


2012

# Undergraduate education and attitudes towards swine welfare

Maureen K. Petersen  
*Iowa State University*

Follow this and additional works at: <http://lib.dr.iastate.edu/etd>

 Part of the [Agriculture Commons](#), [Behavior and Ethology Commons](#), [Other Education Commons](#), and the [Sustainability Commons](#)

---

## Recommended Citation

Petersen, Maureen K., "Undergraduate education and attitudes towards swine welfare" (2012). *Graduate Theses and Dissertations*. 12699.  
<http://lib.dr.iastate.edu/etd/12699>

This Thesis is brought to you for free and open access by the Graduate College at Iowa State University Digital Repository. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact [digirep@iastate.edu](mailto:digirep@iastate.edu).

Undergraduate education and attitudes towards swine welfare

by

**Maureen Kristel Petersen**

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Sustainable Agriculture

Program of Study Committee:  
Cornelia Flora, Major Professor  
Paul Lasley  
Suzanne Millman  
Anna Johnson

Iowa State University

Ames, Iowa

2012

Copyright © Maureen Kristel Petersen, 2012. All rights reserved.

Dedication

For Mom, Dad, and Monica

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	v
ABSTRACT.....	vi
CHAPTER 1. INTRODUCTION.....	1
1.1 Purpose and hypotheses.....	1
1.1.1 Hypotheses.....	2
1.1.2 Justification.....	3
1.2 Background and motivation.....	4
CHAPTER 2. LITERATURE REVIEW.....	6
2.1 Purpose and anticipated findings.....	6
2.2 Animal welfare and attitudes.....	7
2.2.1 Animal welfare and agriculture production systems.....	9
2.2.2 Swine behavior and other factors.....	12
2.3 Summary.....	17
CHAPTER 3. METHODOLOGY.....	18
3.1 Introduction.....	18
3.2 Research components and procedure.....	19
3.2.1 The study population.....	19
3.2.2 Questionnaire delivery system.....	19
3.2.3 Questionnaire initial structure.....	20
3.2.4 Design of the questionnaire.....	20
3.2.5 Beta test.....	20
3.2.6 The questionnaire.....	21
3.2.7 Index of concern.....	21
3.2.8 Data analysis.....	25
3.2.9 Research design.....	26
CHAPTER 4. RESULTS.....	28
4.1 Animal welfare index of concern.....	28
4.2 Five Freedom Chi-squared tests.....	32
CHAPTER 5. DISCUSSION AND CONCLUSIONS.....	33
5.1 Introduction.....	33
5.2 General reflections.....	33
5.2.1 Index of concern and bias.....	34
5.2.2 Direct questioning.....	35
5.2.3 Considerations.....	36
5.2.4 Limitations.....	36
5.3 Conclusion.....	37

LIST OF TABLES.....	39
LIST OF FIGURES.....	43
REFERENCES.....	53
APPENDIX A. RECRUITING EMAIL.....	59
APPENDIX B. STUDY DESCRIPTION.....	60
APPENDIX C. QUESTIONNAIRE.....	62
APPENDIX D. APPROVED IRB.....	66

## ACKNOWLEDGEMENTS

I am very thankful to Dr. Cornelia Flora for her insightful guidance, unconditional support and kind encouragement from the initial through the final stages of my research process.

Many thanks also go to the members of my committee, Dr. Anna Johnson, Dr. Paul Lasley, and Dr. Suzanne Millman for their valuable comments and direction.

I wish to thank my statistical consultant, Dennis Lock, for his essential guidance in my analysis.

To my family, who has been my constant source of support, I am forever grateful. Their unwavering faith in me has been the key to my focused determination.

Last, to my many friends, both within and outside of the sustainable agriculture community, who have helped guide and motivate me; I greatly value their friendship and deeply appreciate their steady optimism.

Maureen K. Petersen

## ABSTRACT

How does training in animal science impact college student attitudes toward swine welfare? I devised an on-line survey of first year and senior students in the College of Agriculture and Life Sciences to determine if year in school, major, and farm background was related to concerns about swine well-being. An index of concern was created and used to analyze the categorical swine welfare questions. Comparing animal science students entering and finishing at Iowa State University to the general population of College of Agriculture and Life Sciences students in the same years, I found that animal science majors were less concerned than all other College of Agriculture and Life Sciences majors about animal welfare ( $P < 0.01$ ). Gender and farm background were not related to concern for animal welfare.

## CHAPTER 1. INTRODUCTION

### 1.1 Purpose and hypotheses

The purpose of this study was to analyze attitudes of Iowa State University College of Agriculture and Life Sciences (CALS) undergraduate freshman and seniors on animal welfare concepts in a general fashion, and swine-welfare issues, specifically. Knowledge of, and concern for, animal welfare among agricultural professionals is essential to continue moving United States (U.S.) agricultural industries towards ethical considerations when keeping animals for protein and fiber while maintaining profitability. During their tenure as an undergraduate at some Land Grant Universities, students can learn what animal welfare is and how to use this in future business considerations. For this research, I examined several factors the literature has found related to ethical and economic concern for animal welfare, including major, gender, year in school, and farm background. Using a web-based survey, I addressed the following research questions.

1. Does concern for animal welfare in Iowa State University undergraduates differ between freshmen and seniors?
2. Do women feel more strongly than men about animal welfare?
3. Are animal science students more concerned about animal welfare than other majors in the College of Agriculture and Life Sciences?
4. Are students from urban backgrounds more concerned about animal welfare than students from farm or rural backgrounds?



### 1.1.1 Hypotheses

1. Undergraduate freshmen and juniors/seniors have shown differences in attitudes toward animals when surveyed. Vigorito (1996) in his study of introductory and established psychology majors that had some experience with animal use issues at Seton Hall University found the most advanced students to have more ( $p < 0.01$ ) animal welfare concerns than the introductory students. The animal welfare issues presented in the study were environmental concerns and moral issues relating to animals. Based on those findings, I hypothesize that undergraduate College of Agriculture and Life Sciences seniors will be more aware and concerned about animal welfare than freshmen.

2. Over the past 20 years, women have become more active and interested in animal welfare and animal rights issues (Heleski, 2004; Kruse, 1999; Kalof et al., 2000). Paul and Podberscek (2000) found female students to have more empathy with animals than male students ( $p < 0.001$ ). Given this general trend, I hypothesize that undergraduate women at Iowa State University will follow this trend and be more concerned than men about animal welfare regardless of year in school.

3. Research and reviews have been done to look at veterinary students' attitudes toward animal welfare (Paul and Podberscek, 2000; Estol, 2004) that suggests more concern about animal welfare by individuals in an animal science-related discipline ( $p < 0.05$ ). Based on this study I hypothesize that animal science students will be more concerned about animal welfare than other majors in the College of Agriculture and Life Sciences.

4. Those from urban backgrounds are more concerned with animal welfare than those from rural backgrounds (Velde, 2001; Hills, 1993). From a collection of interviews,

Velde (2001) found that, in contrast with farmers, all consumers had a negative perception of the life of meat livestock. Hills (1993) found that the general public had higher empathy scores than farmers ( $p < 0.01$ ). Therefore, I hypothesize that students from urban backgrounds will be more concerned about animal welfare than students from rural backgrounds.

### **1.1.2 Justification**

In response to increased demand for livestock products in both developed and developing countries, there has been an increase in the number of animals being produced (Thornton, 2010). Over the last several years, both production and consumption of pork have risen at the global level. World pork production doubled between 1977 and 1998 (Cameron, 2000) and by 2019 the demand for pork is expected to increase by approximately 24% over the base period of 2007-2009, primarily as a result of increased demand in developing countries (OECD/FAO, 2010). To improve animal treatment in the field requires good management (Grandin, 2003), and since many animal science undergraduates will seek employment in animal science-related occupations upon graduation, the Iowa State University undergraduate curriculum can influence students in this area.

There are only three animal science courses listed in the course catalog (2009-2011) for both undergraduates and graduates where alternative agriculture practices are outlined in the course description. Only one of these is specifically for undergraduates. These courses are; AnS 336 Domestic Animal Behavior and Well-being, AnS 515 Integrated Crop and Livestock Production Systems, and AnS 537 Topics in Farm Animal

Behavior, Welfare and Contemporary Issues which is a graduate course that is open to undergraduate seniors with permission from the instructor. According to the College of Agriculture and Life Sciences career services data for Animal Science undergraduates (2007 to 2012) of all graduates, 49% pursued further education, 33% obtained animal science related employment, and 18% obtained other agriculture related employment. The courses taken during the undergraduate years can influence their support of agricultural practices that directly affect farm animal welfare. If Iowa State University undergraduate students' opinions on animal welfare differ between entry to and exit from college, this could have implications for the development of the animal agriculture industry. Understanding these differences could aid in guiding the curriculum and provide insight as to which resources could be most beneficial for students in planning their academic paths.

## **1.2 Background and motivation**

As a graduate of the Iowa State University Animal Science Program, I feel my experience as an undergraduate gave me sufficient understanding of the curriculum. For the General Animal Science Core, the required courses are the same as when I was an undergraduate, with the exception of AnS 320 Feeds and Feeding, which was not a requirement at the time I completed my undergraduate coursework. Among these requirements for a Bachelor's in Animal Science, one can choose two different livestock species to study at the general and in-depth level. One of my choices was swine. I had the opportunity of gaining a thorough apprehension of the swine industry, both conventional

and alternative, via university and extracurricular experiences. The last half of my undergraduate work was spent with an emphasis on animal behavior and welfare after taking the animal behavior and welfare course as an option requirement for my degree. This set the stage for me to include my animal welfare knowledge in sustainable agriculture research.

Sociology provides me an informed lens through which to view the current social movement involving food and agriculture. That background not only brings all of the components of my research together but also gives me a framework to analyze the results of my survey.

Based on my prior affiliation to the animal science program and my personal experience leading to my degree fulfillments, I naturally have assumptions that have led me to my research topic. My assumptions are that courses that consider animal welfare and ways of measuring it are important for ethical and economic reasons and that the inclusion of them in the course catalog is an important step toward providing a balanced program.

## CHAPTER 2. LITERATURE REVIEW

### **2.1 Purpose and anticipated findings**

Knowledge of, and concern for, animal welfare among agricultural professionals is essential to continue moving the U.S. agricultural industries towards ethical considerations when keeping animals for protein and fiber whilst maintaining profitability. During their tenure as an undergraduate at some Land Grant Universities, students can learn what animal welfare is and how to use this in future business considerations.

Undergraduate freshman and senior students in the College of Agriculture and Life Sciences were surveyed as to their levels of concern. I chose to look at these two groups of agricultural majors because differences in their attitudes and knowledge might reflect their learning while at Iowa State University. The study population and principal data source for this research was undergraduate students pursuing a degree in the College of Agriculture and Life Sciences. This study population was chosen because this group may have more awareness of animal welfare and the issues surrounding livestock production than the general population of undergraduate students and these students will more likely be engaged in agricultural industries after graduation.

I hypothesized that 1) Seniors are more aware and concerned about animal welfare than freshmen, 2) Women are more concerned than men about the animal welfare, 3) Animal Science students are more concerned about animal welfare than all

other majors, 4) Students from urban backgrounds are more concerned about animal welfare than students from farm or rural backgrounds.

There has been a substantial social movement committed to changing the way humans use animals (Thompson, 2005). Safeguarding animal welfare and health is good for pigs, pork producers and the animal-conscious public (Kittawornrat, 2010). Human concern for animal welfare has been the motivation for increasing research over the past couple of decades. Collecting and measuring attitudes toward animal welfare provides further knowledge on this subject. The literature should demonstrate an aggregate base of this knowledge.

I reviewed literature based on its relevance to attitudes toward and concern with animal welfare with particular regard to year, gender, major and rural/urban background. The literature review on these subjects is meant to demonstrate what work has already been done in these areas and to provide reference for this research.

## **2.2 Animal welfare and attitudes**

Animal agriculture has experienced two significant changes in recent decades. One is the widespread adoption of confinement production facilities. The other is increased public concern for the welfare of farm animals (Prickett et al., 2010). The animal's welfare can be defined as its state as regards its attempts to cope with its environment (Broom, 1986). When presented with information in an abstract way, animal scientists reflect a high degree of concern for farm animal welfare; however, when presented with specific circumstances that they may have engaged in or taught about, the

concern is, in many cases, considerably lower (Heleski et al., 2004). The group's survey found that swine welfare ranks among the top concerns for animal science faculty. That is, the third largest percentage of respondents felt either minor or substantial changes are needed in the production system of six total production livestock species (Heleski et al., 2004). Lusk and Norwood (2009) note, however, that one must always be wary of survey participants giving socially desirable responses. This is especially true of topics for which there are strong social norms, such as animal welfare, and suggests that indirect questioning, such as asking participants about others' opinions, may yield more accurate results.

Heleski et al. (2004) found that the relationship between gender and total attitude score ( $p < 0.01$ ) was significant, in that females, on average, had higher total pro-animal welfare attitude scores than males, which might be called empathy for agricultural animal welfare. Additionally, Paul and Podberscek (2000) found female students to have more empathy with animals than male students ( $p < 0.001$ ) and Driscoll (1992) found that females rated the use of animals in various examples to be less acceptable than did males ( $p = 0.001$ ). Others have also noted that women are more likely than men to express concern about the treatment of animals (Heleski, 2004; Kruse, 1999; Kalof et al., 2000). Women were found to have more ( $p = 0.08$  and  $p = 0.01$ ) social desirability bias than men when questioned in a direct ( $p = 0.08$ ) and indirect ( $p = 0.01$ ) fashion, where they were asked how the average American might feel in response to a particular question instead of how they might feel (Lusk and Norwood, 2009).

Student year has been found to have a negative impact on views and actions toward animal welfare. Fourth-year students were less likely than second or third-year

students to provide analgesia for certain surgeries (de Boo and Knight, 2005).

### **2.2.1 Animal welfare and agriculture production systems**

Many believe production animals possess minds and the ability to think (Davis and Cheeke, 1998). Similarly, Heleski et al., (2004) reported that 92% of survey respondents agreed or strongly agreed with the statement “*agricultural animals have individual temperaments.*” The concept of thought in animals provides the principle components for how humans treat livestock. How deeply we investigate cognitive reasoning in animals can determine how strongly we feel about this issue, especially in regards to the use of animals in agriculture and for the purpose of food production. The Brambell Report (1965) was developed on what is commonly known as “The Five Freedoms.” The Brambell Report led to or inspired legislation to protect farm animals including Codes of Recommendations for the Welfare of Livestock and legislation in both the United Kingdom (U.K.) and the U.S. (Department for Environment, Food and Rural Affairs, UK 2011; The National Agricultural Law Center, U.S. 2012). It also led to advances in the science of animal welfare, greater emphasis on welfare in the curricula of agricultural and veterinary students and in training programs for farmers and stockmen, development of farm assurance schemes for product certifications, independent advice about farm animal welfare to the government, general improvements in farming systems and animal husbandry, and raised awareness and expectations of some consumers about farm animal welfare (Farm Animal Welfare Council, 2009). While the Bramble Report (1965) has had some impact on the U.S., much of what is being strongly implemented in livestock animal welfare is in the U.K. and other European countries. That impact has



increased over the past few decades as concerns about animal welfare have emerged (Thompson, 2007). The five freedoms are an attempt to maximize the overall arrangements for livestock. They read as follows:

- 1) Freedom from thirst, hunger and malnutrition-by ready access to fresh water and a diet to maintain full health and vigor;
- 2) Freedom from discomfort-by providing a suitable environment including shelter and a comfortable resting area;
- 3) Freedom from pain, injury and disease-by prevention or rapid diagnosis and treatment;
- 4) Freedom to express normal behavior-by providing sufficient space, proper facilities and company of the animals own kind;
- 5) Freedom from fear and distress-by ensuring conditions that avoid mental suffering. (Brambell, 1965).

