenarios of controversial issues were presented by the scholars and critiqued by the scholars and staff from the Department of Dairy and Animal Science. Instructors of the animal science issues unit did not use the pre-course survey results to determine content of the instructional unit.

Following the 2 weeks of instruction, participants were given a post-course survey to assess the effectiveness of the course and its impact on the scholars' attitudes and perceptions. Students were asked in the pre- and post-course surveys about their agricultural experience, age, and gender, which served as demographic

characteristics. The decision to use pre- and post-course surveys was made based on prior studies that indicated this is an effective method in determining trends in studies predicting change (Fesseden & Porter, 1959). After the 1995 PGSAS session, the pre- and post-course surveys were revised. This revision included additional questions. When applicable, the 5-year data were used. In the cases where the 5-year data were not applicable, data from 1996, 1997, and 1998 were compared and noted as such.

### Data Analysis

Descriptive statistics, including frequencies, means, and crosstabulations were obtained. Prior to and upon conclusion of the 2-week unit in animal agriculture, students were asked to respond to attitudinal questions. A Likert scale (strongly disagree to strongly agree) and nominal level data were used to rank their concerns. Scale results were summarized using frequencies, percentages, and means for various animal agricultural issues and were calculated and crosstabulated for agricultural experience. Comparisons were made between students with and without agricultural experience as determining changes in pre- and post-course survey results.

## **Results**

### Demographic Summary

Demographic data were collected and compiled by the Pennsylvania Governor's School for Agricultural Sciences (PGSAS) and reported in the PGSAS Annual Reports 1994-1998 (Table 1). The male to female ratio was 28 to 36 and ethnic backgrounds represented were White/Anglo-American (81.4%), Black/African American (5.0%), Oriental/Asian (9.1%), Hispanic (1.3%), Other Latin American (1.0%), and other (2.2%).

As part of the pre-course survey distributed in 1996, 1997, and 1998, students were

asked if they belonged to any animal or agricultural-oriented clubs. In 1996, the majority of students (62.5%) indicated they did not belong to any type of agricultural-oriented clubs. The two clubs that had the most students involved were 4-H (14%) and FFA (11%). Less than 10% of the students said they were members of dog/kennel or horse clubs. In 1997, 48% of the students indicated they did not belong to an agricultural-related club. Again, the clubs that had the highest percentage of membership were 4-H (29%) and FFA (23%); and less than 10% belonged to dog/kennel and horse clubs. In 1998, the percentage of students who did not belong to an agricultural-oriented club was the same as 1997 (48%). Participation in 4-H and FFA were the highest 29% and 20%, respectively, with less than 10% belonging to dog/kennel and horse clubs.

### Consumption of Animal-based Food Products

Scholars were asked to indicate if they ate various animal-derived food products (beef, pork, veal, dairy products, eggs, fish, and poultry), and any reasons for not consuming these products (Table 2). A 3-year average (1996, 1997, and 1998) of the pre-course survey scores showed that all students, regardless of agricultural experience, had a high consumption level (77.5% or more) of animal-derived food products, with the exception of veal. An average of 56% of all scholars, regardless of agricultural experiences, indicated that they ate veal. When asked why they did not consume certain animal-derived food products, the majority, 102 students, (3-years combined) ranked taste as the most important deciding factor when choosing not to eat a certain animal-derived food product. The second most cited reason (70 students) was because their families did not serve the products, and health concerns (44 students) was the thirdmost cited reason. Weight concerns (16 students), religious reasons (14 students), and allergies (5 students) were at the bottom of the list of reasons for not eating animal-derived food products.

