

Effect of Location and Education on Perceptions and Knowledge about Agriculture

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Abstract

The Oxford English Dictionary defines agriculture as “the science and art of cultivating the soil; including the allied pursuits of gathering in the crops and rearing livestock; tillage, husbandry, [and] farming (in the widest sense)”. This study uses the word “farming” synonymously with “agriculture.” The purpose of this study is to explore how a young person’s perception of agriculture is affected by his or her environment and education. Three high schools within a twenty mile radius of Cornell University were surveyed, including both “urban” (19,859 people) and rural populations. Rural populations were represented by a school with a secondary agricultural program as well as a school with no formal agricultural science program. High School students were surveyed specifically on their knowledge and perceptions of farming in New York State. This study also examined the presence of Cornell University in relation to the data collected. Cornell University is ranked in national surveys among the best college of agriculture and related sciences in the United States (Cornell University, 2006); yet the results of this study do not indicate any obvious influence by this college on its surrounding communities.

Introduction / Theoretical Framework

Agriculture’s role in our society is changing. In 1900, 41% of the American population was employed in agriculture, as compared to 1.9% of the population in 2002 (Dimitri, Effland, & Conklin, 2006). The American economy once revolved around agriculture, but advances in technology and machinery now allow for fewer, larger farms. With machines replacing human work, a smaller percentage of the American workforce is needed in the field of agriculture. As less people work in agriculturally related jobs, fewer children are being exposed to agriculture. Thus, our population is becoming more agriculturally illiterate.

Agricultural literacy is an issue that has gained attention in recent years and is a subject of concern to those in the agriculture business. With fewer agricultural programs offered in schools, generations of young people are being raised with little knowledge of agriculture. As this cycle continues, lack of knowledge creates and perpetuates stereotypes concerning farming.

In a study conducted in rural Missouri, students in schools with agriculture programs were compared to those with no programs. The results concluded what one would expect; students in schools with agricultural programs had a higher knowledge score than students in schools without an agricultural science program. The students’ knowledge score also had a weak positive correlation with a positive perception towards agriculture (Wright, Stewart, & Birkenholz, 1994). The more educated an individual, the fewer negative stereotypes the individual developed about

agriculture.

Stereotypes concerning farming begin at a young age and continue to grow. Iowa middle school students, in both rural and urban areas, imagined farmers as old men, wearing bib overall and chewing on straw. They reported that the farmers they knew did not subscribe to this stereotype, but that “other farmers” did (Holz-Clause & Jost, 1995). In a study done at Cornell University, a representative sample of tenth graders across New York State were surveyed. They ranked low in agreement with the statement that “agriculture is a place for college graduates to work.” These same students had a slightly higher degree of agreement with the statement, “agriculture is a place for high school graduates to work” (Newsom-Stewart & Sutphin, 1994). However, these students recognized that agriculture was important to society, the economy, and to the future (Newsom-Stewart & Sutphin). One specific objective of this current study is to compare the perceptions in the communities surrounding Cornell University with the statewide study results.

Past studies indicate that agriculture is not a popular career path; Iowa middle school students found farming to be an unattractive career choice (Holz-Clause & Jost, 1995). This view was influenced by parents and carried on through the child’s life. In Missouri, both parents and students reported positive feelings concerning agriculture, and yet they were “uncertain” about agricultural education programs (Osborne & Dyer, 2000). Some agriculture majors at college are uncertain about their future in the field. At the University of Illinois, 34% of freshman agriculture majors planned on changing majors (Dyer, Lacey, & Osborne, 1996). Contrasting results were present from the Iowa State University, where only 5.9% indicated that they were planning on changing majors (Dyer, Breja, & Andreasen, 1999). These statistics portray the idea that students in general lack knowledge about agriculture and are confused about its role in their future careers and in society.

The works of Bandura (1964), Brofenbrenner (1979), and Vygotsky (1962) provide the theoretical underpinnings for this study. The social learning theories of Bandura and Vygotsky support social interactions as the basis of learning. Thought, perceptions, and stereotypes are fostered from this learning. Brofenbrenner’s theories concerning ecological interactions and their influence on development further supported this research. Together, these theories demonstrate that knowledge and stereotypes are acquired in the modeling of significant people. They support the idea that learning is derived from society. These works point to society as the source of the perceptions and knowledge young adults have about agriculture and farming.

