This is to certify that the
dissertation entitled

ATTITUDES TOWARD FARM ANIMAL WELFARE

presented by

CAMIE R. HELESKI

has been accepted towards fulfillment
of the requirements for the

Ph.D. degree in Animal Science

Major Professor's Signature

8/27/2007

Date

ATTITUDES TOWARD FARM ANIMAL WELFARE

By

Camie R. Heleski

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Animal Science

2004

ABSTRACT

ATTITUDES TOWARD FARM ANIMAL WELFARE

By

Camie R. Heleski

Understanding attitudes toward farm animal welfare is an important element to enhancing the implementation of animal welfare science research. If people are unaware of animals' needs, or do not recognize welfare indicators within farm animals, sub optimal standards for care may became normal and accepted. Some industry stakeholders may resist enhancing farm animal welfare due to their attitudes on the topic. In an effort to learn more about peoples' attitudes toward farm animal welfare, I developed and implemented several surveys to assess attitudes toward farm animal welfare and developed an educational strategy to impact student attitudes toward farm animal welfare.

First, I examined the attitudes of students (n = 87) enrolled two animal science courses. The findings from this study indicated that students have a generally low awareness of current animal production methods (27% were able to choose correctly how most chickens, pigs and dairy cows are housed). Furthermore, when presented with hypothetical, but industry-typical, farm scenarios, the majority of students responded that they would not be comfortable consuming/using products from these farms (63% for pig farm; 77% for layer chicken farm; 83% for dairy farm and 88% for horse training farm). In response to this evidence for insufficient awareness of farm animal production, a potential intervention strategy for educating students about farm animal welfare was developed. This resulted in the animal welfare judging/assessment competition. Of the 64

participants engaged thus far, 98% responded that they have furthered their knowledge base regarding farm animal welfare.

To assess the attitudes among influential stakeholders in animal agriculture, a second survey was developed. This e-mail survey was developed to conduct with U.S. animal science faculty (ANS; 58 departments; 1,466 surveys sent) and U.S. large animal/food animal veterinary college faculty (VCF; 27 colleges; 795 surveys sent). The respondents consisted of 446 ANS and 157 VCF. In general, VCF had more empathetic attitudes toward farm animal welfare than did ANS (mean attitude scale scores: VCF = 43.8; ANS = 38.3; different at $P < 0.01$). Both populations expressed greater comfort with the current production systems for beef and sheep than for meat birds and layers ($P < 0.01$); dairy and swine were viewed intermediately. When asked about 15 specific husbandry practices/outcomes, more than 80% of our respondents agreed that three of these issues were concerns – flooring effects on lameness in intensively farmed animals, levels of lameness in dairy cattle, and poor/indifferent stockmanship. Four issues had less than 50% agreement – early weaning in pigs, lack of foraging substrate for pigs, beak trimming in poultry and toe trimming in poultry. Several variables showed relationships with our summed attitude scale scores: females were more concerned about farm animal welfare than were males ($P < 0.01$); those with liberal political views were more concerned than those with conservative views ($P < 0.01$); and those expressing higher religiosity had less concern than those with lower religiosity ($P < 0.05$).

Understanding attitudes toward farm animal welfare is essential in maximizing the opportunity for development and implementation of the welfare science research at an industry level.

ACKNOWLEDGEMENTS

I have many people to thank for their various contributions to this degree completion. I would like to thank my major professor, Adroaldo Zanella, along with my committee members, Dennis Banks, Judy Marteniuk, Angela Mertig, John Shelle, Sally Walshaw, and Natalie Waran. Each of them contributed in meaningful ways.

I need to express tremendous appreciation to each person who elected to respond to my surveys. We live in a very busy era, and their investment of time was critical.

I had outstanding student helpers that assisted me with the data entry of the surveys: Jamie Hammer, Dawn Mace, Sara Malone, Kyrstin Mikula, Amy Shelle, Pedrina Vidigal, Rachel Waltman, and Ashley Wichman were all essential to the completion of this degree in a timely manner.

I appreciate the computer assistance provided by my brother-in-law, Bill Scanlon, and the qualitative analysis assistance provided by Peg Whalen.

A heartfelt thanks to all of the members of the Animal Behavior and Welfare Group, and the Horse Group at Michigan State. These folks offered me support, assistance and friendship throughout this lengthy endeavor.

I greatly appreciate the tolerance and support of my husband, Ernie, my children, Tatia and Austin, along with my extended family and friends.

And, of course, I am thankful for funds that contributed to the completion of this degree: two Animal Industry Coalition grants, two Agriculture and Natural Resources Week grants, the USDA Higher Education Challenge Grant, and the Humane Society of the United States – Farm Animals and Sustainable Agriculture Section.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE - Introduction

When I first began to study applied animal behavior and welfare science, I was struck by how much research had been done in this area; yet, surprised that comparatively little progress toward enhancing farm animal welfare seemed to have taken place. While investigating the social psychology literature, I considered that perhaps it was the attitudes of the influential stakeholders (e.g., animal scientists, veterinarians, producers and, ultimately, consumers) that were, in some cases, obstacles to the advancement of enhanced farm animal welfare.

I decided to test two possibilities related to the limited implementation of animal welfare research. Hypothesis one: People have a limited knowledge base/awareness regarding current farm animal production practices and how these impact animal welfare. Using students from a 100-level (first year) introductory animal science course and a 300-level (third year) applied animal behavior course, my objectives were to explore (1) students' knowledge base/awareness level concerning current farm animal production methods and (2) their understanding of how they believe these impact animal welfare. Are students (a) knowledgeable about current production systems and concerned, (b) knowledgeable about and comfortable with current production systems, (c) naïve about current production systems but are concerned once their awareness is enhanced, or (d) naïve about current production systems but comfortable once their awareness is enhanced? These students represented both potential consumers, as well as future animal scientists/veterinarians. This work represents chapter one of this dissertation.

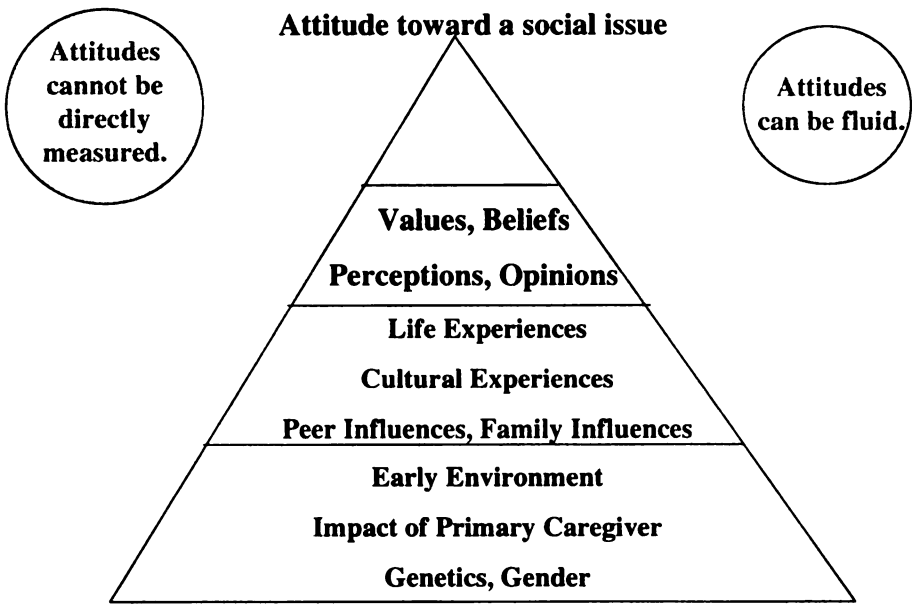
Hypothesis two: There are resistant attitudes among influential stakeholders, e.g. animal scientists and veterinarians. The objectives related to this second hypothesis were

to assess the attitudes toward farm animal welfare of two groups that are highly influential to U.S. animal agriculture, VCF (veterinary college faculty, large animal/food animal emphasis) and ANS (animal science faculty). For this, I needed to develop a valid and reliable attitude survey that could be implemented as a national e-mail survey. The development of this survey instrument, along with the results of its implementation comprise chapters four and five in this dissertation, as well as the comparative chapter, six.

Closely related to the study of attitudes, is the study of mechanisms that can be effective at altering attitudes. One proposed method is covered in chapter three. Given the evidence from chapter two, that even animal science students are largely uninformed about current production methods, it was decided that an educational mechanism for this group would be valuable. This led to the creation of the welfare judging/assessment competition. This concept was generated from trying to develop an inspiring way to teach undergraduate students about the welfare science literature. Other work already supported the value in using a judging competition-type setting to enhance learning and teach critical thinking skills (Guthrie and Majeskie, 1997; McCann and McCann, 1992). I then had only to develop a useable model to fit with welfare assessment scenarios (see chapter three).

Defining attitude

There are many factors that play into one's attitude toward an issue. During my literature review about attitudes, I summarized much of my reading into the following model of what comprises an attitude:



Some attitudes are processed in a thoughtful, cognitive way with a fair degree of investment. Other attitudes are more superficial, and may be processed heavily on the basis of peripheral cues; these are considered more transient.

Attitude is defined in the Random House dictionary as "Manner, disposition, feeling, position, etc. toward a person or thing." Smith and Mackie (2000) define attitude as "A cognitive representation that summarizes an individual's evaluation of a particular person, group, thing, action, or idea." Eagly and Chaiken (1993) define attitude as "A psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor."

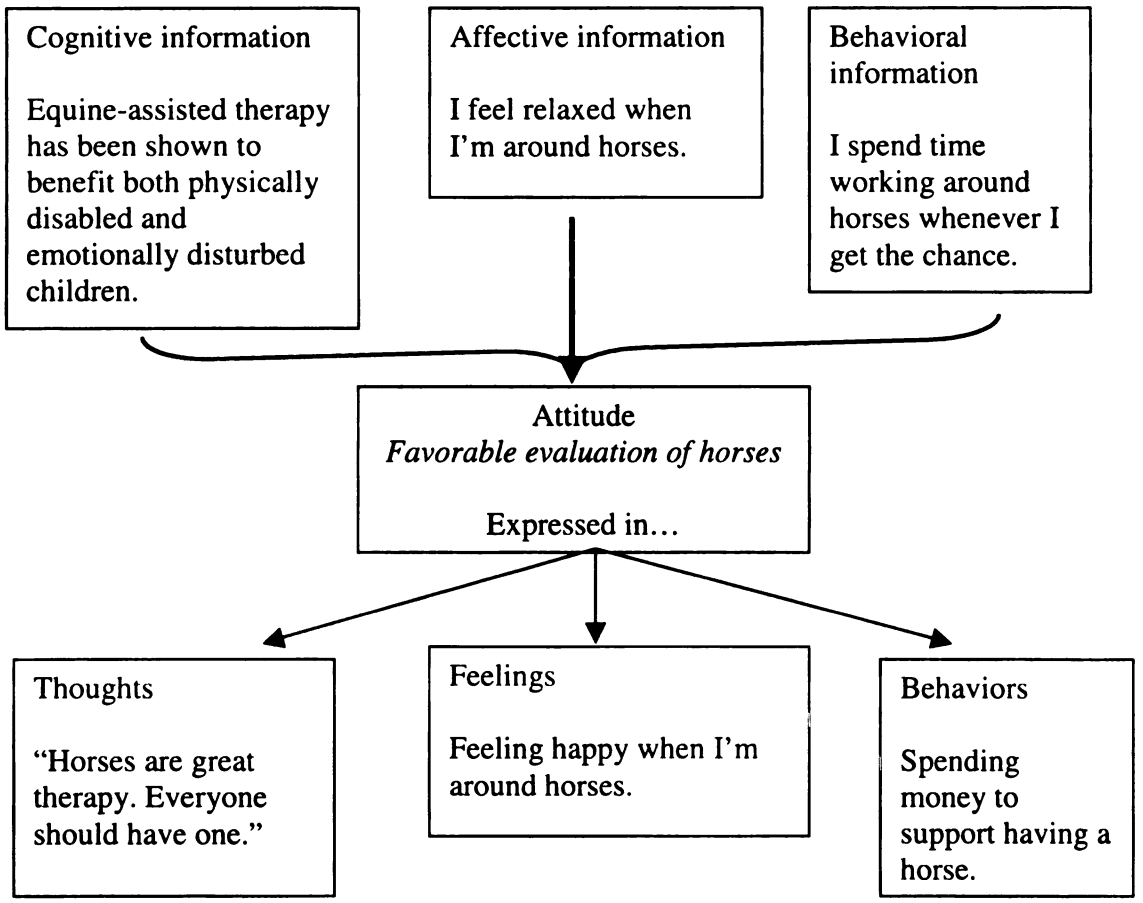
Our attitudes toward attitude objects can be described as favorable, unfavorable, neutral or somewhere along that continuum. Not only do we have a direction for each of our attitudes, but also an intensity (Eagly and Chaiken, 1993).

What builds an attitude and why do we form attitudes?

Smith and Mackie (2000) have said that "People form attitudes because they are useful in mastering the social environment and in expressing important connections with others. Attitudes are assembled from three types of information: beliefs about the object's positive or negative characteristics, feelings and emotions about the object, and information about past and current actions toward the object. Once an attitude has been formed, it becomes closely linked to the representation of the object."

The building blocks of attitudes are often discussed in the following way (Smith and Mackie, 2000): "Cognitive information is what people know about an attitude object – the facts and beliefs they have about it." For example, if people know that farm mammals have brains and neural circuitry very similar to humans, this may contribute to them having a positive view toward enhancing the welfare of farm animals. "Affective information consists of how people feel about the object – the feelings and emotions the attitude object arouses," (Smith and Mackie, 2000). So, if you get angry when you see an animal exposed to poor stockmanship while being moved through a dairy parlor or slaughter plant, that emotion will likely contribute to a positive attitude toward enhancing farm animal welfare. "Behavioral information comprises knowledge about people's past, present or future interactions with the attitude object," (Smith and Mackie, 2000). The fact that someone treats animals gently when moving them through a production facility is consistent behavior with having an attitude favorable toward enhancing farm animal welfare. Although attitudes can be based on just one of the above building blocks, they are typically comprised of a mixture of cognitive, affective, and behavioral information.

The following figure is based on a parallel example in Smith and Mackie (2000):



Literature Review on Attitudes Toward Animal Treatment

Many of the current welfare science articles state something to the effect "The public is increasingly concerned with animal welfare issues," (Blokhuis et al., 2000; Veissier et al, 1999) yet there is rarely a reference offered as proof of this fact. A few articles do cite increasing membership in animal protection and animal welfare associations as their support for these types of statements (Kellert, 1980; Morris, 2000). Several recent polls show conflicting evidence on the public's views. Certainly, question wording can have tremendous impact on public survey outcomes, as can the representativeness of the selected sample (and, perhaps, interpretation by the group

supporting the survey). A Gallup poll (2003), found 62% of the general public support passing stricter laws concerning the treatment of farm animals. A survey sponsored by United Egg Producers and conducted by Golin-Harris Research (2003) found that 75% of American consumers will choose food products certified as protecting animal care over those that are not. Fifty-four percent of these respondents were willing to pay 5-10% more for care-certified products. In contrast, a survey sponsored by the Animal Agriculture Alliance found only 31% of their sample being willing to spend 5% more for welfare-certified products. Still another survey conducted by a collaborative effort between Texas Tech University, *Successful Farming*, and *Better Homes and Gardens* (Freese, 2000) found 68% of their respondents saying they were willing to pay more for pork products produced in a manner that is animal friendly. Overall, there is a very limited amount of information available in refereed journals concerning the public's attitudes toward the welfare of agricultural animals, particularly in the United States.

Holloway, et al. (1999) examined public attitudes toward pig welfare in the United Kingdom. They set out to assess consumers' knowledge and attitudes toward pig welfare and how much they would be willing to pay for pork reared from alternative housing systems. They approached 187 members of the general public at Edinburgh railway and bus stations. One hundred sixty people agreed to take part in their questionnaire survey. They showed them pictures of four housing system. The authors were surprised to learn that 60% of the respondents had never heard of any of the farm assurance schemes. They also found that consumers had a low knowledge base about pigs and their welfare. The researchers found that 80% of the respondents were willing to pay

more for pork from systems which they perceived would enhance welfare; however, the bid varied with the intensity of the consumer's attitude.

Wells and Hepper (1997) sent 1,000 surveys to adults in Northern Ireland to examine their attitudes toward 13 issues involving animal use. They received 422 responses. Survey-takers were given a dichotomous choice on each issue; i.e. they either agreed or disagreed with each issue. Sixty-three percent of the respondents were pet owners, which implied that they found utilizing animals for companionship an acceptable use of animals. The authors found that the results varied and concluded that reducing the public's perception to either "for animal use" or "against animal use" was overly simplistic.

If respondents agreed with a certain animal usage, that usage was coded a 2. If respondents disagreed with a certain usage, that use was scored a 1. The following results were observed: dog fighting received a score of 1.98, meaning it was regarded very negatively; animals used in circuses received a score of 1.56, placing it at a rather intermediate position; and dog showing received a 1.10, ranking it as the lowest level concern asked about.

One of the most extensive works examining American attitudes toward and knowledge of animals is work done by Kellert (1988). During the period of 1973-1976, he surveyed 3,107 randomly selected Americans via a sixty-minute telephone interview procedure. A comparison with the national census documented that the sample population represented a good cross-section of the American population. Sixty-five questions were utilized for the attitudes section and thirty-three items were used for the knowledge-of-animals section. This study's primary focus was on attitudes toward endangered species,

predator control, hunting, trapping and habitat preservation. There were no questions related to the use of agricultural animals. The other problem, at this point in time, is that the material is becoming dated. Attitudes may have shifted in the decades since this study was completed. Kellert's findings (1988), using cluster analysis and multivariate statistics, broke American attitudes down into essentially nine categories, though some people would fall into more than one category.

In general, Kellert found the American public scored low on animal knowledge. For example, only 26% knew that a manatee is not an insect and only 54% knew that veal does not come from lamb. He also found, similar to Wells and Hepper, that lumping "for" or "against" animal usage onto the general public is overly simplistic; for example 80% of the population disapproved of trophy hunting, but 82% approved of sustenance hunting by native groups.

In a follow-up study to address the view that the public is more concerned about animal issues than they once were, Kellert chose to analyze the content and frequency of newspaper articles pertaining to animal usage from 1900-1976. Two urban papers and two rural papers were chosen for analysis. On average, 2.74 animal-related articles appeared in each newspaper issue. The numbers, on average, did not increase over the century. During 1916-1918 and 1940-1944, the time periods of the World Wars, there was a significant reduction in animal-related articles.

Following along the lines of Kellert's work showing different attitude structures toward views about animals, Serpell (2004) proposed a recent model for human attitudes toward animals and their welfare that identifies primarily the dimensions of affect and

utility; i.e. affection for animals on the one hand, and economic and pragmatic considerations on the other.

Paul and Podberscek (2000) conducted an experiment examining attitude shift in veterinary students. They recruited 319 students from two British universities to examine beliefs about animal sentience and empathy with animals. Students in their later years of study rated animals as having lower levels of sentience (tested by asking students' opinions as to whether animals felt pain and/or boredom in ways similar to humans) than did students in the early years of their program. Furthermore, male students in their later years of study showed lower levels of empathy toward animals than did male students in the early years of their study. This attitude shift was not significant in the female population.

Bennett (1998) examined the British consumer's willingness to pay for enhanced welfare by performing a contingent valuation survey of 2,000 people in Great Britain. Contingent valuation is a method used in environmental economics to estimate the non-market value of certain attributes of a product. Bennett used the case study of the European Union's phase-out of battery cages for egg production. The majority of respondents supported the proposed legislation and were willing to pay a significant increase on the current price of eggs to support it. The consumers' willingness to pay appeared to outweigh the extra resource costs of producing eggs without cages. Bennett discusses the concern of whether consumer behavior will follow consumer attitudes.

These and other relevant sources will be referred to again as they pertain to the chapters that follow.

References

Animal Agriculture Alliance poll (2004) Consumers' attitudes about animal welfare. Accessed at: www.animalagalliance.org/images/ag_insert/2004_Pub_Op_PR.ppt. Accessed May 19, 2004.

Bennett, R., 1998. Measuring public support for animal welfare legislation: A case study of cage egg production. Anim. Welfare 7(1), 1-10.

Blokhuis, H.J., Ekkel, E.D., Korte, S.M., Hopster, H., van Reenen, C.G., 2000. Farm animal welfare research in interaction with society. Veterinary Quarterly. 22(4): 217-222.

Eagly, A.H., Chaiken, S., 1993. The Psychology of Attitudes. Harcourt Brace College Publishers, Orlando, FL.

Freese, B., 2000. Survey says people will pay more for family farm-raised pork. Successful Farming. Accessed at http://www.agriculture.com/default.sph/gNews.class?FNC=DetailNews_Asearch_listAgNews_html_43600. Accessed November 14, 2001.

Gallup Poll, Analysis by D.W. Moore, 2003. Public lukewarm on animal rights. Accessed at http://www.gallup.com/poll/releases/pr030521.asp retrieved on June 2, 2003.

Guthrie, L.D., Majeskie, J.L., 1997. Dairy cattle judging teaches critical life skills. J. Dairy Sci. 80(8), 1884-1887.

Holloway, L.A., Waran, N., Austin, E.J., 1999. Assessing public attitudes towards pig welfare in the UK. The Pig Journal 44, 38-51.

Kellert, S.R., 1988. Human-animal interactions: a review of American attitudes to wild and domestic animals in the twentieth century. In A.N. Rowan (Ed.) Animals and People Sharing the World. pp. 137-175.

McAlister, A., Perry, C., Killen, J., Slinkard, L.A., Maccoby, N., 1980. Pilot study of smoking, alcohol and drug abuse prevention. American J. of Public Health 70, 719-721.

McCann, J.S., McCann, M.A., 1992. Judging team members reflection on the value of livestock, horse, meats, and wool judging programs. Prof. Anim. Sci. 8, 7-13.

Morris, M., 2000. Animal care ethics, ANZCCART, and public perceptions of animal use ethics. J. of Agricultural & Environmental Ethics 13(3-4), 249-257.

Paul, E.S., Podberscek, A.L., 2000. Veterinary education and students' attitudes towards animal welfare. Vet. Rec. 146, 269-272.

Serpell, J.A., 2004. Factors influencing human attitudes to animals and their welfare. Anim. Welfare 13, S145-151.

Smith, E.R., Mackie, D.M., 2000. Chapter 8 in Social Psychology, 2nd Ed., Psychology Press, Philadelphia, PA.

Veissier, I., Sarignac, C., Capdeville, J., 1999. Methods to assess the welfare of domestic animals. Productions Animales. 12(2), 113-121.

Wells, D.L., Hepper, P.G., 1997. Pet ownership and adults' views on the use of animals. Society and Animals. 5(1), 45-63.

CHAPTER TWO

Heleski, Camie R., Zanella, A.J. (2004) Attitudes toward farm animal welfare and knowledge of current production methods – a survey of animal science students. Submitted to Anthrozoös.

Attitudes toward farm animal welfare – a survey of animal science students

C.R. Heleski*, A.J. Zanella

Michigan State University

*Corresponding author: Heleski@msu.edu; 1250 Anthony Hall, Animal Behavior & Welfare Group, Department of Animal Science, Michigan State University, East Lansing, MI 48854, USA; 517/355-8427

Abstract

Understanding attitudes toward farm animal welfare will foster an important link between researching welfare issues and implementing those findings. In this study, we examined the attitudes and knowledge base of university animal science students, who represent both potential consumers, and future industry stakeholders. Eighty-seven students were surveyed to assess attitudes and knowledge base regarding farm animal welfare. In 2003, 58 introductory animal science (INTRO) and 29 applied animal behavior (AN BEH) students were surveyed at the beginning (week 1, Early) and end (week 14, Late) of spring semester via a 58-question survey. Evidence of students' knowledge base was lower than we anticipated. As expected, AN BEH students demonstrated a higher knowledge base than did INTRO students. Some clear species perception differences were exposed. Students perceived that horses felt pain more similarly to humans than did other species, experienced boredom more similarly to humans than did other species; and students showed more concern about horses being kept in industry-typical scenarios than they did for other species. When presented with hypothetical (but industry-typical) scenarios for egg production units, dairy operations, pig facilities and horse training facilities, greater than 50% of all sampled groups stated they would either "not be very comfortable buying/using product from said facility" or

"would not buy/use product from said facility." We believe our data lend support to the concept that, even amongst a population that should be knowledgeable about animal agriculture, awareness of modern animal agriculture practices is low, and do not necessarily represent that concern is absent.