Table 1. PGSAS Scholar Demographic Information

| G20   | 1994     |      | 1995     |      | 1996     |      | <u>1997</u> |      | 1998     |      | <u>5 year average</u> |      |
|---|----------|------|----------|------|----------|------|-------------|------|----------|------|-----------------------|------|
|   | <u>f</u> | %    | <u>f</u> | %    | <u>f</u> | %    | <u>f</u>    | %    | <u>f</u> | %    | <u>f</u>              | %    |
| Gender  |          |      |          |      |          |      |             |      |          |      |                       |      |
| Male  | 28       | 44.0 | 28       | 44.0 | 28       | 44.0 | 28          | 44.0 | 28       | 44.0 | 28.0                  | 44.0 |
| Female  | 36       | 56.0 | 36       | 56.0 | 36       | 56.0 | 36          | 56.0 | 36       | 56.0 | 36.0                  | 56.0 |
| Ethnicity   |          |      |          |      |          |      |             |      |          |      |                       |      |
| White/Anglo-American  | 50       | 78.0 | 51       | 79.6 | 53       | 82.6 | 49          | 76.6 | 58       | 90.5 | 52.2                  | 81.4 |
| Black/African American  | 3        | 4.7  | 3        | 4.7  | 4        | 6.3  | 5           | 7.8  | 1        | 1.6  | 3.2                   | 5.0  |
| Oriental/Asian  | 6        | 9.4  | 9        | 14.1 | 4        | 6.3  | 7           | 10.9 | 3        | 4.7  | 5.8                   | 9.1  |
| Hispanic  | 3        | 4.7  | 0        | 0.0  | 1        | 1.6  | 0           | 0.0  | 0        | 0.0  | 0.8                   | 1.3  |
| Other Latin American  | 1        | 1.6  | 0        | 0.0  | 1        | 1.6  | 0           | 0.0  | 1        | 1.6  | 0.6                   | 1.0  |
| Other   | 1        | 1.6  | 1        | 1.6  | 1        | 1.6  | 3           | 4.7  | 1        | 1.6  | 1.4                   | 2.2  |
| Course in high school   |          |      |          |      |          |      |             |      |          |      |                       |      |
| General   | 9        | 14.1 | 7        | 10.9 | 28       | 44.0 | 7           | 10.9 | 1        | 10.9 | 10.0                  | 18.1 |
| College prep  | 46       | 71.8 | 50       | 78.1 | 36       | 56.0 | 51          | 79.7 | 51       | 79.7 | 47.0                  | 73.1 |
| Vocational  | 1        | 1.6  | 6        | 9.4  | 0        | 0.0  | 1           | 1.6  | 1        | 1.6  | 1.8                   | 2.8  |
| College/vocational  | 5        | 7.8  | 0        | 0.0  | 0        | 0.0  | 5           | 7.8  | 5        | 7.8  | 3.0                   | 4.7  |
| Other/missing   | 3        | 4.7  | 1        | 1.6  | 0        | 0.0  | 0           | 0.0  | 0        | 0.0  | 0.8                   | 1.3  |
| High school rank  |          |      |          |      |          |      |             |      |          |      |                       |      |
| Among the best  | 47       | 73.4 | 55       | 85.9 | 57       | 89.1 | 54          | 84.4 | 52       | 81.2 | 53.0                  | 82.8 |
| Above average   | 13       | 20.3 | 8        | 12.5 | 7        | 10.9 | 9           | 14.0 | 11       | 17.2 | 9.6                   | 15.0 |
| Average   | 4        | 6.3  | 1        | 1.6  | 0        | 0.0  | 1           | 1.6  | 1        | 1.6  | 1.4                   | 2.2  |
| Have you lived on a farm?                                     |          |      |          |      |          |      |             |      |          |      |                       |      |
| Yes   | 14       | 21.9 | 15       | 23.4 | 13       | 20.3 | 27          | 42.0 | 19       | 29.7 | 17.6                  | 27.5 |
| No  | 50       | 78.1 | 49       | 76.6 | 50       | 78.1 | 37          | 58.0 | 45       | 70.3 | 46.2                  | 72.2 |
| Missing   | --       | --   | --       | --   | 1        | 1.6  | --          | --   | --       | --   | 0.2                   | 0.3  |
| Did you like farm life?                                       |          |      |          |      |          |      |             |      |          |      |                       |      |
| Liked it a lot/somewhat                                       | 12       | 18.8 | 5        | 7.8  | 12       | 18.8 | 25          | 39.1 | 16       | 25.0 | 14.0                  | 21.9 |
| Disliked it a lot/disliked it                                 | 4        | 6.3  | 13       | 20.3 | 1        | 1.6  | 1           | 1.6  | 2        | 3.1  | 4.2                   | 6.6  |
| Indifferent   | 3        | 4.7  | 11       | 17.2 | 1        | 1.6  | 2           | 3.1  | 1        | 1.6  | 3.6                   | 5.6  |
| Never lived on a farm   | 45       | 70.2 | 35       | 54.7 | 38       | 59.2 | 22          | 34.3 | 45       | 70.3 | 37.0                  | 57.8 |
| Missing   | --       | --   | --       | --   | 12       | 18.8 | 14          | 21.9 | --       | --   | 5.2                   | 8.1  |
| Do you have an interest in pursuing a career in agriculture?" |          |      |          |      |          |      |             |      |          |      |                       |      |
| Yes   | --       | --   | --       | --   | 12       | 18.8 | 50          | 78.1 | 47       | 73.4 | 36.0                  | 56.8 |
| No  | --       | --   | --       | --   | 38       | 59.3 | 13          | 20.3 | 17       | 26.6 | 23.0                  | 35.4 |
| Missing   | --       | --   | --       | --   | 14       | 21.9 | 1           | 1.6  | 0        | 0.0  | 5.0                   | 7.8  |

