

# Changes in Student Perception of Food Animal Agriculture Following Discussion of Controversial Topics

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## Abstract

Discussions on controversial issues in food animal agriculture were incorporated into NC State University's Introduction to Animal Science Lab. Student ( $n=136$ ) perceptions were evaluated through pre- and post-lab surveys collected over two years with responses on a Likert scale ranging from "not at all" (score 1) to "very much" (score 5). Three topics increased in score ( $P<0.01$ ): "How aware are you of the current issues facing animal agriculture?" (3.06 pre to 4.17 post), "Can you describe the difference between animal rights and animal welfare?" (3.58 to 4.55), "Do you consider the US food supply to be safe, wholesome and nutritious" (3.41 to 3.87). Following the discussion, students indicated their understanding of what constitutes poor animal husbandry changed (3.75, SEM=0.09) and they had a better understanding of how animal agriculture interacts within the environment (4.22, SEM= 0.07), antibiotic usage in animal agriculture (4.29, SEM=0.08), and hormone usage in animal agriculture (4.27, SEM= 0.08). Some responses differed by gender (understanding of animal rights vs. welfare) and by college in which the students were enrolled. Based on student responses, this discussion format was determined to be an effective and worthwhile addition to this introductory level course.

## Introduction

Student attitudes toward animal agriculture can vary depending on many factors, including gender (Bennett-Wimbush et al., 2015; Herzog, 2007; Taylor and Signal, 2005; Paul and Podberscek, 2000), residence (Kelbert and Berry, 1980), ethnicity (Davey, 2006), companion animal ownership (Taylor and Signal, 2005) and other demographic characteristics (Bennett-Wimbush et al., 2015; Signal and Taylor, 2006). Attitudes can also depend on species in question (e.g., horses vs. cattle) and experience working with livestock (Adams et al., 2015). Student demographics and backgrounds vary over time in a university setting, and more students with little to no experience with livestock are now interested in studying animal science at land grant universities (Britt et al., 2008). These students lacking experience and knowledge about animal agriculture may share similar

misconceptions about livestock as the general public (as reviewed in Terry et al., 1992).

Adams et al. (2015) documented the demographics of introductory animal science courses and wanted to determine if student background experiences correlated with student perceptions of livestock production. Student agricultural background did have an effect on how animal agriculture was perceived, specifically regarding media portrayal and animal welfare (Adams et al., 2015). Smith et al. (2009) found that high school students who had lived on a farm were more positive about farming than those students who had not lived on a farm. Similarly, in the study conducted by Walter and Reisner (1994), urban students were more critical of livestock agriculture than students from rural areas. This may be a result of opinions formed based on media coverage of livestock agriculture as opposed to first-hand experience and suggests that covering controversial topics in an animal science curriculum is essential in order to produce well-rounded and well-informed students preparing for careers related to livestock agriculture. Controversial topics in livestock agriculture are numerous and complex and preparing future animal scientists to handle such issues in professional settings is important. The objective of this study was to investigate how students perceive food animal agriculture and how an informative, discussion-based presentation focused on controversial topics could influence student perceptions and understanding.