Purpose / Objectives

The purpose of this survey was to analyze the perceptions and knowledge of agricultural literacy in the student populations of three schools in New York State. The specific objectives were:

1. To determine the differences in perception of New York State agriculture by high school students from three different school settings (i.e.: rural, urban),
2. To determine the differences in knowledge of New York State farming by high school

- students from three different school settings, and
3. To identify how school settings and agricultural education courses affect the results.

Methods / Procedures

Three school populations were chosen for participation in this survey due to their community and educational culture. Rural Ag High is in a rural setting and has a two-teacher agricultural science program. During the time of this survey, Rural Ag High enrolled 318 students in grades 9-12 (New York State Education Department (NYSED), 2006). Urban High is an urban school with no agricultural science program. According to the 2000 census, the town population was 63,396. The school enrolled 1,564 students in grades 9-12 (NYSED). Rural Non-Ag High is in a rural setting, but again, has no agricultural science program. Rural Non-Ag High enrolled 267 students in grades 9-12 at the time this survey was conducted (NYSED). The town population was 5,430 during the 2000 census.

This study was a convenience sample of the population of high school students enrolled in these three high schools in New York State ($N = 2,149$). A convenience sample survey is appropriate when one attempts to ascertain characteristics of a small and defined population (Dillman, 2000; Salant & Dillman, 1994). The researcher-developed questionnaire consisted of questions related to the agricultural literacy objectives. In order to establish face and content validity, the questionnaire was reviewed by a panel of experts consisting of an agricultural science teacher, a graduate student in developmental sociology in the college of agriculture, and seven high school students not in the target population. Data were analyzed using SPSS version 13.0. Descriptive statistics were used in the analysis.

Data was collected from January 2006 through May 2006. The study was administered via a modified survey design of teacher-administered questionnaires as outlined by Dillman (2000). The questionnaire consisted of 21 questions targeted at gaining demographic data, student perceptions, and student knowledge. The questionnaire contained statements in which the subjects circled a number on a Likert-type scale to represent their agreement with the statement. Administrative approval was received in each school, and the study was conducted anonymously. Approval was also received from the Cornell University Committee on Human Subjects. Each school received a cover letter explaining the questionnaire, its intents, and instructions for distribution. Questionnaires were administered through a teacher in each school who saw all students in the school or grade level. Thus, the social studies department was used in Rural Ag High to survey all 10th grade students. In Urban High and Rural Non-Ag High, the English department was used for dissemination of the questionnaire and secured the response of all students in the school. The duration for administration of the questionnaires lasted between one and two weeks. All students in attendance at the school during the administration of the survey were included in the study.

Results / Findings

Over half (52%) of the participants were female. Most participants did not live on a farm. Those who did live on a farm comprised 10.8% of the population. A small portion (26.9%) of the participants had relatives who were employed on a farm. The majority of the participants were

not involved in any agricultural groups/organizations; only 10.9% of the population was. Table 1 shows the demographic information of the entire population compared to the individual school populations.

A noticeably larger percentage of participants from Rural Ag High lived on a farm, had relatives that worked on a farm, and/or participated in an agriculturally related group. Urban High students had the lowest agreement with the aforementioned statements; although it was not far below Rural Non-Ag High. Of special interest in this survey is the comparison of the three different school cultures and the differences in perceptions between farm and non-farm students.

Table 1
Demographic information about participants (N=768).