The “Five Freedoms” provide standards that other components of the livestock production system, such as veterinarians and veterinary programs, can endeavor to achieve.

Estol (2004) investigated where animal welfare should be inserted in the veterinary curriculum. Part of the objection by many academic institutions to incorporate animal welfare as a specific subject is that, similar to incorporating ethics in subject matter, it is a conceptual component of all subjects (Estol, 2004). Therefore, in order to distinguish it as a separate subject without disassembling it from the veterinary curriculum, Estol suggested establishing an informed position on animal welfare appropriate to veterinary professions in undergraduate education. It was proposed that

one feasible approach to teaching animal welfare in animal science curriculums would be using evaluation courses such as traditional judging/assessing teams (Heleski et al., 2003). This method would allow students to holistically evaluate the facilities, procedures, and practices while at the same time gaining real-world experiences that guide their attitudes toward animal welfare. At Iowa State University, this option is available for veterinary, graduate and undergraduate teams. However, thus far, Iowa State University has only been represented by veterinary and graduate teams, but not by an undergraduate team.

All students studying the Agriculture and Life Sciences should be aware of animal welfare issues. However, it may be more important for animal science students to be more cognizant of these issues and to learn how to combine ethical principles and scientific knowledge to better understand animal welfare issues. Since undergraduate students are likely to be the future animal science professionals, heightening students' awareness of animal welfare issues seems a fundamental component to curricula (Heleski et al., 2003). Additionally, Heleski et al. (2003) argued that students need to be aware that increasing animal welfare does not always conflict with the goal of maximizing profitability. In fact, it has been shown in a number of livestock industries that poor interactions between stockpeople and their animals can limit the productivity and welfare of these animals (Hemsworth, 2003). Stockperson behavior and attitude appear to have an effect on animal fear, productivity, and welfare and it is, therefore, recommended to introduce cognitive-behavioral training programs for stockpeople in the livestock industries. However, this can be a difficult task, given that industry stockpeople tend to have long-standing beliefs and attitudes that have been established over time

(Hemsworth, 2003).

The ethical responsibilities of animal husbandry have been thought of as duties that individual people—farmers and stockpeople—must perform on behalf of the animals in their care (Thompson, 2005 p. 1325). Although there is still a sense of duty associated with the care of their livestock, the changing magnitude and ramifications of modern production agriculture provide an inherently different set of obligations. Flexibility in the duties performed by farmers and farmhands is constrained by the challenge of a need for economic prosperity. Increased public interest in the origins of food and concern for the practices being used in agriculture could present either economic opportunities or challenges for producers (Thompson et al., 2007). Product claims such as “hormone free”, “free range”, or “Genetically Modified Organism free” describe the use of production practices that may be associated with health, nutritional or welfare benefits by consumers (Thompson, 2007).

### **2.2.2 Swine behavior and other factors**

Heleski et al. (2004) in survey work found that swine are among the top three livestock production species that the animal science faculty respondents thought needed changes made to the production system. Additionally, over 50% of the animal scientist survey respondents showed either concern or strong concern over the exclusively swine issues listed: early weaning in pigs, lack of foraging substrate for pigs, and gestation stalls for sows. These higher swine-specific concerns over practices and overall industry warrant further investigation. The data in this study can provide a step toward further investigation into animal welfare-related concerns.

In order to better understand both swine welfare and other consequences, such as health concerns, of the systems in which we raise and manage pigs, it is crucial to acknowledge the pig's origins and social behavior in a natural setting. The domestic pig is descended from the wild boar, but although they have changed greatly in terms of phenotype, their behavior, when given the opportunity, is extremely similar to their wild ancestors (Marchant-Forde, 2010). In a review of early research on swine behavior during production, Fraser (1984) analyzed the production practices common in many confinement-rearing facilities seen today and the possible implications on swine behavior, welfare and productivity. The sow's rooting and nest building behavior is dampened by her inability to obtain the movement and substrate necessary for these behaviors. Fraser (1984) determined that more research is needed to determine how the environment affects the timing and duration of farrowing, the sow's restlessness before and during farrowing and the viability of the piglets. Research in this area continues to be limited by the economic constraints in the system such as productivity and profit that is affected by piglet mortality (Ahmadi, 2011). Although the farrowing and lactation phases of swine production have always been the most economically limiting phases of production because piglet performance affects the rest of the production system, alternative sow housing facilities show promise for the biological-economic interface (Ahmadi, 2011) in which a possible "win-win" situation could occur where higher animal welfare and higher net margins are suggested for the test housing situation outlined in the study. This may be of special interest to producers if the rate of piglet mortality rises greater than 12% per farm (Jarvis et al., 2005).

Farrowing stalls in confinement facilities are designed to keep the sow from crushing her piglets during this phase of production, where the overall goal is to keep as many piglets alive as possible. With a percent death-loss of piglets between birth and weaning greater than 12% per farm (Jarvis et al., 2005), profit becomes much more difficult. Fraser (1984) suggests that poor suckling in piglets can lead to low nutrition and that weaker piglets are perhaps more likely to be crushed by the sow than healthy piglets. Furthermore, Oostindjer et al. (2010) found that enrichment of the lactation pen (straw, wood shavings, peat, and branches for manipulation) reduced belly nosing and manipulation behavior before weaning and increased exploration, chewing, play behavior and activity. It also decreased time spent exploring feed and eating. Growth before weaning was higher in enriched-housing piglets (Oostindjer et al., 2010), suggesting that piglets in barren pens may have used the feed to perform exploratory behaviors or that these piglets may have been less efficient in processing feed or had a different intake rate than piglets from enriched pens. Although there may be benefits to alternative housing systems such as enriched pens or group housing, it is important to note that disadvantageous parameters to such systems still exist. For example, for group gestation systems, it is important that pig farmers pay attention to reducing competition around the feeding area, which may reduce aggression among sows and minimize difference between high social ranking sows and low social ranking sows. Separating these two extremes will not solve the problem of dominance because new hierarchies will be established (Kranendonk et al., 2007).

In a U.S. random survey of 1,019 households, Lusk and Norwood (2008) found that the effects of information on the acceptability of housing sows in stalls can range

depending on the wording of the question. For example, in the Lusk and Norwood study, approximately 20% of respondents believed housing sows in any type of stall was humane. However, when informed that housing sows in stalls protected them from other pigs, agreement with the statement regarding use of this type of housing increased to approximately 50%. Therefore, public perception of these issues can play a vital role in their consideration or acceptability of animal welfare. With the industrialization of agriculture and a shift in population toward urban centers has come an increase in concern among Americans about animal welfare issues (Lusk and Norwood, 2009). Therefore, even if one is unwilling to give equal consideration to animals, it is worthwhile knowing how people's well-being is affected by animal welfare (Lusk and Norwood, 2009).

In 1984, Fraser believed this lack of easily measurable "normal behaviors" would lead to a large and imaginative research effort to examine and improve confinement rearing of pigs. It was shown that group size and space allowance for pigs in intensive production units does not have a statistically significant impact on feed efficiency (Randolph et al., 1981). However, good feed efficiency can lead to a profitable operation (Hermesch, 2003), and thus more investigation into both normal and abnormal behavior in swine is needed to demonstrate profitability in various systems. Demonstration of profitability may be needed before the fourth Freedom; "Freedom to display normal behavior" (Brambell, 1965) is more readily accepted by all.

Kaupeninen et al. (2011) found an economically beneficial interaction between farmer attitude and piglet mortality. In the study, it was found that farmers with positive attitudes toward the importance of treating animals humanely weaned approximately 0.34

piglets more in first parity litters than did the farmers on average ( $p < 0.05$ ). Similarly, farmers who felt providing the animals with a favorable environment weaned 0.43 piglets more ( $p < 0.05$ ) in first parity litters than the average. Job satisfaction and psychological human well-being can lead to improved work performance (Wright and Cropanzano, 2000) and the stockman's motivation is a significant factor in improving animal welfare and productivity (Hemsworth, 2007).

A major problem in tailoring welfare parameters for swine behavior is the difference between researchers, farmers, and the general public in regard to the importance assigned to the various components of welfare. Enhancing one component while ignoring the others is not functional in the long run. There is a law of diminishing returns for welfare components (Deen, 2005), which means that the Five Freedoms (Brambell, 1965) will not be equally distributed in regards to their practical application in livestock production. Generally, quantifiable extremes are avoided and basic needs met in livestock production facilities (feed, water, temperature, space). After these needs have been met, attention can be focused on improving other, perhaps more qualitative areas. In some areas qualitative and quantitative measures can overlap in a way that maximizing one may maximize the other. For example, outdoor housing systems might change muscle characteristics and improve pork bitterness, flavor, and color which may be preferred by consumers, thus increasing the sale of these meats (Yonezawa et al., 2012). Furthermore, the meat quality of pigs reared in enriched housing has been shown to be superior to that of pigs reared in barren conditions in terms of cooking loss, intramuscular fat content, and muscle characteristics (Klont et al., 2001; Gentry et al., 2002a). Other meat quality parameters, such as maintaining low blood lactate concentration at

exsanguination through careful animal handling immediately pre-slaughter, will likely improve as on-farm handling procedures continue to improve (Edwards et al., 2010). However, there is also evidence that housing systems for pigs do not affect pork quality (Gentry et al., 2002b)

### **2.3 Summary**

A look at the literature on the subjects of animal welfare and attitudes, agriculture production systems, and swine behavior reveals several key points. There is a general concern for animal welfare of production animals among professionals and students engaged in the field of animal science. Good welfare of production animals can lead to economic profit. The inability of swine to display their natural behaviors in some production situations is a concern for many. These key points highlighted by the literature pave the way for more investigation into concern for animal welfare and production animals, especially swine. Since both production and consumption of pork have risen over the last several years (Cameron, 2000) and the demand is expected to increase by 2019 (OECD/FAO, 2010) at the global level, swine welfare, in particular, and animal welfare, at large, may shift even more into the public eye.



## CHAPTER 3. METHODOLOGY

### 3.1 Introduction

Knowledge of, and concern for, animal welfare among agricultural professionals is essential to continue moving the U.S. agricultural industries towards ethical considerations when keeping animals for protein and fiber while maintaining profitability. During their tenure as an undergraduate at some Land Grant Universities, students can learn what animal welfare is and how to use this in future business considerations. Students enter the program with knowledge and concern, based in part on gender, choice of major, and farm background. As agriculture students progress through the curriculum, I hypothesize, based on previous related research, this knowledge and concern increases related to ethical and economic concern for animal welfare, as they learn the science behind animal welfare principles and practices.

Undergraduate freshman and senior students in the College of Agriculture and Life Sciences were surveyed as to their levels of concern. These two groups of agricultural majors were investigated because differences in their attitudes and knowledge might reflect their learning while at Iowa State University. The study population and principal data source for this research was undergraduate students pursuing a degree in the College of Agriculture and Life Sciences. This study population was chosen because this group might have more awareness of animal welfare and the issues surrounding livestock production than the general population of undergraduate students.

I hypothesized that 1) Seniors in will be more aware and concerned about animal welfare than freshmen, 2) Women will be more concerned than men about the animal welfare, 3) Animal Science students will be more concerned about animal welfare than all other majors, 4) Students from urban backgrounds will be more concerned about animal welfare than students from farm or rural backgrounds.

## **3.2 Research components and procedures**

### **3.2.1 The study population**

All procedures were approved by the ISU-IRB committee (Appendix D).

The study population consisted of undergraduate freshmen and seniors at Iowa State University within the College of Agriculture and Life Sciences. A total of 1,833 students were emailed a recruiting email (Appendix A), study description (Appendix B) and a link for the questionnaire (Appendix C). A return of 8% was received.

### **3.2.2 Questionnaire delivery system**

The Survey Monkey electronic questionnaire was delivered via the BigMail service offered by the university to send email to addresses to all freshmen and seniors in the college of agriculture at Iowa State University. Responses were collected and results were downloaded using Survey Monkey online survey tool.

### **3.2.3 Questionnaire initial structure**

The construction of the questionnaire began with the author's concern about the way food animals, particularly swine, are treated. The author looked at the descriptive studies of animal science faculty and curricula (Heleski et al., 2005; Heleski et al., 2004) and wanted to investigate what impact the faculty might have on students. One way to address this is to study animal science students entering and finishing their undergraduate work at Iowa State University, and compare them to the general population of College of Agriculture and Life Sciences students entering and finishing their undergraduate work at Iowa State University.

### **3.2.4 Design of the questionnaire**

The questionnaire structure followed similar work published by Heleski, et al. (2004). Additional questions came from the author's knowledge of current swine welfare issues in the animal industry and from her educational background as an undergraduate in animal science at Iowa State University. Questions were included that, the literature suggested, might explain variation among students in different years of study at Iowa State University. Although the questionnaire was based on studies that had already been done, these studies were looking at different populations and principles than the premise for this study.

### **3.2.5 Beta test**

After developing the first draft of the survey, it was delivered to five individuals from conventional swine production and four individuals from alternative swine

production. Individuals from either a conventional or alternative production background were considered as such from having work experience in that setting. This approach was used to gain perspective from both types of production. It was not beta tested with students, as they would be part of the population being sampled.

### **3.2.6 The questionnaire**

The final questionnaire contained thirteen close-ended questions and space for elaboration if the respondent wanted to explain his or her answer more fully. The questions covered several areas pertaining to college student identity and attitudes toward swine welfare. Seven questions covered general and college of agriculture demographic information, two questions pertained to pre-college, farm-based interactions, one question pertained to the Five Freedoms (Brambell, 1965) where respondents were forced to rank similar issues to the Five Freedoms in order of importance. One question pertained to current swine welfare practices in production agriculture and whether they provide an appropriate level of welfare in swine industry production systems, one question pertained to how much animal welfare influences respondents' career ambition, and one question pertained to how much swine welfare influenced respondents' overall animal welfare perspectives. The majority of questions were multiple-choice or categorical with four Likert-scale questions. The entire questionnaire can be found in Appendix C.

### **3.2.7 Index of concern**

An index of concern was created and used to analyze the specifically swine welfare question, question 11 in the questionnaire (Appendix C). A number was

calculated to measure each respondent's overall concern for animal welfare. These numbers were derived by assigning a numerical value to each of the available category responses (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) in the eight-part question and summing each individual's responses to give a possible minimum score of 8, if respondents answered "strongly disagree" to every category in the question, and a possible maximum score of 40, if respondents answered "strongly agree" to every category in the question, with actual scores ranging from 5 to 36.

Lower scores indicated a higher concern for swine welfare and higher scores indicated lower concern for swine welfare because of the way the questions were worded. For example, a response of "strongly disagree" with an index of concern numerical assignment of 1 to the question, "Sows are safest when they gestate in gestation stalls", is read as higher concern for welfare. These questions were both chosen and worded toward the chronic or production effects typical for the conventional swine production system because these issues had been rated with a higher level of concern by animal science students preparing for a national Animal Welfare Judging competition (Heleski et al., 2003).

The index of concern question was made up of several swine topic including: a) piglet safety in lactation stalls, b) sow safety in gestation stalls, c) welfare of pigs housed in groups with access to the outdoors, d) welfare of pigs housed in buildings, e) docking of piglets' tails, f) early weaning in piglets, g) stocking density of pigs during transport, and h) on-farm euthanasia of pigs. Images and issues dealing with animal welfare issues are becoming more noticed by the consumer due to media coverage and special interest groups (Matthis, 2004). According to the National Pork Board (2012), research is being

dedicated to emerging animal welfare issues in swine including gestational sow housing, handling and transportation, production practices, and on-farm euthanasia. The statements used to determine index of concern in the questionnaire resulted from these emerging animal welfare issues that impact the swine production industry. Individual importance of these issues is illustrated per topic statement as follows:

1) Statement a: “Piglets are safest when sows nurse in lactation stalls.” Though environmental solutions to piglet mortality, such as the introduction of the farrowing stall, had an initial influence on reducing piglet deaths from over-lying by the sow (Edwards, 2002), national herd recording figures in the United Kingdom over the last decade suggest that there have been no further improvements, with total piglet pre-weaning mortality averaging 19.5% (Meat and Livestock Commission/BPEX, 2000-2009). Therefore, piglet mortality continues to be a major welfare and economic concern.