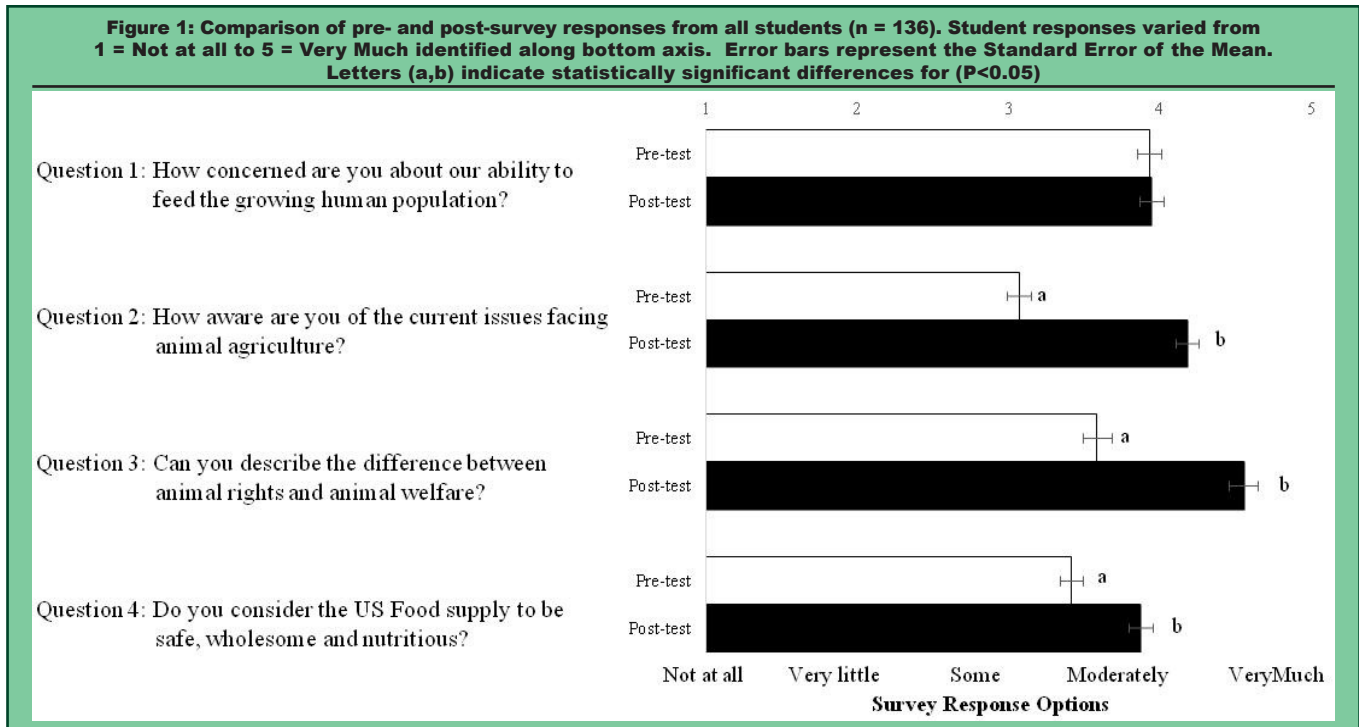
## Materials and Methods

The Introduction to Animal Science Laboratory at North Carolina State University was chosen as a representative course because the material is a universal component of animal science curricula nationwide (Britt et al., 2008). Students enrolled in the course represented a wide range of academic and animal experience. This investigation was a descriptive census (all members of the class) study (Patton, 2002). Due to the restrictions of a census study, participants were not selected randomly but were considered representative of undergraduates at North Carolina State University who had previously or will enroll in this course.

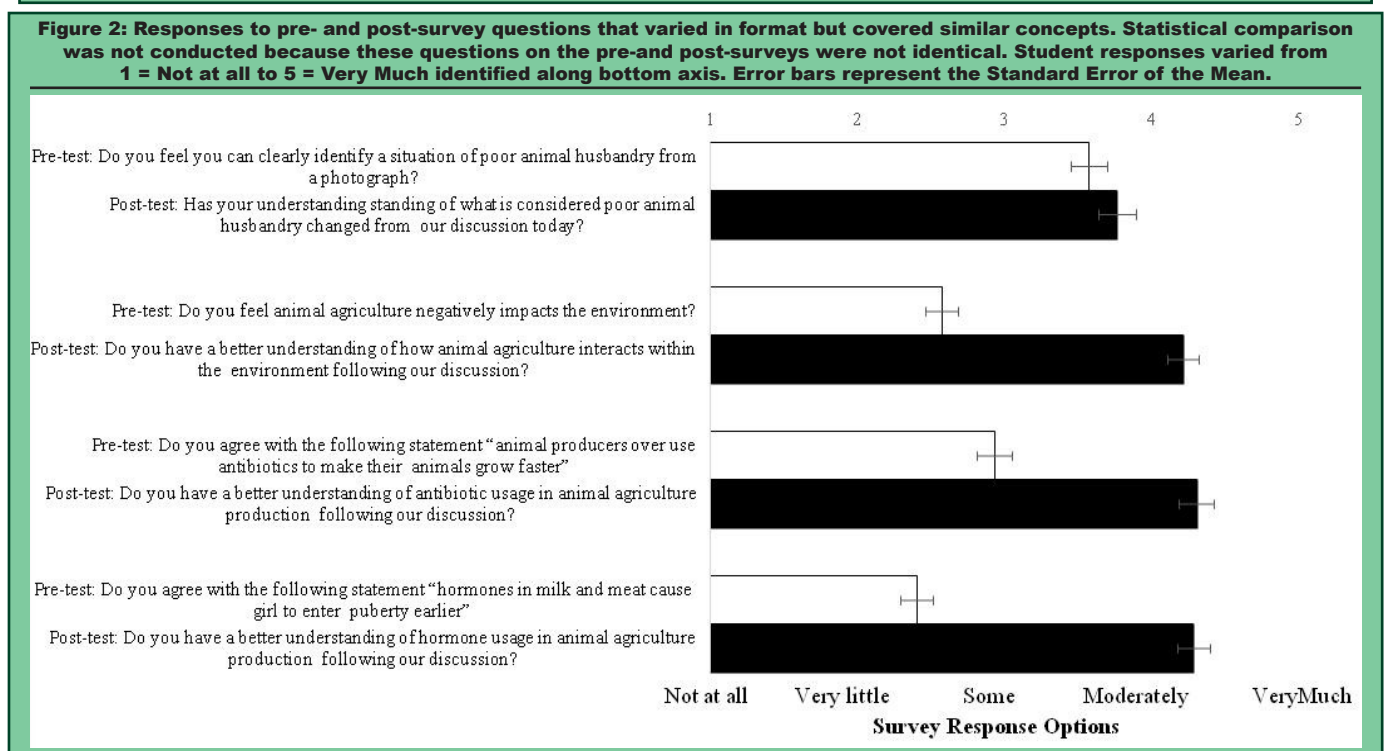
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## Changes in Student Perception