(table continues)

|   | <u>1994</u> |          | <u>1995</u> |          | <u>1996</u> |          | <u>1997</u> |          | <u>1998</u> |          | <u>5-yr avg.</u> |          |
|---|-------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|------------------|----------|
|   | <u>f</u>    | <u>%</u> | <u>f</u>    | <u>%</u> | <u>f</u>    | <u>%</u> | <u>f</u>    | <u>%</u> | <u>f</u>    | <u>%</u> | <u>f</u>         | <u>%</u> |
| Does your school have an agricultural education/FFA chapter?" |             |          |             |          |             |          |             |          |             |          |                  |          |
| Yes   | --          | --       | --          | --       | 12          | 18.8     | 18          | 28.1     | 21          | 32.8     | 17.0             | 26.6     |
| No  | --          | --       | --          | --       | 38          | 59.3     | 41          | 64.1     | 40          | 62.5     | 40.0             | 62.0     |
| Don't know/missing  | --          | --       | --          | --       | 14          | 21.9     | 5           | 7.8      | 3           | 4.7      | 7.3              | 11.4     |

Note. Results expressed in percent of total number of scholars; missing cases not included.

"Data not available for 1994 & 1995.

Table 2. Consumption of Animal-based Food Products (pre-survey)

|                            | Do you eat this product? |      |               |      |               |      |               |      |               |  |               |  |
|----------------------------|--------------------------|------|---------------|------|---------------|------|---------------|------|---------------|--|---------------|--|
|                            | <u>Yes(%)</u>            |      | <u>No (%)</u> |      | <u>Yes(%)</u> |      | <u>No (%)</u> |      | <u>Yes(%)</u> |  | <u>No (%)</u> |  |
|                            | 1996                     |      | 1997          |      | 1998          |      | 3-yr avg.     |      |               |  |               |  |
| <b>Beef</b>                |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 82.1                     | 17.9 | 85.7          | 14.3 | 92.3          | 7.7  | 86.7          | 13.3 |               |  |               |  |
| Agricultural experience    | 91.3                     | 8.7  | 94.1          | 5.9  | 84.0          | 16.0 | 89.8          | 10.2 |               |  |               |  |
| <b>Pork</b>                |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 79.5                     | 20.5 | 71.4          | 28.6 | 89.7          | 10.3 | 80.2          | 19.8 |               |  |               |  |
| Agricultural experience    | 91.3                     | 8.7  | 94.1          | 5.9  | 84.0          | 16.0 | 89.8          | 10.2 |               |  |               |  |
| <b>Veal</b>                |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 52.6                     | 47.4 | 53.6          | 46.4 | 51.3          | 48.7 | 52.5          | 47.5 |               |  |               |  |
| Agricultural experience    | 60.9                     | 39.1 | 61.8          | 38.2 | 56.0          | 44.0 | 59.6          | 40.4 |               |  |               |  |
| <b>Dairy Products</b>      |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 94.9                     | 5.1  | 100.0         | --   | 100.0         | --   | 98.3          | 1.7  |               |  |               |  |
| Agricultural experience    | 95.7                     | 4.3  | 100.0         | --   | 100.0         | --   | 98.6          | 1.4  |               |  |               |  |
| <b>Eggs</b>                |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 89.7                     | 10.3 | 92.9          | 7.1  | 100.0         | --   | 94.2          | 5.8  |               |  |               |  |
| Agricultural experience    | 91.3                     | 8.7  | 100.0         | --   | 100.0         | --   | 97.1          | 2.9  |               |  |               |  |
| <b>Fish</b>                |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 66.7                     | 33.3 | 78.6          | 21.4 | 87.2          | 12.8 | 77.5          | 22.5 |               |  |               |  |
| Agricultural experience    | 91.3                     | 8.7  | 94.1          | 5.9  | 94.0          | 6.0  | 93.1          | 6.9  |               |  |               |  |
| <b>Poultry</b>             |                          |      |               |      |               |      |               |      |               |  |               |  |
| No agricultural experience | 94.9                     | 5.1  | 96.4          | 3.6  | 94.9          | 5.1  | 95.4          | 4.6  |               |  |               |  |
| Agricultural experience    | 95.7                     | 4.3  | 97.1          | 2.9  | 88.0          | 12.0 | 93.6          | 6.4  |               |  |               |  |

Note. Results expressed in percent of total number of scholars; missing cases not included.