	Population	Rural Ag	Urban	Rural Non-Ag
Number of Participants	768	243	312	213
Sex: Female (%)	52.0	51.0	54.8	48.8
Male (%)	48.0	49.0	45.2	51.2
Students living on a farm	83 (10.8%)	49 (20.2%)	14 (4.5%)	20 (9.4%)
Students with a relative who works on farm	206 (26.9%)	104 (43.0%)	51 (16.3%)	51 (23.9%)
Students who participate in agriculturally related group	84 (10.9%)	48 (19.7%)	20 (6.4%)	16 (7.6%)

Objective 1: Perceptions about Agriculture

Students in Urban High generally disagreed that farmers make a lot of money (see Table 2). A large number of students from Rural Ag High (41.7%) disagreed with the statement “Most farms in New York State are small family farms.” On average, students at Rural Ag High disagreed that most farms are small family farms while more students in Urban High (31.0%) and Rural Non-Ag High (43.7%) agreed with the statement. Urban High had the highest rate of agreement (78.7%) with the statement “Farming is very difficult.” Urban High students’ agreement was 10.5% higher than the average agreement of the survey population. Rural Ag High was in highest agreement with the notion that you can tell a farmer just by looking at them; 34.2% of the population agreed with this statement. Of particular note is that the majority of students at Urban High disagreed that you could tell a farmer just by looking at him/her.

Table 2

Rural and urban students' perceptions about NY agriculture. (SD=strongly disagree, D=disagree, DK=don't know, A=agree, SA=strongly agree)

Statement	Population	SD / D (%)	DK (%)	A / SA (%)	mean
Farmers in NY State make a lot of money.	Overall (<i>n</i> = 768)	35.3	51.6	13.1	2.7
	Rural Ag High (<i>n</i> = 243)	31.0	45.5	23.6	2.9
	Urban High (<i>n</i> = 312)	43.0	52.2	4.8	2.6
	Rural Non-Ag High (<i>n</i> = 213)	29.1	57.7	13.2	2.8
Most farms in NY State are small family farms.	Overall	28.3	38.4	33.4	3.0
	Rural Ag High	41.7	31.3	27.1	2.8
	Urban High	23.1	45.8	31.0	3.1
	Rural Non-Ag High	20.6	35.7	43.7	3.2
Farming is very difficult.	Overall	10.0	21.8	68.2	3.8
	Rural Ag High	14.1	27.0	58.9	3.6
	Urban High	5.5	15.8	78.7	4.0
	Rural Non-Ag High	11.8	24.9	63.3	3.7
Most farmers are men.	Overall	33.7	29.3	37.0	3.0
	Rural Ag High	31.7	24.2	44.2	3.1
	Urban High	32.5	33.1	34.4	3.0
	Rural Non-Ag High	37.6	29.6	32.9	2.9
You can tell a farmer is a farmer just by looking at them.	Overall	53.3	21.0	25.6	2.6
	Rural Ag High	45.6	20.2	34.2	2.9
	Urban High	62.4	16.7	20.9	2.4
	Rural Non-Ag High	48.8	28.2	23.0	2.6

The data was also divided into two categories: the population that lived on a farm and those students living off of farms (see Table 3). The majority (55.4%) of on-farm students (*n* = 83) disagree with the statement that farmers make a lot of money. A large number (42.7%) of on-farm students disagreed with the idea that most farms in New York State are small family farms. Only 37.8% of on-farm students agreed with this statement. In reality, the average New York State farm is 206 acres (USDA, 2002). The rest of the population, off-farm students, showed a disagreement of 26.5% and an agreement of 32.9%. In response to the statement “you can tell a farmer just by looking at them,” 18.1% of on-farm students agreed and 26.6% of off-farm students agreed.

Table 3
On-farm students' perceptions compared to those of students living off of farms.

	Group	SD / D (%)	DK (%)	A / SA (%)	mean
Farmers in NY State make a lot of money.	On-farm (<i>n</i> = 83)	55.4	26.5	18.1	2.5
	Off-farm (<i>n</i> = 685)	32.9	54.8	12.2	2.7
Most farms in NY State are small family farms.	On-farm	42.7	19.5	37.8	2.8
	Off-farm	26.5	40.8	32.7	3.1
Farming is very difficult.	On-farm	21.7	9.6	68.7	3.7
	Off-farm	8.6	23.3	68.1	3.8
Most farmers are men.	On-farm	41.0	21.7	37.3	2.9
	Off-farm	32.8	30.3	36.9	3.0
You can tell a farmer is a farmer just by looking at them.	On-farm	67.5	14.5	18.1	2.2
	Off-farm	51.6	21.8	26.6	2.7