Keywords: attitudes, farm animal welfare, survey

Introduction

The study of attitudes toward social issues has long been of interest to social psychologists (Eagly & Chaiken 1993; Smith & Mackie 2000). In studying how attitudes toward issues are formed, many intervention strategies for impacting attitude change or bolstering existing attitudes have been examined. Better understanding peoples' attitudes regarding farm animal welfare will play an important role in deciding whether there is sufficient demand to warrant implementing more welfare-friendly practices into modern animal agriculture.

Many welfare scientists devote their professional careers to studying the behavioral and physiological indicators of animal welfare (Broom & Johnson 1993; Appleby & Hughes 1997). They sometimes become discouraged that, even in the face of strong indicators of negatively impacted animal welfare, stakeholders seem unmotivated to implement alternative methods that have been demonstrated to provide improved animal welfare. Conversations with producers and interviews with fellow animal scientists (Heleski & Zanella, unpublished data) find many giving the rationale that there are no economic incentives for them to enhance animal welfare beyond current, industry-typical standards, and that the economic constraints are so tight that should one farmer increase, for example, space allowances, his/her costs of production go up and retailers

will simply buy from a less expensive source. The assumption that economics should be the primary driver behind animal production practices should, perhaps, be challenged. Furthermore, external costs to minimizing the costs of animal product production can be quite high (Appleby *et al* 2002). However, it should be noted that given the advancement of welfare assurance schemes and guidelines coming from the U.S. National Council of Chain Restaurants and Food Marketing Institute, ethical assessment of production practices may be gaining ground (USA Today 2003).

Even regarding practices that have been proven to enhance production, eg gentler handling of pigs (Hemsworth *et al* 1986), quieter handling of dairy cows (Hemsworth *et al* 1995), these practices have often gone unimplemented. So, especially when welfare enhancement is economically supported, why are producers seemingly reluctant to change practices? Resistant attitudes bound up in tradition may be one reason; lack of awareness of the welfare science literature may be another (Heleski & Zanella, unpublished data). Another part of the equation is how aware are people of modern production practices, and, if aware, are they concerned?

We set out to examine a sample group of potential consumers that will also be future stakeholders in the animal agriculture industry, university animal science students.

Previous work related to this area has ranged from Kellert's interview work of several thousand U.S. citizens (1980) to Gallup's May 2003 poll of the American public. In the Gallup poll, 62% of the randomly selected sample supported passing strict laws to govern the treatment of farm animals. Though a fair number of studies can be found relating to various animal usage issues (Bowd & Bowd 1989; Driscoll 1992; Matthews & Herzog 1997; Wells & Hepper 1997; Paul & Podberscek 2000; Furnham *et al* 2003), far

fewer exist that relate specifically to farm animal issues. One study conducted by Holloway and colleagues (1999) found the general public in the U.K. to be considerably less knowledgeable about issues related to pig husbandry than had been expected. However 80% of respondents said they would be willing to pay more for enhanced pig welfare. In another study, Davis & Cheeke (1998) found that a substantial number (17-25%) of faculty, staff, and graduate students at a U.S. university in the animal science and zoology departments did not agree with the statement that domestic animals have minds.

The survey developed for this study was one of two instruments developed for the purpose of assessing whether various U.S. populations do not know how agricultural animals are housed and managed in typical production systems, or do not care. We look for this first tool, the one devised for university student populations, to help us categorize four different segments of the sampled population: a) knowledgeable about current production systems and are concerned, b) knowledgeable about and comfortable with current production systems, c) naïve about current production systems, but are concerned when their awareness is enhanced, or d) naïve about current production systems, but are comfortable when their awareness is enhanced.

This paper discusses the development and testing of our attitude assessment tool, the results of testing animal science students at a large, Midwestern, public university, and what conclusions we form from the results. We also discuss briefly the implications these results may have on future studies for welfare scientists and what the results may tell us about developing intervention strategies to impact attitudes.

Methods

The first step in testing attitudes and knowledge base was to develop an appropriate survey instrument. Various sources were examined to assist with survey design and the measurement of social attitudes (Converse & Presser 1986; Mueller 1986; Eagly & Chaiken 1993; Hemsworth & Coleman 1998; Babbie 1999; Dillman 2001). We selected a 4- or 5-choice Likert-style scale for participants to use in answering the majority of the survey questions. Selected questions appear throughout the Results section. Briefly, our questionnaire consisted of 58 questions broken up into the following domains: eight questions asked about students' familiarity with animal production practices; three questions asked students to identify actual housing methods for dairy cows, female breeding pigs, and female layer-type chickens; eight questions asked students to assess the importance of various values as they related to animal husbandry (eg "the opportunity to engage in a broad spectrum of their natural behaviors"); ten questions related to how students perceived that animals experience pain or boredom; four questions asked students whether they believed there was a difference between animal rights and animal welfare; two questions asked about behavioral needs in companion animals versus agricultural animals; four statements asked students to rate their comfort level with purchasing/using product from hypothetical, industry-typical scenarios; and 17 questions were about demographic information. A complete copy of the survey can be obtained from the authors.

The University Committee for Research in Human Subjects approved our survey instrument, and we obtained instructor permission to give the survey during two animal science courses at the sampled university. One course was an introductory animal

agriculture course with 78% of the course being comprised of freshmen and sophomores. This class will be referenced throughout the remainder of the paper as INTRO. The second course was an applied animal behavior class with 38% composition of freshmen and sophomores. This class will be referenced through the remainder of this paper as AN BEH. For INTRO, 77% of the class was comprised of females. For AN BEH, 86% of the class was female. The instructors considered these as typical gender splits for these courses over the past five years. Other demographics are presented in Table 1. It should be noted that not all students in these two animal science courses were actually animal science majors. For INTRO, 82% of students were animal science or a closely related major (eg preveterinary science) and for AN BEH, 83% of students were animal science or a closely related major.

Table 1 Demographics of students taking an introductory animal agriculture course (INTRO) (n = 58) and an upper-level applied animal behavior course (AN BEH) (n = 29).

	INTRO	AN BEH
% Freshmen and Sophomores	78%	38%
% from Rural Background	53%	59%
% Female	77%	86%
% that had a Childhood Pet	97%	100%
% that belonged to 4-H, FFA, or similar	65%	59%
% that Raised Animals Not Considered Pets	39%	28%
% Caucasian	93%	93%
% Vegan or Vegetarian	2%	2%

On the testing date, the survey proctor went to each classroom, gave a brief description of the survey, emphasized that completing the survey was voluntary and optional, and explained that the answers would be handled in a confidential manner. Surveys were collected from students as they exited the classroom. The average time for completion was 20 minutes.

Data were entered into an Excel ® spreadsheet. This spreadsheet was later converted to an SPSS ® 11.5 file. SPSS ® 11.5 was used for calculating frequencies, means and standard deviations, Pearson Chi-square analyses, Fisher's exact tests, attitude subscale and scale summations, correlations, comparisons of means, factor and reliability analyses.

Where the survey responses involved 4- or 5-choice Likert-style, ordinal responses (eg 5 = strongly agree, 4 = agree, 3 = unsure or undecided, 2 = disagree, and 1 = strongly disagree), we numerically coded the answers to facilitate a more quantitative analysis.

Results and Discussion

In comparing the 2003 student groups, it is clear from the "Are you comfortable with how agricultural animals in modern, intensive production systems are housed and managed?" question that the AN BEH students start (and finish) the course as a more sensitized audience. See Figure 1.

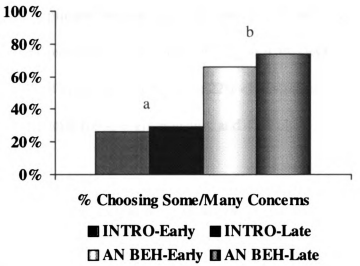


Figure 1. Percentages of students choosing the response "I have many concerns" or "I have some concerns" when asked the question, "Are you comfortable with how agricultural animals in modern, intensive production systems are housed and managed?" INTRO students (a) differed from AN BEH students (b) ($P < 0.05$).

Students were asked to express a self-appraisal of their level of knowledge/familiarity with the practices involved in modern-day animal production. Students responded that they were most familiar with horse production facilities (with an average of 26% of students saying they were very familiar), followed by beef operations, then dairy farms, next was swine operations, then poultry meat facilities, followed by sheep operations, and finally egg-production units (with an average of 1% of students saying they were very familiar). As anticipated in these animal science courses, students in both courses scored their familiarity higher at the end of the semester than at the beginning.

Questions we asked to help document students' true familiarity with several animal industries were as follows, "How do you believe the vast majority of dairy cows/female breeding pigs/egg-laying chickens are housed in our current era?" Three options were provided for each question. The correct answers were, respectively, an

expanded description of free stall barns, an expanded description of gestation crates, and an expanded description of battery cages. Percentages of students choosing correctly for each statement are represented in Figure 2. In all cases INTRO – Early demonstrated the lowest percentage of correct responses with 22% choosing correctly for hen housing, 28% choosing correctly for sow/gilt housing, and 45% choosing correctly for dairy cow housing.

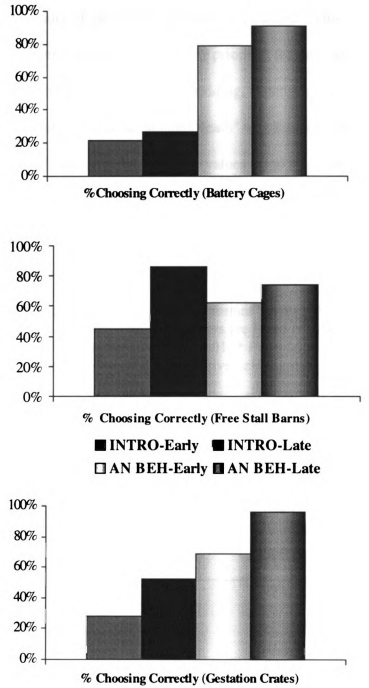


Figure 2. Percent of students choosing correctly in response to "How do you believe the vast majority of egg-laying chickens/dairy cows/female breeding pigs are housed in our current era?"

One segment of our questionnaire asked questions related to students' values as they related to the husbandry of agricultural animals. See Table 2. This section began, "When I think of agricultural animals' welfare, my priorities for their needs are as follows (this assumes their basic needs of food, bedding, water provision and basic health care have already been met)." A "quick, humane death" was deemed the most important value overall. Judged the least important of those values listed was "a preferred temperature is available at all times." As a general trend, INTRO students became somewhat more sensitized to these values as the semester progressed and AN BEH students became slightly less concerned about the values as the semester progressed.

Table 2. Percentage of students choosing "very important" in response to their level of agreement with the following statements. Statements are listed in ranked order with the value deemed most important listed first. ** $P \leq 0.01$; * $P \leq 0.05$; ^ $P \leq 0.1$ (tendency) represent differences between Early and Late of a given class grouping (Chi-square analysis).

Statement	INTRO-Early	INTRO-Late	AN BEH-Early	AN BEH-Late
Quick, humane death	85%	88%	93%	100%
Freedom from predators	79%	79%	76%	78%
Space to move around freely	72%	70%	76%	78%
Free from painful procedures without anesthetic	64%	64%	76%	48% * *
Can engage in broad spectrum of natural behaviors	60%	50%	79%	61%
Safe, calm handling and transport en route to	60%	57%	83%	61% ^ ^

slaughter				
Free from distressing handling situations	43%	66%	69%	52%
	*	*		
Preferred-temperature environment	19%	48%	52%	48%
	**	**		

The next section of the questionnaire involved belief statements related to animal husbandry issues. Based on earlier work by Paul and Podberscek (1995), we asked similar questions relating to how different animals potentially feel the sensation of pain and potentially experience boredom. Responses for the questions about pain consisted of: "yes, in a way very similar to people," "yes, though not as intensely as people," "they respond to pain but only in an instinctive-avoidance manner," or "no, not at all." We also asked students to express how they felt different animals might or might not experience boredom. Responses consisted of: "yes, in a way very similar to people," "yes, though not as intensely as people," "to some degree," or "no, not at all." Results are presented in Table 3. In general, students' perceptions of pain over the course of the semester did not change dramatically. Interestingly, their responses to perceptions of animal boredom did change. In all cases INTRO students became more sensitized to the idea that animals may experience boredom in a way similar to people, and AN BEH students came to question this response slightly more than at the beginning of the semester. However, in most cases, the AN BEH students were still evaluating these responses at a higher rate than INTRO students. Students appear to be more comfortable evaluating animals' responses to pain as more similar to those of humans than they are with responses to potential boredom. This should not be a surprising finding in that many animal welfare scientists would agree with the challenges of assessing affective states in animals (Fraser 2003).

Table 3. Mean scores (± SD) of students' responses to various belief statements regarding how different animal species experience the sensation of pain or potentially experience boredom. Response choices were as follows: 1 = yes, in a way very similar to people; 2 = yes, though not as intensely as people; 3 = they respond to pain but only in an instinctive-avoidance manner *or* to some degree; 4 = no, not at all. Thus, lower mean scores show areas where students believe animals experience pain or boredom more nearly like humans. ** $P \leq 0.01$; * $P \leq 0.05$; ^ $P \leq 0.1$ (tendency). "a" versus "b" categorizes differences between Early and Late within a course. "c" versus "d" categorizes differences between the two courses. Chi-square comparisons.

	INTRO-Early	INTRO- Late	AN BEH-Early	AN BEH-Late
Horses...sensation of pain	1.47 ± 0.66	1.50 ± 0.71	1.52 ± 0.69	1.52 ± 0.73
Pigs...sensation of pain	1.59 ± 0.70	1.50 ± 0.69	1.55 ± 0.74	1.52 ± 0.73
Cattle...sensation of pain	1.71 ± 0.59 c*	1.61 ± 0.68	1.66 ± 0.77 d*	1.57 ± 0.73
Sheep...sensation of pain	1.72 ± 0.70	1.63 ± 0.68	1.62 ± 0.78	1.52 ± 0.73
Poultry...sensation of pain	1.88 ± 0.77	1.77 ± 0.76	1.69 ± 0.76	1.70 ± 0.88
Horses...experience boredom	1.93 ± 1.02 a* c^	1.57 ± 0.76 b*	1.48 ± 0.79 a^ d^	1.74 ± 0.75 b^
Pigs...experience boredom	2.32 ± 0.95 a^ c*	1.84 ± 0.89 b^	1.62 ± 0.78 d*	1.78 ± 0.74
Cattle...experience boredom	2.55 ± 0.84 a** c**	2.04 ± 0.81 b**	1.79 ± 0.77 d**	1.83 ± 0.78
Sheep...experience boredom	2.62 ± 0.86 a* c**	2.18 ± 0.86 b*	1.79 ± 0.77 d**	1.87 ± 0.82
Poultry...experience boredom	2.88 ± 0.80 a** c**	2.34 ± 1.01 b**	1.97 ± 0.91 d**	2.17 ± 0.74

Another statement the authors considered important was whether or not students viewed the concept of "animal welfare" as being the same as "animal rights." At the beginning of INTRO, 74% of students believed (correctly) that the terms mean different things. At the end of INTRO, 88% of students believed correctly. It should be noted that

teaching the difference in these two concepts was not a specific objective of the INTRO course. At the beginning of AN BEH, 90% of students believed in a difference between the terms; at the end, 100% of students understood there was a difference between the terms. In AN BEH, that discussion does specifically take place during the course.

We were also interested in seeing if students viewed meeting the behavioral needs (eg space to move around, opportunity to engage in strongly motivated behaviors, etc.) of companion animals differently from that of agricultural animals. At a $P < 0.05$, both AN BEH and INTRO students did view them differently. They believed more strongly that it is important to meet the behavioral needs of companion animals than it is to meet the behavioral needs of agricultural animals. See Figure 3. It should also be noted that AN BEH viewed meeting the behavioral needs of agricultural animals as significantly more important than INTRO students did ($P < 0.05$). This differentiated valuing of companion animals versus agricultural animals bears further research.

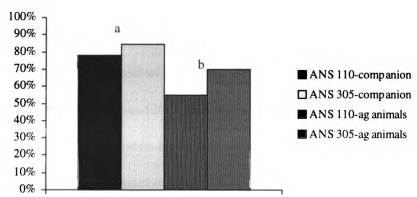


Fig. 3. Percentage of students strongly agreeing that meeting the behavioral needs of companion animals or agricultural animals is important. Responses for companion animals (a) differed from agricultural animals (b). ($P < 0.05$) Furthermore, AN BEH students believed meeting the behavioral needs of farm animals was more important than INTRO students ($P < 0.05$).

The next section of the questionnaire involved presenting students with hypothetical, but industry-typical, scenarios for a swine farm, dairy farm, layer hen facility and horse training facility. Once again, students showed favoritism to the horse deeming this scenario a mean score of 3.5. (Scores were calculated by coding the responses as 1 = student would be very comfortable buying/using product from that farm; 2 = students would be somewhat comfortable buying/using product from that farm; 3 = student would not be very comfortable buying/using product from that farm; or 4 = student would not buy/use product from that farm.) With significantly less reactivity, was their response to the layer hen facility with a 2.9. The response to the dairy farm was a 2.9 and the mean response to the swine facility was a 2.7. See Figure 4. In fact, if students as consumers were to behave true to their responses between one-third and three-fourths – depending on the scenario – would not consume/use product from said farm (see Table 4). We believe these findings should be considered carefully by producers and other stakeholders in production agriculture. If our pilot study with students in animal science courses is representative of consumer attitudes, it appears that consumers will balk when presented with realistic descriptions of current, on-farm practices. Armstrong and colleagues (2002) explored related concerns, especially as comparing welfare issues with lessons learned from several, high-profile environmental problems that had tremendous impact on, particularly, large scale swine operations.

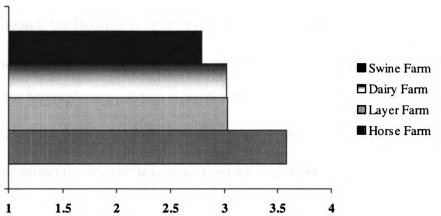


Fig. 4. Mean scores for grouped students of their willingness to buy/use product from hypothetical farms based on descriptions. Their responses were 1 = very comfortable buying/using product from this farm; 2 = somewhat comfortable buying/using product from this farm; 3 = not very comfortable buying/using product from this farm and 4 = I would not buy/use product from this farm. (Higher scores indicate greater student discomfort.) In every case, greater than 50% of the students chose either 3 or 4.

Table 4. Percentage of students choosing the response "I would not buy/use product coming from the hypothetical facility." * $P \leq 0.05$; ^ $P \leq 0.1$ (tendency). "a" versus "b" categorizes differences between Early and Late within a course. "c" versus "d" categorizes differences between the two courses. Chi-square comparisons.

	INTRO-Early	INTRO-Late	AN BEH-Early	AN BEH-Late
Hypothetical pig farm	38% a* c^	20% b*	21% d^	13%
Hypothetical dairy farm	43% a^ c^	34% b^	21% d^	22%
Hypothetical egg-production farm	53% a^ c*	36% b^	28% d*	26%
Hypothetical horse training facility	75%	75%	73%	73%

To clarify an example, the hypothetical pig farm was explained as follows: "On a hypothetical pig farm, the female pigs that produce piglets spend over 300 of every 365

days in a gestation crate which is large enough to allow standing and lying down, but not turning around; the flooring is cement slats with no bedding. As a consumer would you be..." a) very comfortable buying/using product from this farm; b) somewhat comfortable buying/using product from this farm; c) not very comfortable buying/using product from this farm or d) I would not buy/use product from this farm. The fact that students consistently became less concerned about purchasing product from the hypothetical facilities over the course of the semester bears more research. The exception to this was with the hypothetical horse training facilities, which maintained a high level of consistent concern.

We added students' responses to the value statements, behavioral needs statements and responses to the hypothetical farms scenarios to come up with an attitude scale score. Responses were coded so that higher numbers signified a more empathetic/more concerned view toward animal welfare issues. Upon subjecting our scale to factor analysis with SPSS® 11.5, we determined via Principal Component Analysis extraction that one factor was identified in our attitude scale; i.e. one factor had an Eigen value greater than one. That one factor explained 61.7% of the total variance. Upon performing a reliability analysis, we determined a Cronbach's alpha of 0.6895.

Our attitude scores for INTRO-Early ranged from 37-58 with a mean of 50.91 (SD = 4.73); for INTRO-Late they ranged from 31-59 with a mean of 50.50 (SD = 6.00); for AN BEH-Early, scores ranged from 35-58 with a mean of 51.45 (SD = 5.43), and for AN BEH-Late, they ranged from 38-58 with a mean of 50.35 (SD = 5.63). These cumulative attitude scores allowed us to explore our initial question of how students would be divided: knowledgeable and are concerned, knowledgeable but are not

especially concerned, naïve and are concerned when made aware, naïve but are not especially concerned when made aware. We separated our students into those that answered all three knowledge questions correctly and those that got zero or one answer correct. Those who got two questions correct were omitted from the analysis. We then subdivided these groups into the upper one-third of attitude scores (those who are concerned) and the lower one-third of attitude scores (those who are not especially concerned). We had predicted that more knowledgeable students would score lower on the attitude scale, but this did not prove true ($P = 0.33$).

Relationships that we observed with our summed attitude score

In keeping with many previous studies examining animal use/empathy attitudes (Kellert 1980; Driscoll 1992; Matthews & Herzog, 1997; Paul 2000; Paul & Podberscek 2000) females in our groups showed higher (more empathetic) attitude scores ($P < 0.0001$). The mean female attitude score was 52.3 (SD = 4.02) and the mean male score was 45.2 (SD = 4.02).

There was a modest but significant ($P < 0.01$) correlation between socioeconomic level and attitude score with higher socioeconomic groupings having slightly higher attitude scores. Furthermore, there was a modest, but significant ($P = 0.004$) correlation between religiosity and attitude score with respondents citing the highest rate of religiosity having slightly lower attitude scores (mean = 47.4) as compared to students stating they were not religious at all (mean = 51.7). This supports our previous work examining US animal science faculty (Heleski & Zanella submitted). Bowd and Bowd (1989) found similar evidence of religiosity as it related to attitudes toward the treatment of animals.

We had wanted to test the relationship between childhood pet ownership and attitude score. However, only two respondents out of 111 did not have pets as children so this relationship could not be adequately tested.

Conclusions and animal welfare implications

This study offers surprising evidence that even students enrolled in animal science courses are largely unaware of the common practices associated with modern animal agriculture. We would have expected this population of students taking coursework in animal husbandry to be more savvy about modern agriculture practices. However, other recent studies (eg Cheeke 1999) have shown that the face of animal science students has been steadily changing. It should no longer be assumed that today's animal science students come to college with practical, on-farm exposure. We predict the lack of familiarity with modern animal agriculture practices would be echoed even louder in a study of the general population.

As an industry, animal agriculture needs to be pro-active and ready to enhance animal welfare to fit the image the public expects to associate with pastoral America. If practices cannot pass the litmus test of public acceptance, in the long run, it will not matter whether the welfare scientists have definitively proved that practice "X" causes or does not cause animal suffering, consumers will have changed their buying habits and left animal agriculture scrambling to figure out the new paradigm.

During conversations within our research group at MSU, colleagues often ask why don't consumers care more about the welfare of farm animals? It has been our contention that most consumers just do not know what current industry practices for, especially, intensively farmed animals consist of. Based on these preliminary findings

within the animal science student population, it appears there is good reason to believe that knowledge base of general husbandry practices is low. When hypothetical, but industry-typical scenarios are given, a majority of these students were uncomfortable with the practices involved in producing certain animal products. In fact, over 25% of students chose the response "I would *not* consume product from this facility" and yet less than 1% of these students were making consumption choices to avoid animal products, so – perhaps without knowing it – most of these students were consuming/using products from facilities like those they said they would not purchase from.

The next very important step in this line of research will be to do more research on the general consuming population. We need to understand what goes into their animal product selection decisions. We need to learn if educating them about current practices will motivate them to spend more of their income on animal product (in order to facilitate putting in place enhanced welfare practices), or if the drive for minimal income being spent on food products in the United States is simply too strong.

Acknowledgements: We thank the instructors of the INTRO course, Dr. Dennis Banks and Dr. John Shelle, for providing us the opportunity to give our survey to their students. We also thank the students who assisted with data entry, Pedrina Vidigal and Ashley Wichman.