### Effects of Agricultural Experience and Background on Scholars' Attitudes of Animal Agricultural Issues

The students were asked, in pre- and post-course surveys, to indicate the extent they felt products and services from farm animals affect society. The students were given five options: very beneficial, beneficial, no effect, harmful, and very harmful. These categories were collapsed into three categories; beneficial, no effect, and harmful, and crosstabulated with their farm experience. The results for the individual years, 1996, 1997, and 1998, as well as the 3-year averages from pre- and post-course surveys are reported in Tables 2 and 3.

#### What effect do products and services from farm animals have on society?

An average of 95.4% of students with no agricultural experience and 96.2% of students with agricultural experience felt the effects of products and services from farm animals were beneficial for society. There was a slight decrease, 1.7%, of those scholars who did not have an agricultural background after completion of the course, who felt products and services were beneficial to society while students with an agricultural background showed a slight increase of 1.4%. In the pre-course, 2.9% of the scholars with no agricultural experience and 3.8% of those with agricultural experience, felt products and services were harmful to society. The results of the post-course survey showed a 2.4% increase in the students with no agricultural experience who felt that products and services were beneficial and a 1.4% decrease in students who had agricultural experience. The remainder of the students indicated they felt products and services had no effect on society.

#### What effect does raising farm animals have on the environment?

PGSAS scholars were asked their opinion

of the effects of raising farm animals on the environment. Was it beneficial to the environment, harmful to the environment, or have no effect on the environment? Pre-course survey results indicated 55.2% of students with no agricultural experience felt raising farm animals was beneficial to the environment, and 38.3% felt raising farm animals was harmful to the environment. A higher percentage of students with an agricultural experience, 71.1%, felt raising farm animals was beneficial to the environment, whereas 24.4% felt raising farm animals was harmful to the environment. The remainder of the students felt raising farm animals had no effect on the environment. After completion of the course, a higher percentage of all students, 51% of those without agriculture experience and 29% with agricultural experience, felt raising farm animals was harmful to the environment.

#### Do you think farmers try to keep the environment clean and free from residue?

In the pre-course survey, 55% of students without any agricultural experience felt that farmers tried to keep the environment clean as did 80.4% of students with an agricultural background. After completion of the unit, the percentage of those students who felt farmers tried to keep the environment clean increased for students without and with agricultural experience to 81% and 89%, respectively.

#### Do you feel that there are adequate laws and regulations to protect the environment?

Scholars were asked if they felt there were adequate laws and regulations protecting the environment. Results from the pre-course survey showed that 34.4% of students without agricultural experience and 47.8% of students with agricultural experience felt there were adequate laws and regulations. In the post-course survey, students without agricultural experience who felt that there were adequate laws and regulations to protect the environment increased from 34.4% to

64.5%, while those students with agricultural experience decreased from 47.8% to 29.3%. Apparently, the instructional material presented encouraged those with agricultural backgrounds to

consider current laws and regulations sufficient, but had the opposite effect on students without agricultural experience.