2) Statement b: “Sows are safest when they gestate in gestation stalls.” Within the pig industry, the main issues relating to space are the physically and behaviorally restrictive systems in which sows are kept during gestation, farrowing and lactation (Baxter, et al., 2012).

3) Statement c: “Welfare of pigs is optimal when they are housed in groups with access to the outdoors.” Interest in extensive bedded indoor and outdoor pig production in the United States is growing (Honeyman, 2005).

4) Statement d: “Welfare of pigs is optimal when they are housed in buildings.” Most consumers have a strong preference for safe pork produced under housing systems that consider the environment and provide pig-friendly conditions (Cagienard et al., 2005). In order to obtain better meat quality, housing conditions that guarantee pig

welfare, in terms of sufficient space (Spoolder et al. 2000) and adequate environmental enrichment (Day et al., 2002), should be maintained until slaughter.

5) Statement e: “Docking the tails of piglets provides more benefit than harm for the overall welfare of the piglets.” Tail docking of piglets is a routine procedure on farms to control tail-biting behavior; however, tail docking can cause an acute stress response (Sutherland et al., 2007).

6) Statement f: “The financial gains of weaning piglets at less than 21 days is more beneficial than the potential negatives associated with lowered immune system function.” Feed intake in piglets is generally low for several days following early weaning (Pajor et al., 1991, Bruininx et al., 2002, and Van der Meulen et al., 2010). This period of low feed intake negatively affects thermal regulation and gastro-intestinal morphology and physiology, leading to growth check, increased susceptibility to secondary infections and mortality (Pluske et al., 1997, McCracken et al., 1995, McCracken et al., 1999, Le Dividich and Séve, 2000 and Spreeuwenbert et al., 2001).

7) Statement g: “The advantages of having a stocking density for transport of hogs of at least 0.38 m<sup>2</sup>/100 kg (all pigs can lie down without constant contact, Warris *et al.*, 1998) outweighs the financial disadvantages of paying for more space.” Long duration transport of pigs is an important welfare issue world-wide (Bryer et al., 2010). Current transportation legislation in the United States dictates that animals cannot be transported over 28 hours without being rested and given food and water; however, there is limited information available on the acute physiological effects of long distance transport in pigs.

8) Statement h: “If on farm euthanasia will not provide a humane means of eliminating the pig, always consult the veterinarian for an appropriate method.” Matthis (2004) when examining animal rights groups influence on public opinion on sensitive issues, suggested that the swine industry is at a crossroads in relation to sensitive issues such as euthanasia and animal welfare.

As discussed above, the index of concern questions were designed to focus on major issues that the swine industry faces in relation to swine behavior and welfare. The topic of piglet castration was excluded from the index of concern question to eliminate additional bias from male respondents. Evidence from a study on attitudes toward sterilization of companion animals suggested that males are more likely than females to be concerned about an animal’s sexual integrity that may arise through equating the animal’s sexuality or masculinity with their own ( $p \leq 0.05$ ). The perception of piglet pain during processing procedures was, therefore, captured by the tail docking statement (statement e). Also excluded were questions about the growing and finishing stages of production, since these stages typically do not receive as much concern from the public (Fraser, 1984). This design allowed for a more direct approach to identifying how strongly students felt about key issues in the swine industry by providing choices for each isolated issue.

### **3.2.8 Data analysis**

All data were evaluated for normal distribution before analysis by using the PROC UNIVARIATE procedure of SAS (SAS Institute Inc., Cary, NC). Data used to evaluate the Index of Concern (IOC) meet the assumption of normally distributed data.



These data were analyzed by using the PROC MIXED procedure of SAS (SAS Institute Inc., Cary NC). The statistical model for IOC included the fixed effects of year, gender, major and background. All interactions were not significant and were removed from final analysis. A P-value of  $\leq 0.05$  was considered to be significant for all measures.

Attitudes toward animal welfare were analyzed using SAS (SAS Institute Inc., Cary NC). Chi-squared tests were run on each question that involved ranking animal welfare issues derived from the Five Freedoms (Brambell, 1965). The other categorical swine welfare questions were analyzed using an index of concern, which summed the responses to all the Likert scale questions measuring concern for animal welfare. The index was derived by assigning a numerical value to each of the Likert category responses (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) and summing each individual's responses to give a possible minimum score of 8 and a possible maximum score of 40 with actual index of concern scores ranging from 14 to 36, with low numbers indicating high concern and high numbers low concern

A breakdown for the main demographics from the total responses can be found in Table 1, Demographics Comparing Respondent Percentages and Numbers to Total College of Agriculture and Life Sciences Freshmen and Seniors Percentages and Numbers.

### **3.2.9 Research design**

The unit of analysis for the study was the student filling out the questionnaire. The mode of measure was a cross-sectional survey used to study two nonequivalent groups in order to determine any differences in attitudes between freshmen and seniors

during this transition in undergraduate years. The study population included college of agriculture students from both the freshman and senior classes, which were compared to the animal science students. Independent variables were factors the literature found related to ethical and economic concern for animal welfare, including gender, year, major and background. Student concern for animal welfare was the dependent variable. The model was originally set up to attempt to investigate the relationship between animal science freshmen and seniors to decide if there was any significant difference in their views toward swine welfare and if this affected their career ambitions. When no significant interaction presented, the model shifted to address the relationship between the various factors present (year, gender, major, background) and concern for swine welfare.

## CHAPTER 4. RESULTS

### 4.1 Animal welfare index of concern

I will fail to reject the null hypothesis for the first hypothesis that undergraduate College of Agriculture and Life Sciences seniors will be more aware and concerned about animal welfare than freshmen in that no difference in index of concern was shown,  $p=0.36$  (Table 2).

I will fail to reject the null hypothesis for the second hypothesis that women will be more concerned about animal welfare than men in that no difference in index of concern was shown,  $p=0.25$  (Table 2).

I will fail to reject the null hypothesis for the third hypothesis that animal science students will be more concerned about animal welfare than other majors in the College of Agriculture and Life Sciences. The index of concern for major showed a lower ( $p = 0.0019$ ) concern in animal science majors than other agriculture, non-animal science majors, with a lower index score indicating greater concern. The difference in concern among majors does not support my third hypothesis that animal science students will be more concerned about animal welfare than the rest of College of Agriculture and Life Sciences majors. The index of concern mean for Agricultural Education and Studies majors was slightly higher at 28.3 than the rest of the College of Agriculture and Life Sciences at 26.6, but was still not as high as Animal Science majors at 29.9. There was also a difference in index of concern for those planning to work in the animal industry and those not planning to work in the animal industry, with those planning to enter the

field being slightly more concerned about animal welfare at 26.78 than those not planning to enter the industry at 27.29, but this was not a significant difference ( $p=0.76$ ).

I will fail to reject the null hypothesis for the fourth hypothesis that students from urban backgrounds will be more concerned about animal welfare than students from rural backgrounds in that no difference in index of concern was shown,  $p=0.17$  (Table 2).

Distributions of each statement from question 11 in the questionnaire (Appendix C) for the entire sample and animal science majors can be found in Figures 1.1-1.8. Index of concern means for the independent variables can be found in Table 2 Index of concern means with standard error and p-values for independent variables. A distribution of the index of concern scores by percent interval for the entire sample and animal science majors can be found in Figure 2.

An important non-relationship to note is that students' career ambitions did not appear to have a impact on concern for animal welfare, neither between those planning to go to veterinary school (index of concern mean=  $26.70 \pm 0.87$ ,  $p=0.67$ ) and those not planning to (index of concern mean=  $27.38 \pm 1.57$ ,  $p=0.67$ ) nor between those planning to enter the animal industry (index of concern mean=  $26.78 \pm 1.19$ ,  $p=0.76$ ) and those not planning to (index of concern mean=  $27.29 \pm 1.49$ ,  $p=0.76$ ).

Index of concern statement outcomes were interpreted as follows:

1) Statement a: "Piglets are safest when sows nurse in lactation stalls" (Figure 1.1). For this statement, response trends were similar for both the entire sample and the animal science majors where the highest response percentages were found in the "strongly agree" category. This translates to a lower concern for welfare in both groups.

However, animal science majors showed higher percentages than the entire sample of a trend toward lower concern for welfare.

2) Statement b: “Sows are safest when they gestate in gestation stalls” (Figure 1.2). For this statement, response trends were similar for both the entire sample and the animal science majors where the highest response percentages were found in the “strongly agree” category. This translates to a lower concern for welfare in both groups. However, animal science majors showed higher percentages than the entire sample of a trend toward lower concern for welfare.

3) Statement c: “Welfare of pigs is optimal when they are housed in groups with access to the outdoors” (Figure 1.3). For this statement, response trends were somewhat similar for both the entire sample and the animal science majors. However, the entire sample showed the highest response percentages in the “disagree” category, whereas, the animal science majors showed the highest response percentages in the “neutral” category. This translates to a lower concern for welfare in animal science majors than in the entire sample.

4) Statement d: “Welfare of pigs is optimal when they are housed in buildings” (Figure 1.4). For this statement, response trends were similar for both the entire sample and the animal science majors. However, the entire sample showed the highest response percentages in the “neutral” category, whereas, the animal science majors showed the highest response percentages in the “agree” category. This translates to a lower concern for welfare in animal science majors than in the entire sample.

5) Statement e: “Docking the tails of piglets provides more benefit than harm for the overall welfare of the piglets” (Figure 1.5). For this statement, response trends were

similar for both the entire sample and the animal science majors where the highest response percentages were found in the “strongly agree” category. This translates to a lower concern for welfare in both groups. However, animal science majors showed higher percentages than the entire sample of a trend toward lower concern for welfare.

6) Statement f: “The financial gains of weaning piglets at less than 21 days is more beneficial than the potential negatives associated with lowered immune system function” (Figure 1.6). For this statement, response trends were similar for both the entire sample and the animal science majors where the highest response percentages were found in the “neutral” category. This translates to a neutral concern for welfare in both groups.

7) Statement g: “The advantages of having a stocking density of at least 0.38 m<sup>2</sup>/100 kg (all pigs can lie down without constant contact, Warris et al., 1998) outweighs the financial disadvantages of paying for more space” (Figure 1.7). For this statement, response trends were similar for both the entire sample and the animal science majors where the highest response percentages were found in the “agree” category. This translates to a lower concern for welfare in both groups. However, the entire sample showed slightly higher percentages than the animal science majors of a trend toward lower concern for welfare.

8) Statement h: “If on farm euthanasia will not provide a humane means of eliminating the pig, always consult the veterinarian for an appropriate method” (Figure 1.8). For this statement, response trends were similar for both the entire sample and the animal science majors where the highest response percentages were found in the “strongly agree” category. This translates to a lower concern for welfare in both groups.

However, animal science majors showed higher percentages than the entire sample of a trend toward lower concern for welfare.

#### **4.2 Five Freedom Chi-squared tests**

Responses to the question pertaining to the Five Freedoms (Brambell, 1965) where respondents were forced to rank five issues according to what they felt were most important to least important issues resulted in differences for gender ( $p=0.04$ ) and year ( $p=0.03$ ). For all other measures there were no ( $p<0.05$ ) differences (Table 3). Mean responses for independent variables (year, gender, major, background) can be found in Table 4.

## CHAPTER 5. DISCUSSION AND CONCLUSIONS

### **5.1 Introduction**

For this research I analyzed differences between freshmen and seniors, as tracking change in one group over a four-year period was not possible given the time constraints for a master's thesis. Differences in students' concern for animal welfare might suggest a possible impact on the animal science or animal production industry, since many college graduates are bound for the job market soon after graduation. Differences between years, genders, majors and backgrounds are differences that should perhaps be considered by the industry and the animal science curriculum.

### **5.2 General reflections**

Student attitudes and experiences can give perspectives on future animal welfare actions through their employment and their engagement in various activities related to animal science. Furthermore, if the predominant viewpoint presented by the current curriculum at Iowa State University is driven by trends in industry, then animal science students will be influenced by these trends and be more inclined to follow this sentiment as seniors than as freshmen. The time students spend in college can allow for much self-discovery. During this time, faced with many new decisions and experiences, students begin to evaluate and re-evaluate who they are in relation to the world around them. With the rising social context of animal product claims, animal welfare has become a target of



public scrutiny. Undergraduate animal science students may be adapted for future social endeavors relating to animal and swine welfare through curricular and extracurricular influences.

Attitude formation and strengthening in college can be mitigated by several factors including relationships with peers, quality and frequency of student-faculty interactions, and having curriculum content that is relevant to students' background and experiences (Chickering, 1969). Curriculum content that is relevant to students' background and experiences means providing a base on which to build future learning experiences. In the realm of animal science, this construction can begin even before the students have set foot on the college campus. Students' preconceived notions about their program of study, will undoubtedly, shape their choices and experiences at the university. The plethora of variables for any given individual student provides much diversity in a university setting. By looking at these variables and students' attitudes toward and concern for animal welfare, curriculum designers can create programs of study that meet these concerns and the needs of the industry.

### **5.2.1 Index of concern and bias**

Although the index of concern for major showed a lower concern in animal science majors than other agriculture, non-animal science majors, the small size of the sample might render it biased and, therefore, unsubstantial. The overall lack of differences between groups for the four factors examined in the research warrants future research in this area. Although the literature presented foundations for the four

hypotheses proposed, the small sample size might have been biased and therefore did not produce significant findings.

If the study were to be repeated, perhaps more Land Grant universities could be included to provide a larger sample size and an incentive could be provided to encourage wider participation in order to eliminate bias and provide more substantial results. Another method of gathering data could be to administer the questionnaire in a senior capstone class and in a general requirement introductory class. Other items that could be used for the index of concern could include more welfare statements specific to the swine industry such as those involving castration in piglets, grower and finisher issues, etc. to be as aggregate and complete as possible.

### **5.2.2 Direct questioning**

Using indirect questioning, Lusk and Norwood (2009) have shown that social desirability bias can be minimized. For example, instead of asking participants, directly, what they thought about animal welfare, the researchers asked participants what they thought the average American thought about animal welfare. It is assumed that, if questions are asked in an indirect fashion, participants will not be concerned with “looking good” and will answer more honestly. For this research, the author used direct questioning. Since all surveys were anonymous and participants were informed of this before making the decision to participate, it is assumed that they will answer honestly with no social desirability bias. Further research could, perhaps, delve into these swine welfare concepts with direct versus indirect questioning methods to determine if there is a difference.

### **5.2.3 Considerations**

More than twice as many women responded men in the College of Agriculture and Life Sciences as a whole. This very high preponderance of female respondents may mean that the respondents are more acquainted with animal welfare, and, thus, the responses are biased toward wanting to respond to questions on the topic. There was also a large number of Agricultural Education and Studies respondents. Since animal welfare is not part of the curriculum, previous experience areas such as secondary agriculture education or Future Farmers of America (FFA) may explain this occurrence.

Aside from a potential bias obtained by the small sample size, the overall lack of statistical significance might signify a homogenous tone to the College of Agriculture and Life Sciences undergraduate program, since students did not appear to differ in attitudes. This suggestion could warrant future research.