References

Appleby M C and Hughes B O (eds) 1997 *Animal Welfare* CAB International: Wallingford, UK; University Press: Cambridge, UK

Armstrong J D, Zanella A, Sigurdson, C and Pajor, E A 2002 Exceeding expectations in animal welfare. *Proceedings of the American Association of Swine Veterinarians* pp 237-244. Kansas, Missouri, USA

Babbie E 1990 *Survey Research Methods, 2nd Ed* Wadsworth Publishing: California

Bowd A D and A C Bowd 1989 Attitudes toward the treatment of animals: a study of Christian groups in Australia. *Anthrozoös* 3(1): 20-24

Broom D M and Johnson K G 1993. *Stress and Animal Welfare* London, Chapman & Hall: UK

Cheeke P R 1999. Shrinking membership in the American Society of Animal Science: does the discipline of poultry science give us some clues? *Journal of Animal Science* 77: 2031-2038

Converse J M and Presser S 1986 *Survey Questions – Handcrafting the Standardized Questionnaire.* Sage Publications: Thousand Oaks, California

Davis S L and Cheeke P R 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

Dillman D A 2000 *Mail and Internet Surveys, The Tailored Design Method, 2nd Ed.* John Wiley and Sons: New York, USA

Driscoll J W 1992 Attitudes toward animal use *Anthrozoös.* 5(1) 32-39

Eagly A H and Chaiken S 1993 *The Psychology of Attitudes* Harcourt Brace College Publishers: Orlando, Florida, USA

Fraser D 2003 Assessing animal welfare at the farm and group level: the interplay of science and values. *Animal Welfare* 12: 433-443

Furnham A, McManus C and Scott D 2003 Personality, empathy and attitudes to animal welfare *Anthrozoös* 16(2) 135-146

Gallup Poll, Analysis by D W Moore 2003 Public lukewarm on animal rights. http://www.gallup.com/poll/releases/pr030521.asp retrieved on June 2, 2003

Hemsworth P H, Barnett, J L and Hansen, C 1986 The influence of handling by humans on the behaviour, reproduction and corticosteroids of male and female pigs *Applied Animal Behaviour Science* 15:303-314

Hemsworth P H, Barnett J L, Breuer K, Coleman G J and Matthews L R 1995 An investigation of the relationships between handling and human contact and the milking behaviour, productivity and welfare of commercial dairy cows. *Research Report on Dairy Research and Development Council Project,* Atwood, Australia

Holloway L A, Waran N and Austin, E J 1999 Assessing public attitudes towards pig welfare in the UK *The Pig Journal* 44: 38-51

Matthews S and Herzog H A 1997 Personality and attitudes toward the treatment of animals *Society and Animals* 5(2) 169-175

Mueller D J 1986 *Measuring Social Attitudes: A Handbook for Researchers and Practitioners* Teachers College Press: New York, New York, USA

Paul E S 2000 Empathy with animals and with humans: are they linked? *Anthrozoös* 13(4): 194-202

Paul E S and A L Podberscek 2000 Veterinary education and students' attitudes towards animal welfare *Veterinary Record* 146: 269-272

Wells D L and Hepper P G 1997 Pet ownership and adults' views on the use of animals *Society and Animals* 5(1): 45-63

APPENDIX 1

A Survey to Assess Peoples' Attitudes toward Agricultural Animals

You are being asked to complete a survey on how MSU students feel about the care and welfare of typical animals involved in production agriculture: beef cattle, chickens, dairy cattle, horses, pigs, sheep, and turkeys. Your answers will be critical in developing policies that will impact production agriculture. Your answers, in all cases, will be treated with complete confidentiality and your privacy will be protected to the maximum extent allowable by law. While your answers are extremely important to us, please understand your participation in this survey is completely ***voluntary****. If you understand that responding to this survey is voluntary, and you consent to participate, please continue and answer the following questions.*

Your answers will be the most helpful to us if you do not read ahead, but simply read the question before you and answer it to the best of your abilities. *Thank you for your cooperation and willingness to assist us!*

a. How much do you **know** about the care and management of agricultural animals in our current era?
____A LOT
____A FAIR BIT
____SOME
____NOT VERY MUCH
____HARDLY ANYTHING

b. Do you **care** about how agricultural animals are housed and managed?
____VERY MUCH
____QUITE A BIT
____SOMEWHAT
____NOT VERY MUCH
____NOT AT ALL

c. Are you **comfortable** with how agricultural animals in modern, intensive production systems are housed and managed?
____VERY MUCH SO
____FOR THE MOST PART
____I HAVE SOME CONCERNS
____I HAVE MANY CONCERNS
____DON'T KNOW ENOUGH TO VENTURE AN OPINION

1. I am _____ familiar with the practices involved in modern-day dairy production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

2. I am _____familiar with the practices involved in modern-day egg production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

3. I am _____familiar with the practices involved in modern-day poultry meat production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

4. I am _____familiar with the practices involved in modern-day pig production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

5. I am _____familiar with the practices involved in modern-day beef cattle production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

6. I am _____familiar with the practices involved in modern-day horse production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

7. I am _____familiar with the practices involved in modern-day sheep production.
____VERY (FAMILIAR)
____QUITE (FAMILIAR)
____SOMEWHAT (FAMILIAR)
____SLIGHTLY (FAMILIAR)
____NOT AT ALL (FAMILIAR)

8. How do you believe the vast majority of dairy cows are housed in our current era?
___OUT ON GRASSY PASTURE WITH OTHER COWS, BARN SHELTER AS NEEDED, HERDED UP TO THE MILKING PARLOR TWICE DAILY
___THEY LIVE THEIR LIVES INSIDE, BUT WITH OPPORTUNITY TO MOVE AROUND AND INTERACT WITH OTHER CATTLE; EACH SLEEPING STALL IS BEDDED WITH STRAW, SAND OR SIMILAR MATERIAL
___THEY LIVE THEIR LIVES COMPLETELY CONFINED TO SMALL, DARK, UNBEDDED STALLS IN WHICH THEY CANNOT TURN AROUND; MILKING MACHINES ARE BROUGHT TO THEM

9. How do you believe the vast majority of female breeding pigs are housed in our current era?
___IN LARGE, OUTDOOR PENS WITH OTHER PIGS AND HAVING ACCESS TO DIRT AND STRAW TO ROOT AROUND IN; SHELTER PROVIDED FOR INCLEMENT WEATHER
___IN LARGE INDOOR PENS THAT ALLOW SOCIAL INTERACTION; FLOOR IS BEDDED WITH STRAW
___IN INDIVIDUAL CRATES WHICH ALLOW THEM TO STAND & LIE DOWN, BUT DO NOT ALLOW FOR TURNING AROUND; FLOORING IS CEMENT SLATS

10.How do you believe the vast majority of female, egg-laying chickens are kept?
___IN CHICKEN COOPS WITH ROOSTING PERCHES; ATTACHED, OUTDOOR CHICKEN YARDS WHICH ALLOW FOR SCRATCHING AROUND IN THE DIRT AND DUST BATHING
___IN SPACIOUS INDOOR COOPS WHERE TEMPERATURE AND VENTILATION ARE CONTROLLED AND NESTING BOXES ARE PROVIDED; PERCHES PROVIDED
___IN SMALL CAGES WHERE 4 HENS SHARE FLOOR SPACE EQUAL TO THE SIZE OF A SHEET OF OFFICE PAPER FOR EACH; FLOORING IS WIRE; NEST BOXES AND PERCHES ARE NOT PROVIDED

WHEN I THINK OF AGRICULTURAL ANIMALS' WELFARE, MY PRIORITIES FOR THEIR NEEDS ARE AS FOLLOWS (THIS ASSUMES THEIR BASIC NEEDS OF FOOD, BEDDING, WATER PROVISION AND BASIC HEALTH CARE ARE ALREADY MET)

11. A preferred-temperature environment is available at all times.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

12. They have space to move around freely.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

13. Freedom from predators.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

14. The opportunity to engage in a broad spectrum of their natural behaviors.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

15. Freedom from distressing handling situations.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

16. Freedom from painful procedures without anesthetic.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

17. Safe, calm handling and transportation en route to the slaughter facility.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

18. A quick, humane death.
____VERY IMPORTANT
____SOMEWHAT IMPORTANT
____NOT THAT IMPORTANT
____NOT IMPORTANT AT ALL

THE FOLLOWING QUESTIONS ARE MODIFIED FROM A SURVEY DONE IN 1995 BY E.S. PAUL AND A.L. PODBERSCEK.

19. Do you think most horses can feel the sensation of pain?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS INTENSELY AS PEOPLE
____THEY RESPOND TO PAIN BUT ONLY IN AN INSTINCTIVE-AVOIDANCE MANNER
____NO, NOT AT ALL

20. Do you think most cattle can feel the sensation of pain?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS INTENSELY AS PEOPLE
____THEY RESPOND TO PAIN BUT ONLY IN AN INSTINCTIVE-AVOIDANCE MANNER
____NO, NOT AT ALL

21. Do you think most pigs can feel the sensation of pain?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS INTENSELY AS PEOPLE
____THEY RESPOND TO PAIN BUT ONLY IN AN INSTINCTIVE-AVOIDANCE MANNER
____NO, NOT AT ALL

22. Do you think most sheep can feel the sensation of pain?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS INTENSELY AS PEOPLE
____THEY RESPOND TO PAIN BUT ONLY IN AN INSTINCTIVE-AVOIDANCE MANNER
____NO, NOT AT ALL

23. Do you think most chickens/turkeys can feel the sensation of pain?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS INTENSELY AS PEOPLE
____THEY RESPOND TO PAIN BUT ONLY IN AN INSTINCTIVE-AVOIDANCE WAY
____NO, NOT AT ALL

24. Do you think most horses can experience boredom?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS READILY AS PEOPLE
____TO SOME DEGREE
____NO, NOT AT ALL

25. Do you think most cattle can experience boredom?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS READILY AS PEOPLE
____TO SOME DEGREE
____NO, NOT AT ALL

26. Do you think most pigs can experience boredom?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS READILY AS PEOPLE
____TO SOME DEGREE
____NO, NOT AT ALL

27. Do you think most sheep can experience boredom?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS READILY AS PEOPLE
____TO SOME DEGREE
____NO, NOT AT ALL

28. Do you think most chickens/turkeys can experience boredom?
____YES, IN A WAY VERY SIMILAR TO PEOPLE
____YES, THOUGH NOT AS INTENSELY AS PEOPLE
____TO SOME DEGREE
____NO, NOT AT ALL

<u>QUESTIONS ABOUT YOUR PHILOSOPHIES TOWARD ANIMAL CARE</u>

29. I believe "animal rights" and "animal welfare" refer to the same concept.
YES____ NO_____

IF YOU CHOSE "NO" IN RESPONSE TO #29, PLEASE READ QUESTIONS #30-#32 CAREFULLY BEFORE ANSWERING THEM; IF YOU CHOSE "YES," PLEASE GO ON TO #33:

30. "Animal rights" philosophy refers to believing that all non-human animals have essentially the same rights as humans, which include the right to not be eaten or used for medical research.

_____THIS POSITION STATEMENT MIRRORS MY OWN PHILOSOPHY.
_____THIS POSITION STATEMENT DOES NOT MIRROR MY OWN PHILOSOPHY.

31. "Animal welfare" philosophy refers to believing that we owe the animals that are being utilized to provide food, fiber or recreation a good standard of well-being and a life which minimizes physiological or behavioral suffering.

_____THIS POSITION STATEMENT MIRRORS MY OWN PHILOSOPHY.
_____THIS POSITION STATEMENT DOES NOT MIRROR MY OWN PHILOSOPHY.

32. If neither #30 nor #31 accurately reflects your personal philosophy regarding animal usage, please describe briefly your philosophy:

_____

_____

_____

33. I feel companion animals (e.g. dogs, cats) should have their **behavioral** needs met (e.g. space to move around, the opportunity to engage in preferred behaviors), as well as their basic physiological needs (e.g. food, water, shelter)
_____ STRONGLY AGREE
_____ AGREE
_____ NEUTRAL
_____ DISAGREE
_____ STRONGLY DISAGREE

34. I feel agricultural animals (e.g. pigs, chickens) should have their **behavioral** needs met, as well as their basic physiological needs.
_____ STRONGLY AGREE
_____ AGREE
_____ NEUTRAL
_____ DISAGREE
_____ STRONGLY DISAGREE

35. On a hypothetical pig farm, the female pigs that produce piglets spend over 300 of every 365 days in a gestation crate which is large enough to allow standing and lying down, but not turning around; the flooring is cement slats with no bedding.

As a consumer, would you be:
_____VERY COMFORTABLE BUYING PORK PRODUCTS FROM THIS FARM
_____SOMEWHAT COMFORTABLE BUYING PORK PRODUCTS FROM THIS FARM
_____NOT VERY COMFORTABLE BUYING PORK PRODUCTS FROM THIS FARM
_____I WOULD NOT BUY PORK PRODUCTS FROM THIS FARM
_____(I CANNOT ANSWER THE QUESTION BECAUSE I DO NOT CONSUME/USE PORK PRODUCTS)

36. On a hypothetical egg producing farm, the female chickens live in cages where 4 hens share the amount of space equivalent to a typical sheet of office paper and male chicks are disposed of without being first euthanised.

As a consumer, would you be:
_____VERY COMFORTABLE BUYING EGGS FROM THIS FARM
_____SOMEWHAT COMFORTABLE BUYING EGGS FROM THIS FARM
_____NOT VERY COMFORTABLE BUYING EGGS FROM THIS FARM
_____I WOULD NOT BUY EGGS FROM THIS FARM
_____(I CANNOT ANSWER THE QUESTION BECAUSE I DO NOT CONSUME EGGS)

37. On a hypothetical dairy farm, the cows live their productive milking life completely indoors and on any given day 15 – 20% of this operator's cows are obviously lame as they proceed to the milking parlor.

As a consumer, would you be:
_____VERY COMFORTABLE BUYING DAIRY PRODUCTS FROM THIS FARM
_____SOMEWHAT COMFORTABLE BUYING DAIRY PRODUCTS FROM THIS FARM
_____NOT VERY COMFORTABLE BUYING DAIRY PRODUCTS FROM THIS FARM
_____I WOULD NOT BUY DAIRY PRODUCTS FROM THIS FARM
_____(I CANNOT ANSWER THE QUESTION BECAUSE I DO NOT CONSUME DAIRY PRODUCTS)

38. On a hypothetical show horse farm, the horses spend 23 of each 24 hours per day alone in a 12 foot x 12 foot, solid-walled box stall which prevents them from interacting with other horses; the one hour per day they are out involves a training routine in the indoor arena; after being ridden and bathed, they spend an additional two hours tied in their stalls.

As a hypothetical client, would you be:
_____VERY COMFORTABLE HAVING YOUR HORSE TRAINED AT THIS FARM
_____SOMEWHAT COMFORTABLE HAVING YOUR HORSE TRAINED AT THIS FARM
_____NOT VERY COMFORTABLE HAVING YOUR HORSE TRAINED AT THIS FARM
_____I WOULD NOT HAVE MY HORSE TRAINED AT THIS FARM
_____(I CANNOT ANSWER THE QUESTION BECAUSE I DO NOT BELIEVE HORSES SHOULD BE KEPT FOR RECREATION PURPOSES)

DEMOGRAPHICS In order for us to better understand our respondents, please answer the following questions. Remember that your responses are completely confidential.

1. What year were you born?_____

2. What is your current academic level (freshman, sophomore, etc.)?_____

3. In which socio-economic grouping have you lived *most* of your life:
____ GROSS ANNUAL FAMILY INCOME IS LESS THAN $15,999
____ BELOW MOST OF THE MIDDLE CLASS INCOME LEVEL (GROSS ANNUAL FAMILY INCOME BETWEEN $16,000-$39,999)
____ AT BASIC, MIDDLE CLASS INCOME LEVEL (GROSS ANNUAL FAMILY INCOME BETWEEN $40,000-$80,999)
____ ABOVE MOST OF MIDDLE CLASS INCOME LEVEL (GROSS ANNUAL FAMILY INCOME BETWEEN $81,000-$199,999)
____ Gross annual family income is greater than $200,000

4. In what type of area have you lived *most* of your life?
____RURAL, FARM
____RURAL, HOBBY FARM
____RURAL, NON FARM
____SMALL TOWN
____LARGE TOWN/URBAN
____LARGE CITY/METROPOLITAN

5. Are you ____MALE ____FEMALE?

6. Please identify your racial/ethnic identity:_____

7. Do you consider yourself:
_____HIGHLY RELIGIOUS
_____QUITE RELIGIOUS
_____SOMEWHAT RELIGIOUS
_____NOT VERY RELIGIOUS
_____NOT RELIGIOUS AT ALL
8. Which religion do you practice (if any)?
_____

9. Do you practice any dietary or product purchasing restrictions (for example, are you a vegan or vegetarian)?_____

10. As a child or adolescent, did you or your family keep a pet(s) that you felt fondness toward/considered a companion:
____YES ____NO
11. If you answered "yes" to the above question, please identify the pet or pets that you had during childhood/adolescence (please check all that apply):
____DOG
____CAT
____HORSE/PONY
____HAMSTER/GUINEA PIG/GERBIL
____PARROT/PARAKEET/OTHER CAGED BIRD
____TROPICAL/MARINE FISH
____REPTILES/AMPHIBIANS
____RABBIT
____OTHER (PLEASE SPECIFY)
Of those above mentioned pets, please put a "*" next to those that you would consider to have had a close bond with.

12. Did you raise a type of animal that you did not consider as a pet:_____(please specify)

13. Do you currently have a pet(s)?
____YES ____NO
14. If "yes," please identify the pet(s) that you have currently:
____DOG
____CAT
____HORSE/PONY
____HAMSTER/GUINEA PIG/GERBIL
____PARROT/PARAKEET/OTHER CAGED BIRD
____TROPICAL/MARINE FISH
____REPTILES/AMPHIBIANS
____RABBIT
____OTHER (PLEASE SPECIFY)
Of those above mentioned pets, please put a "*" next to those that you would consider that you have a close bond with.

15. Do you raise a type of animal that you do not consider as a pet: (please specify)_____

16. As a child or adolescent were you involved in animal projects with any of the following organizations?
____ 4-H
____ FFA
____JUNIOR BREED ASSOCIATION
____OTHER
____NOT APPLICABLE

17. Given that the dictionary definition of "empathy" is as follows:
understanding of another's feelings: the ability to identify with and understand another's feelings or difficulties
Do you consider yourself to be...
____A VERY EMPATHETIC PERSON TOWARD PEOPLE AND ANIMALS
____A VERY EMPATHETIC PERSON TOWARDS PEOPLE AND SOMEWHAT EMPATHETIC TOWARDS ANIMALS
____A VERY EMPATHETIC PERSON TOWARDS ANIMALS AND SOMEWHAT EMPATHETIC TOWARDS PEOPLE
____A SOMEWHAT EMPATHETIC PERSON
____NEUTRAL
____A NOT PARTICULARLY EMPATHETIC PERSON

This Project was approved by UCRIHS on February 3, 2001. Approval expires on February 3, 2003.

CHAPTER THREE

Heleski, Camie R., Zanella, A.J., Pajor, E.A. (2003) Animal welfare judging teams – a way to interface welfare science with traditional animal science curricula? Applied Animal Behaviour Science 81 (2003) 279-289.

Figure, Table, and Appendix for this article are at the conclusion of the article.

Animal welfare judging teams – a way to interface welfare science with traditional animal science curricula?

C.R. Heleski, A.J. Zanella, E.A. Pajor*

*E-mail: heleski@msu.edu; tel.: 517/355-8427; address: C.R. Heleski, Animal Behavior and Welfare Group, Department of Animal Science, 1250 Anthony Hall, Michigan State University, East Lansing, MI, USA 48824

A.J. Zanella, Animal Behavior and Welfare Group, Department of Animal Science, 1230 Anthony Hall, Michigan State University, East Lansing, MI, USA 48824

E.A. Pajor, Department of Animal Sciences, Purdue University, 1205 Poultry Building, West Lafayette, IN, USA 47906

Abstract

Animal evaluation courses have been part of animal science curricula for over 80 years in the United States. A need for skills in the visual evaluation of conformation traits and the appraisal of productivity potential laid the foundation for animal judging courses. Eventually these courses developed into competitions for students to compare their skill level.

Following a similar framework, we propose that developing teams to educate young people about animal welfare, then establishing competitions to assess these skills will be a successful way to integrate animal welfare science into the mainstream of animal science curricula. Using traditional judging programs as a model, a paradigm for establishing animal welfare judging/assessment teams has been developed. Students take a background course in understanding evolutionary biology, biological needs, behavioral and physiological indicators of differing levels of welfare, and how to holistically evaluate facilities, stockmanship and management schemes. It should be noted that while

the *assessment* of various aspects of animal welfare can be objective and quantifiable, judgment *decisions* of which area will be acceptable in the continuum between very poor and very good welfare still comes down to an ethics-based choice. Animal welfare assessment will teach students to integrate science-based knowledge with ethical values for an interdisciplinary approach to problem solving.

The competition unfolds as follows: CD-ROM scenarios are prepared with indicators of animal welfare ranging from physiological data, video and still clips, to behavioral responses and time budgets. Students evaluate competition scenarios for each species being judged, prepare their analysis, then make an oral presentation of why they assess one scenario as demonstrating a higher level of welfare than another. The knowledge of welfare science in making the assessment, as well as the persuasion in the presentation, are key factors in scoring the students. A pilot competition was held March 1, 2002, at Michigan State University. Eighteen student participants from the University of Wisconsin, University of Guelph, Purdue University and Michigan State University competed in this pilot endeavor. Post-contest surveys demonstrated that 100% of the students felt the development of animal welfare judging teams was a good idea and that they would recommend the course to fellow students.

Keywords: Animal welfare; Welfare assessment; Judging teams

1. Introduction and Problem Statement

In United States animal science departments, over 10,000 undergraduates are instructed annually in the science of raising and caring for agricultural animals. These departments have missions of teaching, research and extension/outreach efforts. In contrast to the traditional sub-disciplines, such as nutrition and growth biology, which are

found in nearly all animal science departments, the area of animal behavior and welfare is considerably less common. While there are over 65 animal science departments in the United States (Swanson, 1999), less than half have even one full time departmental staff member devoted to animal behavior and/or welfare teaching, research and extension issues (NCR-131, 2001). Additionally, only about one-third of these faculty members have formal training in animal behavior and/or animal welfare science (NCR-131, 2001). Consequently, finding methods of integrating applied behavior and welfare science into traditional curricular features will be important if these concepts are to be imparted upon animal science students.

With the advent of welfare assurance schemes currently evolving in the U.S., our animal science departments are at a critical juncture in making a commitment to prepare graduates to address these changes in the industry. One factor that may limit animal scientists from taking a leadership role in addressing these changes is the perception that addressing animal welfare concerns conflicts with the traditional goal of improving the efficiency and productivity of farm animals. Consequently, the concept of animal welfare is sometimes viewed negatively and trying to "raise the profile of animal welfare science" is fraught with subtly interwoven challenges.

Over the past five years at Michigan State University Department of Animal Science, East Lansing, Michigan, role-play exercises have been used as a teaching tool in the undergraduate applied behavior class. Post-exercise self-reports have indicated that the most difficult position for animal science undergraduates to argue was when the assignment asked them to criticize animal agriculture practices (in comparison to zoo animals, companion animals, and laboratory animals). However, it should be noted that

this may be a regional phenomenon. Personal reports from animal science departments along the East and West coasts of the United States are more likely to cite animal science students as being inherently negative toward production agriculture practices.

We would like to argue that it will be beneficial for the long term sustainability of animal production systems if animal science students, who will be future leaders in the industry, are trained to gather and evaluate information and, as a result, address societal concerns in an unbiased and critical way. Teaching students to critically synthesize the results of animal welfare research will be essential.

Evidence for the effect of judging teams on impacting attitudes toward a specific discipline/industry has been established by Squires and colleagues (1991). We propose that one tool for impacting attitudes toward the welfare of agricultural animals is to develop welfare judging teams. This model will serve as motivation for fostering knowledge of animal welfare science and seeking active reflection of the material. Yoking the concept of welfare assessment to a familiar, experiential learning technique, one that has been part of traditional animal science culture for decades, has the potential to create powerful inroads.

2. Judging Teams as an Example of Experiential Learning

Transferable skills such as communication, critical thinking and information management have been identified repeatedly by employers as those competencies necessary for success in many different careers (Berg, 2002; Coorts, 1987; Guthrie and Majeskie, 1997; Smith, 1989; Taylor, 1990). Decision-making and industry knowledge are also especially valued by those employers of people in the agriculture industry (Berg, 2002; Field et al., 1998). These types of skills may be taught best in experiential learning

settings, such as internships, hands-on laboratories and judging teams (McCann and McCann, 1992; Taylor, 1990). The concept of teaching animal science in a learning community where students are prompted to question, explore, synthesize, make and defend judgements has been promoted by Schillo (1997). In many ways, animal welfare assessment is an ideal example of integrating facts and values with what has been described by Swanson (1999) as contemporary social issues.

Furthermore, a National Task Force which focused on impacting student learning developed Ten Principles of Learning (Potter, 1999). These principles discuss learning being enhanced in the context of a compelling situation, learning taking place informally in casual contacts with faculty, staff and peers; and learning being enhanced by interacting as competitors. Students involved either in traditional judging classes and competitions, or the newly established welfare judging program, fulfill many of the learning principles posed in this pedagogical model.