Table 3. Scholar's Attitudes on Animal Agricultural Issues

|  | Do you have prior agricultural experience? |      |         |           |        |      |             |             |
|--|--|------|---------|-----------|--------|------|-------------|-------------|
|  | No (%)                                     |      | Yes (%) |           | No (%) |      | Yes (%)     |             |
|  | 1996                                       | 1997 | 1998    | 3 yr avg. | 1996   | 1997 | 1998        | 3 yr avg.   |
| The effect products and services from farm animals have on society.                  |  |      |         |           |        |      |             |             |
| Beneficial (pre)   | 94.9                                       | 95.5 | 96.4    | 97.1      | 94.9   | 96.0 | <b>95.4</b> | <b>96.2</b> |
| Beneficial (post)  | 94.6                                       | 96.0 | 96.4    | 100.0     | 90.0   | 96.9 | <b>93.7</b> | <b>97.6</b> |
| No effect (pre)  | 0.0  | 0.0  | 0.0     | 0.0       | 5.1    | 0.0  | 1.7         | <b>0.0</b>  |
| No effect (post)   | 0.0  | 0.0  | 0.0     | 0.0       | 3.3    | 0.0  | 1.0         | <b>0.0</b>  |
| Harmful (pre)  | 5.1  | 4.5  | 3.6     | 2.9       | 0.0    | 4.0  | 2.9         | 3.8         |
| Harmful (post)   | 5.4  | 4.0  | 3.6     | 0.0       | 6.7    | 3.1  | 5.3         | 2.4         |
| The effect raising farm animals has on the environment.                              |  |      |         |           |        |      |             |             |
| Beneficial (pre)   | 61.6                                       | 87.0 | 68.9    | 64.7      | 36.0   | 61.5 | 55.2        | 71.1        |
| Beneficial (post)  | 34.3                                       | 72.0 | 37.0    | 55.6      | 43.3   | 56.3 | 38.0        | 61.0        |
| No effect (pre)  | 0.0  | 0.0  | 3.5     | 5.9       | 16.0   | 7.7  | 6.5         | 4.5         |
| No effect (post)   | 14.3                                       | 4.0  | 11.1    | 16.7      | 6.7    | 9.4  | 11.0        | 10.0        |
| Harmful (pre)  | 38.4                                       | 13.0 | 27.6    | 29.4      | 48.0   | 30.8 | 38.3        | 24.4        |
| Harmful (post)   | 51.4                                       | 24.0 | 51.9    | 27.7      | 50.0   | 34.3 | 51.0        | 29.0        |
| Do you think farmers try to keep the environment clean and free from residues?       |  |      |         |           |        |      |             |             |
| Yes (pre)  | 56.4                                       | 87.0 | 44.4    | 82.4      | 64.1   | 72.0 | 55.0        | 80.4        |
| Yes (post)   | 75.7                                       | 84.0 | 81.5    | 94.4      | 86.7   | 87.4 | 81.0        | 89.0        |
| No (pre)   | 5.1  | 0.0  | 14.8    | 2.9       | 20.5   | 12.0 | 13.4        | 5.0         |
| No (post)  | 13.5                                       | 12.0 | 7.4     | 0.0       | 3.3    | 6.3  | 8.0         | 6.0         |
| Don't know (pre)   | 38.5                                       | 13.0 | 40.8    | 14.7      | 15.4   | 16.0 | 31.6        | 14.6        |
| Don't know (post)  | 10.8                                       | 4.0  | 11.1    | 5.6       | 10.0   | 6.3  | 11.0        | 5.0         |
| Do you feel that there are adequate laws and regulations to protect the environment? |  |      |         |           |        |      |             |             |
| Yes (pre)  | 76.9                                       | 39.1 | 14.3    | 52.9      | 12.0   | 51.3 | 34.4        | 47.8        |
| Yes (post)   | 70.3                                       | 40.0 | 51.4    | 21.2      | 71.9   | 26.6 | 64.5        | 29.3        |
| No (pre)   | 2.6  | 39.1 | 25.0    | 17.7      | 44.0   | 28.2 | 23.9        | 28.3        |
| No (post)  | 10.8                                       | 44.0 | 25.7    | 39.3      | 21.9   | 56.7 | 19.5        | 46.7        |
| Don't know (pre)   | 20.5                                       | 21.8 | 60.7    | 29.4      | 44.0   | 20.5 | 41.7        | 23.9        |
| Don't know (post)  | 18.9                                       | 16.0 | 22.9    | 39.5      | 6.2    | 16.7 | 16.0        | 24.0        |

Note. Results expressed as percents of total numbers; missing data not included.

### Conclusions

The overall trend demonstrates that students, who have had some type of exposure to agriculture, either from living/working on a farm or taking agricultural-related classes, have a more

positive view of agriculture than students who have had no exposure to agriculture do. The majority of issues showed a positive increase in attitudes toward agriculture for those students with no prior exposure to agriculture. The percentage of students who had previously been

exposed to agriculture increased as well, though not to the same degree as students with no agricultural background. This conclusion concurs with the Bennett and Wilson (1992) study on the impact of the PGSAS "...that students' overall perceptions/opinions tended to become more positive toward animal agriculture at the end of this course." This study was based on academically-talented students with mixed agricultural and non-agricultural experiences similar to some earlier studies (e.g. Betts & Newcomb, 1986; Frick & Birkenholz, 1995), and yielded similar conclusions.