### **5.2.4 Limitations**

This research, like all research, has limitations. One concern is that the groups being studied are not congruent. This is a cross-sectional rather than a longitudinal study. Time did not permit the same group to be followed from beginning as freshmen to finishing as seniors to track possible changes in attitudes or concern. Therefore, it was decided that measuring attitudes of freshmen and seniors separately but at the same interval would be optimal for the desired research objectives. Another limitation was the use of a quasi-control group. The study population of animal science students was compared with the quasi-control group of all other freshmen and seniors in the College of

Agriculture and Life Sciences. This control group was used on the basis that random assignment of treatments would defeat the purpose of the research. Since these students may have similar agricultural backgrounds to animal science students without having the same coursework as animal science students there may be less cause for bias in responses. Therefore, animal science freshmen and seniors could be adequately compared with a suitable “baseline”. Finally, another limitation was the survey return of about eight percent for the entire College of Agriculture and Life Sciences which is quite low and it is possible that it is selective toward those already interested in the topic.

### **5.3 Conclusion**

The purpose of this study was to assess Iowa State University undergraduate education and attitudes toward animal welfare. Students’ concerns about animal welfare were measured using a questionnaire. It was hypothesized that students’ concern about animal welfare would differ depending on year, gender, major and background.

The animal production industry has been under much scrutiny from the media in recent years. Given this added attention, it is essential to keep practices that involve the production of animals for food and fiber both transparent and consistent with consumer expectations. This means keeping all components of the livestock production system homogenous in essence so as to cultivate confidence in the system. If concern about animal welfare, and swine welfare in particular, are a function of courses taken during time spent in the animal science program, curriculum developers may need to investigate the needs of both students and industry to confirm that the current curriculum is at least

adequate for these needs. If undergraduate concern about animal welfare is higher for some variables (year, gender, major, background), the curriculum and industry may need to adjust to align with these tendencies.

## LIST OF TABLES

Table 1. Demographics Comparing Respondent Percentages and Numbers to Total College of Agriculture and Life Sciences Freshmen and Seniors Percentages and Numbers

Demographic Category	Percentage of Respondents	Number of Respondents	Total Percent of CALS Students	Total number of CALS Students
Gender, n=140			n=1,850	n=1,850
Male	30	42	50.8	939
Female	70	98	49.2	922
Year, n=139			n=1,850	n=1,850
Freshmen	53.4	71	42.8	791
Senior	46.6	62	57.2	1,059
Majors, n=137			n=842	n=842
Ag./Biosys. Engr. <sup>a</sup>	3.0	4	3.2	27
Ag Ed/Studies <sup>b</sup>	10.5	14	5.2	44
Agronomy	7.5	10	14.0	118
Animal Science	46.6	62	54.2	456
BBMB <sup>c</sup>	1.5	2	3.0	25
EEOB <sup>d</sup>	7.5	10	2.6	22
Economics	3.8	5	0.4	3
Entomology	0.8	1	2.6	22
FSHN <sup>e</sup>	3.8	5	1.3	11
Genet./Dvpt./Cell Bio. <sup>f</sup>	2.3	3	2.0	16
Horticulture	5.3	7	7.5	63
NREM <sup>g</sup>	10.5	14	4.2	35
Career Ambition, n=117				
Vet School	41	48		
Graduate School	24.8	29		
Work with Livestock	4.3	5		
Work on a Farm	3.4	4		
Work in the Ag. Ind. <sup>h</sup>	26.5	31		
Residence Background, n=139				
Rural	44.6	62		
Urban	55.4	77		

## Abbreviations:

<sup>a</sup> Agricultural and Biosystems Engineering

<sup>b</sup> Agricultural Education and Studies

<sup>c</sup> Biochemistry, Biophysics and Molecular Biology

<sup>d</sup> Ecology, Evolution and Organismal Biology

<sup>e</sup> Food Science and Human Nutrition

<sup>f</sup> Genetics, Development and Cell Biology

<sup>g</sup> Natural Resource Ecology and Management

<sup>h</sup> Work in the Agriculture Industry

Table 2. Index of concern means<sup>a</sup> with standard error and p-values for independent variables (the lower the score, the higher the concern)

<u>Gender, n=140, p=0.25</u>	<u>LSMEAN</u>
Female, n=98	26.24(±1.02)
Male, n=42	27.83(±1.37)
<u>Year, n=139, p=0.36</u>	<u>LSMEAN</u>
Freshmen, n=71	26.46(±1.03)
Senior, n=62	27.60(±0.95)
<u>Major, n=137, p=0.09</u>	<u>LSMEAN</u>
Animal Science, n=62	30.67(±1.21)
CALS, n=75	26.25(±2.27)
<u>Background, n=139, p=0.17</u>	<u>LSMEAN</u>
Rural, n=62	27.88(±1.20)
Urban, n=77	26.19(±1.15)
<u>Veterinary/Non-veterinary ambition, n=117, p=0.67</u>	<u>LSMEAN</u>
Veterinary, n=48	26.70(±0.87)
Non-veterinary, n=69	27.38(±1.57)
<u>Animal industry ambition, n=129, p=0.76</u>	<u>LSMEAN</u>
Do plan to enter the field, n=80	26.78(±1.19)
Do not plan to enter the field, n=49	27.29(±1.49)

<sup>a</sup> Lower index of concern scores signify greater concern

Table 3. P-values per factor for Five Freedom (Brambell, 1965) derived question

Factor	Slaughter/harvest of animals is done humanely	Animals are allowed freedom to move	Animals are provided proper feed/water	Animals are provided a clean and safe environment	Animals are provided environmental enrichment
Year	0.07	0.19	0.52	0.28	0.03
Gender	0.06	0.57	0.04	0.70	0.02
Major	0.42	0.29	0.70	0.92	0,90
Background	0.03	0.22	0.14	0.14	0.33



Table 4. Mean response scores for Five Freedom (1965) derived question

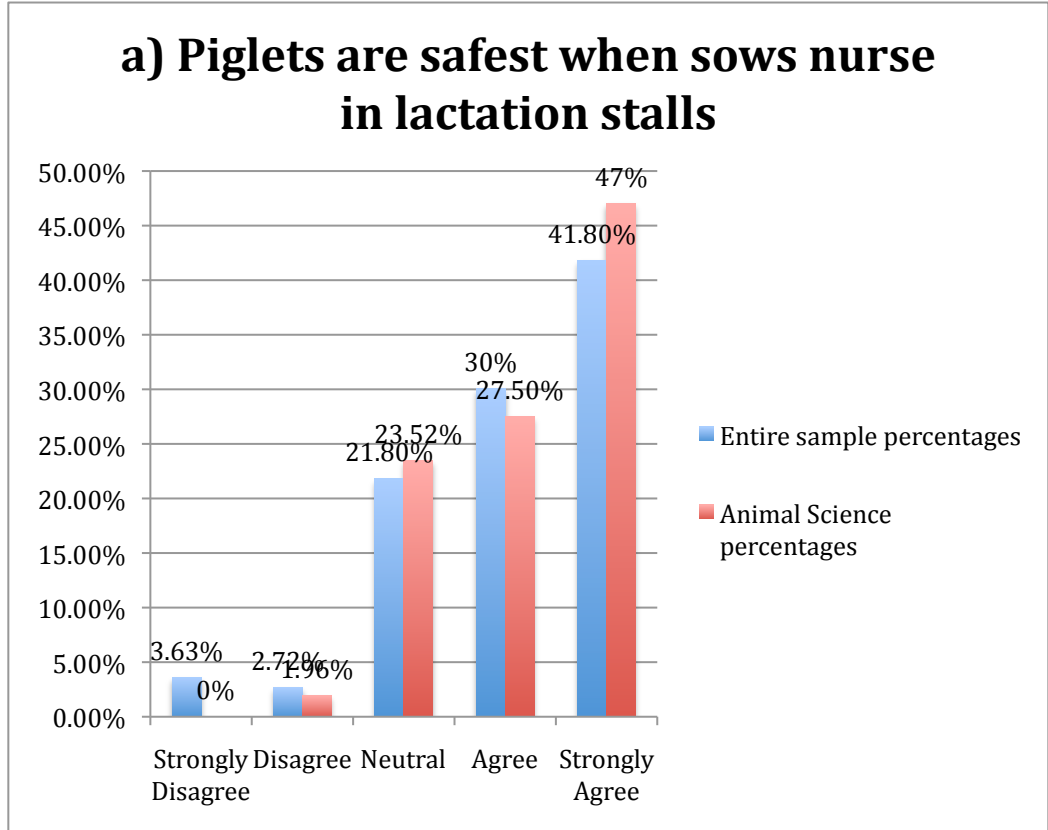
Factor	Factor	Slaughter/harvest is done humanely	Animals are allowed freedom to move	Animals are provided proper feed/water	Animals are provided a clean and safe environment	Animals are provided environmental enrichment
Year	Freshmen	2.96(±0.18)	3.23(±0.12)	1.92(±0.13)	2.55(±0.11)	4.35(±0.13)
	Senior	2.62(±0.19)	3.39(±0.12)	1.87(±0.14)	2.56(±0.12)	4.56(±0.14)
Gender	Female	2.72(±0.15)	3.25(±0.10)	2.05(±0.11)	2.55(±0.09)	4.43(±0.12)
	Male	3.07(±0.23)	3.50(±0.15)	1.45(±0.16)	2.60(±0.14)	4.39(±0.15)
Major	AnS <sup>a</sup>	2.80(±0.19)	3.31(±0.12)	1.90(±0.14)	2.60(±0.12)	4.39(±0.15)
	CALS <sup>b</sup>	2.85(±0.17)	3.33(±0.11)	1.85(±0.12)	2.54(±0.11)	4.44(±0.13)
Background	Rural	2.93(±0.17)	3.52(±0.12)	1.64(±0.14)	2.43(±0.12)	4.48(±0.15)
	Urban	2.77(±0.17)	3.15(±0.11)	2.05(±0.12)	2.66(±0.11)	4.36(±0.13)

<sup>a</sup> Animal Science

<sup>b</sup> College of Agriculture and Life Sciences

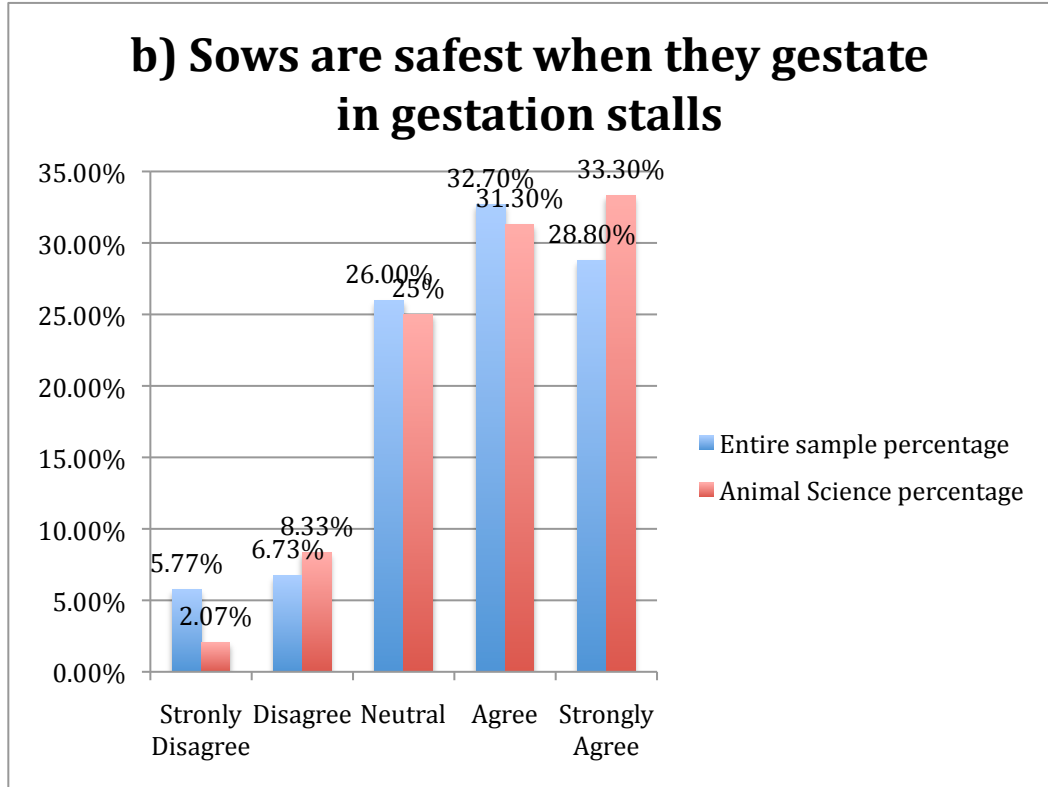
LIST OF FIGURES

Figure 1.1. Distribution of index of concern statement a), for the entire sample and animal science majors



Mean 4.08      Median 4      Standard Error 0.1

Figure 1.2. Distribution of index of concern statement b), for the entire sample and animal science majors



Mean	Median	Standard Error
3.76	4	0.11

Figure 1.3. Distribution of index of concern statement c), for the entire sample and animal science majors

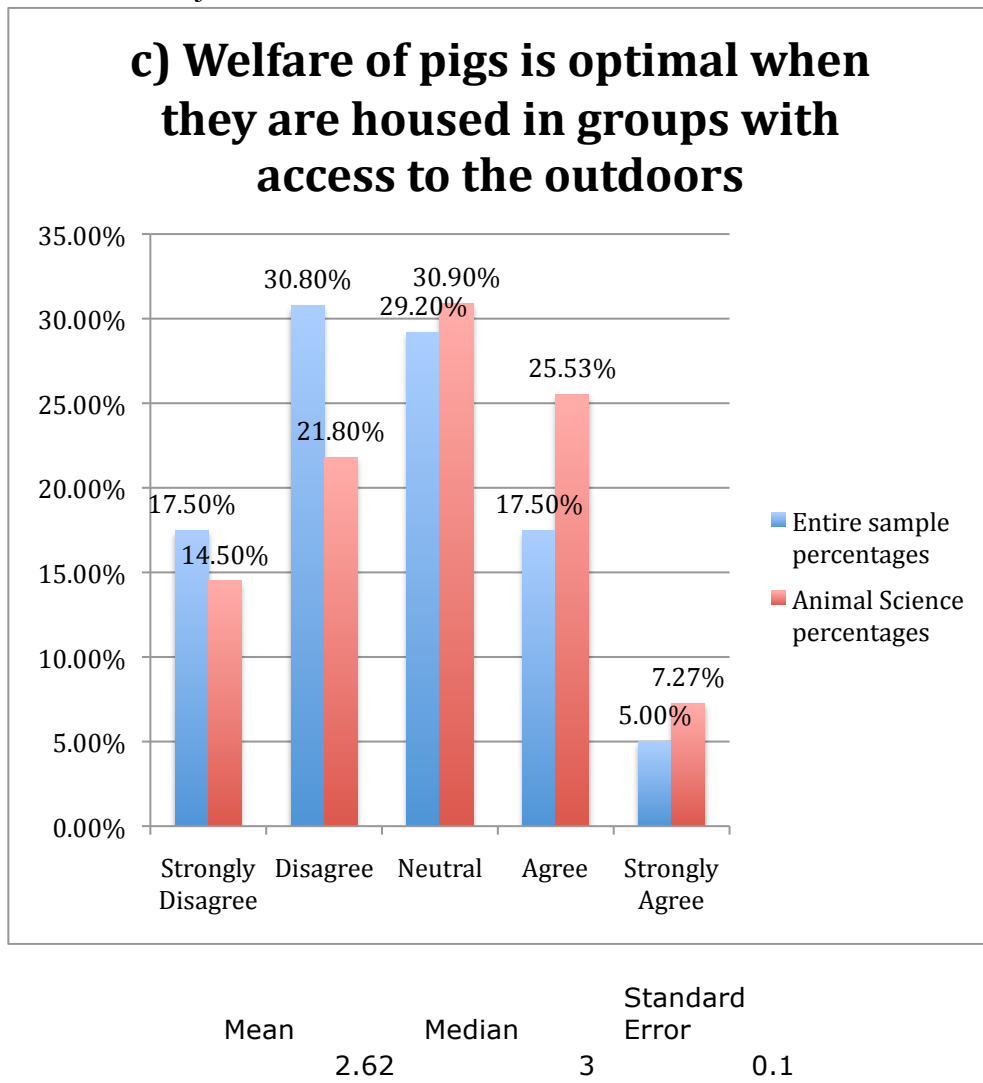


Figure 1.4. Distribution of index of concern statement d), for the entire sample and animal science majors