3. History of Judging Teams

Judging teams have over an eight-decade history within animal husbandry/science departments in the United States. Early in the twentieth century, animal evaluation courses were at the forefront of material taught to animal husbandry undergraduates. Practical learning was at the core of the students' academic program, and the ability to evaluate animals' conformation and the animals' likelihood to stay sound and be productive was deemed highly important. Team competition was eventually added to provide additional incentive for practicing evaluation skills and enhancing the students' verbal defenses for why they placed animals in a certain order (McCann and McCann, 1992). As animal husbandry departments transformed into animal science departments

over the last 50 years (Rollin, 1995) judging teams came under increased scrutiny by many universities (Field et al., 1998). Criticisms of judging activities have included concerns about the ability of judging contests to simulate realistic views of the livestock industry and the validity of utilizing visual appraisal as a genetic improvement tool (Field et al., 1998). Nonetheless, judging teams remain a popular, highly supported educational activity at many universitites across the United States because of their positive impact in fostering unique learning environments.

A survey done by McCann and McCann (1992) questioned 1,291 judging team alumni, primarily from 18 schools, about their opinions of their judging experiences. The respondents consisted of alumni from livestock, meats, dairy, horse and wool judging teams. Ninety-nine percent of the respondents felt that judging teams were worthy of departmental support. When asked how judging programs had benefited them, 35% cited "improved communication skills." Other frequently cited benefits were "enhanced confidence," "improved animal evaluation skills," and "better decision-making skills."

4. Review of traditional judging teams[1]

In traditional judging programs, students begin by taking a background course in basic conformation evaluation, understanding form to function, learning about unsoundnesses, learning the terminology to describe the animals being evaluated, and beginning to make decisions about the placement (see Glossry) of a group of animals. When some of this foundation information has been acquired, students begin to learn how to assemble the reasons for their class assessment into the format of an oral presentation; i.e. oral reasons (see Glossary). As students advance in their understanding of

[1] The first author has a 15-year history with judging teams, as a competitor, coach, and official judge; hence, most of this section is from personal experience.

conformation evaluation, or in some cases, performance evaluation, they begin spending more time on the preparation of their oral reasons and preparing to go to judging competitions. Many different animals will be looked at to learn about making decisions as to how to weigh various positive and negative factors regarding the four animals in a class (see Glossary). Animals are evaluated from each angle, observed in movement, and, where appropriate, supporting performance data are provided for analysis. Students are given between fifteen and twenty minutes to evaluate each set of four animals. In a competition situation, after the day's classes have been analyzed and notes have been taken on each, the students have a period of time, averaging 30 minutes, to prepare their oral reasons. These reasons will be given in two minutes or less, citing the positives and negatives about each pair of animals involved in the class placing.

Students are given two scores for each class. One score is for the placement of the animals themselves. A panel of trained judges evaluates the animals at the same time as the students, makes an official placing, subsequently the students' placings are compared with this official placing. Reasons are judged on accuracy, relevancy, terminology, organization and presentation style (NHJTCA Handbook, 1997). Each species group has a governing body which designates competition rules and outlines suggestions for conducting contests, and judging fairly. The membership of these organizations consists of current and past coaches of both collegiate and pre-collegiate youth teams, along with interested industry partners.

5. Methodology

We have developed, and will continue to develop, multi-media libraries addressing animal welfare issues. The libraries consist of still digital pictures, video clips

and supporting physiological and behavioral data. These represent a wide variety of situations that can be integrated into interactive practice and competition welfare assessment scenarios. Portions of this data were selected and placed onto CD-ROMs for the first contest in March, 2002. We propose to use DVDs for the competition media beginning in 2003. The competition scenarios are set up within the framework of Microsoft PowerPoint® slide shows. The information utilized is from existing data, and complemented, oftentimes, by hypothetical, but realistic, information. Each scenario has been designed to take approximately 25 minutes to analyze. A representative sample of a competition scenario can be viewed in Figure 1.

To assist in the process of modeling traditional judging programs, we have thus far elected to use the same terminology for welfare judging that is utilized in traditional judging programs (see Glossary).

5.1. Team Preparation

The following presents one model of team preparation which was used at Michigan State University. Students were recruited from the Applied Animal Behavior class and a weekly one-hour block was set aside during fall semester, 2001, to meet with the students and begin discussing the expectations for an animal welfare judging team.

Since the MSU students came from varied backgrounds and many had experience with only one species, a great deal of time was spent discussing general husbandry practices of the other species. We reviewed the physiological and behavioral indicators that typically represent different levels of welfare (Broom and Johnson, 1993). Each student was given the *FASS 1999 GUIDE For the Care and Use of Agricultural Animals in Agricultural Research and Teaching*. These manuals provided general husbandry

guidelines for all of the species proposed for this competition. In addition, excerpts were reviewed from Broom and Johnson's *Stress and Animal Welfare* (1993), Hemsworth and Coleman's *Human-Livestock Interactions* (1998), Appleby and Hughes' *Animal Welfare* (1997), along with pertinent articles by various ethologists and ethicists.

Students were also asked to bring material for discussion from alternative sources. This proved to be a very productive exercise in assessing the accuracy, or lack thereof, of the information obtained. The potential for developing critical skills through this exercise should not be underestimated. A reference packet of recommended readings was shared with the coaches of the other teams which were preparing for the 2002 contest and is available upon request to other interested coaches.

When students were sufficiently knowledgeable to make a comparative assessment about which of two animals or two herds/flocks had a "better" welfare status, students were presented with practice CD-ROM scenarios . During the first attempt, the coach (see Glossry) assisted them with the exercise of examining the scenarios on the CD-ROM and looking for various indicators of welfare. The coach then gave a sample assessment of how oral reasons might be presented for that pair of scenarios. See Table 1 for a brief sample set of reasons. Later, students worked in pairs at assessing a different sample CD-ROM scenario, then worked together to write out their assessment. Students then read their reasons aloud and received feedback from both the coach and their fellow team members.

As the contest approached, students were ready to practice evaluating the CD-ROM scenarios on their own and attempt oral reasons, using only a note card for reminder notes. Further team preparation involved enhancing the students' knowledge

base of animal welfare science information to the point where they could reference certain scientific publications when taking a position stance in their oral reasons. In addition, students continued to practice reasons and improve their breadth of vocabulary concerning animal welfare.

5.2. The First Contest

Two competitive grants were awarded from Michigan State University for establishing this first competition for undergraduate students in welfare assessment/judging. This event was held March 1, 2002, as one of the initial events of Michigan State's Agriculture and Natural Resources Week.

On competition day, 18 students from Purdue University, University of Guelph, University of Wisconsin, and Michigan State University tested their skills in assessment and oral reasons. The contest began in the morning at a computer laboratory. Each contestant was handed a CD-ROM to load onto their computer, then at verbally orchestrated times, students examined a scenario representing two differing levels of welfare for each species. For this first contest, the coaches had discussed in advance that the contest would focus on four species: chickens, dairy cattle, horses, and pigs, with the potential of having one class which would compare scenarios from two differing species. Students judged five classes during the morning, each one taking 25 minutes to analyze and take down written notes. After each class, students turned in a placing card with their appraisal choice marked down and their contestant number. Students then took a working lunch break which gave them time to prepare their notes for the oral reasons they would give during the afternoon.

The afternoon was spent with students first answering a series of open-ended questions asked to them individually by the panel of three judges. Questions were asked on the two classes which were not selected for oral reasons. After the question session, students gave oral reasons to individual judges on the other three classes. Judges were chosen based on having a combined background in ethology and welfare science, undergraduate education and a familiarity with traditional judging competition. At the conclusion of the afternoon oral reasons segment, an open forum suggestions session was hosted, followed by an evening awards dinner. The open forum was an innovation not based on traditional judging competitions, but rather on the desire of the authors to obtain immediate feedback toward enhancing future animal welfare judging activities. A qualitative evaluation of the open forum suggestion found an overwhelmingly positive response from contestants, judges and coaches.

Pre- and post-contest surveys were given to student participants to provide an impact assessment (Waltman, 2002). One hundred percent of the students said the contest was a good idea. Furthermore, 100% of the students said they would recommend the activity to other students. Ninety-four percent said they had enhanced their awareness or understanding of welfare issues related to animal agriculture. One of the initial goals for developing this welfare judging concept was based on the idea that students would network with others in their social circle to impart their enhanced awareness. Each student in this endeavor conversed with an average of 3.82 people per week on a topic pertaining to animal welfare.

One primary goal after the first contest was completed was to expand the number of teams involved for 2003. In an effort to expand the audience beyond the schools that

traditionally attend International Society of Applied Ethology meetings, we presented a talk (Heleski et al., 2002) and set up a recruiting booth at the American Society of Animal Science combined meetings in Quebec City, Canada, July, 2002.

6. Conclusion

Welfare scientists, in the last few decades, have made significant progress in assessing which animal production practices impinge upon an animal's well-being (Dawkins, 1997). Yet many of the findings remain non-implemented due, in part, to a lack of awareness (Dawkins, 1997). We feel student members of the welfare judging team can serve as liaisons to offer principles of welfare science and the ethical examination of husbandry practices to others in the animal science community. Since undergraduates in animal science often comprise the next generation of producers, it seems logical and essential to commence with enhancing their awareness of welfare issues that affect agricultural animals and the findings of the welfare scientists. It is also important to make students aware that enhancing welfare should not be viewed automatically as conflicting with the goal of minimizing production costs/enhancing profitability. As an example, Hemsworth and colleagues (1986) found that gilts receiving positive-type handling had pregnancy rates of 88% versus gilts receiving negative-type handling with only a 33% pregnancy rate.

Animal agriculture in the United States has a history of looking to animal scientists for information on helping to develop their industries. The goal of animal welfare science programs within existing academic structures should not be construed as being anti-production agriculture. Rather, the overall goal should be aligned with helping

maintain the long-term sustainability of animal agriculture and assisting animal science departments in developing this role.

More recently, perceived social pressure has been driving the animal agriculture industries to scrutinize their modern production practices, sometimes by the producers themselves, sometimes indirectly through venues such as the fast food industries' task forces (Armstrong et al., 2002; Grandin, 2000). Animal science departments and their graduates can make the choice to follow the results of this paradigm shift; i.e. be reactive, or take an active leadership role in educating students in animal welfare science; i.e. be pro-active. In consideration of these factors, we propose that the development of welfare judging/assessment teams is particularly timely.

We anticipate welfare judging team members making the following impacts: their increased awareness of the science available to address welfare issues, coupled with their training in ethical decision-making will allow them to elucidate the issues to their social and professional networks; they will assist in forming liaisons between animal science faculty and university and area farm managers; and they have the potential of becoming trained assessors for welfare labeling schemes or animal welfare organizations. We fully anticipate that the students will derive many of the same benefits from this judging experience as cited by alumni of other judging teams (McCann and McCann, 1992); i.e. enhanced communication skills, improved analytical and decision-making skills, and an augmented network of professional contacts. The positive outcomes associated with our pilot endeavor lend support to this prediction.

Though the purpose of this paper has been to examine the concept of undergraduate welfare judging teams, the concept of developing competitions for pre-

collegiate students; e.g. 4-H and FFA members[2], has been raised and is being explored. Additionally, the possibility of using media developed for these competitions as a source for training welfare assurance scheme and certifying agency assessors has been proposed.

Acknowledgements

For financial support in developing this first contest, we acknowledge the Michigan Animal Industry Initiative Coalition, the Michigan State University Agriculture and Natural Resources Week Funding Committee, the Humane Society of the United States, and the American Society of Animal Science for providing an exhibit space at the combined meetings in Quebec City, Canada, July, 2002. For contributing to the success of this first contest, we thank our judges: Dr. Dennis Banks, Dr. Suzanne Millman, and Dr. Martin Potter; the coaches and contestants of the University of Wisconsin, the University of Guelph, Purdue University, and Michigan State University, and all members of the MSU Animal Behavior and Welfare Group, especially Emilly Wilson and Sandra Rigotti.

[2] 4-H is the name given to a U.S.-based youth activity that began in the early 1900's and continues to gain in enrollment numbers. The program was launched as an agriculture based program for rural boys and a home skills club activity for girls. Today over 6.8 million U.S. youth are involved with hundreds of different project options. 4-H is the youth education branch of the Cooperative Extension Service. FFA stands for Future Farmers of America and began in the 1920's. There are over 450,000 members aged 12-21. (4-H and FFA web sites, 2002)

References

Armstrong, J.D., Zanella, A.J., Sigurdson, C., Pajor, E.A., 2002. Exceeding expectations in animal welfare. Proceedings of the American Association of Swine Veterinarians.

Berg, P., 2002. Meat judging as a learning tool: gender comparison. J. Anim. Sci. 80 (Suppl. 1 Abstracts), p. 165.

Broom, D.M., Johnson, K.G. 1993. Stress and Animal Welfare, Chapman & Hall, London, U.K.

Coorts, G.D., 1987. Updating today's college curriculum for tomorrow's agriculture. Nat. Assoc. Coll. Teachers' Agric. J. 31(2), 20.

Dawkins, M.S., 1997. D.G.M. Wood-Gush Memorial lecture: Why has there not been more progress in animal welfare research? Appl. Anim. Beh. Sci. 53: 59-73.

Duncan, I.J.H., 2001. Animal welfare issues in the poultry industry: is there a lesson to be learned? J. Appl. Anim. Welf. Sci., 4(3), 207-221.

4-H web site. 2002. Retrieved on January 14, 2002 from http://www.4-H.org

FASS (Federation of Animal Science Societies), 1999. GUIDE For the Care and Use of Agricultural Animals in Agricultural Research and Teaching. Federation of Animal Science Societies, Savoy, Illinois, USA.

Field, T.G., Green, R.D., Gosey, J.A., Ritchie, H.D., 1998. A summary of intercollegiate judging activity, funding and philosophy. Nat. Assoc. Coll. Teachers' Agric. J. September, 27-31.

FFA web site. 2002. Retrieved on January 14, 2002 from http://www.FFA.org

Fraser, A.F., Broom, D.M., 1990. Farm Animal Behaviour and Welfare. 3rd Ed. Ballihre Tindall, London, UK.

Guthrie, L.D., Majeskie, J.L., 1997. Dairy cattle judging teaches critical life skills. J. Dairy Sci. 80(8), 1884-1887.

Heleski, C.R., Zanella, A.J., Pajor, E.A. 2002. A novel method for teaching animal welfare concepts: animal welfare judging teams. J. Anim. Sci. 80 (Suppl. 1 Abstracts) p. 164.

Hemsworth, P.H., Coleman, G.J., 1998. Human-Livestock Interactions (The Stockperson and the Productivity and Welfare of Intensively Farmed Animals). CAB International, Wallingford, UK.

McCann, J.S., McCann, M.A., 1992. Judging team members reflection on the value of livestock, horse, meats, and wool judging programs. Prof. Anim. Sci. 8, 7-13.

NCR-131, 2001, North Central Regional Committee for Animal Care and Behavior. Membership list, also as retrieved on January 3, 2002 from http://www.liru.asft.ttu.edu/Collab/NCR-131/ncr131.htm

NHJTCA Handbook. 1997. Offical Handbook of the National Horse Judging Team Coaches' Association. http://www.showscene.com/Handbook2000.PDF

Potter, D.L., 1999. Is George Mason a learning-centered university? Inventio, Feb. 1, 1, Sec. 6. Retrieved January 3, 2002 from http://www.doiiit.gmu.edu/Archives/feb98/dpotter_7.htm

Rollin, B.E., 1995. Farm Animal Welfare (Social, Bioethical and Research Issues). Iowa State University Press, Ames, Iowa, USA.

Schillo, K.K., 1997. Teaching animal science: education or indoctrination? J. Anim. Sci. 75(4), 950-953.

Serpell, J.A., Parsons, T.D., 2001. Food animal husbandry and the new millennium. J. Appl. Anim. Welf. Sci. 4(3), 169-173.

Smith, G.C., 1989. Developing critical thinking, communication skills, and leadership in animal science students. J. Anim. Sci. 67 (Suppl. 1), 601.

Squires, M.W., Bokyani, R.P.Jr., Toelle, V.D., Stephens, J.F, 1991. Development and evaluation of an intramural poultry judging contest. Poultry Sci. 70(2), 260-264.

Swanson, J.C., 1995. Farm animal well-being and intensive production systems. J. Anim. Sci. 73, 2744-2751.

Swanson, J.C., 1999. What are animal science departments doing to address contemporary issues? J. Anim. Sci. 77, 354-360.

Taylor, M.E., 1990. Empowering freshmen to design their own learning experiences, Nat. Assoc. Coll. Teachers' Agric. J. June, 46-49.

Waltman, 2002. The impact of the animal welfare judging team experience on undergraduate students. Proceedings of the Regional ISAE, Quebec City, Canada.

Glossary

Class – In traditional livestock judging, this refers to a "class" of four animals which students will rank. In welfare judging, this refers to two scenarios which the student will assess and rank one over the other; e.g. welfare status of flock 1 versus welfare status of flock 2.

Class Official – Someone chosen by the contest organizers to have a high level of expertise regarding the class being judged. Will meet with the other class officials and come to a decision regarding the official placing for the class. Class officials will typically also serve as the reason listeners.

Coach – The term typically applied to the instructor of a judging team.

Cuts – In traditional livestock judging, a "cut" is determined by the official judges between each pair of animals. For example, if the placing between animal #3 and animal #1 seems very obvious, there might be a six point cut, which would ultimately be subtracted from the 50 possible points for those participants who would switch that pair of animals in their placing. As guidelines to our officials for the first welfare judging competition, we suggested that 10 point cuts between scenarios would signify a very obvious difference in welfare status. Lower "cuts" would signify less obvious choices, and, as opposed to traditional judging, we allowed the officials to make zero point "cuts" in situations where it was deemed that the welfare status of either scenario could be argued as preferable, depending upon what facets were emphasized. For more information on cuts, see the NHJTCA Handbook (1997).

Oral Reasons – An assessment/defense of why a student placed a class as they have stated. Traditional livestock judging presents these in a standardized format and limits them to two minutes in length with no notecards for reference. In the welfare judging methodology, we have opted for less formatted, more conversational reasons; three minutes in length, with the option of students using one note card, and with preference granted those students who incorporate scientific references into their reasons.

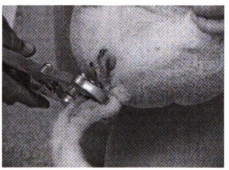
Placing – This refers to the rank ordering of how students or officials have "placed" the class. For example, the placing of Class 1 should be scenario 1 over scenario 2, or in traditional judging, it might be that the placing of Class 2 is animal #3, then animal #1, then animal #2, then animal #4 (each animal is assigned a number upon entering the class).

Reason Listener – May also be a class official. This person will listen to the competitors' oral reasons for a given class and will give each one a score.

Figure 1
Excerpts from a Sheep Welfare Scenario that Students Assessed (Actual Scenario Consisted of 24 PowerPoint® Slides)

Neonatal Interventions – Flock 1

- Tails are docked "tight" for show lambs, using a rubber ring Elastrator, during first 24 hours of life



Neonatal Interventions – Flock 2

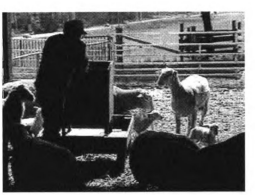
- Tails are docked at the junction of the caudal folds, using a rubber ring Elastrator, at 3 days of age

Stockmanship – Flock 1

- In this video clip, students see the ewes moving quickly to get out of the stockman's way; when he tries to reach out to touch them, they dart away

Stockmanship – Flock 2

- In this video clip, students will see the ewes actually allow the stockman to walk up to them and stroke them as he walks by



Foot Health-
Flock 2

- Rate of mild foot rot lesions (5% of flock)

Predator Control-
Flock 2

- "Guard" donkey in with sheep when they are at pasture; donkey does have access to being with sheep

Foot Health-
Flock 1

- Rate of mild foot rot lesions (1% of flock)

Predator Control-
Flock 1

- Sheep stay up in barnyard pens and predators have not been a problem

Table 1
A Sample Set of Student Reasons for the Sheep Scenario Cited
(A conversational style is used; hence, authors are referenced, but years are not.)

I placed this sheep flock welfare comparison 2/1.

In regards to neonatal interventions, flock 2's long-term welfare would be enhanced by the fact that tails are docked at a longer length and at an age that has allowed for maternal bonding to occur. The FASS GUIDE states that earlier interventions may interfere with this bonding.

In regards to stockmanship, I again placed 2 over 1 in that the fear response in flock 1 seems apparent from the video clip. Hemsworth has pointed out repeatedly the impact of positive versus negative handling in terms of production measures.

In terms of stocking density and feed bunk space, I deemed both flocks acceptable and did not view this as a discerning point.

In terms of predator control, both herdsmen took very different tacks – 1 with keeping the animals up in the barn yard so as to minimize contact with predators; 2 with keeping predators at bay via the use of a guard donkey. It is my opinion that any time animals can be given the opportunity to behave in a highly natural manner; i.e. out on pasture in a flock type situation, that style of husbandry should be promoted, hence I preferred flock 2's welfare in this regard also. This is also in keeping with Rollin's philosophy of animals being allowed to display their 'telos;' i.e. the "sheepness" of the sheep.

The only place I would fault 2 and prefer 1 is in the rate of foot-related illness. A rate of 5% minor foot-rot lesions would not raise a red flag for poor welfare, but it is still a higher rate than the 1% experienced by flock 1.

To conclude, I assessed the overall welfare status of flock 2 over that of flock

APPENDIX 2

Outcome Measures from First 3 Years of the Animal Welfare Judging/Assessment Competition

One meaningful measure of whether or not this endeavor can be judged successful, is whether or not students feel that developing this contest was a good idea. Of 64 participants thus far, 99% of students agreed that it was. Some reasons given as to why students felt this was a good idea were: to think more/learn more about this topic area (n = 24); to cultivate the right forum to discuss farm animal welfare (n=6); to put students' knowledge to the test (n=5).

Another validation of the importance students placed on this competition is that 97% of student participants would encourage a fellow student to participate in a future year. Furthermore, 98% of the student participants thus far said they had furthered their knowledge base/enhanced their understanding of animal welfare science through this endeavor.

A third testimony to the students' high regard for this endeavor was their response to the following, "A long range goal for this activity is to engage 4-H/FFA members in a similar competition; if circumstances allowed, would you be interested in helping to coach a youth team, or be a volunteer judge for such a contest?" 80% of students responded in the affirmative to this question.

We asked students, on average, how many people per week they had discussed animal welfare-related topics with. In 2002, students answered with an average of 3.8 people/week; in 2003, students answered with an average of 4.8 people/week; in 2004, students answered with an average of 4.0 people/week.

We asked students how they would classify their knowledge base about production animal agriculture prior to commencing this exercise. 8% said they were highly knowledgeable, 26% said they were quite knowledgeable, 51% said they were somewhat knowledgeable, 14% said they were not very knowledgeable, and 1% said they were not at all knowledgeable.

Demographics of our student participants: 79% of our participants thus far have been female; 80% have been upper classmen (juniors/seniors); of those listing a primary species orientation, 43% have listed horse, 13% beef, 13% dairy, 10% swine, 8% sheep, 8% poultry and 8% small animal or exotics.

Regarding self-assessed level of empathy, 48% of participants considered themselves to be very empathetic to both humans and animals; 26% considered themselves very empathetic to animals, somewhat to humans; 10% considered themselves very empathetic to humans, somewhat to animals; 17% considered themselves somewhat empathetic and 0% considered themselves not particularly empathetic.

When asked what prompted their interest in participating in this exercise, participants identified the following reasons: interested in the topic (n=26); wanted to learn more about the topic (n=22); an advisor suggested or knew the coach (n=16); networking opportunities (n=6); wanted to enhance skills (e.g. public speaking) – (n=3); wanted the chance to visit another university (n=3). It should be noted this is based on 46 students, rather than 64 because it is for 2003 and 2004 only. These data were not collected in 2002.

When asked about their expectations for the contest, the following reasons were cited: to learn more (n=23), to have fun (n=14), to refine new skills (e.g. oral reasons) – (n=11), to meet new people (n=8), to be competitive (n=8). These responses were also based on the answers from 46 students (2003 and 2004 participants).

Post-contest surveys asked students to identify welfare-related concerns for each species (if they had any concerns). Results for 2003 and 2004 follow:

For layers, the top four concerns were: cage size, induced molting, beak/toe trimming, and bone strength.

For meat birds, the top four concerns were: transportation/handling related to slaughter, size/growth rate related to leg problems, stocking density, and feather pecking.