The survey included an open ended question which asked about the first image the individual has of a farmer. The most common responses involved a man wearing overalls, a straw hat and a plaid shirt, with hay sticking out of his mouth and a pitchfork in his hand. Tractors and big red barns were also mentioned. The words redneck, hick, and hillbilly were used in many cases as well. Only one person specifically responded that they imagined a woman in their description. The two most outlandish responses were from Rural Ag High. Both students answered that farmers get a “free ride” from the government through checks. One of the students went on to say that they get rich off this money and sit on their “lazy asses” all day.

Objective 2: Knowledge about Agriculture

The population surveyed was unaware of the importance of certain New York State agriculture products (see Tables 4). The students of each school had an importance rating of over 50% for every product listed. They did not show many noticeable variations among the products. Most participants did not have accurate perceptions coinciding with the importance according to the rates of production in New York State. Grapes were perceived as the second most unimportant, with 21.3% agreement with this status. Apples were valued significantly higher by students in Urban High than Rural Ag High and Rural Non-Ag High students. The population did agree that dairy production is the most important for New York State agriculture.

Table 4
Rural and urban high school students' knowledge about New York State agriculture.

Importance of:	Population	Not Imp. (%)	DK (%)	Imp. (%)	Very Imp. (%)	Mean
Dairy Products	Overall (<i>n</i> = 768)	1.4	6.3	32.0	60.3	3.5
	Rural Ag High (<i>n</i> = 243)	2.9	6.2	27.7	63.2	3.5
	Urban High (<i>n</i> = 312)	0.6	6.8	32.2	60.5	3.5
	Rural Non-Ag High (<i>n</i> = 213)	0.9	5.6	36.6	56.8	3.5
Beef	Overall	6.5	15.9	35.9	41.6	3.1
	Rural Ag High	3.3	13.6	35.5	47.5	3.3
	Urban High	10.3	20.3	32.3	37.3	3.0
	Rural Non-Ag High	4.7	12.3	42.0	41.0	3.2
Corn	Overall	4.1	14.0	45.8	36.1	3.1
	Rural Ag High	4.1	12.4	36.9	46.5	3.3
	Urban High	3.9	16.5	45.5	34.2	3.1
	Rural Non-Ag High	4.2	12.2	56.3	27.2	3.1
Chicken	Overall	5.9	17.6	37.3	39.2	3.0
	Rural Ag High	5.0	18.2	36.8	40.1	3.1
	Urban High	7.1	23.2	31.2	38.6	3.0
	Rural Non-Ag High	5.2	8.9	46.9	39.0	3.2
Apples	Overall	4.2	13.2	47.1	35.6	3.1
	Rural Ag High	7.0	17.8	43.4	31.8	3.0
	Urban High	2.3	8.7	47.9	41.2	3.3
	Rural Non-Ag High	3.8	14.6	50.0	31.6	3.1
Pork	Overall	13.2	22.4	35.9	28.5	2.8
	Rural Ag High	6.6	21.1	41.7	30.6	3.0
	Urban High	17.7	28.3	28.0	26.0	2.6
	Rural Non-Ag High	14.2	15.1	41.0	29.7	2.9
Hay	Overall	6.8	31.1	37.4	24.7	2.8
	Rural Ag High	5.0	25.6	41.3	28.1	2.9
	Urban High	9.6	34.1	32.5	23.8	2.7
	Rural Non-Ag High	4.7	33.0	40.1	22.2	2.8
Grapes	Overall	11.1	25.3	42.3	21.3	2.7
	Rural Ag High	10.3	29.3	41.7	18.6	2.7
	Urban High	11.6	21.5	42.8	24.1	2.8
	Rural Non-Ag High	11.2	26.3	42.3	20.2	2.7

When comparing on-farm and off-farm students' knowledge about the importance of

agricultural commodities to New York State, on-farm students identified dairy (71.1%), beef (55.4%) and hay (53.0%) as the top three commodities of importance to the state (see Table 5). Off-farm students identified dairy (58.9%), beef (39.8%), and chicken (39.3%) as the top three commodities of importance to the state. Overall, fewer off-farm students identified the commodities as *very important*. In spite of the growing viticulture industry in the area, grapes were ranked lowest in importance by both groups of students.