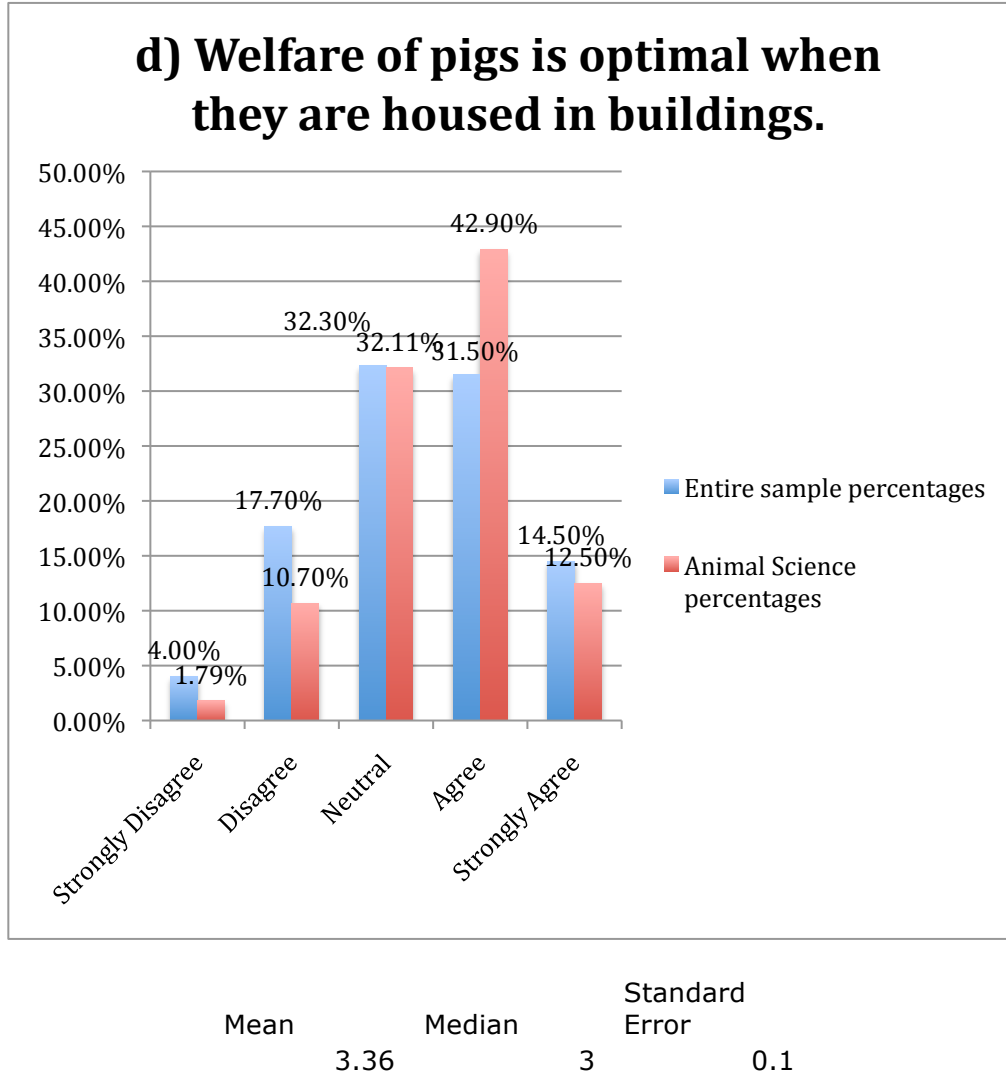


Figure 1.5. Distribution of index of concern statement e), for the entire sample and animal science majors

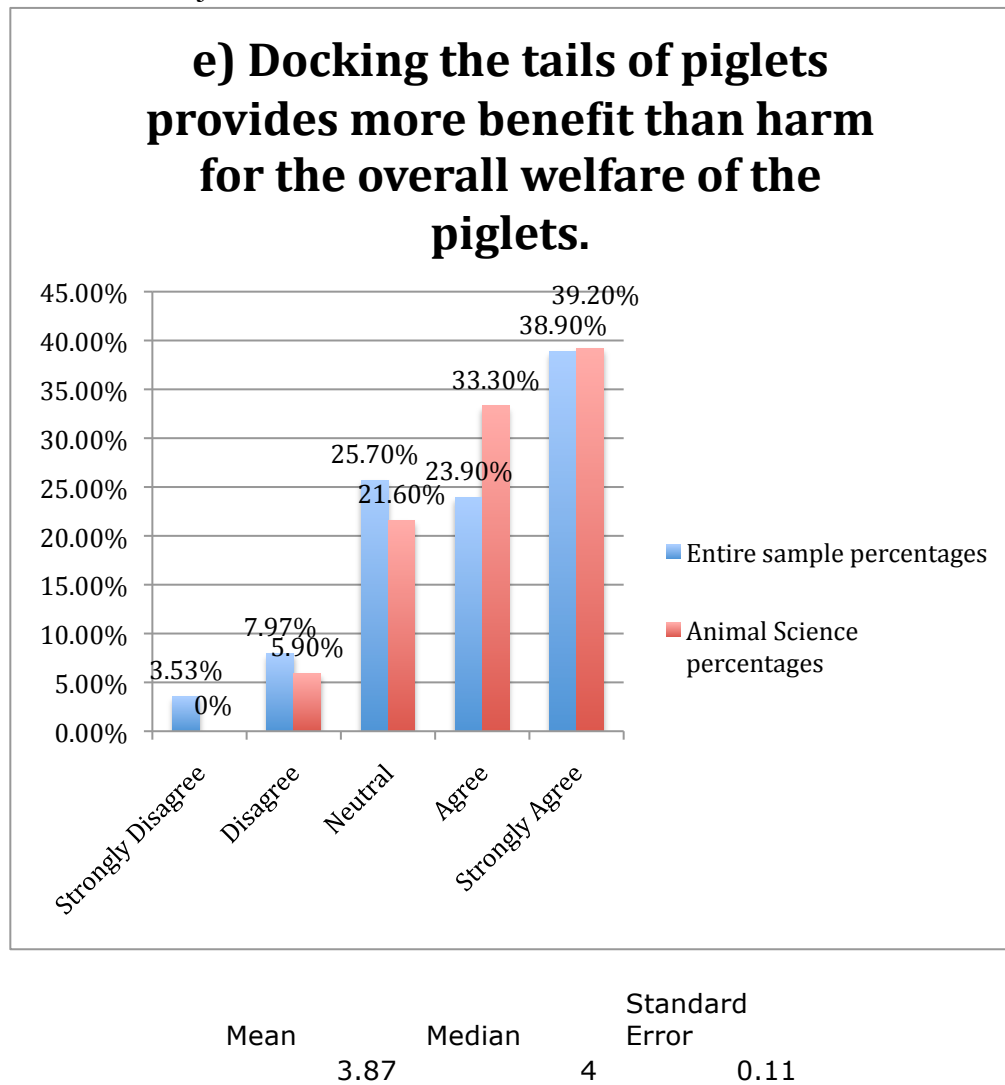
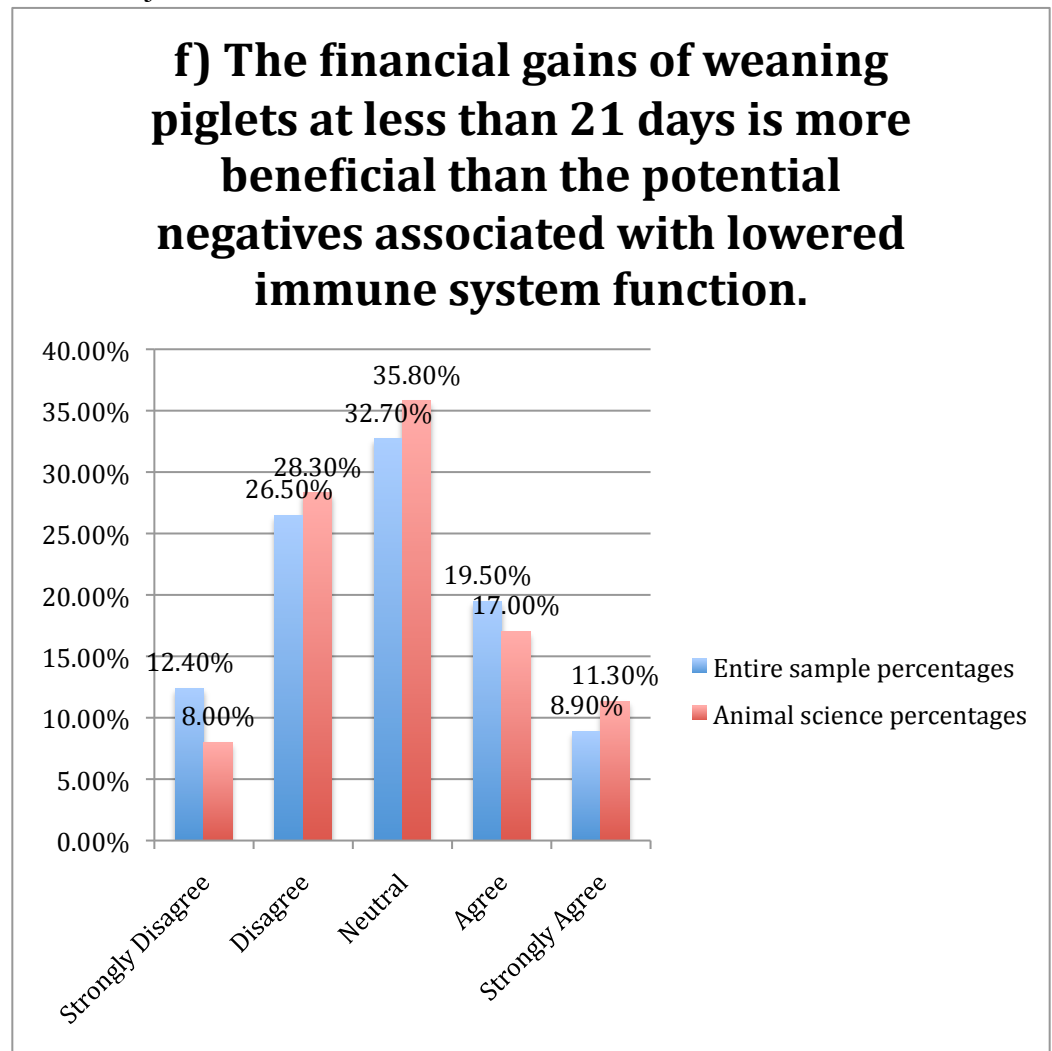
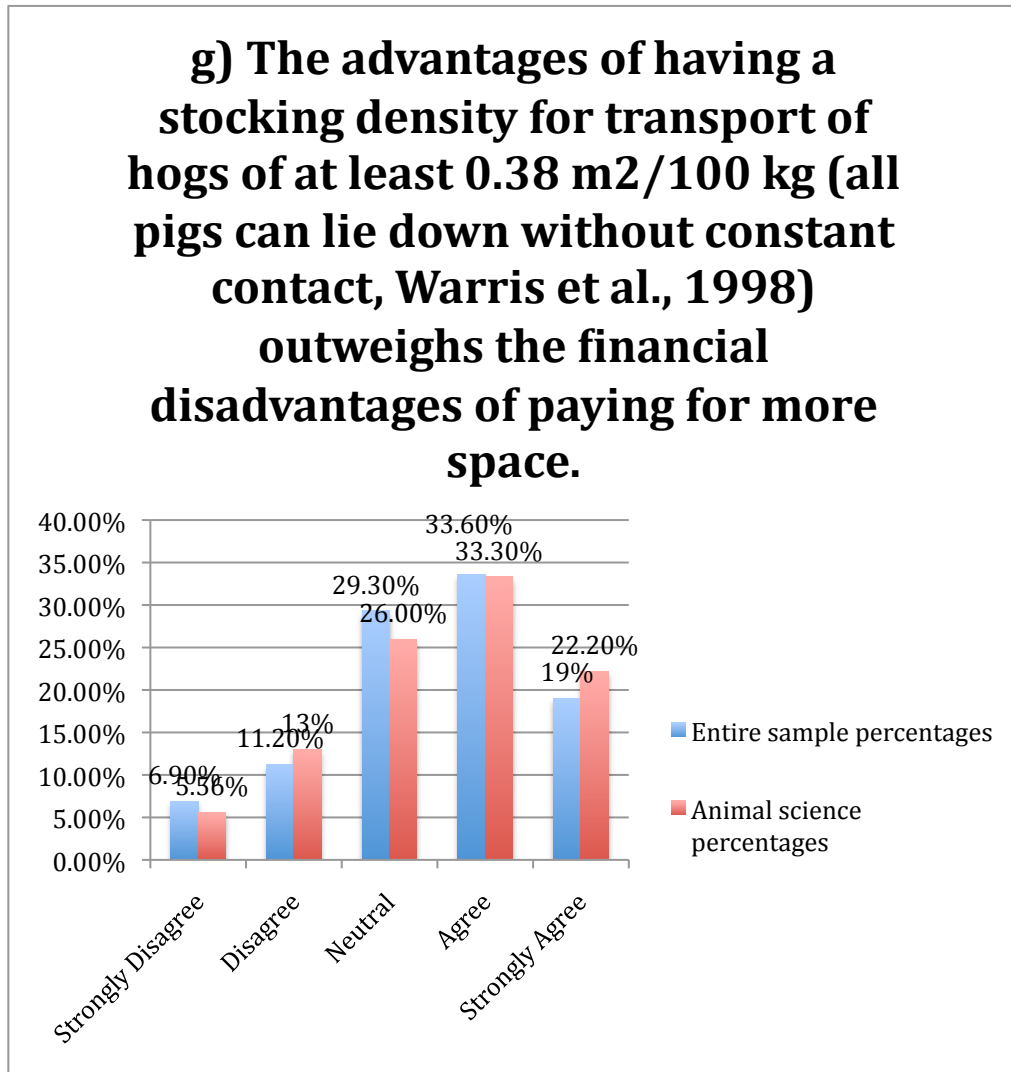


Figure 1.6. Distribution of index of concern statement f), for the entire sample and animal science majors