For pigs, the top four concerns were: gestation crates, aggressive interactions, early weaning, and castration/ear notching/tail docking (i.e. neonatal interventions).

For dairy, the top four concerns were: no access to pasture, calf treatment, lameness, demands for high milk.

For beef, (it should be noted that cited concerns were low, in general), the top four concerns were: transportation/handling related to slaughter, dirty feedlots, castration without anesthetic, hot branding.

For sheep, (it should be noted that cited concerns were very low, in general), the three categories of concern were: tail docking methods, castration methods, shearing procedures.

For horses, the top four concerns were amount of time spent in stalls, training methods, PMU (pregnant mare urine) ranching, and soring of Tennessee Walkers.

In 2002, students were not asked to identify welfare-related concerns by species, but rather, in general. Their top four concerns were as follows: housing issues (specifically, gestation crates and layer hen cages), stockmanship and transportation issues, neonatal interventions without pain control (e.g. castration, dehorning), and anatomical modifications (e.g. beak trimming and toe trimming).

An interesting follow-up assessment would be to compare the welfare-related knowledge base of students that participate in the welfare judging contest, with a comparable cohort of horse judging/livestock judging or dairy judging students.

CHAPTER FOUR

Assessing attitudes toward farm animal welfare: a national survey of animal science faculty[3]

C.R. Heleski*[2], A.G. Mertig‡, A.J. Zanella*
*Animal Behavior and Welfare Group, Department of Animal Science, Michigan State University, East Lansing, MI, United States, 48824; ‡ Department of Sociology and Anthropology, Middle Tennessee State University, Murfreesboro, TN, United States, 37132

Accepted by the Journal of Animal Science, Volume 82, pp. 2806-2814.
Tables and Figures for this article are placed at the end of this article.

[3] We acknowledge Pedrina Vidigal and Dawn Mace for data entry; the Animal Behavior and Welfare Group for assistance with interpretation; our pilot interviewees and respondents for their assistance with survey development; our national respondents to the questionnaire; and financial support from our Michigan Animal Industry Coalition grant.
[2] Correspondence: E-mail: Heleski@msu.edu; Phone: 517/355-8427.

Assessing attitudes toward farm animal welfare: a national survey of animal science faculty

C.R. Heleski*, A.G. Mertig‡, A.J. Zanella*
*Animal Behavior and Welfare Group, Department of Animal Science, Michigan State University, East Lansing, MI, United States, 48824; ‡ Department of Sociology and Anthropology, Middle Tennessee State University, Murfreesboro, TN, United States, 37132

ABSTRACT: A survey to measure attitudes toward farm animal welfare was developed. We targeted animal science faculty because of their influence on animal production in the U.S. We initially interviewed 34 faculty from a large, Midwestern public university to assist with questionnaire development. After our written survey was developed, we pilot tested our questionnaire at this same university. Thereafter, we e-mailed a pre-notice, first survey, and follow-up survey/thank you to the national population of animal science faculty. With an n = 446 (response rate = 45%), we observed the following: 51% (for layer birds), 58% (for meat birds), 66% (for swine), 84% (for dairy), 86% (for sheep) and 87% (for beef) of our respondents agreed that the predominant methods used to produce different types of animal products provided appropriate levels of animal welfare in the respective species. Our findings showed that greater than 90% of respondents support general principles of animal welfare, such as keeping animals free from unnecessary fear and distress. However specific practices that have been shown to elicit distress, e.g. castration without anesthetic, were deemed a concern by only 32% of the respondents. Various industry practices/outcomes were assessed for level of concern and varied from a high of 83% of respondents agreeing that flooring effects on lameness in intensively farmed animals are a concern, to a low of 16% agreeing that early weaning in pigs is a concern. Summed attitude scores showed significant relationships with the demographic variables of gender ($P < 0.01$) and political ideology ($P < 0.01$), with women and those

holding more liberal political views being more concerned about farm animal welfare issues. Gaining an awareness of various stakeholders' attitudes (e.g. animal scientists, veterinarians, producers and consumers) toward farm animal welfare will assist animal welfare scientists in knowing which research topics to emphasize and, perhaps, where critical gaps in accessibility of knowledge exist.

Key Words: Attitudes, Surveys, Animal welfare, Animal scientists

Introduction

Animal welfare scientists have published numerous articles in peer-reviewed journals during the last few decades. However, the impact of welfare science research appears to have not yet lived up to its potential. We propose one possible reason for this is that some stakeholder attitudes are resistant to change relating to animal welfare.

We chose to study attitudes because of their relationship to behavioral intentions (i.e. how people intend to behave). Azjen and Fishbein (1980) proposed the Theory of Reasoned Action, stating that attitudes relate to intentions on how people will behave. However, external obstacles may impede the ability to act on intentions (Eagly and Chaiken, 1993). One potential obstacle may be cognitive dissonance (Festinger, 1957; Smith and Mackie, 2000); e.g. if people need to act in a certain way in order to perform tasks, but those actions do not correspond with their attitudes, they may alter their attitudes through rationalization so as to reduce dissonance (i.e. cognitive discomfort). If we, as animal scientists, need to educate producers and/or students on the importance of maximizing production efficiency, while realizing this may impinge upon animal welfare, we may rationalize our position by convincing ourselves that the welfare science literature is not sound science or that consumers will not support the cost of enhancing animal welfare. Hemsworth and Coleman (1998) present a more extensive review of

attitudes. Hemsworth and colleagues (2002) have used this attitude information to develop strategies to impact stockperson behavior.

We began exploring the idea that certain attitudes were impeding receptivity to the welfare science literature. With this possibility in mind, we decided to examine the attitudes of two influential populations in the U.S. animal agriculture industry - animal science faculty and veterinary college faculty. This paper will address the former. Our objectives were to develop and implement a survey that would assess the attitudes of U.S. animal science faculty to farm animal welfare.

Materials and Methods

Designing the survey

Pilot interviews. In developing our questionnaire, we initially examined other available instruments that have been used to assess attitudes toward animal welfare in other contexts (Kellert, 1980; Wells and Hepper, 1997; Paul and Podberscek, 2000). We ultimately decided to develop a new questionnaire, primarily because of the lack of specificity in these other studies toward production animal issues. Thirty-four out of 49 animal science faculty at a Midwestern university (69%) agreed to be interviewed (approximately 30 min) to refine a proposed pilot questionnaire. These interviews were conducted during fall semester, 2002. Interviewees were asked to examine the pilot questionnaire and assess it for: ease of readability and comprehension, whether it presented a balanced viewpoint for this rather sensitive topic, and whether it was missing critical elements. After approximately every five interviews, a new version of the questionnaire was made.

Pilot testing of the written questionnaire. Once a final version had been developed, the attitude questionnaire was E-mailed to all members of this Midwestern

animal science department. A pre-notice was sent, followed several days later by a cover letter with the questionnaire as a Word attachment. This was followed one week later by a thank you/reminder with another questionnaire attached. In general, Dillman's (2000) Internet survey methodology was followed.

Thirty-one questionnaires were returned, for a response rate of 63%. Based upon feedback from this survey, additional modifications to our attitude questionnaire were made. One modification that was made in this process was to omit horses and aquaculture from the questionnaire, as it appeared too few people had a working familiarity with these areas to provide meaningful data. This set of responses also served as a standard by which to compare the responses garnered from the national population. Sample questions from our final survey are included within this article. A full copy of the attitude assessment questionnaire may be obtained from the authors.

The national animal science population

A complete listing of U.S. animal science faculty was compiled in the following manner. Three different listings of U.S. animal science departments were reviewed (http://www.ansi.okstate.edu/library/dairy/univ.htm,http://ag.ansc.purdue.edu/poultry/university.htm, http://www.fass.org/memdir/). Fifty-eight departmental websites were then investigated for E-mail directories of their respective faculty members. A total of 1,466 people comprised the final E-mail listing. Four hundred forty-six responses were ultimately received. Once undeliverables and inappropriate targets were removed from the original listing, this represented a response rate of 45%. When doing survey research, one needs to be concerned with whether the respondents appropriately represent the population of interest (Babbie, 1990). We feel our respondents appropriately represent

the greater animal science faculty population for the following reasons: these national responses closely mirrored our pilot sample results (which had a 63% response rate); there was diversity in the universities that respondents reported as having heavily influenced their belief system; there was diversity in the states that respondents reported as representing where they had spent the greatest portion of their lives; and when asked to make a self-rating of their attitudes toward farm animal welfare, a nearly equal number chose scale options expressing a greater than "typical" level of concern to those that chose a lesser than "typical" level of concern. The diverse responses increased our confidence that we had a representative response. We had initially been concerned that we might primarily get responses from those most empathetic to animal welfare concerns.

The Internet survey procedure was similar to that used above: pre-notice, followed 2-4 days later by a cover letter along with the questionnaire, followed one week later by a thank you/reminder with a second questionnaire. One notable difference was employed between the pilot testing and the national surveying. In the pilot testing, a Word attachment was used so that bolding and italicizing could be utilized. In the national survey process, we decided that since people might not be familiar with the sender's name, an embedded text message would more likely be opened than would an attachment from an unknown source. Respondents had the option of returning their survey via E-mail or printing off their responses and returning them via postal mail.

Questionnaire

The final version of the seven-page questionnaire consisted of 52 quantitative (closed-ended) questions, 1 qualitative (open-ended) question, plus space for points of

clarification. Questions chosen represented the following information categories: six questions pertained to whether respondents felt the predominant methods currently used to produce animal products provide an appropriate level of animal welfare in the beef, dairy, layer chicken, meat bird, sheep, and swine industries; 11 questions pertained to various aspects of the Five Freedoms[4]; four questions related to specific beliefs (e.g. agricultural animals have individual temperaments); six questions pertained to whether respondents felt no welfare-related changes, minor changes, or substantial changes were needed for each of the livestock production systems; 15 questions asked respondents to indicate their level of agreement/disagreement with various husbandry practices that animal science students had cited as concerns in an earlier survey (e.g. levels of lameness in dairy cattle); four questions related to behavioral intentions (e.g. as a consumer, I would be willing to pay slightly more for products coming from facilities that are enhancing welfare beyond current industry-common levels); four questions asked respondents to prioritize how much time and money should go toward animal welfare, environmental issues, sustainable agriculture and food safety; one open-ended question asked respondents to identify obstacles to implementing welfare-related changes if they felt any were needed; one question asked respondents to self-assess their attitude on a 7-point scale with one anchor being a strong animal rights position and the opposite anchor being a strong utilitarian position; and 13 demographic questions. The majority of the

---

[4] The Five Freedoms (Farm Animal Welfare Council: 1. FREEDOM FROM HUNGER AND THIRST - by ready access to fresh water and a diet to maintain full health and vigour. 2. FREEDOM FROM DISCOMFORT - by providing an appropriate environment including shelter and a comfortable resting area. 3. FREEDOM FROM PAIN, INJURY OR DISEASE - by prevention or rapid diagnosis and treatment. 4. FREEDOM TO EXPRESS NORMAL BEHAVIOUR - by providing sufficient space, proper facilities and company of the animal's own kind. 5. FREEDOM FROM FEAR AND DISTRESS - by ensuring conditions and treatment which avoid mental suffering.

questions could be answered with a typical Likert-style scale: strongly agree, agree, neutral/unsure, disagree, or strongly disagree (Mueller, 1986). To facilitate Chi-square analyses and ensure a sufficient number of respondents per cell, strongly agree and agree were combined and strongly disagree and disagree were combined (see Figures 1 and 3). Some questions allowed the option of "not familiar enough" with the species or practice being asked about.

Data handling

Data analysis was conducted using SPSS (version 11.5, Chicago, Illinois). SPSS was used for frequency counts, descriptive statistics, comparisons of means, correlations, Chi-square testing, summation of attitude scores into a scale score, factor analysis and reliability analysis. Where Bernoulli proportions were conducted (Lindgren, 1976), question responses were first ranked from highest percentage of respondents to lowest, then the proportion for each situation was compared to that of the next highest proportion on the list. Pairwise Z-test statistics were then used to compare the proportions within each group.

To calculate the total attitude score for each respondent, we added together: the production method responses, the values responses that related to the Five Freedoms, the belief statement responses, the husbandry practices responses, and the behavioral intention responses. The relationship of gender with attitude score was assessed with a comparison of means, as was the relationship between species emphasis area with attitude score. The relationships between political views and attitude score, pet ownership with attitude score, and age with attitude score were assessed with Pearson's correlation.

Factor analysis revealed that the overall attitude scale was unidimensional. Cronbach's alpha ($\alpha = 0.78$) of the scale items also revealed a high degree of internal consistency. None of the questions, upon deletion, caused the alpha to increase.

Results and Discussion

Demographic information is cited in Table 1. The high proportions of male respondents and white respondents appear to reflect accurately the general population of animal scientists. We base this on perceptions acquired while assembling the E-mail database from departmental websites, along with comparison to our pilot respondents. However, we were unable to obtain hard data describing the demographic make-up of the general animal science faculty population.

Respondents were asked to identify their species emphasis area. This was an open-ended question, and respondents could choose as many species emphases as they wished. Four hundred and four respondents cited one or more species emphasis area with the following results: 44% listed beef, 33% listed dairy, 25% listed swine, 16% listed poultry, 14% listed sheep, and 13% listed horses. Other species listed were goats, lab animals, fish, llamas, and humans. Since this was a "free" listing; i.e. there was not a list of options that happened to list beef first, we are not sure why the beef emphasis was present at a higher level than we suspect is true of the general population of animal scientists. Many of those listing beef also listed other species as well, so it may be a very common secondary interest for animal scientists. There is also the possibility that faculty with a beef background felt more comfortable responding to this questionnaire, though this would warrant more studying.

Attitudes toward current farm animal production methods

Respondents were asked to identify whether they felt the predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in each of the following species: beef cattle, dairy cattle, layer chickens, meat birds, sheep and swine. Results are shown in Figure 1. In each species, over 50% of the respondents agreed or strongly agreed that the predominant methods currently used provide appropriate levels of animal welfare.

Values related to various aspects of farm animal welfare

The second subset of questions related to peoples' values as they pertain to what are classically referred to as "The Five Freedoms" (UK's Farm Animal Welfare Council, as cited in Farm Animal Welfare, edited by Appleby and Hughes, 1997). They were very subtly modified, in response to feedback from the pilot interviews, and several additions were made, again based on feedback from the pilot survey.

In general, the abstract presentation of these fundamental animal care values was met with a high degree of agreement; seven statements had over 90% agreement by the respondents. However, there were several noteworthy exceptions: 53% of respondents agreed/strongly agreed with the statement "Agricultural animals should have room to move around freely", 61% agreed/strongly agreed with the statement "Agricultural animals should have freedom to express a majority of their normal behavioral repertoire", and 84% agreed/strongly agreed with "Agricultural animals should be able to lie down on a comfortable substrate". See Table 2.

Belief statements related to farm animal welfare

Respondents were asked to express their agreement with certain belief statements. Ninety-two percent of respondents agreed or strongly agreed with the statement "agricultural animals have individual temperaments." Sixty-one percent of respondents agreed or strongly agreed with the statement, "agricultural animals can experience something akin to boredom". Related work on whether or not domestic animals have "minds" and "the ability to think" has been done by Davis and Cheeke (1998), who found that 17% of the animal science faculty they surveyed said, "no, animals do not have minds" and "no, they do not have the ability to think"."

Forty-eight percent of respondents agreed or strongly agreed with the statement "it is important to meet the majority of behavioral needs possessed by agricultural animals (behavioral needs are defined in this survey as those behaviors animals have evolved to perform and are highly motivated to engage in)". Another question in this segment was "if animals are producing (i.e. gaining weight, producing eggs, etc.), that means they have good welfare". Fifty-one percent of the respondents agreed/strongly agreed with this statement.

Perceptions related to whether welfare-related changes are needed

Respondents were asked whether they felt welfare-related changes are needed in our current production systems by species. Respondents could answer that they felt no changes are needed, minor changes are needed or substantial changes are needed. Results are presented in Figure 2.

Concerns based on earlier student survey

A prior survey of animal science students preparing for a national Animal Welfare Judging competition (Heleski et al., 2003) revealed fifteen animal production practices/outcomes that students saw as concerns. We asked the animal scientists whether they agreed or disagreed that these items were concerns. In this question, respondents had the option of choosing "not familiar enough with practice to form an opinion." Respondents choosing the "not familiar enough" option ranged from 2% of the respondents (e.g. castration without anesthetic) to a high of 29% for toe trimming in poultry. See Figure 3 for a detailed breakdown of the results to this question.

It appears that issues viewed as more chronic situations (e.g. cage space for layers) or as production impacts (e.g. lameness in dairy cattle) are rated as higher level concerns. However, several notable exceptions within the swine industry warrant further research. We further went on to examine these practices on a species by species basis; e.g. we evaluated toe trimming and beak trimming based on respondents with a poultry emphasis and compared them to non-poultry background respondents. In this case, the species background difference was significant ($P < 0.05$) with poultry respondents rating these two practices less a concern than non-poultry background respondents. Swine respondents rated early weaning of pigs and gestation crates for sows as less a concern than non-swine background respondents ($P < 0.01$). On the other hand, there was a tendency for dairy respondents to rate lameness in dairy cattle as a higher concern than non-dairy respondents ($P < 0.10$).

Intentions involving a "cost", related to farm animal welfare

When asked to agree/disagree with the following statement "animal welfare should be enhanced only if it can be done without increasing costs of production", a substantial proportion of the respondents (69%) disagreed or strongly disagreed with this statement. We then asked for a projected behavior response to the following: "as a consumer, I would be willing to pay slightly more for products coming from facilities that are enhancing welfare beyond current industry-common levels". Forty percent agreed/strongly agreed, 44% disagreed/strongly disagreed and 16% were neutral or unsure.

We did not conduct a contingent valuation of what margin people would be prepared to pay. Based on the work of Bennett (1998), adding the necessary questions to conduct an appropriate contingent valuation would have added a large number of questions to our survey. We decided this would best be handled in a future survey if it warranted further research.

In our experience working with students preparing for animal welfare judging competitions (our unpublished observations), one area they seem keen to improve is the pain relief via anesthetic and/or analgesic approach to dealing with acute interventions, such as dehorning, castration, and beak trimming. However, our current data do not show strong faculty support for following up this concern with further research. Only 34% agreed/strongly agreed with the statement "acute interventions that cause pain (e.g. castration) should be performed under local anesthesia (or general, if animal's age suggests that)". Frequent clarifiers written to support respondents' answers were statements such as, "How do we know the animal is experiencing pain?", "It is too time

consuming to administer anesthetic or analgesic on any sort of routine basis", "The consuming public will never support the costs of these procedures". However, the welfare science literature offers substantial supporting evidence that many of these procedures elicit multiple indicators of pain (e.g. dehorning in cattle – Graf and Senn (1999); piglet castration – Taylor and Weary (2000); lamb castration and tail docking – Molony and others (2002)). These studies have shown not just one questionable indicator, but several such as increased cortisol, decreased gain, increased vocalizations, along with increased and abnormal body postures, such as kicking and foot stamping. There seems a tendency to dismiss these findings. However, another possibility exists: perhaps the welfare scientists/applied ethologists have not sufficiently provided information to the typical industry stakeholder so that they might be aware of the current body of research literature. Perhaps a critical gap exists between welfare science research findings and information dissemination to industry stakeholders. Still another alternative explanation exists: that respondents place a different weight on chronic situations (e.g. lameness) versus short-term, acute situations (e.g. castration without anesthetic). Interviews of respondents would be an interesting way of clarifying this point.

Prioritizing resources for critical, contemporary issues

During the interviews with the pilot respondents, it was frequently brought up that while animal welfare might be viewed as an important contemporary topic, when compared to other critical, contemporary topics such as environmental issues, especially as they relate to manure management; sustainable agriculture issues, and food safety issues, animal welfare might be considered somewhat less important. Subsequently we decided to assess this in the national population. We asked respondents "in terms of

prioritizing animal science resources (whether research dollars, time spent teaching, or number of outreach programs), how would you prioritize the following topic areas?". Respondents could rank items as high priority, medium priority, or low priority. Figure 4 depicts the results. In general, food safety and environmental issues were seen as very high priorities, while animal welfare and sustainable agriculture were seen as lower priorities.

Relationships with various demographic variables

In terms of total attitude score (where scores from each of the above question category subscales were added together, with higher numbers reflecting greater concern for farm animal welfare), several relationships were significant. There was a relationship between gender and total attitude score ($P < 0.01$) in that females, on average, had higher total attitude scores, which we might also call empathy for agricultural animal welfare. Similar findings of females being more empathetic toward animal issues have been found by Pifer and others (1994), Wells and Hepper (1997), and Paul and Podberscek (2000).

Furthermore, there was a relationship between political affiliation and total attitude score ($P < 0.01$) in that higher total attitude scores were correlated with more liberal viewpoints. This finding has also been noted in the field of concern for the environment (Dunlap et al., 2000). There was a negative correlation between a higher sense of religiosity and total attitude scores ($P < 0.05$), with those scoring lower in terms of religiosity being more concerned with farm animal welfare. The relationship between religiosity and concern for farm animal welfare may seem counterintuitive. It would seem like people who view themselves as more highly religious should want to be especially good stewards of animals; however, one study that delved into this more thoroughly

(Bowd and Bowd, 1989) found that more conservatively religious people had less positive (less humane) attitudes toward animal treatment than did more liberally religious (or less religious) people. The religiosity debate between a "dominion over the animals" approach to animal treatment versus a "steward of the animals" approach to animal treatment is further expanded upon in Preece and Fraser, 2000.

We did not find a significant relationship between age and attitude score (P = 0.625). We did not find a significant relationship between whether people considered having a pet to be important and their total attitude score. This was asked both from the standpoint of childhood pet ownership, as well as current adult pet ownership. Neither situation showed a significant relationship. This was surprising in light of other work (Paul, 2000), but may reflect the notion that people view their relationship with pets very differently than they view their relationship with farm animals.

Implications

Our attitude survey proved insightful with this population. We see the results as demonstrating that 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, concern, in many cases, was considerably lower. We propose that rationalization may have taken place to help protect respondents from the unpleasant feelings associated with cognitive dissonance. This warrants further research to substantiate or refute. Ultimately, attitudes should be assessed and understood before effective intervention strategies can be designed to moderate certain attitudes. We believe enhanced understanding of stakeholder attitudes toward farm animal welfare will assist with formulating strategies

aimed at enhancing acceptance and implementation of welfare science literature that has passed scientific scrutiny.

Literature Cited

Appleby, M.C. and B.O. Hughes, editors. 1997. Animal Welfare. CAB International, Wallingford, U.K.; University Press, Cambridge, U.K.

Azjen, I., and M. Fishbein. 1980. Understanding Attitudes and Predicting Social Behavior. Prentice-Hall, Englewood Cliffs, NJ.

Babbie, E. 1990. Survey Research Methods, 2nd Ed. Wadsworth Publishing, Belmont, CA.

Bennett, R. 1998. Measuring public support for animal welfare legislation: a case study of cage egg production. Anim. Welfare. 7(1): 1-10.

Bowd, A.D. and A.C. Bowd. 1989. Attitudes toward the treatment of animals: a study of Christian groups in Australia. Anthrozoös. 3(1):20-24.

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. J. Anim. Sci. 76:2072-2079.

Dillman. D.A. 2000. Mail and Internet Surveys, The Tailored Design Method, 2nd Ed., John Wiley & Sons, Inc., New York.

Dunlap, R.E., K.D. Van Liere, A.G. Mertig, and R.E. Jones. 2000. Measuring endorsement of the new ecological paradigm: a revised NEP scale. J. Social Issues. 56(3):425-442.

Eagly, A.H. and S. Chaiken.1993. The Psychology of Attitudes. Harcourt Brace College Publishers, Orlando, FL.

Farm Animal Welfare Council. 2004. The Five Freedoms. Available: http://www.fawc.org.uk/freedoms.htm. Accessed Feb. 25, 2004.

Festinger, L. 1957. A Theory of Cognitive Dissonance. Row, Peterson, Evanston, IL.

Graf, B. and M. Senn. 1999. Behavioural and physiological responses of calves to dehorning by heat cauterization with or without local anaesthesia. Appl. Anim. Beh. Sci. 62(2-3):153-171.

Heleski, C.R., A.J. Zanella, E.A. Pajor. 2003. Animal welfare judging teams – a way to interface welfare science with traditional animal science curricula? Appl. Anim. Beh. Sci. 81:279-289.

Hemsworth, P.H., G.J. Coleman, J.L. Barnett, S. Borg, and S. Dowling. 2002. The effects of cognitive behavioral intervention on the attitude and behavior of stockpersons

and the behavior and productivity of commercial dairy cows. J. Anim. Sci. 80:68-78.