**Figure 1: Comparison of pre- and post-survey responses from all students (n = 136). Student responses varied from 1 = Not at all to 5 = Very Much identified along bottom axis. Error bars represent the Standard Error of the Mean. Letters (a,b) indicate statistically significant differences for (P<0.05)**



**Figure 2: Responses to pre- and post-survey questions that varied in format but covered similar concepts. Statistical comparison was not conducted because these questions on the pre-and post-surveys were not identical. Student responses varied from 1 = Not at all to 5 = Very Much identified along bottom axis. Error bars represent the Standard Error of the Mean.**



The course instructors developed two surveys with a range of questions regarding livestock agriculture. Students from the Introduction to Animal Science Laboratory in the spring semesters of 2014 and 2015 were included in the survey (n = 136). Surveys were administered at the beginning and end of the lab period. The pre- and post-lab surveys consisted of 10 and 9 questions, respectively. The first four questions on the pre- and post-lab surveys were identical (Figure 1), whereas the remaining questions on the pre- lab survey varied slightly from the post-lab survey (Figure 2). Responses included a 1 to 5 Likert scale using descriptors such as "not at all" to "very much."

Controversial livestock agriculture topics included: concern about feeding the growing population, awareness of issues facing animal agriculture, the safety of food and welfare of animals in agriculture, tools used in animal agriculture such as hormones and antibiotics and the use of social media to discuss these topics. In year two, an interactive audience response polling system (Turning Point Technologies©) was included in the lecture PowerPoint®. Questions included in the poll asked students for their opinions concerning food security and safety as well as asking students to recognize various classifications of livestock agriculture based on photos (e.g., organic, cage-free). This provided a visual

representation of responses in bar graph form on the screen that assisted in student discussion between topics. Within the various lab sections, students were presented information accompanied with a series of pictures or video pertaining to a controversial issue. Students were asked to discuss and respond to the information provided. In year two, students were asked to respond to questions using the audience response polling system following the provided information; open discussion occurred after this point. No demographic questions were included in the surveys, poll or analyses. The goal of this study involved efforts to improve instruction and thus was deemed exempt by the North Carolina State University Institutional Review Board. Student responses were anonymous and no identifying information was used in the data analysis.

Data were entered into an Excel® spreadsheet. Data were analyzed numerically (“not at all” received a 1, “very much” received a 5) and means were calculated for survey questions 1-9. Identical questions from pre- and post-lab surveys were compared for significant changes in responses, and change in response was also compared between years to determine if there was an effect of the in-class poll. Differences in pre and post-test data were analyzed using Paired T-Test model in SAS 9.2 (SAS Inst. Inc., Cary, NC). Correlation analysis (Pearson) was performed between demographic main effects (gender, college, major, academic rank, transfer status and semesters enrolled at the university) and composite score using least square means. Major, academic rank, transfer status and semesters enrolled at the university did not influence the student response and was subsequently removed from the model. These data were analyzed using Proc Mixed of SAS 9.2 (SAS Inst. Inc., Cary, NC). Significance was reported at  $P < 0.05$  and trends were reported at  $0.05 < P < 0.10$  level.

**Results and Discussion**

The target population consisted of 136 undergraduate students (17% male and 83% female) from the Introduction to Animal Science Laboratory during the Spring semesters of 2014 and 2015. Of the 136 students, 78% were enrolled in the Colleges of Agriculture and Life Sciences, 9% in the Colleges of Sciences and 13% were undeclared university students or students with majors in the College of Humanities and Social Sciences. Eighteen different majors were represented within this student population, with 57% of the students pursuing a degree in Animal Science. Additionally, students in the

course were distributed into the following academic ranks: seniors (13%), juniors (32%), sophomores (35%) and freshmen (20%). These data were collected in the spring semester and the course is restricted to Animal Science freshmen in fall semester, so it is not surprising that 68% of the students transferred into the university after completing coursework at another college or university. With this large percentage of students transferring into the university, the number of semesters enrolled at the university ranged from 1 to 7 semesters.