Mean 2.9      Median 3      Standard Error 0.11

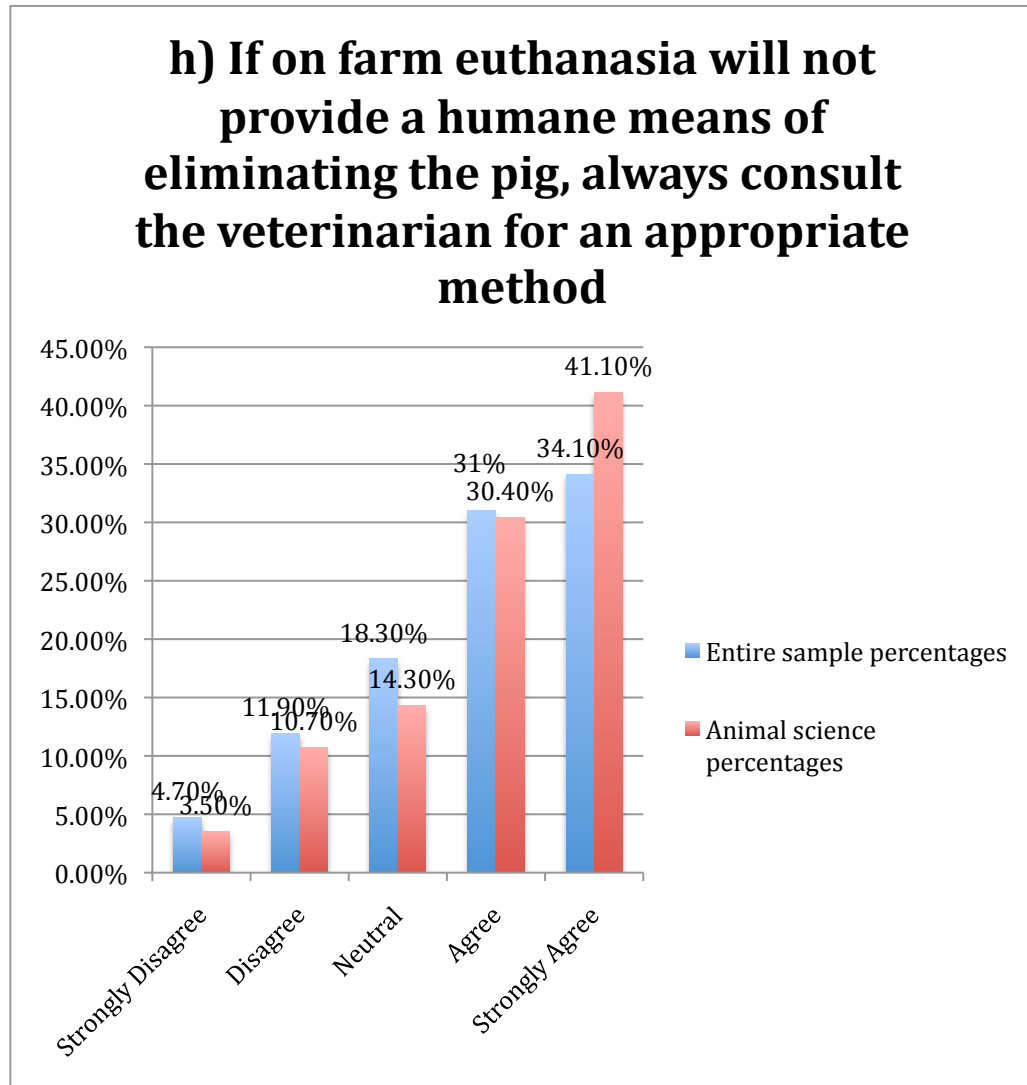
Figure 1.7. Distribution of index of concern statement g), for the entire sample and animal science majors



Mean 3.45      Median 4      Standard Error 0.11

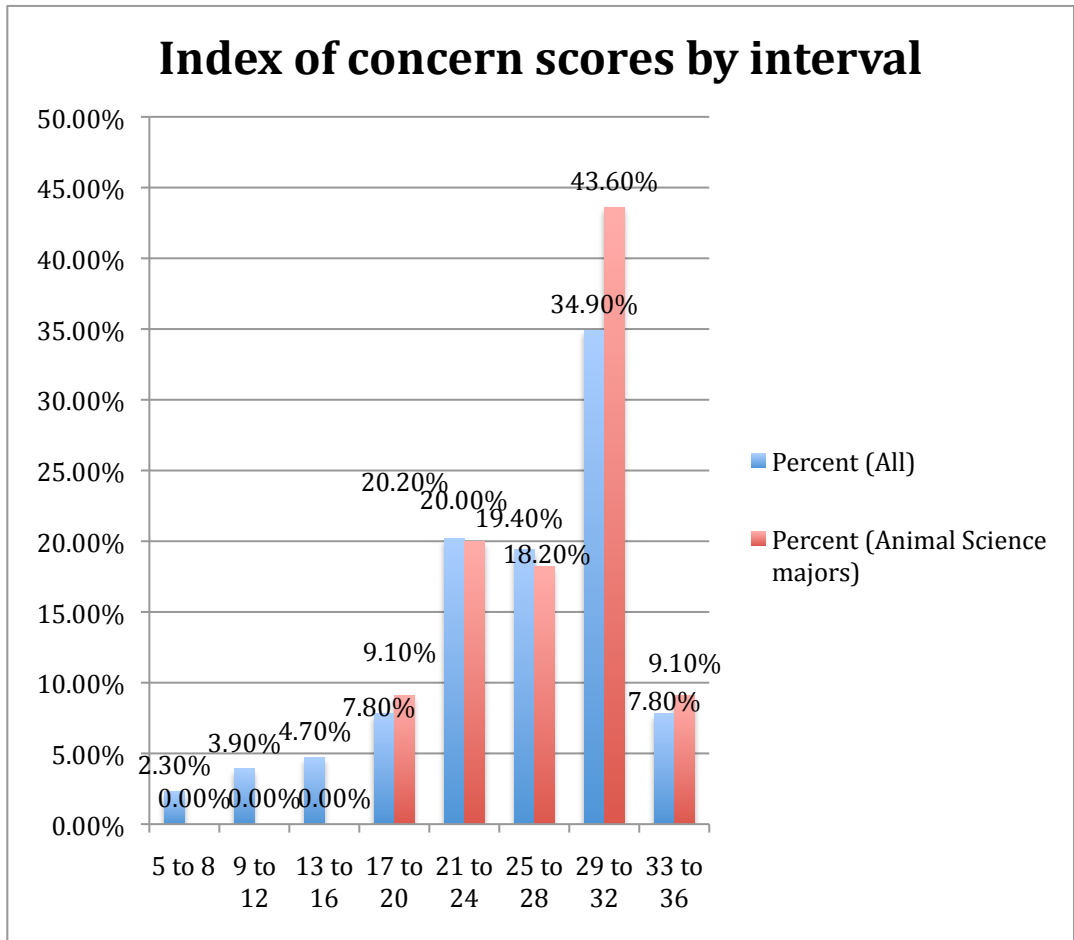


Figure 1.8. Distribution of index of concern statement h), for the entire sample and animal science majors



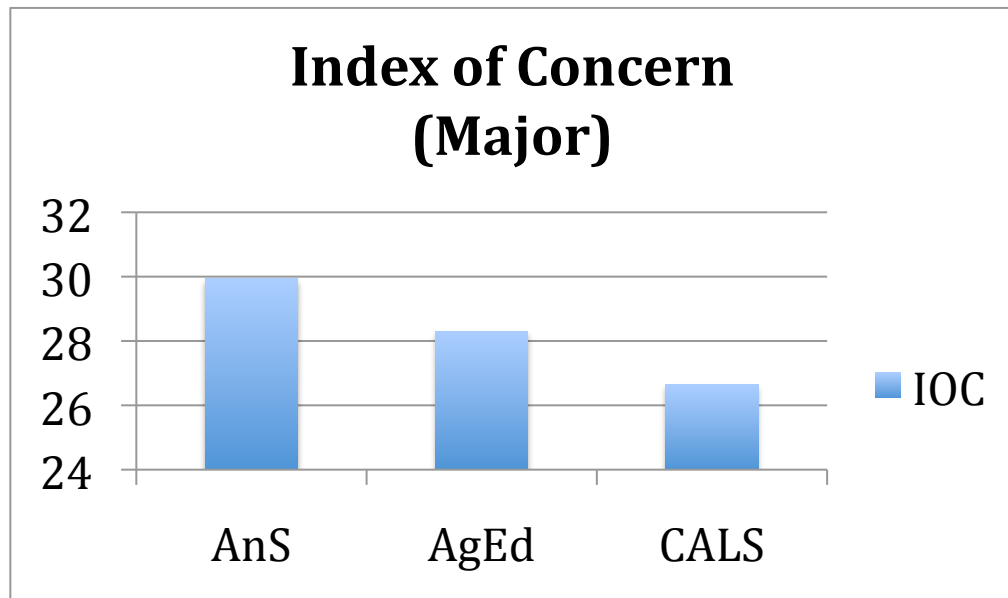
Mean 3.73      Median 4      Standard Error 0.11

Figure 2. Index of concern scores by percent interval



Mean 28.3      Median 29.00%      Standard Error 15.60%

Figure 3. Index of concern mean by major.



## REFERENCES

- Ahmadi, B. V., Stott, A. W., Baxter, E. M., Lawrence, A. B., and Edwards, S. A. (2011). Animal welfare and economic optimisation of farrowing systems. *Animal Welfare*, 20: 57-67.
- Baxter, E. M., Lawrence, A. B., and Edwards, S. A. (2012). Alternative farrowing accommodation: welfare and economic aspects of existing farrowing and lactation systems for pigs. *Animal*, 6:96-117.
- Brambell, F. W. R. (1965). Report of the technical committee to enquire into the welfare of animals kept under intensive livestock husbandry systems. (Command Rep. 2836). London: Her Majesty's Stationery Office.
- Broom, D. M. (1986). Indicators of poor welfare. *British Veterinary Journal*, 142: 524-526.
- Bruininx, E. M. A. M., Binnendijk, G. P., van der Peet-Schwering, C. M. C., Schrama, J. W., den Hartog, L. A., Everts, H., Beynen, A. C. (2002). Effect of creep feed consumption on individual feed intake characteristics and performance of group-housed weanling pigs. *Journal of Animal Science*, 80:1413-1418.
- Bryer, P. J., Sutherland, M. A., Davis, B. L., Smith, J. F. and McGlone, J. J. (2010). The effect transport and space allowance on the physiology of breeding age gilts. *Livestock Scienc*, 137: 58-65.
- Cagienard, A., Regula, G., Danuser, J. (2005). The impact of different housing systems on health and welfare of grower and finisher pigs in Switzerland. *Preventive Veterinary Medicine*, 68:49–61.
- Cameron RDA. (2000). A review of the industrialization of pig production worldwide with particular reference to the Asian region.  
<http://www.fao.org/ag/AGInfo/resources/en/publications/agapubs>.
- Chickering, A. (1969). *Education and identity*. Jossey-Bass, San Francisco.
- Davis, S. L., and P. R. Cheeke. (1998). Do domestic animals have minds and the ability to think? A provisional sample of opinions on the question. *Journal of Animal Science*, 76:2072–2079.
- Day, J. E. L., Spooler, H. A. M., Burfoot, A., Chamberlain, H. L., Edwards, S. A. (2002). The separate and interactive effects of handling and environmental enrichment on

- the behaviour and welfare of growing pigs. *Applied Animal Behavior Science*, 75: 177-192.
- de Boo, J. and Knight, A. (2005). "Concepts in animal welfare": a syllabus in animal welfare science and ethics for veterinary schools. *Journal of Veterinary Medical Education*, 32(4): 451-453.
- Deen, J. (2005). Sow housing: Opportunities, constraints, and unknowns. *Journal of American Veterinary Medical Association*, 226:1331–1334.
- Department for Environment, Food and Rural Affairs. (2011). Code of Recommendations for the Welfare of Livestock. DEFRA Publications London.
- Edwards, L. N., Grandin, T., Engle, T. E., Ritter, M. J., Sosnicki, A. A., Carlson, B. A., Anderson, D. B. (2010). The effects of pre-slaughter pig management from the farm to the processing plant on pork quality. *Meat Science*, 86: 938-944.
- Edwards, S. A. 2002. Perinatal mortality in the pig: environmental or physiological solutions?. *Livestock Production Science*, 78: 3-12.
- Estol, L. R. (2004). Animal welfare in the veterinary curriculum. In Global Conference on Animal Welfare, pages 37-49.
- Farm Animal Welfare Council. (2009). Farm Animal Welfare in Great Britain: Past, Present and Future. Farm Animal Welfare Council, UK.
- Fraser, D., (1984). The role of behavior in swine production: a review of research. *Applied Animal Ethology*, 11: 317-339.
- Gentry, J. G., McGlone, J. J., Blanton, J. R., Jr. and Miller, M. F. (2002a). Impact of spontaneous exercise on performance, meat quality, and muscle fiber characteristics of growing/finishing pigs. *Journal of Animal Science*, 80:2833-2839.
- Gentry, J. G., McGlone, J. J., Blanton, J. R., Jr. and Miller, M. F. (2002b). Alternative housing systems for pigs: Influences on growth, composition, and pork quality. *Journal of Animal Science*, 80: 1781-1790.
- Grandin, T. (2003). The welfare of pigs during transport and slaughter. *PigNews and Information*, 24: 83-90.
- Heleski, C. R., A. G. Mertig and A. J. Zanella. (2005). Results of a national survey of US veterinary college faculty regarding attitudes toward farm animal welfare. *Journal of American Veterinary Medical Association*, 226:1538-1546.

- Heleski, C. R., A. G. Mertig, and A. J. Zanella. (2004). Assessing attitudes toward farm animal welfare: A national survey of animal science faculty members. *Journal of Animal Science*, 82:2806–2814.
- Heleski, C. R., A. J. Zanella, and E. A. Pajor. (2003). Animal welfare judging teams: A way to interface welfare science with traditional animal science curricula? *Applied Animal Behavior Science*, 81:279–289.
- Hemsworth, P. H. (2003). Human-Livestock Interactions: The stockperson and the productivity and welfare of intensively farmed animals. *Applied Animal Behavior Science*, 81:185-189.
- Hermesch, S., Kanis, E. and Eissen, J. J. (2003). Economic weights for feed intake in the growing pig derived from a growth model and an economic model. *Journal of Animal Science*, 81:895-903.
- Hills, A. M. (1993). The Motivational Bases of Attitudes Toward Animals. *Society and Animals*, 1: 111-128.
- Honeyman, M. S. (2005). Extensive bedded indoor and outdoor pig production systems in USA: current trends and effects on animal care and product quality. *Livestock Production Science*, 94: 15-24.
- Iowa State University (2009). Course catalog 2009-2011.
- Jarvis, S., D'Eath, R. B., Fujita, K. (2005). Consistency of piglet crushing by sows. *Animal welfare*, 14:43-51.
- Kalof, L., Addams, H., and Proops, J. (2000). Social Discourse and Environmental Policy: An application of Q methodology. Edward Elgar Publishing Limited. Pages 1-11.
- Kauppinen, T., Vesala, K. M., and Valros, A., (2011). Farmer attitude toward improvement of animal welfare is correlated with piglet production parameters. *Livestock Science*, 143: 142-150.
- Kittawornrat, A. and Zimmerman, J. J. (2010). Toward a better understanding of pig behavior and pig welfare. *Animal Health Research Review*, 12: 25-32.
- Klont, R. E., Hulsegge, B., Hoving-Bolink, A. H., Gerritzen, M. A., Kurt, E., Winkelmann-Goedhart, H. A., de Jong, I. C., Kranen, R. W. (2001). Relationships between behavioral and meat quality characteristics of pigs raised under barren and enriched housing conditions. *Journal of Animal Science*, 79: 2835-2843.