Table 5
On- and off-farm high school students' knowledge about New York State agriculture.

Importance of:	Group	Not Imp. (%)	DK (%)	Imp. (%)	Very Imp. (%)	Mean
Dairy Products	On-farm (<i>n</i> = 83)	2.4	1.2	25.3	71.1	3.7
	Off-farm (<i>n</i> = 685)	1.3	6.9	32.8	58.9	3.5
Beef	On-farm	4.8	9.6	30.2	55.4	3.4
	Off-farm	6.8	16.7	36.7	39.8	3.1
Hay	On-farm	2.4	9.6	34.9	53.0	3.4
	Off-farm	7.3	33.8	37.7	21.1	2.0
Corn	On-farm	4.9	7.3	36.6	51.2	3.3
	Off-farm	4.0	14.8	47.0	34.2	3.1
Chicken	On-farm	8.4	18.1	34.9	38.6	3.0
	Off-farm	5.6	17.6	37.5	39.3	3.1
Pork	On-farm	8.5	15.9	39.0	36.6	3.0
	Off-farm	13.8	23.2	35.5	27.6	2.8
Apples	On-farm	6.0	14.5	50.6	28.9	3.0
	Off-farm	4.0	13.1	46.5	36.4	3.2
Grapes	On-farm	18.1	21.7	45.8	14.5	2.6
	Off-farm	10.2	25.7	41.9	22.1	2.8

Table 6 shows the population's knowledge the farmer's college education and occupation. Nearly half (49.6%) of Rural Ag High students agreed with the statement that most farmers work only on their farm. In New York State, farming is the primary occupation of 60.8% of the principal operators (USDA, 2002). Rural Non-Ag High students had the highest disagreement with this statement at 72%. Overall, the population did not believe that farmers had to go to college to be successful. The most interesting result from this statement concerning farmers' education was seen in on-farm students. The majority of on-farm students (67.9%) believed that farmers did not need college to be successful in agriculture.

Table 6
Rural, urban, on- and off-farm students' knowledge of a farmer's lifestyle.

Population	Most farmers work only on their <u>farm</u> .		Farmers must go to college to be <u>successful</u> .	
	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)
Overall (<i>n</i> = 768)	39.6	60.4	27.2	72.8
Rural Ag High (<i>n</i> = 243)	49.6	50.4	26.7	73.3
Urban High (<i>n</i> = 312)	40.1	59.9	32.9	67.1
Rural Non-Ag High (<i>n</i> = 213)	28.0	72.0	19.6	80.4
On-farm (<i>n</i> = 83)	34.2	65.8	32.1	67.9
Off-farm (<i>n</i> = 685)	40.2	59.8	26.6	73.4

Conclusions / Implications / Recommendations

The agriculturally related demographic data from each school is what was expected. A noticeably larger percentage of participants from Rural Ag High live on a farm, have relatives that work on a farm, and/or participate in an agriculturally related group. Urban High had the lowest agreement with the aforementioned statements; although it was not far below Rural Non-Ag High. Of special interest in this survey was the comparison of the three different school cultures and the differences in perceptions between farm and non-farm students.

Overall, students in these three schools were not agriculturally literate, even with a major land-grant university in the community and one school having an agricultural science program. Students in these schools still held on to several misconceptions about agriculture, including the idea that farming is hard work, farmers are poor, and the importance of various agricultural commodities in the state. Further, many students thought that farmers only worked on their own farms and that they did not have to attend college to be successful.

With the exception of thinking that most farmers were men and that you could identify a farmer by looking at him/her, students at Rural High School appeared to be slightly more agriculturally literate. Their general perceptions of agriculture and their knowledge about agricultural commodities were more in line with the actual state of agriculture in New York.