Hemsworth, P.H. and G.J. Coleman. 1998. Human-Livestock Interactions: The Stockperson and the Productivity and Welfare of Intensively Farmed Animals. CAB International, Oxon, U.K.

Kellert, S.R. 1980. American attitudes toward and knowledge of animals: an update. Int. J. Stud. Anim. Prob. 1(2):87-119.

Lindgren, B.W. 1976. Statistical Theory. Third edition. Macmillan Publishing Co., Inc., New York, NY.

Molony, V., J.E. Kent and I.J. McKendrick. 2002. Validation of a method for assessment of an acute pain in lambs. Appl. Anim. Beh. Sci. 76(3):215-238.

Mueller, D.J. 1986. Measuring Social Attitudes: A Handbook for Researchers and Practitioners. Teachers College Press, New York, NY.

Paul, E.S. 2000. Empathy with animals and with humans: are they linked? Anthrozoös. 13(4):194-202.

Paul, E.S. and A.L. Podberscek. 2000. Veterinary education and students' attitudes towards animal welfare. Vet. Rec. 146:269-272.

Pifer, L., K. Shimizu, and R. Pifer. 1994. Public attitudes toward animal research: some international comparisons. Society and Animals 2(2):95-113.

Preece, R. and D. Fraser. 2000. The status of animals in Biblical and Christian thought: a study in colliding values. Society and Animals. 8(3):245-263.

Smith, E.R. and D.M. Mackie. 2000. Chapter 8 in Social Psychology, 2nd Ed., Psychology Press, Philadelphia, PA.

Taylor, A.A, D.M. Weary. 2000. Vocal responses of piglets to castration: identifying procedural sources of pain. Appl. Anim. Beh. Sci. 70(1):17-26.

Wells, D.L. and P.G. Hepper. 1997. Pet ownership and adults' views on the use of animals. Society and Animals. 5(1):45-63.

Table 1. Demographic information from our national animal science respondents.

Demographic Category	Percentage of Respondents
Response Mode n = 445	
E-mail	89%
Postal	11%
Gender n = 437	
Male	83%
Female	17%
Ethnicity n = 433	
White	96%
Non-white	4%
Age n = 415	
60 yrs or older	25%
52-59 yrs	25%
45-51 yrs	25%
26-44 yrs	25%
Species Emphasis (could list > 1) n = 418	
Beef	44%
Dairy	33%
Swine	25%
Poultry	16%
Sheep	14%
Horse	13%
Political ideology n = 427	
Primarily liberal	8%
Somewhat liberal	12%
Moderate	26%
Somewhat conservative	27%
Primarily conservative	26%
Don't know	2%
Religiosity n = 431	
Very religious/spiritual	34%
Moderately religious/spiritual	37%
Somewhat religious/spiritual	13%
Slightly religious/spiritual	7%
Not at all religious/spiritual	9%
State they've spent greatest % of their life; n = 432	
Greater Midwest	27%
Greater New England/Northeast	15%
South/Gulf states region	15%
Central Southwest region	12%
Midatlantic/East Central region	10%
Central Plains/Mountains/Desert region	9%
West Coast	7%
Country outside of the U.S.	5%

Table 2. Percent of animal science faculty agreeing or strongly agreeing with value statements relating to the husbandry of farm animals. We ranked the percentages of strongly agree/agree responses for each statement from the highest proportion of agreement to the lowest proportion.

Statement	Percentage respondents agreeing/strongly agreeing	Number of respondents
Agricultural animals should have freedom from thirst most of the time.	98%	444
Agricultural animals should have freedom from injury and disease (or prompt treatment should they arise).	98%	443
Agricultural animals should have freedom from unnecessary pain and/or discomfort.	97%	441
Agricultural animals should have sufficient area to lie down.	94%	441
Agricultural animals should have calm handling during "processing" and transportation situations.	93%	444
Agricultural animals should have freedom from hunger most of the time.	92%	444
Agricultural animals should have freedom from unnecessary fear and/or distress.	89%	440
Agricultural animals should be able to lie down on a comfortable substrate.	84%	441
Agricultural animals should have freedom to express a majority of their normal behavioral repertoire.	61%	439
Agricultural animals should have room to move around freely.	53%	439

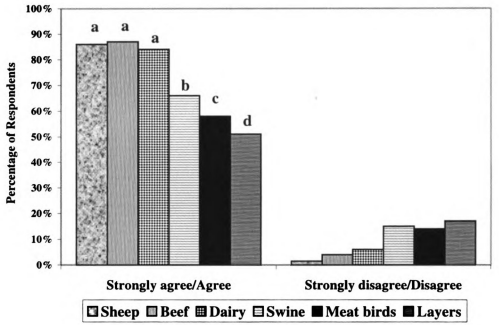


Figure 1. Percent of animal science faculty agreeing and disagreeing with the following statement for each species: "The predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in the _____ industry." Some combinations do not add up to 100% because the neutral/unsure category has been omitted from this depiction. We ranked the percentages of strongly agree/agree responses for each species from highest to lowest and treated them as Bernoulli proportions (Lindgren, 1976). We compared the Bernoulli proportion for each situation to that of the next highest proportion and used pairwise Z-test statistics. "**a**'s" did not differ from one another; "**a**" differed from "**b**" ($P < 0.0001$); "**b**" differed from "**c**" ($P = 0.009$); "**c**" differed from "**d**" ($P = 0.021$).

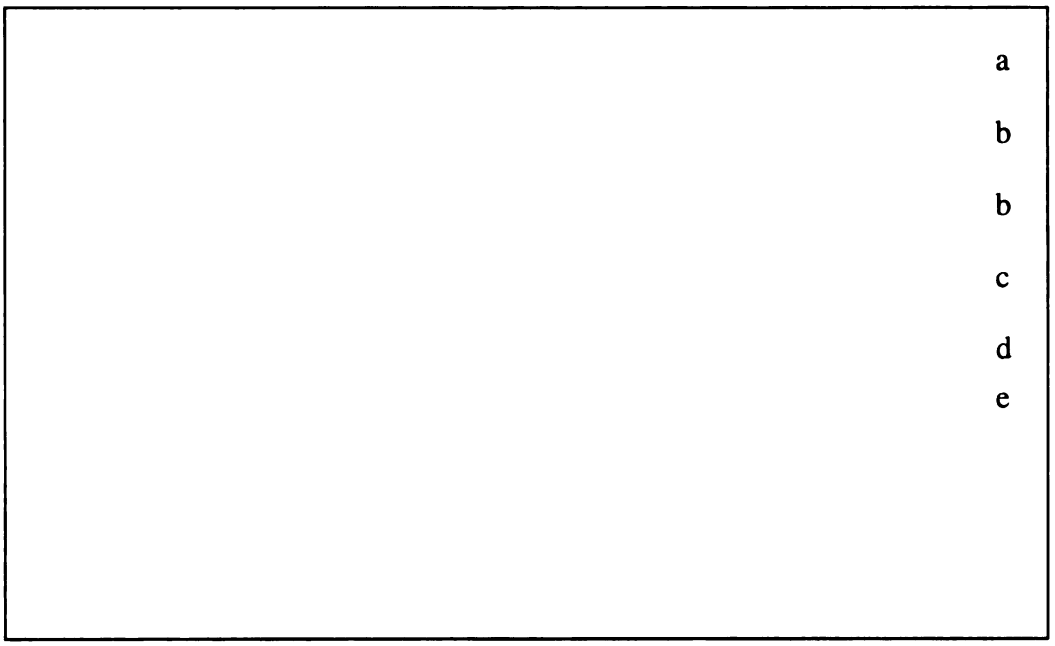


Figure 2. Percent of animal science faculty that felt no changes, minor changes or substantial welfare-related changes were needed in each of the various production systems. Respondents choosing "not familiar enough with species to form an opinion" were not included in this figure. Proportions were ranked on the "substantial changes" basis and treated as Bernoulli proportions (Lindgren, 1976). We compared the Bernoulli proportion for each situation to that of the next highest proportion and used pairwise Z-test statistics. "**a**" differed from "**b**" ($P = 0.005$); "**b**'s" did not differ from one another; "**b**" differed from "**c**" ($P < 0.001$); "**c**" differed from "**d**" ($P = .022$); and "**d**" differed from "**e**" ($P < 0.001$).

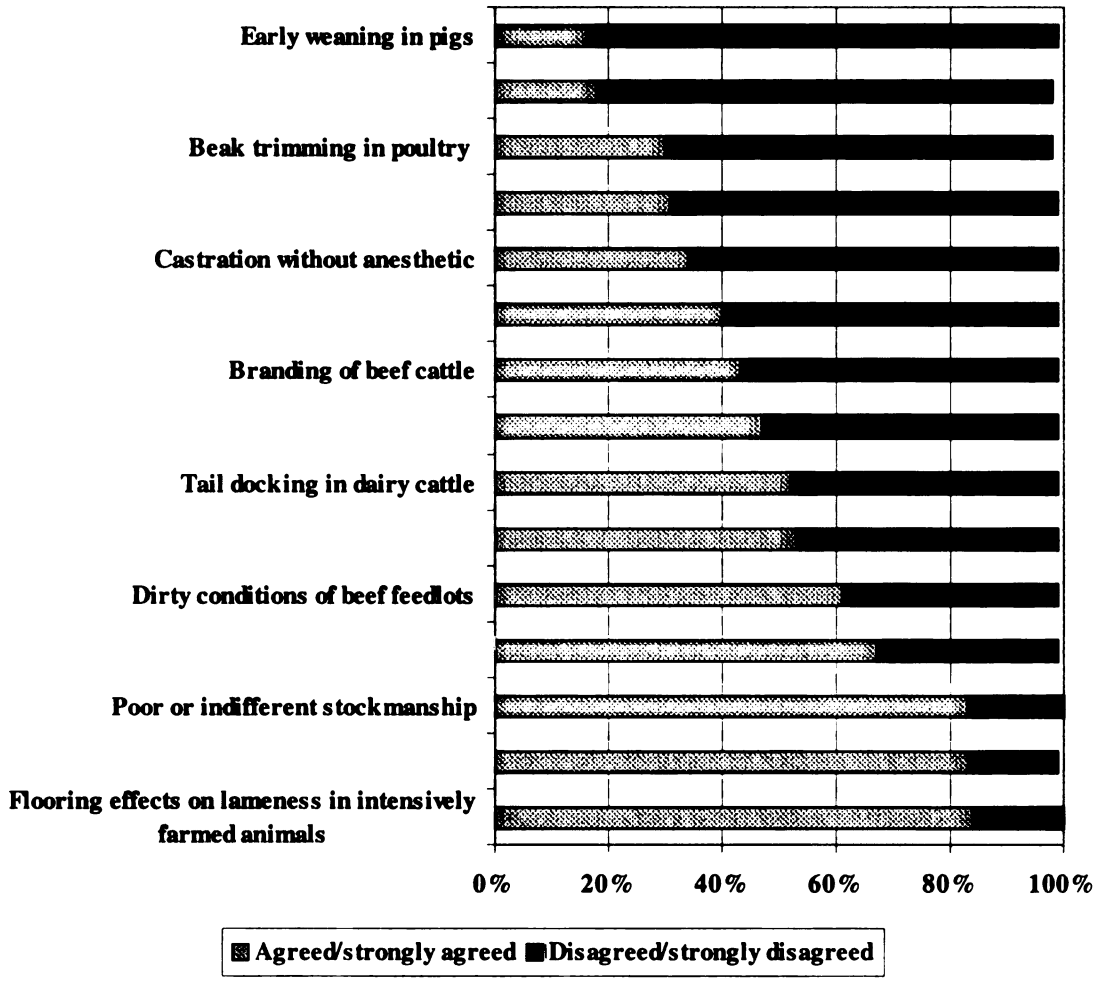


Figure 3. Percent of animal science faculty agreeing and disagreeing with whether or not the above practices/outcomes warrant concern. These concerns were revealed during an earlier survey of animal science undergraduate students. For clarity purposes, those not familiar enough with a given practice to form an opinion were not included in this graph.

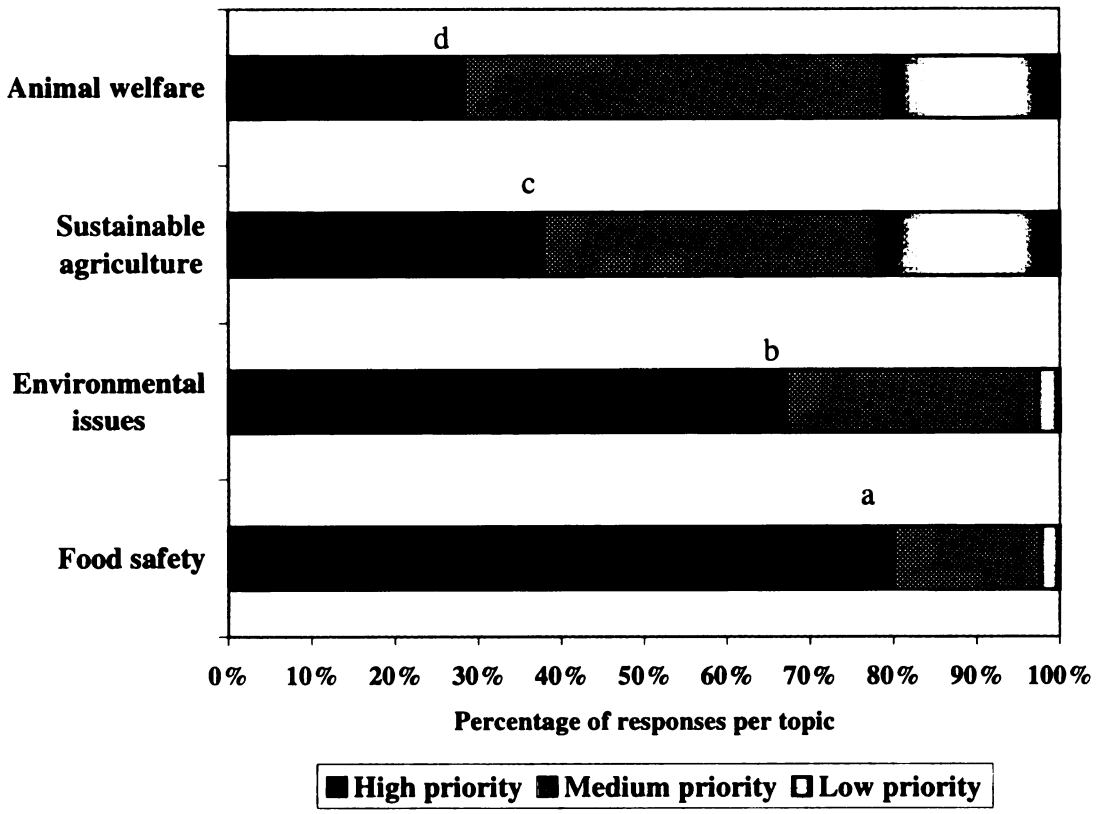


Figure 4. Percent of animal science faculty responding with "high," "medium" or "low" in reference to the following question: 'In terms of prioritizing animal science resources (whether research dollars, time spent teaching, or number of outreach programs), how would you prioritize the following topic areas – high priority, medium priority, or low priority'. Respondents were not limited in the number of times they could choose a response. We ranked the percentages of "high priority" responses from highest to lowest and treated them as Bernoulli proportions (Lindgren, 1976). We compared the Bernoulli proportion to that of the next highest response category and used pairwise Z-test statistics to compare them. "**a**" differed from "**b**" ($P < 0.001$); "**b**" differed from "**c**" ($P < 0.0001$); and "**c**" differed from "**d**" ($P = 0.001$).

APPENDIX 3

Attitude Survey for the Welfare of Agricultural Animals

Thank you for taking valuable time from your schedule to assist me with my Ph.D. research. We are investigating different target audiences attitudes toward the welfare of agricultural animals. This information has the potential to be extremely valuable to stakeholders involved with animal agriculture. This particular survey instrument has been designed to assess the attitudes of United States Animal Science faculty members. Your answers are extremely important for helping us better understand this area, however, your participation in this survey is completely voluntary. Your answers, in all cases, will be treated with complete confidentiality, and your privacy will be protected to the maximum extent allowable by law. You indicate your voluntary participation by returning this questionnaire. Thank you for your cooperation and willingness to assist us! We estimate this survey will take 10-15 minutes to complete. Please bear in mind that you have the option of not answering certain questions and can discontinue participation at any time without penalty.

If you have questions regarding the rights of human subjects involved with survey research, please contact the MSU University Committee on Research Involving Human Subjects, Dr. Ashir Kumar, Chairperson, 517/355-2180 or UCRIHS@ores.msu.edu.

If you have questions regarding this research project, specifically, you can contact me at heleski@msu.edu or 517/355-8427 or my major professor, Dr. Adroaldo Zanella, Department of Animal Science, Michigan State University, 517/432-4134 or Zanella@msu.edu.

****

There are two ways to answer this survey:
1. Touch the Reply command on your computer, enter your responses and touch Send. or
2. Print this message and return it with your written answers to Camie Heleski, 1250 Anthony, MSU, East Lansing, MI 48824.

Certain questions that follow will involve somewhat subjective opinions (e.g. what does appropriate level of animal welfare mean to you). Please answer the questions in the way that they have meaning to you, and if you would like to add clarification points to any questions, please do so.

****

For this first question, please use the following choices & place your choice in the brackets for each question:
SA-strongly agree
A-agree
N-neutral or unsure
D-disagree
SD-strongly disagree

1. The predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in the:
[ ] Beef Cattle Industry
[ ] Dairy Cattle Industry
[ ] Layer Chicken Industry
[ ] Meat Bird Industry
[ ] Sheep Industry
[ ] Swine Industry
****
This next question relates to some of your values related to various aspects of animal welfare. For this question, please use the following choices:
SA-strongly agree
A-agree
N-neutral or unsure
D-disagree
SD-strongly disagree
2. Agricultural animals should have freedom from hunger most of the time.
[ ]

Agricultural animals should have freedom from thirst most of the time.
[ ]

Agricultural animals should have freedom from unnecessary pain and/or discomfort.
[ ]

Agricultural animals should have freedom from injury and disease (or prompt treatment should they arise).
[ ]

Agricultural animals should have freedom to express a majority of their normal behavioral repertoire.
[ ]

Agricultural animals should have freedom from unnecessary fear and/or distress.
[ ]

Agricultural animals should have room to move around freely.
[ ]

Agricultural animals should have calm handling during processing and transportation situations.
[ ]

Agricultural animals should have sufficient area to lie down.
[ ]
Agricultural animals should be able to lie down on a comfortable substrate.
[ ]

Agricultural animals should have good ventilation/good air quality provided in their environment.
[ ]
****
This next question relates to some of your beliefs related to various aspects of animal welfare. For this question, please use the following choices:
SA-strongly agree
A-agree
N-neutral or unsure
D-disagree
SD-strongly disagree

3. If animals are producing (i.e. gaining weight, producing eggs, etc.), that means they have good welfare.
[ ]

Agricultural animals have individual temperaments.
[ ]

Agricultural animals can experience something akin to boredom.
[ ]

It is important to meet the majority of behavioral needs possessed by agricultural animals (I am defining behavioral needs as those behaviors animals have evolved to perform and are highly motivated to engage in.)
[ ]
****
4. For the following question, please decide whether you think NC no changes are needed; MC minor changes are needed; or SC substantial changes are needed for each of the following production systems. NTF not familiar enough with species to form an opinion can also be used. IF you would like to identify specific changes that you would like to see made, please insert that information.

[ ] Beef production
[ ] Dairy production
[ ] Egg production

[ ] Meat bird production
[ ] Sheep production
[ ] Swine production
****

5. An earlier survey of animal science students revealed several current animal production practices/outcomes that students felt were of concern. The following list represents some of the more frequently mentioned items. Please rate the following practices/outcomes using these choices:

SA-strongly agree it is a concern
A-agree it is a concern
D-disagree it is a concern
SD-strongly disagree it is a concern
NTF-not familiar enough with practice to form an opinion

[ ] Branding of beef cattle
[ ] Dirty conditions of beef feedlots
[ ] Dehorning without local anesthetic
[ ] Levels of lameness in dairy cattle
[ ] Tail docking in dairy cattle
[ ] Toe trimming in poultry
[ ] Beak trimming in poultry
[ ] Cage space for layers
[ ] Gestation crates for sows
[ ] Early weaning in pigs
[ ] Lack of foraging substrate for pigs
[ ] Castration without anesthetic
[ ] Flooring effects on lameness in intensively farmed animals
[ ] Poor or indifferent stockmanship
[ ] Methods of transportation to slaughter
****

6. For this next question, please use the following choices:
SA-strongly agree
A-agree
N-neutral or unsure
D-disagree
SD-strongly disagree

Animal welfare should be enhanced only if it can be done without increasing costs of production.
[ ]

As a consumer, I would be willing to pay slightly more for products coming from facilities that are enhancing welfare beyond current industry-common levels.
[ ]

Acute interventions that cause pain (e.g. castration) should be performed under local anesthesia (or general, if animals age suggests that).
[ ]

As a consumer, I would be willing to pay slightly more for products coming from facilities that provide anesthetic/analgesic when performing potentially painful procedures.
[ ]

****

7. In terms of prioritizing animal science resources (whether research dollars, time spent teaching, or number of outreach programs), how would you prioritize the following topic areas; please mark as H for high priority; M for medium priority and L as low priority for each of the following:

[ ] Animal Welfare
[ ] Environmental Issues
[ ] Food Safety
[ ] Sustainable Agriculture

****

8. If you feel changes related to animal welfare are needed, what do you see as the major obstacles to affecting changes in our current production systems? Please use the space below to provide your answer.

****

9. Please mark next to one of the letters on the scale below where you would categorize yourself in terms of your attitude toward animal use and care.

_____A = I take a strong animal rights position; i.e. I believe a human, a dog, and a rat all have comparable rights and each individual's desires should be respected equally.
|
|
_____B = Intermediate between A and D, but more nearly like A.
|
|
_____C = Intermediate between A and D, but more nearly like D.
|
|
_____D = I believe in using animals for the greater human good (could be in regards to food production, for providing work, for recreation purposes, etc.) but we have an obligation to provide for the majority of their physiological and behavioral needs.
|
|
_____E = Intermediate between D and G, but more nearly like D.
|
|
_____F = Intermediate between D and G, but more nearly like G.
|
|
_____G = I am not at all concerned about animal welfare issues; animals were put on this earth for us to
use in whatever possible way they can benefit us the most and in the least expensive way possible.

****

In order to understand our respondents a little better, we need to ask you a few background demographic questions:

1. What is your species emphasis area (e.g. beef, dairy, horse, etc.), if applicable?

_____

2. What is/are your discipline(s) of expertise (e.g. nutrition, genetics, behavior, etc.), if applicable ?

_____

3. What is the nature of your appointment, primarily extension/outreach, primarily research, primarily teaching, combination?
[ ] Primarily extension/outreach
[ ] Primarily research
[ ] Primarily teaching
[ ] Combination (please specify)_____

4. Thinking about your formal education, of the institutions you've attended, which has had the greatest
influence on your current philosophy? (Please indicate the name of the college/university.)

_____

5. In which state* have you spent the greatest portion of your life? *(or non-U.S. country, if applicable)

_____

6. In what type of area have you spent the greatest portion of your life?
[ ] Rural, farm
[ ] Rural, non-farm
[ ] Small town (25,000 people or fewer)
[ ] Urban area (25,001 - 100,000 people)
[ ] Metropolitan area (More than 100,000 people)

7. As a child, was having a pet(s) important to you?
[ ] Very much so
[ ] Somewhat
[ ] Not that much
[ ] Not at all
[ ] Did not have a pet

8. As an adult, is having a pet(s) important to you?
[ ] Very much so
[ ] Somewhat
[ ] Not that much
[ ] Not at all
[ ] Do not have a pet

9. To what extent do you consider yourself religious or spiritual?
[ ] Very
[ ] Moderately
[ ] Somewhat
[ ] Slightly
[ ] Not at all

10. Would you consider your political views to be
[ ] Primarily Liberal
[ ] Somewhat Liberal
[ ] Moderate
[ ] Somewhat Conservative
[ ] Primarily Conservative
[ ] Dont Know

11. Are you male or female?
[ ] Male
[ ] Female

12. In what year were you born?
_____

13. What is your race or ethnicity? (Please check all that apply.)
[ ] American Indian or Alaska Native
[ ] Asian
[ ] Black or African American
[ ] Hispanic or Latino
[ ] Native Hawaiian or Other Pacific Islander
[ ] White or Caucasian
[ ] Other _____

Thank you for your participation!
IRB #02-013

CHAPTER FIVE

Attitudes toward farm animal welfare – results of a national survey of US veterinary college faculty. Submitted to the Journal of the American Veterinary Medical Association. Camie R. Heleski, MS; Angela G. Mertig, PhD; Adroaldo J. Zanella, DVM, PhD.