All four questions included on the pre- and post-survey increased in score following the course activity ( $P < 0.05$ ) except for one (Q1; Figure 1). Student concern about feeding the growing population was high and did not change ( $P > 0.10$ ) following the lab period. However, after the class presentation and discussions, students indicated that they had a greater awareness of current issues facing animal agriculture and had an increased ability to differentiate between animal rights and animal welfare ( $P < 0.05$ ). Because there is growing concern in the general public about practices in livestock agriculture, especially concerning animal welfare (Poletto and Hotzel, 2012; Verbeke and Viaene, 2000), it is important

**Table 1. Pre- and post-survey responses by gender<sup>1,2</sup>**

		Pre-test	Post-test	P value
<b>Question 1:</b> How concerned are you about our ability to feed the growing human population?	Male	3.4	3.7	0.48
	Female	3.8	3.7	0.88
<b>Question 2:</b> How aware are you of the current issues facing animal agriculture?	Male	2.8	4.1	<.0001
	Female	3.1	4.2	<.0001
<b>Question 3:</b> Can you describe the difference between animal rights and animal welfare?	Male	2.9	4.5	<.0001
	Female	3.6	4.6	<.0001
<b>Question 4:</b> Do you consider the US Food supply to be safe, wholesome and nutritious?	Male	3.3	3.9	0.04
	Female	3.3	3.8	0.05

<sup>1</sup>Pre- and post-survey responses varied by gender (male, n = 23; female, n = 113).

<sup>2</sup>Student responses varied from: 1 = Not at all; 2 = Very little; 3 = Some; 4 = Moderately; 5 = Very Much. P-values within gender are considered statistically difference at ( $P < 0.05$ ).

**Table 2. Comparison of survey responses by college in which the students were enrolled<sup>1,2</sup>**

		Colleges			P value	P value
		CALS	COS	UN	CALS-COS	CALS-UN
<b>Question 1:</b> How concerned are you about our ability to feed the growing human population?	Pre-test	4.0	3.3	3.5	0.009	0.040
	Post-test	4.1	3.3	3.7	0.002	0.099
<b>Question 2:</b> How aware are you of the current issues facing animal agriculture?	Pre-test	3.3	2.6	3.0	0.003	0.089
	Post-test	4.3	4.0	4.2	0.271	0.735
<b>Question 3:</b> Can you describe the difference between animal rights and animal welfare?	Pre-test	3.6	3.1	2.9	0.123	0.016
	Post-test	4.6	4.5	4.6	0.689	0.993
<b>Question 4:</b> Do you consider the US Food supply to be safe, wholesome and nutritious?	Pre-test	3.6	3.3	3.0	0.273	0.040
	Post-test	3.9	3.8	3.8	0.781	0.761

<sup>1</sup>Pre- and post-survey responses varied by college in which the student were enrolled CALS = College of Agriculture and Life Sciences (n = 106); COS = College of Sciences (n = 12); UN = University undeclared majors plus students from the College of Humanities and Social Sciences (n = 18).

<sup>2</sup>Student responses varied from: 1 = Not at all; 2 = Very little; 3 = Some; 4 = Moderately; 5 = Very Much. P-values for main effects of college were considered statistically difference at ( $P < 0.05$ ).

**Table 3. Responses by college the students were enrolled in to questions about hormone and antibiotic use in animal agriculture<sup>1,2</sup>**

	CALS	COS	UN	P value	P value
				CALS-COS	CALS-UN
<b>Pre-test:</b> Do you agree with the following statement “animal producers over use antibiotics to make their animals grow faster”	2.8	3.6	3.4	0.025	0.001
<b>Post-test:</b> Do you have a better understanding of hormone usage in animal agriculture production following our discussion?	4.4	3.8	4.3	0.00	0.659

<sup>1</sup>Pre- and post-survey responses varied by college in which the student were enrolled CALS = College of Agriculture and Life Sciences (n = 106); COS = College of Sciences (n = 12); UN = University undeclared majors plus students from the College of Humanities and Social Sciences (n = 18).

<sup>2</sup>Student responses varied from: 1 = Not at all; 2 = Very little; 3 = Some; 4 = Moderately; 5 = Very Much. P-values for main effects of college were considered statistically difference at ( $P < 0.05$ ).

