

Perceptions of Freshman Agriculture Majors of Alternative Versus Conventional Agricultural Paradigms

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Abstract

This study examined the perceptions of freshman agriculture students enrolled at a land-grant university on the alternative and conventional paradigms of agriculture. Those who are proponents of these paradigms differ drastically in their views of agriculture's impact on the environment, the sustainability of current practices, and the policies needed to maintain a productive agriculture and viable rural America. The measurement of these beliefs was assessed on the Alternative vs. Conventional Agricultural Paradigm (ACAP) scale developed by Beus and Dunlap (1991). The findings revealed that freshman held views similar to those of conventional agriculturists. They largely agree that maintaining rural communities is essential to the future of agriculture, see farm tradition and culture as essential to good agriculture, and are more likely to see farming as primarily a business rather than a way of life. There was great variation in the scores by college majors. Agribusiness, turf management and poultry science majors held more of a conventional perspective of agriculture while entomology/pest management and horticulture majors tended more toward the alternative agriculture paradigm. Agricultural and extension education majors tended to hold more conventional views. Animal science majors had the greatest variability in scores. Differences in pre-college residence and parents educational level were low or moderate relationships. The freshman living on a farm reported the highest ACAP scores, which is a closer affiliation to the alternative paradigm. Higher ACAP scores were also found with students whose parents had a high school education and lower scores for students whose parents had a college education. Males tended to favor conventional agriculture more than females. These findings are similar to those of statewide farmers conventional agriculturists and senior students in the college.

Introduction and Theoretical Framework

Farmers and agricultural industry are increasingly becoming homogenized into mainstream U.S. society and its industrial economy. As a result, agriculture is rapidly losing its "uniqueness." Non-agricultural groups have become involved in agricultural policy and are outlining a new agenda largely of issues and problems defined by non-farm interests (Beus & Dunlap, 1993). Prior to this, agricultural policy was largely controlled by the major farm organizations, the agricultural committees of Congress, the United States Department of Agriculture, and to some extent the land grant colleges of agriculture. This shift in policy development is a paradigm shift --a change in the rules or boundaries of agriculture (Barker, 1993). As a result, two divergent viewpoints are developing regarding the desired future of agricultural production in the United States. According to Beus and Dunlap (1991) some promote the vision of agriculture as large scale, industrialized production that is capital intensive, highly mechanized, using extensive amounts of synthetic fertilizers and pesticides and may involve highly concentrated and intense livestock production. Knorr and Watkins (1986)

call this “conventional agriculture.” Conventional agriculture may also include the agricultural business complex with which today's farmers are highly integrated (Martinson and Campbell as cited in Buttel and Newby, 1980).

Other individuals have a vision for agriculture as smaller farm units with reduced use of agricultural chemicals, reduced energy use, greater farm self-sufficiency, and a goal of improved conservation and regeneration of agricultural resources such as soil and water (Buttel, Gillespie, Janke, Caldwell, & Sarrantonio, 1986). This is called "alternative agriculture" (Lockeretz, 1986) and encompasses many different approaches, ranging from organic farming to permaculture.

These conventional and alternative agriculture proponents differ drastically in their view of agriculture's impact on the environment, the ecological and socio-economic sustainability of current practices and the policies needed to maintain a productive agriculture and viable rural America. Defenders of the conventional agricultural system feel that current problems in agriculture can be solved by scientific and technical progress while those favoring alternative agriculture believe that conventional agriculture needs a complete revamping to solve the ecological, economic and social problems associated with agriculture (Beus, Dunlap, Jimmerson, & Holmes, 1991).

Increased public demands to hold corporations accountable for environmental damage and the increasing willingness of federal and state authorities to pursue civil and criminal environmental cases are expanding into the agricultural community. Opinion polls reveal that 80 % of Americans feel that farmers are polluters, especially those farmers using pesticides. It has been estimated that 64 % of America's rivers have been polluted as a result of agricultural production practices (Copeland, 1993).

Proponents of conventional agriculture have often ridiculed the environmental movement accusing their critics of being radical, of knowing little about farming, or the economics of the "real world" (Beus & Dunlap, 1990). This difference of opinion has escalated into political confrontation.