The exceptions to this trend were how students felt about the effects of raising farm animals on the environment and the amount of laws regulating the protection of the environment. The fact that the results showed students with both agricultural experience and non-agricultural experience felt worse about farm animal production and its impact on the environment after participating in 6-week course, lead us to believe the Governor's School program is primarily creating an awareness and a questioning of agricultural practices. A similar conclusion can be drawn about how students felt about adequate laws and regulations protecting the environment. Students with no agricultural background were made aware of what is required of farmers and producers to ensure the safety of the environment, while students with agricultural experience were made more aware of the very close and delicate link between the practices employed by farmers and the environment. This realization could conclude that additional regulations may be necessary to guarantee that all farmers and producers practice what is required to keep the environment safe and clean.

### **Recommendations**

Because of the positive impact participation in the course has on the scholars, the PGSAS should be used as a model for other land grant universities. Currently Pennsylvania is the

only state that has a Governor's School for agriculture, though there is a strong interest from other universities. A noticeable drawback of PGSAS is that participation is limited to only those students who show academic promise and an interest in agriculture. This limiting factor must be removed and agricultural education made available to all middle and high school students. With the continuing merging of agriculture, science, and technology on a global level, "agriscience" should be integrated into science class curricula throughout our nation's school systems. Technical advances in agriculture will continue to provide an inexpensive and wholesome food supply. All students, not just the academically-talented or agriculturally interested, should be encouraged to explore careers and expand their knowledge in agriculture.

### **References**

- Barkley, A. P. (1995). Students thinking critically about agricultural issues. NACTA Journal. March, 4-9.
- Bennett, M. B., & Wilson, L. L. (1992). The influence of special instruction on perceptions/opinions of academically-talented youth regarding farms animal welfare, care, and use. The Professional Animal Scientist, 8,1-6.
- Betts, S. & Newcomb, L. (1986). High-ability urban high school seniors' perceptions of agricultural study and selected recruitment strategies. NACTA Journal. December, 14- 17.
- Boone, H., Jr. & Newcomb, L. (1990). Effects of approach to teaching on student achievement, retention, and attitude. Journal of Agricultural Education. Winter, 9- 14.
- Coulter, K. J. (1985). The agricultural image. NACTA Journal, 29(3), 19-22.
- Fesseden, J. & Porter, W. (1959) Analysis and Interpretation. Evaluation in Extension.

pg. 1-7.

Fivek, M. & Reynar, R. (1996). Annual Report of the Pennsylvania Governor's School for the Agricultural Sciences, The Pennsylvania State University, University Park, PA.

Frick, M. & Birkenholz, R. (1995). Rural and inner-city high school student knowledge and perception of agriculture. Journal of Agricultural Education. 36(4),44-53.

Hoover, T. & Houser, M. (1991). Participant perceptions about agricultural careers. NACTA Journal. June, 14-18.

Kauffman, R. (1992). Modernizing the animal science curriculum: Is change needed? Journal of Animal Science. 70, 2593-2596.

Mallory, M. & Sommer, R. (1986). Student images of agriculture: survey highlights and recommendations. Journal of the American Association of Teachers in Education. 27(4), 15-17.

National Ag Week Promotes Food and Farm to Students. (1997). Salt Lake City, Utah: Utah Department of Agriculture and Food.

National Research Council, 198 8. Understanding Agriculture: New Directions For Education. The National Academy Press. Washington, D.C..

Roll-Hansen, N. (1994). Science, politics, and the mass media: On biased communication of environmental issues, Science, Technology and Human Values. 19(3),324-34 1.

Terry, R., Jr. & Lawver, D. (1995). University student's perceptions of issues related to agriculture. Journal of Agricultural Education. 36(4),64-70.

The Center for Rural Pennsylvania. (1997). Pennsylvania Ag Factors. [Brochure]. Harrisburg, PA:Pennsylvania General Assembly.

Valenti, J. (1993). Framing public issues and working with the media. Paper presented at the National Public Policy Education Conference, Clearwater Beach, Fl.

Walter, G. & Reisner, A. (1994). Student opinion formation on animal agriculture issues. Journal of Animal Science. 72,1654-56.