## Changes in Student Perception

for students who will obtain careers involving animals to be aware of societal views of food animal agriculture, the current practices of livestock operations and the regulations governing management practices

Student perception of whether the US food system is safe, wholesome, and nutritious had a positive change following the activity ( $P < 0.05$ , Figure 1). The positive change in response to this question is likely associated with the increase in student understanding of how animal agriculture interacts with the environment, antibiotic and hormone usage in animal agriculture (Figure 2).

Females indicated they were better able describe the difference between animal rights and animal welfare on the pre-survey compared to males. This is in agreement with recent finding by Bennett-Wimbush et al. (2015) which also reported that more females (88%) indicated they could distinguish between animal rights and animal welfare than males (75%). However, responses were similar for animal right versus animal welfare on the post-survey for males and females and both genders were confident they distinguish between animal rights and animal welfare follow the laboratory discussion.

Terry and Lawver (1995) reported that College of Agricultural Science students had more favorable perceptions of similar issues when compared to students in the College of Arts and Sciences. Therefore, student responses to the survey questions were further analyzed by comparing students with majors in the College of Agriculture and Life Sciences (CALS; mostly Animal Science and Ag Education) to those in the College of Sciences (COS; mostly Zoology and Biology) or to students in non-science majors (UN; mostly undeclared university students or students with majors in the College of Humanities and Social Sciences); see Tables 2 and 3. Students in CALS were more concerned pre- and post-survey about our ability to feed the growing human population than were students in COS or in UN (Table 2). The survey administered prior to the discussions showed a difference between CALS and COS and a tendency for a difference between CALS and UN for the question about awareness of issues facing animal agriculture, but those differences disappeared after the in-class presentations and discussions. Furthermore, the pre-survey showed a difference between CALS and UN pertaining to questions about animal rights/welfare and safety of the US food supply, whereas no difference was observed between life science oriented students (CALS and COS; Table 2). Differences on questions about animal rights/welfare and safety of the US food supply disappeared after the in-class presentations and discussions. Interestingly, there was not a difference between CALS and COS on the pre- and post- questions about animal rights/welfare and safety of the US food supply.

Table 3 shows differences in CALS students compared to either COS or UN students when asked in the pre-test about over-use of antibiotics in livestock, indicating that CALS students were more knowledgeable about livestock practices in the industry. The CALS and UN

students indicated a better understanding of hormone usage in animal agriculture following the in-class presentations and discussions when compared to students in COS. Terry and Lawver (1995) found that university students in the College of Agricultural Science at Texas Tech had more favorable perceptions of farming/ranching practices and animal medications when compared to students in the College of Arts and Sciences.

Another interest was to see if using the in-class polling (“clickers”) in the second year would alter the discussion results. While the in-class polls encouraged student discussion, there was no difference in changes in perception following the lab with the addition of the poll ( $P > 0.10$ ). This suggests that even without the use of advanced classroom tools and technologies, in-class presentations and student discussions about controversial topics in agriculture can be beneficial for students in the field. The presentation of controversial topics with visuals followed by class discussion may have given those students with very little exposure to animal agriculture a more sophisticated foundation upon which to form opinions about the controversial issues. According to Walter and Reisner (1994), animal science students who had encountered issues in livestock agriculture in the classroom were better able to offer and articulate their opinions on a similar, short-answer survey than those who had not, regardless of farm experience. Based on the survey results included in this study as well as observed student engagement and interest, the activity was determined to be an adequate introduction to the complex issues in food animal agriculture and a worthwhile addition to the course.

## Summary

As the demographics of students seeking degrees at Land Grant Universities continues to change, so do their attitudes toward the various production systems utilized in animal agriculture. Because there is growing concern in the general public about practices involved in livestock agriculture, it is important for students who will obtain careers involving animal agriculture to be aware of societal views of food animals, the current practices of livestock operations, and the regulations governing management practices. Initial student knowledge of controversial issues, such as differences between animal rights and animal welfare, hormone and antibiotic usage, and factors that influence the U.S. food supply, was somewhat limited despite many of them seeking a degree in Animal Science. This learning activity engaged students in discussion about these animal agriculture issues, which increased their perception and knowledge of consumer attitudes and misconceptions about labeling of products. In addition, methods to stimulate discussions to educate individuals not familiar with these agricultural practices were explored. Results of this study indicate a student's gender and college which they are enrolled in influence the student's perceptions of animal care, use and treatment by society. Providing students the opportunity to discuss these issues in

animal agriculture sparked student engagement and interest and was successful at introducing students to the complex issues in food animal agriculture.

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