Beus and Dunlap (1991) propose that these viewpoints are paradigms that can be represented on a continuum from alternative to conventional. In order to assess adherence to either the alternative or conventional viewpoint, they developed the Alternative vs. Conventional Agricultural Paradigm (ACAP) scale. This scale measures basic beliefs and values assumed to constitute the two competing perspectives of agriculture. The instrument has been validated with known groups of alternative and conventional agriculturists, as well as statewide groups of farmers and agricultural faculty at a state land-grant university.

Graduates of U.S. colleges of agriculture will become leaders who will shape the policies and decisions about agriculture for the next generation. As the groups supporting alternative agriculture seem to be growing in number, size, and political influence while the farm population decreases, it will be incumbent upon agricultural graduates to assist communities to critically analyze agricultural science and practice. New skills will be needed to effectively use knowledge and technology in the change process. Agricultural education is situated in an important position in the ongoing debates of alternative and conventional agriculture production. With the vast changes taking place in agriculture, there is much attention being given to agriculture production needed to meet the demand of the global economy. Are changes needed in the curriculum of agricultural colleges? Since little is known about how these debates have influenced students enrolled in colleges of agriculture, it is important to understand the beliefs and values of future players in this agricultural debate.

Purpose and Objectives

The purpose of this study was to describe the beliefs of entering freshman in a college of agricultural, food and life sciences relative to their adherence to alternative versus conventional agricultural paradigms.

The specific objectives of the study were to:

1. Determine the alternative or conventional agricultural beliefs, as measured by ACAP scale scores, of freshman agriculture majors enrolled in a land-grant college of agricultural, food and life sciences.
2. Compare alternative or conventional beliefs of freshman agriculture students by major, gender, parent's education, and pre-college residence.
3. Compare the ACAP scale scores of freshman agriculture majors to ACAP scores of known groups of conventional and alternative agriculture.

Methods and Procedures

The population for this study was entering freshman in a college of agricultural, food and life sciences enrolled in a orientation course, AGED 1011-B Freshman Orientation. The instrument used was the Alternative-Conventional Agricultural Paradigm (ACAP) scale developed by Beus & Dunlap (1991). It contains 24 bipolar statements that portray the respective positions of the two paradigms: the conventional view of agriculture and the alternative view of agriculture. The ACAP instrument was administered during the second week of the semester to 75 students beginning in the fall semester of 1999 and enrolled in the freshman orientation class open to all majors of agriculture. Students enrolled in crops, soils and environmental sciences did not complete the survey.

The 24 items on the instrument are organized into six major dimensions: centralization vs. decentralization, dependence vs. independence; competition vs. community; domination of nature vs. harmony with nature; specialization vs. diversity; and exploitation vs. restraint. Some items are value oriented, while others focus more on beliefs about agricultural practices or issues. Some items present completely opposite positions, while the positions in other items were designed to accurately portray the contrasting positions held by the alternative or conventional agriculturists. Twelve of the 24 items are reversed in direction to help offset response set bias. A five-point scale is placed between each of the two contrasting positions with 3 representing a neutral position. Respondents were asked to circle one number per item. The possible range of total scores is 24 to 120 with a low score representing a strong endorsement of conventional agriculture and a high score representing strong endorsement of alternative agriculture. Figure 1 shows an example item from the ACAP instrument.

The abundance and relatively low prices of food in the United States are evidence that American agriculture is the most successful in the world	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.
1 2 3 4 5	

Figure 1: Example item from the ACAP instrument.

Beus and Dunlap (1991) reported that the average internal consistency of the instrument ranged from .74 to .93 for different groups, with an overall average of .88. Construct validity was established through comparisons of known alternative and conventional agriculturists verified by the developers of the instrument. For the present study, a coefficient alpha reliability estimate of .78 was obtained. Data were analyzed using the SAR7 statistical package.

Findings

Students in nine of the 11 majors of the Bachelor of Science in Agriculture degree were represented in this study. Majors in common discipline areas were collapsed into departmental majors, (i.e. urban horticulture/landscape design majors and other horticulture majors), creating eight different majors for the study. Students majoring in poultry science represented the largest percentage of the freshman majors with 26.2% of the total. Students enrolled as agricultural and extension education and animal sciences majors each represented 16.9% of the total, while horticulture had 13.8% and turf management majors represented 10.8%. Entomology/pest management (4.6%) and food science (4.6%) majors were represented the least as majors of the freshman students in this orientation course.