Figures and tables are presented at the end of this article.

Attitudes toward farm animal welfare – results of a national survey of US veterinary college faculty

Camie R. Heleski, MS; Angela G. Mertig, PhD; Adroaldo J. Zanella, DVM, PhD

Heleski and Zanella: Department of Animal Science, Michigan State University, East Lansing, MI 48824
Mertig: Department of Sociology and Anthropology, Middle Tennessee State University, Murfreesboro, TN 37132

Portions of the information in this paper will be published as abstracts in the following proceedings and will be presented at those conferences:
Qualitative assessment of a question asked to U.S. veterinary college faculty - perceived obstacles preventing the enhancement of farm animal welfare; C.R. Heleski and A.J. Zanella; ISAE (International Society for Applied Ethology) North American Regional Meeting; June 18-19, 2004, Purdue University.

Attitudes toward farm animal welfare – a comparison of U.S. animal science and veterinary college faculty; C.R. Heleski, A.J. Zanella; ISAE (International Society for Applied Ethology), 38th International Congress, Helsinki, Finland; August 2-8, 2004.

Acknowledgements: The authors thank Jamie Hammer, Kyrstin Mikula and Sarah Malone for assistance with data entry.

Address correspondence to Adroaldo Zanella, Zanella@msu.edu.

Interpretive Summary

We surveyed US veterinary college faculty (VCF) with a large animal emphasis. In general, VCF showed fairly concerned/empathetic attitudes toward farm animal welfare. Concern appears to be greater for those industries typically perceived as more intensive: layer birds, meat birds and swine (less than 50% agreed/strongly agreed that the predominant methods of production for these species provides appropriate animal welfare), as compared to the beef and sheep industries (greater than 75% agreed/strongly agreed). When asked to express level of concern with various husbandry practices/outcomes - previously identified from a student survey – responses ranged from

89% agreeing that poor/indifferent stockmanship is a concern to a minimum of 24% agreeing that early weaning of piglets is a concern.

Welfare scientists might use these results as support to provide more education/more evidence to VCF for welfare issues they feel warrant greater concern, or concentrate their efforts on areas already perceived as high-level concerns.

Structured Abstract

Objective – To examine attitudes toward farm animal welfare among veterinary college faculty.

Design – Social survey.

Subjects – 157 US veterinary college faculty (VCF), large animal emphasis.

Procedure – Veterinarians from 27 US veterinary colleges were contacted up to four times via e-mail and asked to fill out a seven-page survey relating to farm animal welfare issues. Thirty-one percent of those contacted ultimately responded. Data were analyzed with SPSS®11.5.

Results – Seventy-one percent of VCF self-rated their attitude toward farm animal welfare as "we can use animals for the greater human good but have an obligation to provide for the majority of the animals' physiological and behavioral needs." An additional 19% of VCF were more concerned about animal welfare than is reflected in this statement and 10% of VCF were less concerned about farm animal welfare than is reflected by this statement. The following statistically significant relationships between background variables and attitude scores were observed: females had more empathetic

attitudes, those with more liberal political views had more empathetic attitudes, and those citing lower religiosity had more empathetic attitudes. No relationship between attitude and age was observed in this study.

Conclusions – In general, VCF that responded to this survey showed empathetic attitudes toward farm animal welfare. They registered greater concern for the current welfare practices of farm animal species that are typically more intensively managed (layer birds, meat birds and swine) than they did for beef and sheep; the dairy industry was generally perceived with intermediate levels of concern.

Keywords: Animal welfare, veterinary faculty, attitudes

Introduction

Animal welfare scientists have spent the last several decades producing a rich research base of information related to behavioral and physiological indicators of animal welfare[1-9]. In many cases, common housing practices or husbandry methods have been found to negatively impact animal welfare based on multiple measures (eg, piglet castration without anesthetic[10], dehorning without anesthetic[11,12], crowding in layer hens[13], and confinement housing for sows[14]). However, there seems to be a long interval between publishing the research and seeing pertinent results implemented at an industry level.

There are several possible reasons for the lag (or void) in implementing pertinent welfare science research, some of which were explored by Dawkins[15]. We predict that the reasons for the delay in implementing animal welfare research may be multi-factorial, but three main arguments are likely to be: a) perhaps the welfare scientists have not done an

adequate job of informing agriculture stakeholders about their findings, b) perhaps consumers will not support the cost of welfare-enhancing changes, or c) perhaps influential stakeholders have not been optimally receptive to the welfare science literature. This paper explores the latter possibility, that those who are among the most likely to influence producers' husbandry practices are less than optimally receptive to the findings of welfare scientists. In order to substantiate or refute this, we decided to survey two of the most influential groups on US animal production decisions, veterinary college faculty (VCF)[16] and animal science faculty. This paper presents results from US VCF. The results of our US animal science faculty surveys are presented in the Journal of Animal Science[17].

In exploring this issue, we came to predict that the attitudes of those who are highly influential to farm animal production decisions may be very important to the implementation of animal welfare science research findings. Certainly one of the most influential groups toward animal treatment issues in the US is veterinarians. Veterinarians, via the collective voice of the American Veterinary Medical Association (AVMA), play an important role in developing animal welfare position statements that are viewed as extremely important by various policy-making bodies and commodity groups. The AVMA Animal Welfare Committee develops position statements on animal welfare issues that are then considered by the AVMA Executive Board. According to the 2002 American Veterinary Medical Association statistics[18], over 15,000 US veterinarians play some role in treating large animals/farm animals in the US, over 4,000 veterinarians are employed in college or university settings (large animal and small animal combined);

over 1,200 work for the federal government, over 300 work for state or local governments, over 450 work for Uniformed Services and over 1,500 work for industry. Further evidence of the potential impact of veterinarians in the US is offered by a 1998 Public Opinion Survey conducted by AIF (Animal Industry Foundation)[19] that showed 94% of consumers place the most trust for farm animal well-being with farm animal veterinarians. University faculty in veterinary and animal sciences often produce and disseminate the knowledge that leads to changes in animal use practices. Furthermore, US VCF are involved in instructing over 4,000 incoming veterinary students each year[20]. Many of these students will ultimately graduate and play an important role in disseminating research findings to producers. Few people would argue with the potential impact veterinarians have in shaping views toward the treatment of farm animals.

A definition of attitude

Eagly and Chaiken[21] define attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor." Attitudes typically have a cognitive component that we have thought about, an emotional component that consists of how we feel about an attitude object and a behavioral component that has to do with people's actions as they relate to an attitude object[21].

Despite a wealth of literature on attitudes and their measurement[21-25], attitudes toward farm animal welfare have not yet been extensively studied. Though a number of studies have examined attitudes toward general issues of animal use and treatment[26-30], comparatively few refereed articles exist relating to attitudes toward farm animal welfare[31,32]. To the best of our knowledge, no published articles exist that examine the

attitudes of US VCF toward farm animal welfare. There is, however, interesting research into the attitudes of veterinary students and the decrease in level of empathy observed over the course of their academic program[33].

In deciding to study stakeholder attitudes, we are subscribing to a key notion embedded within the Theory of Planned Behavior (a variant of the Theory of Reasoned Action)[34] that states that peoples' attitudes influence their intentions as to how they will behave, particularly when attitudes are measured at the same specificity as behavioral intentions. Though an oft-cited study refuted this[35], the stronger evidence in the attitude literature is that attitudes do influence behavior[36,37]. Therefore, we believe that understanding VCF attitudes toward farm animal welfare can help us understand their potential behavior with regard to the dissemination of farm animal welfare concerns.

Our rationale for pursuing this study is our conviction that VCF are highly invested in and influential toward animal production decisions made in this country and abroad. The purpose of the study reported here was to examine the attitudes of US VCF via an e-mail questionnaire.

Materials and Methods

Developing our survey instrument

We initially interviewed 34 (69% of those contacted) animal scientists at a large, Midwestern university to assist in formulating an instrument for measuring attitudes toward farm animal welfare. Interviews were conducted over a two-month period during

fall, 2002, and averaged 49 minutes in length. Interviewees were asked to examine a pilot instrument and assess it for: ease of readability, whether it presented a balanced viewpoint for this rather sensitive topic, and whether it was missing important elements. After several revisions, the final survey instrument was e-mailed to these same faculty members using the same methodology that we planned to use for national animal science faculty and national VCF. A complete copy of the seven-page survey may be obtained from the authors.

Description of question categories

Our final survey consisted of 46 items related to farm animal welfare and 13 background questions. Responses for each question were primarily Likert-scale[38] choices (eg, strongly agree, agree, neutral/unsure, disagree, strongly disagree). The first section asked for respondents' level of agreement with the following statement: "The predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in the _____ industry (blank filled in with: beef, dairy, layer chickens, meat birds, sheep and swine, respectively)." The second section asked respondents to express their level of agreement with those values classically referred to as the Five Freedoms[39], along with several related values: "Agricultural animals should have...freedom from hunger most of the time; freedom from thirst most of the time; freedom from unnecessary pain and/or discomfort; freedom from injury and disease (or prompt treatment should they arise); freedom to express a majority of their normal behavioral repertoire; freedom from unnecessary fear and/or distress; room to move around freely; calm handling during "processing" and transportation situations; sufficient

area to lie down; the ability to lie down on a comfortable substrate; and good ventilation/good air quality provided in their environment."

The third section asked respondents to identify their level of agreement with several belief statements: "If animals are producing (ie, gaining weight, producing eggs, etc) that means they have good welfare; agricultural animals have individual temperaments; agricultural animals can experience something akin to boredom; it is important to meet the majority of behavioral needs possessed by agricultural animals." The fourth section was a reliability check and asked a similar question to that in section one: "For the following industries (beef, dairy, layer chicken, meat bird, sheep and swine, respectively), please identify whether you think 'no changes,' 'minor changes,' or 'substantial changes' related to animal welfare are needed."

The fifth section was based on an earlier survey of animal science students (unpublished data) who had been asked to identify animal production practices/outcomes that represented welfare concerns to them. We then asked the VCF respondents to show their level of agreement with whether these student-identified concerns were truly animal welfare concerns or not. The following fifteen practices/outcomes were examined: branding of beef cattle, dirty conditions of beef feedlots, dehorning without local anesthetic, levels of lameness in dairy cattle, tail docking in dairy cattle, toe trimming in poultry, beak trimming in poultry, cage space for layers, gestation crates for sows, early weaning in pigs, lack of foraging substrate for pigs, castration without anesthetic, flooring effects on lameness in intensively farmed animals, poor or indifferent

stockmanship, and methods of transportation to slaughter. The sixth section asked respondents to make a prediction about some of their potential behaviors and related items: "Animal welfare should be enhanced only if it can be done without increasing costs of production; as a consumer, I would be willing to pay slightly more for products coming from facilities that are enhancing welfare beyond current industry-common levels; acute interventions that cause pain (eg, castration) should be performed under local anesthesia (or general, if animal's age suggests that); as a consumer, I would be willing to pay slightly more for products coming from facilities that provide anesthetic/analgesic when performing potentially painful procedures."

The seventh section asked VCF to prioritize the use of veterinary science resources (in terms of research dollars, time spent teaching or number of outreach programs) for the following contemporary topic areas: animal welfare, environmental issues, food safety, and sustainable agriculture. Respondents were asked to rate these topic areas as high, medium, or low priority, and they were not limited as to how many times they could use each category. The eighth section asked for a qualitative, open-ended response to the following question: "If you feel changes related to animal welfare are needed, what do you see as the major obstacles to affecting changes in our current production systems?" Section nine was another reliability check and asked the following: "Please mark next to one of the letters on the scale below where you would categorize yourself in terms of your attitude toward animal use and care"...the letter "A" anchor stated "I take a strong animal rights position; ie, I believe a human, a dog, and a rat all have comparable rights and each individual's desires should be respected equally"; the letter "D" midpoint stated

"I believe in using animals for the greater human good (could be in regards to food production, for providing work, for recreation purposes, etc) but we have an obligation to provide for the majority of their physiological and behavioral needs"; the letter "G" anchor stated "I am not at all concerned about animal welfare issues; animals were put on this earth for us to use in whatever possible way they can benefit us the most and in the least expensive way possible."

The following background questions were asked: species emphasis area, the state they have lived in the longest, the importance to them of having a pet, religiosity, political viewpoint, nature of their appointment (eg, clinical service, extension, research teaching), gender, the year they were born, and ethnicity. The rationale for asking about species emphasis area was based on a hypothesis developed during the pilot interviews (data not shown) that respondents with beef, dairy, horse and sheep backgrounds appeared to be more sensitive to animal welfare concerns than respondents with other emphasis areas. We asked about the nature of respondents' appointments, ethnicity, and the state lived in the longest, to help determine how representative our respondents were. The rationale for asking about the importance of having a pet both as a child and as an adult comes from work by Paul and Serpell[40] that showed pet ownership was related to more sensitive attitudes toward animal welfare. We asked about political viewpoints because research on attitudes toward concern about environmental issues, arguably a parallel issue to animal welfare issues, has shown a relationship with political liberalism[41]. Asking a participant's year born allowed us to calculate age, which has sometimes been shown to correlate negatively with views about animal treatment (ie, lower concern for animal treatment was

associated with increased age)[26]. Females have frequently been shown to have more sensitive attitudes toward animal welfare[27,28,33] so knowing respondents' gender and how this related with attitude scores was one way to test the validity of our instrument. Religiosity has also been linked to more conservative views about animal welfare[42,43].

Survey implementation

In order to contact our target population, we compiled email addresses for VCF that appeared to have a large animal/farm animal emphasis from 27 national veterinary college websites. After having our survey approved by Michigan State's University Committee for Research Involving Human Subjects and then the AAVMC (Association of American Veterinary Medical Colleges), we followed the general recommendations for survey protocol advocated by Dillman[44]. We sent an e-mailed pre-notice in September 2003, informing VCF of the forthcoming survey. We followed this several days later by an e-mailed cover letter with an embedded text copy of the survey. (We did not use a document attachment because it was likely that people would fear opening attachments from unknown sources.) We then followed this a week and a half later with a second e-mailed cover letter and survey, thanking people who had already responded and appealing to others to respond. As of early December, our response rate was only 26%, so we made a fourth contact in an attempt to encourage more responses. After this fourth contact, our final response rate was 31%. Despite this lapse in time between third and fourth contacts, results from the final 5% did not differ significantly from those of the initial respondents.

Statistical analyses

Data were entered into SPSS® 11.5 and double-checked for accuracy. SPSS® 11.5 was used for calculating frequencies, means, and standard deviations of responses; correlations, comparisons of means, and Chi-square analyses of relationships between variables; attitude scale scores; factor analysis and reliability results for our attitude scale.

Attitude scale score

Because attitudes are usually best measured by using multiple items rather than a single item[22], we developed an overall attitude scale score to measure general concern for farm animal welfare. Those items that appeared most valid (face validity[45]) and exhibited a healthy degree of variability within our sample were incorporated into this scale (eg, we did not include the question "animals should be free from thirst most of the time" because all respondents either strongly agreed or agreed). The final attitude scale score consisted of the sum of the following responses: all six items related to comfort level with current production systems; two items from the values section (freedom to exhibit normal behavior, and room to move around freely); two items from the beliefs section (production means good welfare and importance of meeting behavioral needs); all 15 items under the husbandry practices/outcomes section; all four items relating to whether, as a potential consumer, respondents would be willing to pay slightly more; and their response to how high/low the area of animal welfare should be prioritized in terms of resource use.

Missing data were handled in a standard manner used by attitude researchers[46]. If a respondent answered at least 75% of the questions, their missing answers were filled in with that person's response average for each relevant item.

Qualitative analysis

In an effort to more thoroughly understand our participants' responses, we elected to perform a qualitative analysis on the responses of VCF to our open-ended question, "If you feel changes related to animal welfare are needed, what do you see as the major obstacles to affecting changes in our current production systems?" Of the 157 respondents, 105 (67%) wrote a response to this question. Their answers provided a richer tapestry for understanding perceptions of VCF. Answers were entered into Microsoft Access and 15 topic area themes were developed after reading the responses. We followed the methodology proposed by Berg[47] for developing thematic topics.

Results

Seven hundred ninety-five email addresses were initially obtained from the email directories of 27 US veterinary colleges. One hundred fifty-seven responses were ultimately returned. Once incorrect targets, eg, a survey being sent to a small animal faculty member versus a large animal faculty member, and bounced messages were subtracted, this represented a 31% response rate. Ninety-one percent of the respondents returned their surveys via e-mail; the remaining nine percent returned their responses via postal mail.

Background variables (Table 1)

Regarding the background make-up of our respondents, 68% were male and 32% were female. Ninety-six percent of the respondents were Caucasian. Regarding age

breakdown, 25% of our respondents were aged 57 years or older, 25% were aged 51 - 56 years, 25% were aged 44 – 50 years and 25% were aged 27 – 43 years. Fifteen percent of our respondents were engaged in primarily clinical service appointments, 4% were engaged in primarily extension/outreach appointments, 57% were engaged in combination appointments, 12% were engaged in primarily research appointments, and 6% were engaged in primarily teaching appointments. Survey participants were asked to identify their species emphasis area and had the option to list more than one emphasis area. Thirty-three percent of respondents identified horses as one of their emphasis areas; 31% identified dairy; 27% identified beef; 15% identified swine; 11% identified small animal (but also listed a large animal specie); 10% identified sheep and 3% identified poultry. Other species listed occasionally were llamas, goats, aquaculture, non-human primates and humans.

Regarding regional diversity, we asked respondents to list the state (or non-US country) where they had spent the greatest portion of their lives with the following results: 28% identified a Midwestern state; 15% - New England state; 12% - Non-US country; 10% - Southern state; 10% - West Coast state; 8% - Great Plains state; 7% Southwestern state; 6% - Mid-Atlantic state; 4% - did not answer. In regards to what extent VCF considered themselves religious/spiritual, 17% chose "very," 33% chose "moderately," 17% chose "somewhat," 17% chose "slightly," and 16% chose "not at all."

In terms of political views, 25% identified themselves as primarily liberal, 17% as somewhat liberal, 26% as moderate; 14% as somewhat conservative and 16% as primarily conservative, 2% chose unsure.

In response to the question, "As a child, was having a pet(s) important to you?", 73% chose "very much so," 20% chose "somewhat," 5% chose "not that much," 1% chose "not at all," and 1% did not have a pet as a child. Regarding the importance of having a pet as an adult, 65% chose "very much so," 20% chose "somewhat," 9% chose "not that much," 2% chose "not at all," and 2% do not have a pet as an adult.

Current production systems

Participants were asked to respond to the following statement with a Likert-scale response choice: "The predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in the..." beef cattle industry, dairy cattle industry, layer chicken industry, meat bird industry, sheep industry, and swine industry, respectively. See Figure 1. Results indicate that respondents were most comfortable with the sheep and beef industries (greater than 70% agreed/strongly agreed), followed closely by the dairy industry. There was a significant difference between the comfort level of how these species are managed versus swine (55% agreed/strongly agreed; $P \leq .01$; Bernoulli comparison[48], which was, in turn, significantly different ($P \leq .01$) when compared to meat birds and layer birds (~35% agreed/strongly agreed).

Values

We asked VCF to express their level of agreement with the importance of the Five Freedoms[39] and other related values that impact farm animal welfare. See Figure 2. Results indicate that respondents agreed most strongly with "agricultural animals should have freedom from thirst most of the time" with 80% strongly agreeing and the remaining 20% agreeing. Seventy-one percent strongly agreed with the statement "agricultural animals should have freedom from unnecessary pain and/or discomfort;" and 63-64% strongly agreed with the following three statements: "Agricultural animals should have freedom from hunger most of the time," "...should have freedom from injury and disease (or prompt treatment should they arise," and "...should have good ventilation/good air quality provided in their environment." The statement, "Agricultural animals should have sufficient area to lie down," found 51% of respondents strongly agreeing; and 49% strongly agreed that "agricultural animals should have calm handling during 'processing' and transportation situations." Forty-five percent of VCF strongly agreed that "agricultural animals should have freedom from unnecessary fear and/or distress," and 42% strongly agreed that "agricultural animals should be able to lie down on a comfortable substrate." The two value statements showing the lowest levels of agreement were "agricultural animals should have the freedom to express a majority of their normal behavioral repertoire" with 27% strongly agreeing and an additional 36% agreeing with this. Twenty-three percent of VCF strongly agreed that "agricultural animals should have room to move around freely," and an additional 32% agreed. Perceptions of these various value statements did differ significantly in some cases (see Figure 2).

Beliefs

When asked to express their level of agreement with certain belief statements, VCF responded as follows: 40% agreed or strongly agreed "if animals are producing (ie, gaining weight, producing eggs, etc) that means they have good welfare," 93% agreed/strongly agreed that "agricultural animals have individual temperaments," 63% agreed/strongly agreed that "agricultural animals can experience something akin to boredom," and 50% agreed/strongly agreed that "it is important to meet the majority of behavioral needs possessed by agricultural animals (We are defining behavioral needs as those behaviors that animals have evolved to perform and are highly motivated to engage in.)"

Husbandry practices/outcomes

From a previous survey of students' welfare concerns (unpublished data), where the students were participating in an intercollegiate animal welfare judging competition[49], we compiled 15 specific husbandry practices/outcomes for VCF to express agreement/disagreement with as to whether these represented concerns. The following items were used: branding of beef cattle, dirty conditions of beef feedlots, dehorning without local anesthetic, levels of lameness in dairy cattle, tail docking in dairy cattle, toe trimming in poultry, beak trimming in poultry, cage space for layers, gestation crates for sows, early weaning in pigs, lack of foraging substrate for pigs, castration without anesthetic, flooring effects on lameness in intensively farmed animals, poor or indifferent stockmanship, and methods of transportation to slaughter (see Figure 3). The ranking of concern, when percentages of respondents agreeing and strongly agreeing were combined, was as follows: flooring effects on lameness in intensively farmed animals

received the highest level of concern with 21% strongly agreeing and 69% agreeing; poor or indifferent stockmanship had 39% strongly agreeing and 50% agreeing. Twenty-five percent of VCF strongly agreed, and 57% agreed, that level of lameness in dairy cattle is a concern; while 28% strongly agreed and 52% agreed that cage space for layers is a concern. On the lower end of the range of concern was the issue of early weaning in pigs with 6% strongly agreeing and 18% agreeing. Second lowest ranking for level of concern related to the issue of lack of foraging substrate for pigs, which found 8% to strongly agree and 31% to agree that this represents a concern.

System changes

In Figure 4, results from the following question are presented: "For the following industry systems, please identify whether you think 'no,' 'minor,' or 'substantial' welfare-related changes are needed...beef production, dairy production, egg production, meat bird production, sheep production, swine production." For the statistical analysis using Bernoulli proportion comparisons[48], we compared the proportion of VCF respondents choosing substantial changes needed for a given system. The layer bird industry was ranked highest for needing substantial changes (51%), while the sheep industry was ranked lowest for needing substantial changes (6%). The order of the industries followed the same ranking order as it did for the question responses represented in Figure 1 and differed significantly when noted by different letters ($P \leq 0.03$).

Predicted behaviors

When asked to express their level of agreement with the following statement, "as a consumer, I would be willing to pay slightly more for products coming from facilities

that are enhancing welfare beyond current industry-common levels," 22% strongly agreed with the statement and 44% agreed. When asked to express agreement with the statement, "acute interventions that cause pain (eg, castration) should be performed under local anesthesia (or general, if animal's age suggests that)," 21% strongly agreed and 35% agreed. When asked to express level of agreement with the statement, "as a consumer, I would be willing to pay slightly more for products coming from facilities that provide anesthetic/analgesic when performing potentially painful procedures," 17% of VCF strongly agreed and 35% agreed.

Prioritizing contemporary issues

Figure 5 represents the percentage of respondents prioritizing four contemporary topics as to how they would suggest veterinary colleges allocate resources (eg, funding and time commitment). Respondents could choose to rank each issue as either "high," "medium," or "low priority. Respondents were not limited as to how many items could be identified as either high, medium, or low priority items. Food safety was the highest ranked contemporary topic, with 79% of VCF stating this is a high priority issue. Environmental issues, eg, manure management, followed with 60% of respondents identifying this as a high priority issue. Sustainable agriculture was the third most highly ranked issue with 55% of respondents stating this is a high priority. Ranked fourth of the four identified issues, was animal welfare with 42% of respondents rating this as a high priority. The proportion of support for prioritizing animal welfare was ranked significantly lower than that for sustainable agriculture and environmental issues ($P \leq 0.005$), which ranked significantly lower than that for food safety.