On-farm students from all three schools were more positive about farming, with more students agreeing that farming is lucrative, that most farms are smaller family farms, and disregarding the stereotype of a farmer's appearance. Further, these students identified dairy as the most important commodity by a wide margin, yet they gave more credence to corn and beef than is the case in the state's agricultural economy.

On average, on-farm students were a little more knowledgeable about some products, but not others. There is no noticeable correlation between participants knowledge of New York State agriculture. Of interest in this data, are the results concerning beef, pork, and hay. On-farm students viewed these products as more important than off-farm students. Combined with some other crops, hay accounts for 3.81% of the total value of agriculture products sold in New York State; beef accounts for 8.0% and pork for .5% (USDA, 2002). On-farm students rated hay as 31.9% more “very important” than off-farm students. Pork was rated as important by 75.6% of on-farm students and 63.1% by off-farm students. Pork is not very important to New York State. The participants who lived on farms, on-farm students were less accurate in this case.

Students did not know much about production agriculture in New York State and which commodities are important to the state’s economy. Dairy makes up for a little over 50% of New York State Agriculture and is produced statewide (USDA, 2002). New York State is the leading producer of dairy products nationally (New York State Department of Agriculture and Markets [NYSDAM], 2005). Most students in all schools and from farms understood the importance of dairy to the state’s agriculture economy. However, students living off-farm were markedly less in agreement as to dairy’s importance. Apple production in New York State is ranked 2nd nationally (NYSDAM). Nearly one-third of all students in all demographic categories understood the importance of apples. New York State grape production is ranked third highest in the nation (NYSDAM). All students perceived grapes and associated industries as being of little importance to agriculture in the state.

Among other commodities, students generally knew little of their importance to the state. Students believed that hay, corn, beef, chicken, and pork were more important than is actually the case. Perhaps the lack of knowledge stems from students’ general perceptions about agriculture. Students in all demographic categories also believed that a college education was not necessary for success in agriculture. This is particularly interesting and disturbing with one of the Nation’s elite colleges of agriculture in the community. Evidently, students do not realize the importance of a college education to successful agriculture

The implications of agricultural illiteracy in our schools and communities have direct impacts on agricultural policy and economics. Students who lack an understanding of the importance of agriculture or who hold various misconceptions and stereotypes about agriculture will become adults who make poor, misinformed decisions about political candidates, agricultural policy, and food and fiber decisions in their own homes. Agricultural illiteracy in youth translates into agricultural illiteracy in adults, yet these adults may have significant impacts on various aspects of food and fiber. For agricultural educators, this research provides one more piece of evidence relating to the agricultural illiteracy of our youth.

Further, in these three schools, Rural Ag High, Urban High, and Rural Non-Ag High, students were not markedly different in their agricultural illiteracy. Even though the community surrounding Rural Ag High is one of the most productive agricultural areas in the state, and even though Rural Ag High supports a two-teacher agricultural science program, these students were not more agriculturally literate than their counterparts at Urban High or Rural Non-Ag High. In fact, Rural Ag High students subscribed to the gender, appearance, and working condition stereotypes common to popular presentations of farmers. Further, students at Urban High

believed more accurately that a college education contributed to success in agriculture, than did students at either of the other two rural high schools.

Several recommendations arise out of this research. Agriculture science teachers and county extension faculty should promote more accurate representations of agriculture than traditional farming stereotypes. The faculty and outreach coordinators in the college of agriculture at Cornell University should engage the local communities in authentic education about the importance and current state of agriculture in New York State. Further, local FFA chapters may engage and educate civic organizations about the breadth and diversity of agriculture through the use of the Agricultural Issues Forum and Agricultural Communications Career Development Events.

Future research should engage local students in discussions about their perceptions of agriculture. Where do students find evidence to support their perceptions about agriculture? How do these perceptions influence their choices of future careers? When presented with information that more accurately portrays agriculture, how do these students respond?

As participants in the broad field of agriculture, agriculture educators must continue to educate as many people as possible about agriculture. Agriculture educators and agricultural science education must represent current agriculture practices, align with those individuals and entities outside of traditional production, and educate youth about the abundant and diverse career opportunities available in the broad field of agriculture.

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