Objective 1

ACAP scale scores ranged from 59 to 110 (Table 2) with the former representing strong endorsement of the conventional agriculture paradigm and the latter strong endorsement of the alternative paradigm. The mean ACAP score for all freshmen in agricultural, food, and life sciences was 79.47. Considerable variation in mean ACAP scores occurred across the various majors in the College, ranging from a low of 70.75 for agricultural economics/business students (more conventional than the known conventional agriculturists) to 86.67 for entomology/pest management students. The greatest variability occurred in the scores for animal science students with a range of scores from 69-110, followed by agricultural and extension education majors and turf management scores from 60 B 91 and 65 B 92, respectively.

Entomology/pest management majors (Mean=86.67) had the highest mean ACAP scale score. Higher ACAP scores are similar to that of known alternative agriculturists and signify these students are much more likely to endorse the alternative agriculture viewpoint. Likewise animal science majors (Mean =82.27), agricultural and extension education majors (Mean =80.45) and poultry science majors (Mean = 78.53) had great variation in the range of ACAP scores signifying opposing viewpoints in these majors. Agricultural business students had the lowest overall mean ACAP score (Mean =70.75), followed by turf management (Mean=76.57)

and poultry science (Mean = 78.53). These scores are similar to known conventional agricultural viewpoints.

Table 1
Classification of freshman enrolled in an agriculture orientation course

Major	N	Percent
Agricultural Economics/Business	4	6.2
Agricultural & Extension Education	11	16.9
Animal Science	11	16.9
Entomology/pest management	3	4.6
Food Science	3	4.6
Horticulture	9	13.8
Turf Management	7	10.8
Poultry Science	17	26.2
Missing	10	
Total	75	100.0

Table 2
ACAP scale scores for freshman majoring in agricultural, food and life sciences

Major	ACAP Mean	S.D.	Range
Agricultural Economics/Business	70.75	2.21	68 - 73
Turf Management	76.57	8.98	65 - 92
Poultry Science	78.53	9.66	59 - 99
Agricultural & Extension Education	80.45	8.89	60 - 91
Animal Science	82.27	12.60	69 - 110
Food Science	83.00	13.08	68 - 92
Horticulture	83.89	6.71	75 - 96
Entomology/pest management	86.67	10.60	77 - 98
Total	79.47	9.61	59 - 110

Objective 2

Possible variations of the student's perspectives were examined by comparing ACAP scale scores and four background characteristics that might offer possible predictions of paradigmatic orientations: gender, pre-college residence, parent's educational level, and major (Table 3).

There were 29 (42.7%) male respondents and 39 (57.4%) female respondents in this study. Female students (Mean = 82.39) rated 7.11 points higher on the ACAP scale than did the male students (Mean = 75.28). To determine if a relationship existed between the ACAP score and gender, a correlation coefficient was computed on these variables. A moderate correlation ($r = .30$) was found between gender and ACAP scores (Davis, 1971) but explaining less than ten percent of the variance.

Traditionally, a majority of students studying agriculture have had a farm background. Although this situation is rapidly changing (Dyer and Breja, 1999), most of these students in this study had grown up on a farm or in a rural area. Prior to college enrollment, 40.6 % reported they lived on a farm, 24.6 % lived in rural, non-farm areas and 20.3% reported growing up in towns of 10,000-50,000. Only 8.7% reported living in towns less than 10,000 population while 5.8% lived in cities over 50,000 in size.

ACAP scale scores were more conventional for freshman living in towns under 10,000 in size. (Mean = 74.43). There were similar ACAP scores for students living in rural, non-farm settings and in cities of 10,000 to 50,000 in size. The freshman living on a farm reported the highest ACAP scores (Mean = 82.71), which is a closer affiliation to alternative paradigm. Students growing up on a farm also had the greatest variability in ACAP scores than did other students. However, the correlation ($r = -.20$) indicated a negligible relationship between pre-college residence and ACAP scale scores (Davis, 1971).