- Kranendonk, G., Van der Mheen, H., Fillerup, M., and Hopster, H. (2007). Social rank of pregnant sows affects their body weight gain and behavior and performance of the offspring. *Journal of Animal Science*, 85: 420-429.
- Kruse, Corwin R. (1999). Gender, views of nature, and support for animal rights. *Society & Animals*, 7:179-198.
- Le Dividich, J. and Séve, B. 2000. Effects of underfeeding during the weaning period on growth, metabolism, and hormonal adjustments in the piglet. *Domestic Animal Endocrinology*, 19 (2000): 63-74.
- Lopez, J., Jesse, G. W., Becker, B. A. and Eilersieck, M. R. 1991. Effects of temperature on the performance of finishing swine: I. Effects of a hot, diurnal temperature on average daily gain, feed intake, and feed efficiency. *Journal of Animal Science* 69:1843-1849.
- Lusk, J. L. and Norwood, F. B. (2008). A survey to determine public opinion about the ethics and governance of farm animal welfare. *Journal of the American Veterinary Medical Association*, 233: 1121-1126.
- Marchant-Forde, J. N. (2010). Social behavior in swine and its impact on welfare. In *Welfare and Behavior: IPVS Congress, Vancouver, Canada*, pages 36-39.
- Matthis, J. S. (2004). Selected employee attributes and perceptions regarding methods and animal welfare concerns associated with swine euthanasia. PhD thesis, North Carolina State University.
- McCracken, B. A., Spurlock, M. E., Roos, M. A., Zuckermann, F. A., Gaskins, H. R. (1999). Weaning anorexia may contribute to local inflammation in the piglet small intestine *Journal of Nutrition*, 129: 613-619.
- McCracken, B. A., Gaskins, H. R., Ruwe-Kaiser, P. J., Klasing, K. C., Jewell, D. E. (1995). Diet-dependent and diet-independent metabolic responses underlie growth stasis of pigs at weaning. *Journal of Nutrition*, 125:2838-2845.
- McKay, S. A., Farnworth, M. J. and Waran, N. K. (2009). Current attitudes toward, and incidence of, sterilization of cats and dogs by caregivers (owners) in Auckland, New Zealand. *Journal of Applied Animal Welfare Science*, 12: 331-344.
- Meat and Livestock Commission (2000). *The Pig Yearbooks 2000-2009*.
- National Pork Board. (2012). *Pork checkoff swine welfare research publication*.  
<http://www.pork.org/filelibrary/Factsheets/Well-Being/SwineWelfareResearch.pdf>

- OECD/FAO. (2010). Organisation for economic co-operation and development-food and agriculture organization of the United Nations agricultural outlook 2010-2019 Highlights. page 20.
- Oostindjer, M., Bolhuis, J. E., Mendle, M., Held, S., Gerrits, W., van den Brand, H., and Kemp, B. (2010). Effects of environmental enrichment and loose housing of lactation sows on piglet performance before and after weaning. *Journal of Animal Science*, 88:3554-3562.
- Pajor, E. A., Fraser, D., Kramer, D. L. (1991). Consumption of solid food by suckling pigs: individual variation and relation to weight gain. *Applied Animal Behavior Science*, 32: 139-155.
- Paul, E. S., and A. L. Podberscek. (2000). Veterinary education and students' attitudes towards animal welfare. *American Journal of Veterinary Research*, 146:269–272.
- Pluske, J. R., Hampson, D. J., Williams, I. H. (1997). Factors influencing the structure and function of the small intestine in the weaned pig: a review. *Livestock Production Science*, 51: 215-236.
- Prickett, R. W., Norwood, F. B., and Lusk, J. L. (2010). Consumer preferences for farm animal welfare: results from a telephone survey of US households. *Animal Welfare*, 19: 335-347.
- Randolph, J. H., Cromwell, G. L., Stahly, T. S., Kratzer, D.D. (1981). J.H. Effects of group size and space allowance on performance and behavior of swine. *Journal of Animal Science*, 53:922–927.
- Rumley, E. R. (2012). The National Agricultural Law Center.  
<http://www.nationalaglawcenter.org/assets/farmanimal/index.html>
- Spoolder, H. A. M., Edwards, S. A., Corning, S. (2000). Legislative methods for specifying stocking density and consequences for welfare of finishing pigs. *Livestock Production Science*, 64:167-173.
- Spreeuwenberg, M. A. M., Verdonk, J. M. A. J., Gaskins, H. R., Verstegen, M. W. A. (2001). Small intestine epithelial barrier function is compromised in pigs with low feed intake at weaning. *Journal of Nutrition*, 131: 1520-1527.
- Sutherland, M. A., Bryer, P. J., Krebs, N., and McGlone, J. J. (2007). Tail docking in pigs: acute physiological and behavioural responses. *Animal*, pages 292-297.
- Thompson, P., C. Harris, D. Holt, and E. A. Pajor. (2007). Livestock welfare product claim: The emerging social context. *Journal of Animal Science*, 85:2354–2360.



- Thompson, P. B. (2005). Animal agriculture and the welfare of animals. *Journal of American Veterinary Medical Association*, 226:1325–1327.
- Thornton, Philip K.(2010). Livestock production: recent trends, future prospects. *Philosophical Transactions of the Royal Society B*, 365:2853-2867.
- Van der Meulen, J., Koopmans, S. J., Dekker, R. A., Hoogendoorn, A. (2010). Increasing weaning age of piglets from 4 to 7 weeks reduces stress, increases post-weaning feed intake but does not improve intestinal functionality. *Animal*, 4:1653-1661.
- Velde, H. T., Aarts, N., and Woerkum, C. V. (2001). Dealing with ambivalence: farmers' and consumers' perceptions of animal welfare in livestock breeding. *Journal of Agricultural and Environmental Ethics*, 15: 203-219.
- Vigorito, M. (1996). An animal rights attitude survey of undergraduate psychology students. *Psychological Reports*, 79:131-142.
- Warris, P. D. (1998). Choosing appropriate space allowance for slaughter pigs transported by road: a review. *Veterinary Record*, 142:449-454.
- Wright, T. A., and Cropanzano, R., (2000). Psychological well-being and job satisfaction as predictors of job performance. *Journal of Occupational Health Psychology*. 5:84-94.
- Yonezawa, T., Takahashi, A., Imai, S., Okitsu, A., Komiyama, S., Irimajiri, M., Matsuura, A., Yamazaki, A., and Hodate, K. (2012). Effects of outdoor housing of piglets on behavior, stress reaction and meat characteristics. *Asian-Australasian Journal of Animal Science*, 25: 886-894.

## APPENDIX A. RECRUITING EMAIL

Subject line: Seeking participants for attitude research study

You are receiving this email because you are a freshman or senior in the college of agriculture at Iowa State University.

This study is about identifying attitudes of Iowa State University College of Agriculture and Life Sciences undergraduate freshman and seniors on the topic of animal welfare and to see if there is any difference in career ambition between these two groups. You should not participate if you are under the age of 18. If you take part in this study, you will be asked to complete a questionnaire about your attitudes towards your current career ambition and swine welfare issues such as housing, processing, and euthanasia practices. Your participation will last for the length of time needed to complete the questionnaire; about 15 minutes.

If you are interested in participating, please click the link below to begin the survey. A more detailed description of the study is attached.

Thank you,

Maureen Petersen  
mpeterse@iastate.edu  
Graduate Student in Sustainable Agriculture  
Iowa State University  
317 E Hall  
Ames, IA 50011

## APPENDIX B. STUDY DESCRIPTION

### **Career Ambitions and Attitudes Toward Swine Welfare**

Principal Investigator: Maureen K. Petersen  
Graduate Student in Sustainable Agriculture, Iowa State University

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

#### **INTRODUCTION**

The purpose of this study is to identify attitudes of Iowa State University College of Agriculture and Life Sciences undergraduate freshman and seniors on the topic of animal welfare and to see if there is any difference in career ambition between these two groups. You are being invited to participate in this study because you are an undergraduate freshman or senior in the College of Agriculture and Life Sciences at Iowa State University. You should not participate if you are under the age of 18.

#### **DESCRIPTION OF PROCEDURES**

If you agree to participate, you will be asked to complete a questionnaire about your attitudes towards your current career ambition and swine welfare issues such as housing, processing, and euthanasia practices. Your participation will last for the length of time needed to complete the questionnaire; about 15 minutes.

#### **RISKS**

There are no foreseeable risks at this time from participating in this study. No discomfort is anticipated from participation in this study. The probability and magnitude of harm or discomfort is no greater than that encountered ordinarily in daily life or during the performance of routine physical or psychological examinations or tests.

#### **BENEFITS**

If you decide to participate in this study there may be no direct benefit to you. It is hoped that the information gained in this study will benefit society by helping to understand any differences in career ambition that could aid in guiding the curriculum and provide insight as to which resources could be most beneficial for students in planning their academic paths.

#### **COSTS AND COMPENSATION**

You will not have any costs from participating in this study. You may be entered in a drawing for a \$50 Amazon.com gift certificate. If you would like to be included in

the drawing, please email [mpeterse@iastate.edu](mailto:mpeterse@iastate.edu). That email cannot be connected to your response to the survey. After the data has been collected, the drawing will be conducted. The winner will receive the gift certificate via e-mail.

### **PARTICIPANT RIGHTS**

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. You can skip any questions in the questionnaire that you do not wish to answer.

### **CONFIDENTIALITY**

This study does not require the names or contact information of any of the participants. The web-based survey has no questions asking for this type of information.

### **QUESTIONS OR PROBLEMS**

You are encouraged to ask questions at any time during this study.

- For further information about the study contact:

Maureen Petersen

(515)-231-3167

- If you have any questions about the rights of research subjects, please contact the IRB Administrator, (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

## APPENDIX C. QUESTIONNAIRE

- 1) Are you male or female?
  - a. Male
  - b. Female
  
- 2) What is your classification?
  - a. Freshman
  - b. Senior
  - c. Other
  
- 3) What is your major (please select two if dual-major and/or list minor at bottom)?
  - a. Agricultural and Biosystems Engineering
  - b. Agricultural Education and Studies
  - c. Agronomy
  - d. Animal Science
  - e. Biochemistry, Biophysics, and Molecular Biology
  - f. Ecology, Evolution and Organismal Biology
  - g. Economics
  - h. Entomology
  - i. Food Science and Human Nutrition
  - j. Genetics, Development and Cell Biology
  - k. Horticulture
  - l. Natural Resource Ecology and Management
  - m. Plant Pathology
  - n. Sociology
  - o. Statistics
  - Minor (please list)\_\_\_\_\_
  
- 4) Which of the following best describes your current occupational ambition after graduation?
  - a. Vet school
  - b. Graduate school
  - c. Work with livestock
  - d. Work on a farm
  - e. Work in the agriculture industry
  - f. Other\_\_\_\_\_
  
- 5) What is your residence background?
  - a. Rural (area of 2,499 or fewer people- as defined by the Bureau of the Census in the 2000 Decennial Census.)
  - b. Urban (are 2,500 or more people)
  
- 6) Prior to attending college, how would you designate your living arrangements?

- a. On a farm producing primarily grain and/or livestock-related products
- b. On a small acreage in the country
- c. In a small rural town
- d. In a medium to large-sized city

7) Have you ever visited a farm (provided you have not lived on a grain and/or livestock producing farm)?

- a. Yes
- b. No
- c. Lived on a farm

8) If so, was it because:

- a. It was a school trip or field trip
- b. I had some external interest in livestock production/agriculture
- c. I worked or had an internship on a farm
- d. Lived on a farm
- e. Never visited a farm
- f. Other \_\_\_\_\_

9) If planning to enter into the field of animal science post graduation, which of the following animal species do you aim to work with?

- a. Horses
- b. Cattle
- c. Swine
- d. Sheep
- e. Poultry
- f. Companion animals (dogs, cats, hamsters, etc.)
- g. I don't plan to enter into the field of animal science
- h. Other \_\_\_\_\_

10) The Brambell Committee identified the following animal welfare issues in December 1965 (HMSO London, ISBN 0 10 850286 4). Rank these issues on how important you believe they are to the overall operation of producing swine for meat:

1=most important, 5=least important

- a. Slaughter/harvest of animals is done humanely \_\_\_\_\_
- b. Animals are allowed freedom to move \_\_\_\_\_
- c. Animals are provided proper feed/water \_\_\_\_\_
- d. Animals are provided a clean and safe environment \_\_\_\_\_
- e. Animals are provided environmental enrichment \_\_\_\_\_

11) Please respond to the following statements based on how much you agree or disagree with each statement:

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	I don't know what this is
a. Piglets are safest when sows nurse in lactation stalls.						
b. Sows are safest when they gestate in gestation stalls.						
c. Welfare of pigs is optimal ( <b>minimal</b> ) when they are housed in groups with access to the outdoors.						
d. Welfare of pigs is optimal when they are housed in buildings.						
e. Docking the tails of piglets provides more benefit than harm for the overall welfare of the piglets.						
f. The financial gains of weaning piglets at less than 21 days is more beneficial than the potential negatives associated with lowered immune system function.						
g. The advantages of having a stocking density for transport of hogs of at least 0.38 m <sup>2</sup> /100 kg (all pigs can lie down without constant contact, Warris <i>et al.</i> , 1998) outweighs the financial disadvantages of paying for more space.						
h. If on farm euthanasia will not provide a humane means of eliminating the pig, always consult the veterinarian for an appropriate method						

12) How much of an impact do your views on animal welfare affect your career ambition?

- a. Not at all
- b. Not very much
- c. Neutral
- d. A little
- e. A lot

13) How much of an influence does swine welfare have on your overall animal welfare perspective?

- a. No influence
- b. Not very much
- c. Neutral
- d. A little
- e. A lot of influence



## APPENDIX D. APPROVED IRB

<b>For IRB Use Only</b>	Review Date: _____	IRB ID: ____
	_____	Approval Date: ____
	Length of Approval: _____	
	Approval Expiration Date: _____	FULL
	Committee Review: _____	EXEMPT per 45 CFR
	46.101(b): _____ Date: _____	Minimal Risk:
	_____ EXPEDITED per 45 CFR 46.110(b)	More than
Minimal Risks: _____	Project Closed	
Category _____, Letter _____		
Date: _____		

**INSTITUTIONAL REVIEW BOARD (IRB)****Application for Approval of Research Involving Humans**

## SECTION I: GENERAL INFORMATION

Principal Investigator (PI): Maureen K. Petersen	Phone: 515-231-3167	Fax: N/A
Degrees: B. S. Animal Science	Correspondence Address: 317 East Hall	
Department: Sustainable Agriculture/Sociology	Email Address: mpeterse@iastate.edu	
Center/Institute: Iowa State University	College: Agriculture	
PI Level: <input type="checkbox"/> Faculty <input type="checkbox"/> Staff <input type="checkbox"/> Postdoctoral   X <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Undergraduate Student		

<b>Alternate Contact Person: Dr. Cornelia Flora</b>	<b>Email Address: cflora@iastate.edu</b>
<b>Correspondence Address: 317 East Hall</b>	<b>Phone: 515-294-1329</b>
<b>Title of Project: Career Ambitions and Attitudes Toward Swine Welfare</b>	
<b>Project Period (Include Start and End Date): [mm/dd/yy][09/15/2011] to [mm/dd/yy][3/15/2012]</b>	

<b>FOR STUDENT PROJECTS</b>	
Name of Major Professor/Supervising Faculty: Dr. Cornelia Flora	Signature of Major Professor/Supervising Faculty:
Phone: 515-294-1329	Campus Address: 317 East Hall
Department: Sociology	Email Address: cflora@iastate.edu
Type of Project: (check all that apply) <input type="checkbox"/> Research                      X <input checked="" type="checkbox"/> Thesis <input type="checkbox"/> Dissertation <input type="checkbox"/> Independent Study (490, 590, Honors project) <input type="checkbox"/> Class project <input type="checkbox"/> Other. Please specify: _____	

#### KEY PERSONNEL

List all members and relevant experience of the project personnel. This information is intended to inform the committee of the training and background related to the specific procedures that each person will perform on the project.

NAME & DEGREE(S)	SPECIFIC DUTIES ON PROJECT	TRAINING & EXPERIENCE RELATED TO PROCEDURES PERFORMED, DATE OF TRAINING
------------------	----------------------------	---

Maureen Petersen, B.S.	Design the questionnaire, get access to sample, collect and analyze the data	NIH Web-based training course. "Protecting Human Research Participants." Date of completion: 04/19/2011. Certification Number: 673288
------------------------	--	---

### FUNDING INFORMATION

<input type="checkbox"/>	Internally funded, please provide account number:
<input type="checkbox"/>	Externally funded, please provide funding source and account number:
<input type="checkbox"/>	Funding is pending, please provide OSPA Record ID on GoldSheet:
Title on GoldSheet if different from above:	
<input type="checkbox"/>	Other: ( <i>e.g., funding will be applied for later</i> )
X <input checked="" type="checkbox"/>	Student Project—no funding or funding provided by student

### SCIENTIFIC REVIEW

Although the assurance committees are not intended to conduct peer review of research proposals, the federal regulations include language such as “consistent with sound research design,” “rationale for involving animals or humans” and “scientifically valuable research,” which requires that the committees consider in their review the general scientific relevance of a research study. Proposals that do not meet these basic tests are not justifiable and cannot be approved. If an assurance review committee(s) has concerns about the scientific merit of a project and the project was not competitively funded by peer review or was funded by corporate sponsors, the project may be referred to a scientific review committee. The scientific review committee will be an ad hoc and will consist of your ISU peers and outside experts as needed. If this situation arises, the PI will be contacted and given the option of agreeing that a consultant may be contacted or withdrawing the proposal from consideration.

X Yes  No Has or will this project receive peer review?

If the answer is “yes,” please indicate who did or will conduct the review: POS committee will review the research

If a review was conducted, please indicate the outcome of the review:

### COLLECTION OR RECEIPT OF SAMPLES

Will you be: (Please check all that apply.)

Yes X No Receiving samples from outside of ISU? See examples below.  
 Yes X No Sending samples outside of ISU? See examples below.

Examples include: genetically modified organisms, body fluids, tissue samples, blood samples, pathogens.

**If you will be receiving samples from or sending samples outside of ISU, please identify the name of the outside organization(s) and the identity of the samples you will be sending or receiving outside of ISU. If the outside organizations have not been identified, please check no for both questions above.**

N/A
-----

Please note that **some samples may require a** USDA Animal Plant Health Inspection Service (APHIS) **permit**, a USPHS Centers for Disease Control and Prevention (CDC) Import Permit for Etiologic Agents, a Registration for Select Agents, High Consequence Livestock Pathogens and Toxins or Listed Plant Pathogens, or a Material Transfer Agreement (MTA) [EH&S Website](#)

**ASSURANCE**

- I certify that the information provided in this application is complete and accurate and consistent with any proposal(s) submitted to external funding agencies.
- I agree to provide proper surveillance of this project to ensure that the rights and welfare of the human subject or welfare of animal subjects are protected. I will report any problems to the appropriate assurance review committee(s).
- I agree that I will not begin this project until receipt of official approval from all appropriate committee(s).
- I agree that modifications to the originally approved project will not take place without prior review and approval by the appropriate committee(s), and that all activities will be performed in accordance with all applicable federal, state, local and Iowa State University policies.



**SIGNATURES**

Signature of Principal Investigator	Date
-------------------------------------	------

Signature of Department Chair	Date
-------------------------------	------

**PLEASE NOTE: Any changes to an approved protocol must be submitted to the appropriate committee(s) before the changes may be implemented.**

**Please proceed to SECTION II.**

## SECTION II: IRB SECTION - STUDY SPECIFIC INFORMATION

Please complete all of the following questions.

### STUDY OBJECTIVES

Briefly explain in **language understandable to a layperson** the specific aim(s) of the study.

This study is aimed at identifying attitudes of Iowa State University College of Agriculture undergraduate freshman and seniors on the topic of animal welfare, generally, and swine-related issues, in particular. Any difference in career ambition might suggest a possible impact on the animal science or animal production industry, since many college graduates are bound for the job market soon after graduation. Any differences could predict changes that should be considered by the industry and the major.

Using data collected from my questionnaire, my research seeks to answer the following questions: Do Iowa State University undergraduate career ambitions differ between freshmen and seniors? Do views on welfare of swine differ between freshmen and seniors; how might this indicate difference in career paths? What are some factors that could influence differing career ambitions between freshmen and seniors?

### BENEFITS TO SOCIETY AND PARTICIPANTS

Explain in **language understandable to a layperson** how the information gained in this study will advance knowledge, and/or serve the good of society. Please also describe the direct benefits to research participants; if there are no direct benefits to participants, indicate that. **Note:** monetary compensation cannot be considered a benefit to participants.

An investigation of attitudes of those likely to enter the field of animal science or animal production could assist in realizing both functioning and impaired or inoperative components of the animal science curriculum. If undergraduate students' opinions of agriculture and the animal science department at Iowa State University differ between entry to exit from college, the drivers of these differences could explain a change in career path, major, or emphasis. Understanding these differences could aid in guiding the curriculum and provide insight as to which resources could be most beneficial for students in planning their academic paths.

### PART A: PROJECT INVOLVEMENT

1)  Yes  No Is this project part of a Training, Center, Program Project Grant?

Director Name:

Overall IRB ID:

- 2)  Yes  No Is the purpose of this project to develop survey instruments?
- 3)  Yes  No Does this project involve an investigational new drug (IND)? Number:
- 4)  Yes  No Does this project involve an investigational device exemption (IDE)? Number:
- 5)  Yes  No Does this project involve existing data or records?
- 6)  Yes  No Does this project involve secondary analysis?
- 7)  Yes  No Does this project involve pathology or diagnostic specimens?
- 8)  Yes  No Does this project require approval from another institution? Please attach letters of approval.
- 9)  Yes  No Does this project involve DEXA/CT scans or X-rays?

**PART B: MEDICAL HEALTH INFORMATION OR RECORDS**

10)  Yes  No Does your project require the use of a health care provider’s records concerning past, present, or future physical, dental, or mental health information about a subject? The Health Insurance Portability and Accountability Act established the conditions under which protected health information may be used or disclosed for research purposes. If your project will involve the use of any past or present clinical information about someone, or if you will add clinical information to someone’s treatment record (electronic or paper) during the study, you must complete and submit the Application for Use of Protected Health Information.

**PART C: ANTICIPATED ENROLLMENT**

<b>Estimated number of participants to be enrolled in the study Total:</b>	
Males:	Females:
Check if any enrolled participants are: <input type="checkbox"/> Minors (Under 18) Age Range of Minors: <input type="checkbox"/> Pregnant Women/Fetuses <input type="checkbox"/> Cognitively Impaired <input type="checkbox"/> Prisoners	Check below if this project involves either: <input type="checkbox"/> Adults, non-students <input type="checkbox"/> Minor ISU students <input checked="" type="checkbox"/> ISU students 18 and older <input type="checkbox"/> Other (explain)
<b>List estimated percent of the anticipated enrollment that will be minorities if known:</b>	
American Indian:	Alaskan Native:
Asian or Pacific Islander:	Black or African American:
Latino or Hispanic:	

**PART D: PARTICIPANT SELECTION**

Please use additional space as necessary to adequately answer each question.



11. Explain the procedures and rationale for selecting participants, including the inclusion and exclusion criteria (e.g., where will names come from, what persons will be included or excluded and why, etc.).

I will contact the Office of the Registrar at Iowa State University to get access to an email list of all freshmen and seniors in the College of Agriculture. From there I will email the informed consent form and survey link to all freshmen and seniors in the College of Agriculture and Life Sciences.

12. Describe the procedures for contacting participants (e.g., letter, email, flyer, advertisements, phone call, etc.). Attach copies of any letters, scripts, flyers, or advertisements that will be used. Recruitment materials should include a statement of the voluntary and confidential nature of the research.

The survey will be administered through the web. Recruitment materials are attached.

#### PART E: RESEARCH PLAN

**Include sufficient detail for IRB review of this project independent of the grant, protocol, or other documents.**

**13. The information needed here is similar to that in the “methods” or “procedures” sections of a research proposal—it should describe the flow of events that will occur during your interactions with subjects. Please describe in detail your plans for collecting data from participants, including all procedures, tasks, or interventions participants will be asked to complete during the research (e.g., random assignment, any conditions or treatment groups into which participants will be divided, mail survey or interview procedures, sensors to be worn, amount of blood drawn, etc.). This information is intended to inform the committee of the procedures used in the study and their potential risk. Please do not respond with “see attached” or “not applicable.”**

**1. With the help of Dr. Anna Johnson in the department of animal science I will secure access to the email list of all freshmen and seniors in the College of Agriculture and Life Sciences.**

**2. I will email an invitation to participate in the study which includes a description of the study and a webpage link. The webpage will include informed consent and the questionnaire.**

**3. I will analyze the data using appropriate statistical techniques to determine differences between freshmen and seniors.**

14. For studies involving pathology/diagnostic specimens, indicate whether specimens will be collected prospectively and/or already exist “on the shelf” at the time of submission of this review form. If prospective, describe specimen procurement procedures;

indicate whether any additional medical information about the subject is being gathered, and whether specimens are linked at any time by code number to the participant's identity. If this question is not applicable, please type N/A in the response cell.

N/A

**15. For studies involving deception or where information is intentionally withheld from participants, such as the full purpose of the study, please explain how persons will be deceived or what information will be withheld. Additionally, a waiver of the applicable elements of consent will be needed. Please complete the "Waiver of Elements of Consent" form (available at the IRB website). If this question is not applicable, please type N/A in the response cell.**

N/A

#### PART F: CONSENT PROCESS

A copy of any translated informed consent documents and an English version should be submitted with the application. Provide the name of the individual who translated the consent documents, their qualifications for translating documents, and in particular informed consent documents, below.

If the consent process does not include documented consent, a waiver of documentation of consent must be requested. If any information about the study is intentionally withheld or misleading (i.e., deception is used), a waiver of the elements of consent must be requested. Forms for requesting waivers are available at the IRB website.

16. Describe the consent process for adult participants (those who are age 18 and older).

In all cases I will ask the participants to read the study description form. There will be a box to click at the beginning of the web survey denoting acknowledgment of this information by participants.

17. If your study involves minor children, please explain how parental consent will be obtained prior to enrollment of the minor(s).

This study does not involve minor children.

18. Please explain how assent will be obtained from minors (younger than 18 years of age), prior to their enrollment. Also, please explain if the assent process will be documented (e.g., a simplified version of the consent form, combined with the parental informed consent document). According to the federal regulations assent "...means a child's affirmative agreement to participate in research. Mere failure to object should not, absent affirmative agreement, be construed as assent."

This study does not involve minors.

#### PART G: DATA ANALYSIS

19. **Describe how the data will be analyzed (e.g. statistical methodology, statistical evaluation, statistical measures used to evaluate results).**

Quantitative methods will be used to analyze the data. The data will be analyzed using statistical software packages such as SAS and SPSS.

**PART H: RISKS**

The concept of risk goes beyond physical risk and includes risks to participants' dignity and self-respect as well as psychological, emotional, legal, social or financial risk.

20.  Yes  No Is the **probability** of the harm or discomfort anticipated in the proposed research greater than that encountered ordinarily in daily life or during the performance of routine physical or psychological examinations or tests?

21.  Yes  No Is the **magnitude** of the harm or discomfort greater than that encountered ordinarily in daily life, or during the performance of routine physical or psychological examinations or tests?

22. Describe any risks or discomforts to the participants and how they will be minimized and precautions taken. Do **not** respond with N/A. If you believe that there will not be risk or discomfort to participants, you must explain why.

No discomfort is anticipated from participation in this study. The probability and magnitude of harm or discomfort is no greater than that encountered ordinarily in daily life or during the performance of routine physical or psychological examinations or tests.

23. If this study involves vulnerable populations, including minors, pregnant women, prisoners, the cognitively impaired, or those educationally or economically disadvantaged, what additional protections will be provided to minimize risks?

N/A This study does not involve vulnerable populations.

**PART I: COMPENSATION**

24.  Yes  No Will participants receive compensation for their participation? If yes, please explain.

**Do not make the payment an inducement, only a compensation for expenses and inconvenience. If a person is to receive money or another token of appreciation for their participation, explain when it will be given and any conditions of full or partial**

**payment. (E.g., volunteers will receive \$5.00 for each of the five visits in the study or a total of \$25.00 if he/she completes the study. If a participant withdraws from participation, they will receive \$5.00 for each of the visits completed.) It is considered undue influence to make completion of the study the basis for compensation.**

---

N/A

---

**PART J: CONFIDENTIALITY**

25. Describe below the methods that will be used to ensure the confidentiality of data obtained. (For example, who has access to the data, where the data will be stored, security measures for web-based surveys and computer storage, how long data or specimens will be retained, anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased, etc.)

The study does not require the names or contact information of any of the participants. The web-based survey has no questions eliciting this type of information. At the end of the questionnaire, there will be a link to an email address where participants can send an email of interest in a drawing. Those emails cannot be connected to survey response. These emails will be put in a specific file and erased after the study and drawing have been completed.

### PART K: REGISTRY PROJECTS

**26. To be considered a registry: (1) the individuals must have a common condition or demonstrate common responses to questions; (2) the individuals in the registry might be contacted in the future; and (3) the names/data of the individuals in the registry might be used by investigators other than the one maintaining the registry.**

Yes  No Does this project establish a registry?

If "yes," please provide the registry name below.

#### Checklist for Attachments

**Listed below are the types of documents that should be submitted for IRB review. Please check and attach the documents that are applicable for your study:**

- A copy of the informed consent document **OR**  Letter of introduction containing the elements of consent
- A copy of the assent form if minors will be enrolled
- Letter of approval from cooperating organizations or institutions allowing you to conduct research at their facility
- Data-gathering instruments (including surveys)
- Recruitment fliers, phone scripts, or any other documents or materials participants will see or hear

The original signed copy of the application form and one set of accompanying materials should be submitted for review. **Federal regulations require that one copy of the grant application or proposal be submitted for comparison with the application for approval.**

#### FOR IRB USE ONLY:

Action by the Institutional Review Board (IRB):

- Project approved. Date: \_\_\_\_\_
- Project is exempt. Date: \_\_\_\_\_
- Project not approved. Date: \_\_\_\_\_
- IRB approval is not required. Date: \_\_\_\_\_
- Project is not research according to the federal definition.
- Project does not include human subjects as defined by the federal regulations.

\_\_\_\_\_  
 IRB Approval Signature

\_\_\_\_\_  
 Date

**SECTION III: ENVIRONMENTAL HEALTH AND SAFETY INFORMATION**

Yes  No Does this project involve human cell or tissue cultures (primary OR immortalized), or human blood components, body fluids or tissues?

**PART A: HUMAN CELL LINES**

Yes  No Does this project involve human cell or tissue cultures (primary OR immortalized cell lines/strains) that have been documented to be free of bloodborne pathogens? If the answer is “yes,” please answer question 1 below and attach copies of the documentation.

1) Please list the specific cell lines/strains to be used, their source and description of use.

CELL LINE	SOURCE	DESCRIPTION OF USE

2) Please refer to the ISU “Bloodborne Pathogens Manual,” which contains the requirements of the OSHA Bloodborne Pathogens Standard. Please list the specific precautions to be followed for this project below (e.g., retractable needles used for blood draws):

N/A

**Anyone working with human cell lines/strains that have not been documented to be free of bloodborne pathogens is required to have Bloodborne Pathogen Training annually. Current Bloodborne Pathogen Training dates must be listed in Section I for all Key Personnel. Please contact Environmental Health and Safety (294-5359) if you need to sign up for training and/or to get a copy of the Bloodborne Pathogens Manual (<http://www.ehs.iastate.edu/cms/default.asp?action=article&ID=214>)**

**PART B: HUMAN BLOOD COMPONENTS, BODY FLUIDS OR TISSUES**

Yes  No Does this project involve human blood components, body fluids or tissues? If “yes,” please answer all of the questions in the “Human Blood Components, Body Fluids or Tissues” section.

1) Please list the specific human substances used, their source, amount and description of use.

SUBSTANCE	SOURCE	MOUNT	DESCRIPTION OF USE
<i>E.g., Blood</i>	<i>Normal healthy volunteers</i>	<i>ml</i>	<i>Approximate quantity, assays to be done.</i>

2) Please refer to the ISU “Bloodborne Pathogens Manual,” which contains the requirements of the OSHA Bloodborne Pathogens Standard. Specific sections to be followed for this project are:

N/A
-----

Anyone working with human blood components, body fluids or tissues is required to have Bloodborne Pathogen Training annually. Current Bloodborne Pathogen Training dates must be listed in Section I for all Key Personnel. Please contact Environmental Health and Safety (294-5359) if you need to sign up for training and/or to get a copy of the Bloodborne Pathogens Manual (<http://www.ehs.iastate.edu/cms/default.asp?action=article&ID=214>).