There was an almost equal distribution of the respondents' parents who had completed high school, some college, or a college degree. A very small percentage of these respondents had parents with less than a high school education. There were 38% of the respondents' parents with college degrees. There were 19 (29.23%) of the respondents' fathers and 17 (26.15%) of the respondents' mothers who had bachelor degrees and an additional 13 (20.00%) of the parents with advanced degrees. The ACAP mean scores of the respondents' fathers ranged from 59-110 with those having less than a high school education reporting the highest ACAP mean score of 92.00. Those fathers with a bachelors degree reported the lowest ACAP mean score (Mean = 77.84). A negative but low relationship ($r = -.11$) was found between ACAP scores and the father's level of education.

The mean ACAP scores of the respondents' mother's educational level ranged from 66-110. These scores mirrored those of the fathers with the highest ACAP scores being reported by students whose mothers had a high school education (Mean = 82.63) and the lowest ACAP score reported by students whose mother had a bachelors degree (Mean = 77.82). There were very similar ACAP scores for the students whose mothers had an advanced degree. The mother's educational level also had a negative and low relationship ($r = -.23$) with the ACAP scale score (Davis, 1971).

Table 3
ACAP scale scores for agriculture majors listed by gender, pre-college residence, and educational level of their parents

<u>Gender</u>	<u>N</u>	<u>Percent</u>	<u>Mean</u>	<u>S.D.</u>	<u>Range</u>
Male	29	42.65	75.28	7.20	59-90
Female	39	57.35	82.39	9.94	66-110
Missing	7				
<u>Pre-College Residence</u>					
Farm	28	40.57	82.71	9.76	68-110
Rural, Non Farm	17	24.63	78.59	11.21	59-96
Town Under 10,000	6	8.70	74.33	6.38	66-85
City 10,000-50,000	14	20.28	76.43	5.54	68-88
City Over 50,000	4	5.80	79.50	13.92	67-96
Missing	6				
<u>Education of Father</u>					
Less than H.S. diploma	3	4.62	92.00	18.00	74-110
H.S. diploma or GED	20	30.77	80.30	9.22	60-99
Some College	16	24.62	78.56	8.40	66-99
BS Degree	19	29.23	77.84	9.36	59-98
MS or Ph.D.	7	10.77	84.29	9.43	71-96
Missing	10				
<u>Education of Mother</u>					
Less than H.S. diploma	0				
H.S. diploma or GED	19	29.23	82.63	7.60	69-99
Some College	23	35.38	80.30	10.39	66-110
BS Degree	17	26.15	77.82	11.36	59-98
MS or Ph.D.	6	9.23	78.00	8.89	68-89
Missing	10				

Objective 3

To determine if freshman agricultural majors were similar in their viewpoints with those of known conventional and alternative agriculturists, a comparison was made of the mean ACAP scores of these groups. There were nine groups used in the original research, which were classified as either alternative agriculturists or conventional agriculturists. Known alternative agriculturists included members of a state association of permaculture, members of a coalition for alternatives to pesticides, and certified organic farmers. Conventional agriculturists included Farm Bureau members, chemical dealers, and aerial pesticide applicators. A statewide farmer sample was also used as intermediate between the known groups of alternative and conventional agriculture; however, their responses are more similar to the conventional group than to the alternative groups. For a complete description of this research, see Beus and Dunlap, 1991. Additionally, senior students in the college were also used as a comparison group with data obtained from a previous study.

The mean ACAP score of the freshman agriculture majors (Mean = 79.5) was basically the same as senior agriculture majors and almost the same as the statewide farmer sample (Mean =80.9) but slightly higher than the known conventional agriculturists (Mean =73.3). The alternative agriculturists had an overall mean score of 102.1. The means and range of scores are shown in Table 4.

Table 4
Means scores of the alternative agriculturists, conventional agriculturists, seniors and freshmen majoring in agriculture

Group	Mean	S.D.	Range
Alternative Agriculturists	102.1	14.0	46-120
Statewide farmers	80.9	11.6	37-114
Conventional Agriculturists	73.3	11.7	41-105
Senior Agriculture Students	79.1	11.5	49-118
Freshman Agriculture Students	79.5	9.6	59-110

Conclusions and Recommendations

Overall, these freshman agricultural majors adhere to the conventional agricultural paradigm. They have similar scores to those of statewide farmers and conventional agriculturists. While the ACAP scores varied more widely, the freshmen held the same views as senior students in the college. The conventional agriculturists still largely agree that maintaining rural communities is essential to the future of agriculture, see farm tradition and culture as essential to good agriculture, and are more likely to see farming as primarily a business rather than a way of life. However, there was wide variation of these viewpoints within majors.

The agribusiness, turf management and poultry science majors in this study hold more of a conventional perspective of agriculture and would thus endorse conventional agricultural

practices. By comparison, entomology/pest management and horticulture majors tended more toward the alternative agriculture paradigm. Agricultural and extension education majors tend to hold more conventional views. Animal science majors reflected the greatest variability in the range of scores. Variation in the scores by the different majors indicates that these freshmen have diverse viewpoints on the agricultural paradigms

Differences in the pre-college residence, and parent's educational level were low or moderate relationships. However, males tended to favor conventional agriculture when compared to females. This trend follows other research, which indicates that females are more likely to endorse more strongly than do men environmental protection, appropriate technology, risk avoidance, and other issues closely related to the alternative agriculture paradigm (Blocker & Eckberg, 1989). However, with only a seven-point difference in the means, one could conclude that any differences might be a function of choice of major by gender. Students with lower ACAP scores tended to have college-educated parents.

Based upon the findings of this research, the following recommendations are made:

1. Further study is needed to determine if students select majors based on their beliefs of the paradigm and how this viewpoint is developed.
2. Continuing research is needed to determine the alternative and conventional paradigms of entering students, if a student's view of the paradigms changes over a period of time, and if faculty influence student viewpoints.
3. Further study is needed to determine if the alternative or conventional beliefs of agriculture faculty are similar to agriculture majors.
4. Further study is needed to determine if the alternative or conventional beliefs of non-agriculture majors are similar to agriculture majors.
5. Further study is needed to try to explain how educational level influences the beliefs in the alternative or conventional paradigms.
6. A greater philosophical question for study is whether colleges of agriculture are exposing students to differing viewpoints regarding production practices in agriculture.

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Perceptions of Freshman Agriculture Majors of Alternative Versus Conventional Agricultural Paradigms

A Critique

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Contribution and Significance of Research

The results of the study describe well the beliefs of entering freshmen in one college of agriculture as related to conventional and alternative perceptions of agriculture. While some implications may be inferred, the results do not address directly the important question stated by the author, namely, "Are changes needed in the curriculum of agricultural colleges?"

Procedural Considerations

The research was designed well and carried out effectively, even though students in crops, soils, and environmental sciences were not included. While ACAP means obtained could be associated with conventional or alternative paradigms, it should be noted that the range in scores and the large standard deviations in six of the eight groups reflected the spread in the beliefs by the students in each group. If the study is replicated, could the five-point scale used with the 24 bi-polar statements be expanded to a seven or nine-point scale? Doing so provides a chance to respond more closely to marking along a continuum, as is commonly done when using semantic differential scales.

Questions for Consideration

Because the freshmen tended to mirror the Alternative vs. Conventional Agricultural Paradigm (ACAP) scores of statewide farmers and conventional agriculturalists, and because 65.2% of them had come from farms or rural, non-farm areas, should we replicate this study in a college of agriculture where a higher percentage of freshmen students come from urban areas in order to determine if there is consistency?

Because the research was conducted on first year agricultural majors and attempted to identify factors at work that caused them to bring to college the viewpoints that they held, it is important to carry out the author's Recommendation #2, that research is needed to determine if the college faculty influence students' viewpoints over a period of time until graduation. Can we do so, but factor out other contaminating factors, such as viewpoints contributed by student peers and increased accessibility to activities of various public interest or pressure groups? Possibly, additional research should focus on the whole college experience, and not just the influence of the faculty. However, probably more important, in terms of further research, is following the author's Recommendation #6, namely, "A greater philosophical question for study is whether colleges of agriculture are exposing students to differing viewpoints regarding production practices in agriculture." Should we not be doing so?