Visual scale for self-assessment

In an attempt to have another opportunity to assess the validity of our attitude scores, we asked respondents to self-rate themselves on a visual scale with top and bottom "anchors" that were marked by attitude descriptions and a midpoint attitude description (see Figure 6). We also graphed box plots of how well these self-assessments correlated with our overall attitude scores for respondents. There was a significant correlation between the two measures ($P \leq 0.01$) and in the correct direction; ie, more welfare empathetic self-assessments were correlated with higher attitude scores using our multiple item measure.

Overall attitude scale

Factor analysis revealed that the overall attitude scale was unidimensional. Cronbach's standardized alpha equaled 0.86, indicating a high level of reliability for this attitude scale. One hundred forty-four respondents answered enough of the questions to determine an attitude scale score for them. The overall mean was 90.22 with a standard deviation of ± 24.03.

Relationships

Correlations or comparisons of means were run between the overall attitude scale scores and background variables that have been previously linked with attitudes toward animal treatment[26-30,33] or that we hypothesized would have an impact. Gender had a significant relationship with attitude scores in that females expressed a greater degree of concern for animal welfare (female mean = 99.74; male mean = 85.99) ($P = 0.002$).

We found a significant linear relationship ($P < 0.001$) between political views and attitude scores, with more supportive scores being linked with more liberal views (r =

-0.336). Though the relationship was modest (r = 0.165), we did find a statistically significant relationship ($P = 0.05$) between religiosity and one's overall attitude toward farm animal welfare, with higher religiosity being related to lower support for animal welfare concerns. We did not find a significant relationship between age and attitude score ($P = 0.35$). Of the 139 respondents who answered the question on ethnicity, only six were non-Caucasian so we were not able to adequately test the relationship between ethnicity and attitude score. Furthermore, we did not find a significant relationship between appointment (ie, whether clinical service, extension, research, teaching or a combination) and attitude score.

We had expected to see a relationship between the importance of having a pet and respondents' attitude scores, but given that 73% reported that having a pet as a child was "very important" to them and an additional 20% said that it was "somewhat important" to them, we were left with insufficient variability to test this relationship (only two respondents reported not having a childhood pet, and only one respondent reported having a childhood pet was "not at all important").

In comparing species emphasis areas with overall attitude scores, we found lower scale scores with dairy emphasis (mean = 83.7) versus non-dairy ($P = 0.03$); lower attitude scores with swine emphasis (mean = 79.2) versus non-swine ($P = 0.02$); lower attitude scores with beef emphasis (mean = 79.4) versus non-beef ($P = 0.001$), and higher attitude scores with small animal emphasis (mean = 111.5) versus non-small animal ($P < 0.001$).

We found no significant relationship between sheep, horse, or poultry emphases when compared to respondents without these respective emphases.

While there was no significant difference in overall attitude score by the region of the country in which a person spent the greatest portion of their lives, VCF who had spent most of their lives outside the US did have significantly higher attitude scale scores than their US counterparts ($P = 0.012$). Non-US mean = 103.5; overall US mean = 88.33; Greater Plains mean = 100.5; New England mean = 96.3; West Coast mean = 91.7; Mid-Atlantic mean = 87.0; Midwest mean = 84.9; Southern mean = 83.6; Southwest mean = 82.3.

Qualitative assessment

One hundred five respondents (67%) chose to write a response to our open-ended question, "If you feel changes related to animal welfare are needed, what do you see as the major obstacles to affecting changes in our current production systems?" Fifteen topic themes were developed in response to the answers. Those answers which were voluntarily cited greater than twenty times were the following: response centered around an economic theme (n = 80), response focused on a perceived lack of consumer support (n = 33), response centered on producer attitudes (n = 29), response theme dealt with the lack of understanding of what comprises appropriate animal welfare (n = 27), response centered around a political theme (n = 22), and response centered around the theme of tradition (n = 21). The other theme areas were: the perception that inadequate welfare science research has been conducted, disbelief of the welfare science research, the issue of undereducated/underpaid employees, the limitations of current housing designs, the

fear of an animal rights agenda, the shifting of responsibility/unwillingness to speak out by those who should be able to make a difference, the perception that anthropomorphism is a problem, and that there has been insufficient monitoring by a third party.

The following are sample responses to this question: "Lack of funding and unwillingness of Americans to pay more for their food; Americans are not well informed on how cheap their food is compared to other countries and the public are uninformed about practices allowed in the USA (eg, castration without anesthesia) that are illegal in other countries; Americans assume that things are 'done right' in USA; in Switzerland people buy more humanely raised pork products (eg, pigs castrated under anesthesia) the companies promoting that their piglets are better treated charge more for the product but have a higher market share"; "The nearly complete abandonment of agriculture animal welfare by the AVMA; our lack of leadership here is exemplified, for example, by our after-the-fact efforts to join the initiative on animal welfare begun by the Food Marketing Institute six months after the FMI effort was launched"; "These situations arose as a result of consumers not wanting to pay much for their food; also, if these types of additional regulations are put in place, what will be done about meat imported from other countries where controls on food safety and antibiotic use/residue are far less than our own? Increasing costs of production with welfare rules/regulations will only make it economically difficult for American farmers to produce food animals, it will not stop the consumption of meat raised in undesirable manners as we will import the meat from other countries which we will have little or no control of. If you can get effective laws to ensure all food animals are raised in the expected manner and that the costs to do so are

passed on to the consumer and society, thus maintaining the already modest profits realized by the farmer, then I would accept many of the often cosmetic and anthropomorphized requests of often minimally informed and nearly inexperienced people with 'welfare concerns'"; "We need to be careful that more legislation does not drive the farmers out of business. There must be a way to educate the public (which is lacking at present) about the importance of animal welfare on the farms, and the minor sacrifice required on the part of the consumer (ie paying a bit more for product). I think the economics is the major hurdle."

Discussion

While we are concerned with our relatively low response rate (31%), especially given the salience of this topic for the target population, the proportion of men (68%) and Caucasians (96%) in our sample does seem to parallel known characteristics of VCF in the United States. At least two possibilities may have played a role in causing a lower response rate: 1) e-mail may not be a good mode for reaching this population; perhaps they are so deluged with e-mails that they simply delete those messages from senders unknown to them, and/or 2) the topic area is too emotionally and politically charged, making potential participants cautious about responding.

Results regarding VCF opinions of current production systems suggest an interesting pattern regarding the order of comfort/concern that respondents have for the various agricultural animal industries. This same pattern was observed in an earlier study of national animal science faculty[17]. The explanation for this pattern that we find most

plausible is that people's comfort level with production systems is inversely related to typical levels of intensification. Sheep are still largely extensively reared; beef are still largely extensively reared – especially at the cow-calf phase of operations; and though dairy cattle are often housed in indoor, free-stall facilities, the facilities still typically have the option of open sides on the building, and allow the cows access to moving around and interacting with conspecifics. Pigs and birds, on the other hand, are typically reared in highly intensive systems, with comparatively high stocking densities. Space to move around freely is the exception rather than the rule. Since 55% of our respondents agreed/strongly agreed that room to move around freely is an important value for agricultural animals and 64% agreed/strongly agreed that the freedom to express a majority of an animal's normal behaviors is important, we consider the level of industry intensification to be the most likely explanation for the patterns we observed. However, another possibility is that swine and poultry have received more media attention, making our respondents more sensitized to these issues.

Overall, our respondents show a high level of concern regarding farm animal welfare, especially regarding global concepts versus specific issues. Therefore, our results do not indicate a great deal of resistance toward farm animal welfare concerns, as we had initially anticipated. However, the fact that less than 50% of responding VCF expressed concern for certain specific practices (eg, gestation crates for sows/gilts) – which many welfare scientists *would* identify as a concern – may reflect resistant attitudes toward altering specific practices. It could also be, however, that VCF are simply more convinced by the arguments that health care is easier to provide and aggression is easier

to manage in individual housing systems, and the predominant production systems are already set up for individual housing of sows and gilts. Evidence of the controversy surrounding this particular issue can be observed from the AVMA position statement on gestation stall housing in 2002[50], to the appointment of an AVMA Task Force on the Housing of Pregnant Sows in April, 2004[51], to the fact that the 2004 AVMA Animal Welfare forum will be on the specific topic of sow housing[51].

Another possibility exists; though the majority of our respondents showed empathetic attitudes toward farm animal welfare, it is possible (as has been seen in other social issues) that a minority of the population express their attitudes in a very vocal way. If resistant attitudes are held by small percentages, but those percentages are involved in making policy, they can still be very powerful attitudes, albeit not representing the majority.

VCF are but one of the important stakeholder groups when it comes to farm animal welfare. Further studies should take place on the attitudes of producers and consumers; both of which play key roles in how farm animals are managed – the former in a very direct way, the latter in an indirect, yet crucial, way.

The qualitative analysis lends support to a prediction the authors had gleaned from many conversations with colleagues. That is, that when asked what stands in the way of enhancing farm animal welfare beyond current levels, the most common assessment is that it relates to economic factors. These factors might be expressed in different ways –

"consumers will not support the cost of enhanced welfare," "producers cannot afford to increase inputs," "one producer cannot be competitive with another if it costs him/her more to raise product," "consumers in this country are too accustomed to our 'cheap food' policy," and so on. The number of times that this response was voluntarily expressed warrants further examination into how much of a role this is playing. Furthermore, the topic themes that were expressed frequently in the open-ended answer would make appropriate response choices to a follow-up survey or one designed to target another group of stakeholders.

There are other issues that society has determined should not be decided solely on the basis of economics (eg, water quality enhancements)...perhaps in the future, farm animal welfare will be another.

References

1. Broom DM, Johnson KG. *Stress and animal welfare* London: Chapman and Hall, 1993.

2. Appleby MC, Hughes BO, editors. *Animal welfare* Wallingford, UK: CAB International, 1997.

3. Hemsworth PH, Coleman GJ. *Human-livestock interactions; the stockperson and the productivity and welfare of intensively farmed animals* Wallingford, UK: CAB International, 1998.

4. Lawrence AB, Terlouw EM. A review of behavioral factors involved in the development and continued performance of stereotypic behaviors in pigs. *J Anim Sci* 1993; 71(10):2815-2825.

5. Rushen J. Using aversion learning techniques to assess the mental state, suffering, and welfare of farm animals. *J Anim Sci* 1996; 74(8):1990-1995.

6. Grandin T. Objective scoring of animal handling and stunning practices at slaughter plants. *J Am Vet Med Assoc* 1998; 212(1):36-39.

7. Kent JE, Molony V, Graham MJ. Comparison of methods for the reduction of acute pain produced by rubber ring castration or tail docking of week-old lambs. *Vet J* 1998; 155(1):39-51.

8. Broom DM. Transport stress in cattle and sheep with details of physiological, ethological and other indicators. *Dtsch Tierarztl Wochenschr* 2003; 110(3):83-89.

9. Barnett JL, Hemsworth PH. Science and its application in assessing the welfare of laying hens in the egg industry. *Aust Vet J* 2003; 81(10):615-624.

10. Taylor AA, Weary DM. Vocal responses of piglets to castration: identifying procedural sources of pain. *Appl Anim Beh Sci* 2000; 70:17-26.

11. Wohlt JE, Allyn ME, Zajac PK, et al. Cortisol increases in plasma of Holstein heifer calves from handling and method of electrical dehorning. *J Dairy Sci* 1994; 77(12):3725-3729.

12. Milligan BN, Duffield T, Lissemore K. The utility of ketoprofen for alleviating pain following dehorning in young dairy calves. *Canad Vet J-Revue Veterinaire Canadienne* 2004; 45(2):140-143.

13. Lindberg AC, Nicol CJ. Space and density effects on group size preferences in laying hens. *Br Poult Sci* 1996; 37(4):709-721.

14. Zanella AJ, Broom DM, Hunter JC, et al. Brain opioid receptors in relation to stereotypies, inactivity and housing in sows. *Physiol Behav* 1996; 59(4/5):769-775 and 60(2):685.

15. Dawkins MS. Why has there not been more progress in animal welfare research? *Appl Anim Beh Sci* 1997;53:59-73.

16. Animal Agriculture Alliance Web site. Trust in agriculture and support for freedom of food choice is high. Available at www.animalagalliance.org/main/home.cfm?Section=Trust_In_Agriculture&Category=PressReleases. Accessed May 19, 2004.

17. Heleski CR, Mertig AG, Zanella AJ. Assessing attitudes toward farm animal welfare: a national survey of animal science faculty. *J Anim Sci* 82:2806-2814.

18. The American Veterinary Medical Association Web site. Veterinary market statistics. Available at www.avma.org/membshp/marketstats/usvets.asp. Accessed May 19, 2004.

19. Animal Agriculture Alliance Web site. Consumers' attitudes about animal welfare. Available at www.animalagalliance.org/images/ag_insert/2004_Pub_Op_PR.ppt. Accessed May 25, 2004.

20. Association of American Veterinary Medical Colleges Web site. VMCAS applicant and class data. Available at http://aavmc.org/vmcasstat.htm. Accessed May 18, 2004.

21. Eagly AH, Chaiken S. *The psychology of attitudes.* Orlando, FL: Harcourt Brace and Company, 1993.

22. Mueller EJ. *Measuring social attitudes: a handbook for researchers and practitioners.* New York: Teachers College Press, 1986.

23. Alwin DF, Krosnick JA. The reliability of survey attitude measurement; the influence of question and respondent attributes. *Sociological Meth & Res* 1991; 20(1):139-181.

24. Schuman, H. Attitudes, beliefs, and behavior. In: Cook KS, Fine GA, House JS, eds. *Sociological perspectives on social psychology.* Pearson Education POD, 1995; 68-89.

25. Fink EL, Kaplowitz SA, Hubbard SM. Oscillation in beliefs and decisions. In: Dillard JP, Pfau M, eds. *The persuasion handbook: developments in theory and practice.* Thousand Oaks, CA: Sage, 2002;17-38.

26. Kellert, SR. Human-animal interactions: a review of American attitudes to wild and domestic animals in the twentieth century. In: Rowan AN, ed. *Animals and people sharing the world.* Hanover, NH: Univ Press of New Engl, 1988;137-175.

27. Wells DL, Hepper PG. Pet ownership and adults' views on the use of animals. *Society & Animals* 1997;5(1):45-63.

28. Pifer L, Shimizu K, Pifer R. Public attitudes toward animal research: some international comparisons. *Society & Animals* 1994;2(2):95-113.

29. Driscoll JW. Attitudes toward animal use. *Anthrozoös* 1992;5(1):32-39.

30. Matthews S, Herzog HA. Personality and attitudes toward the treatment of animals. *Society & Animals* 1997; 5(2):169-175.

31. Hemsworth PH, Coleman GJ, Barnett JL, et al. The effects of cognitive behavioral intervention on the attitude and behavior of stockpersons and the behavior and productivity of commercial dairy cows. *J Anim Sci* 2002;80:68-78.

32. Holloway IA, Waran N, Austin EJ. Assessing public attitudes towards pig welfare in the UK. *The Pig Jour* 1999; 44:38-51.

33 Paul ES, Podberscek AL. Veterinary education and students' attitudes towards animal welfare. *Vet Rec* 2000;146:269-272.

34. Azjen I, Fishbein M. *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice-Hall, 1980.

35. LaPiere RT. Attitudes vs. actions. *Soc Forc* 1934;13:230-237.

36. Schuman H, Johnson MP. Attitudes and behavior. *Ann Rev of Soc* 1976;2:161-207.

37. Snyder M, Ickes W. Personality and social behavior. In: Lindzey G, Aronson E, eds. *Handbook of social psychology.* 3rd ed. New York: Random House, 1985;883-947.

38. Newman I, McNeil K. *Conducting survey research in the social sciences.* University Press of America, 1998.

39. Farm Animal Welfare Council Web site. The 5 Freedoms. Available at: www.fawc.org.uk/freedoms.htm. Accessed April 21, 2004.

40. Paul ES, Serpell J. Why children keep pets – the influence of child and family characteristics. *Anthrozoös* 1992;5(4):231-244.

41. Dunlap RE, VanLiere KD, Mertig AG, Jones RE. Measuring endorsement of the New Ecological Paradigm: a revised NEP scale. *J of Soc Issues* 2000;56(3):425-442.

42. Bowd AD, Bowd AC. Attitudes toward the treatment of animals: a study of Christian groups in Australia. *Anthrozoös* 1989;3(1):20-24.

43. Preece R, Fraser D. The status of animals in Biblical and Christian thought: a study in colliding values. *Society and Animals* 2000;8(3):245-263.

44. Dillman DA. *Mail and internet surveys. The tailored design method.* 2nd ed. New York: John Wiley & Sons, 2000.

45. Litwin MS. *How to measure survey reliability and validity.* Thousand Oaks, CA: Sage Publications 1995.

46. Babbie E. *Survey research methods.* 2nd ed. Belmont, CA: Wadsworth Publishing, 1990.

47. Berg BL. *Qualitative research methods for the social sciences.* 4th ed. Needham Heights, MA: Allyn & Bacon, 2001.

48. Lindgren BW. *Statistical theory.* 3rd ed. New York: Macmillan Publishing Co, 1976.

49. Heleski CR, Zanella AJ, Pajor EA. Animal welfare judging teams – a way to interface welfare science with traditional animal science curricula? *Appl Anim Beh Sci* 2003;81:279-289.

50. National Pork Producers Council Web site. Gestation stalls – the facts. Available at: www.nppc.org/public_policy/gestation_stalls.html. Accessed May 31, 2004.

51. JAVMA News Website. Sow housing task force members appointed. Available at: www.avma.org/onlnews/javma/jun04/04060lm.asp. Accessed May 31, 2004.

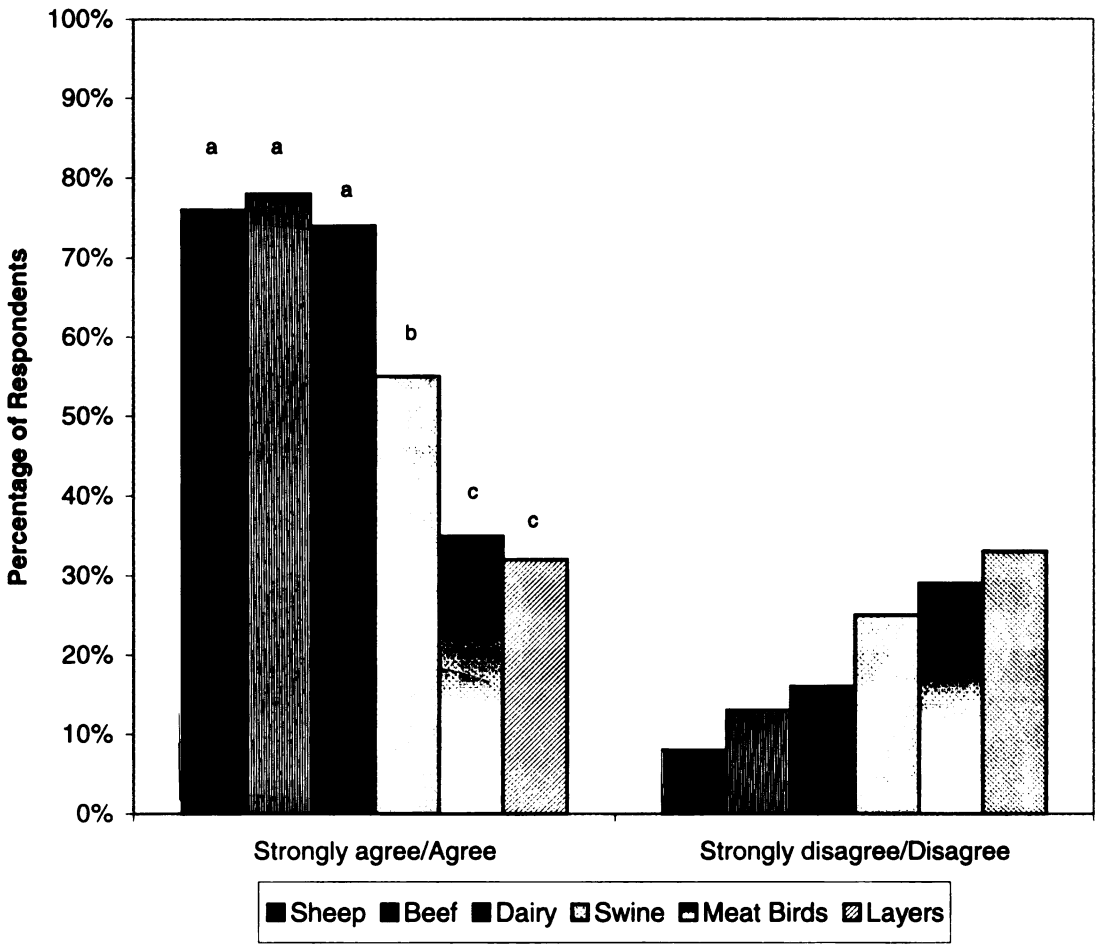


Figure 1 – Percentage of respondents in agreement or disagreement that the predominant methods currently used to produce animal products in the referenced industries provide an appropriate level of animal welfare. Bernoulli comparisons of proportions[48] were used to make statistical assessment that perceptions differed among the industries. Different letters represent significant differences in proportions ($P \leq 0.001$).

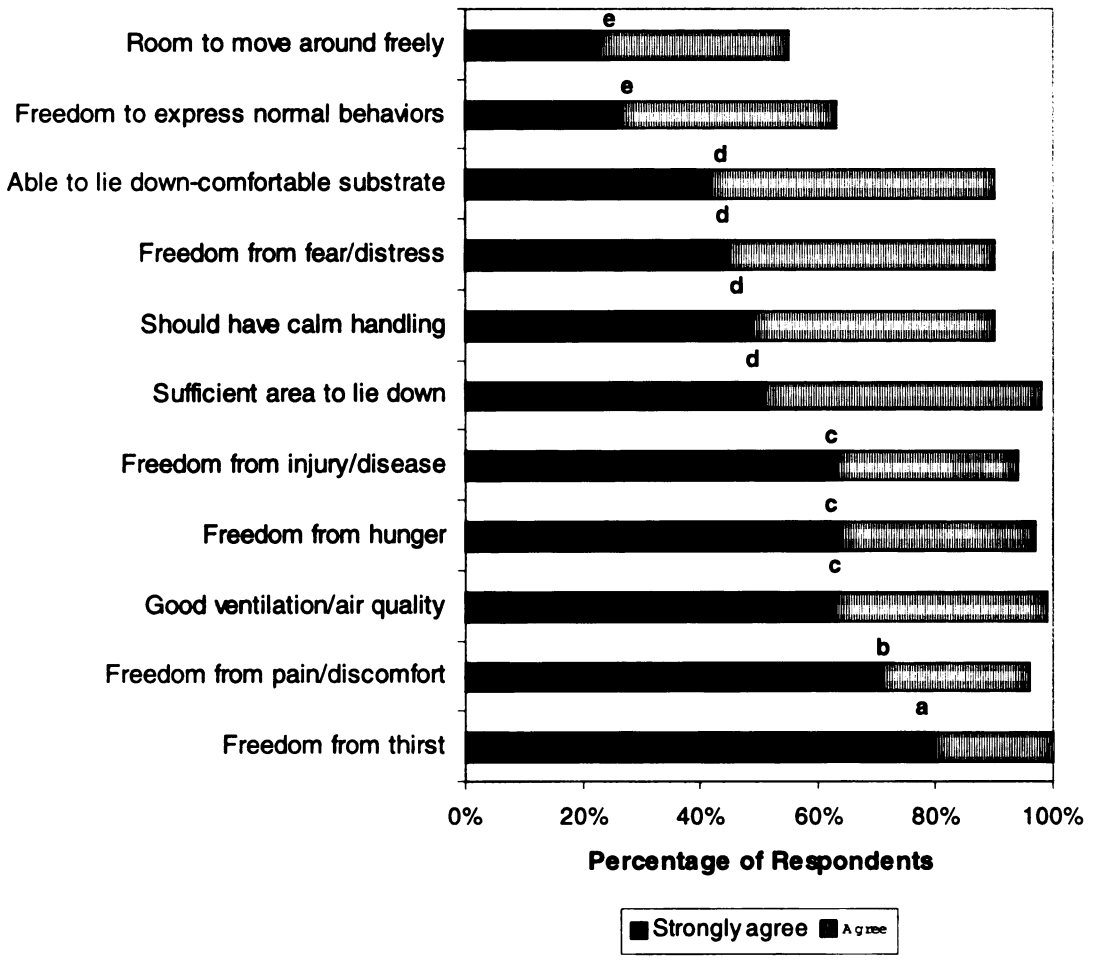


Figure 2 – Percentage of respondents strongly agreeing or agreeing with the Five Freedoms[39] and related values. Please refer to the text for more complete descriptions of these value statements than the abbreviated form shown along the Y-axis. Bernoulli comparisons of proportions[48] were used to make statistical assessment that perceptions differed among some of these value statements. Comparisons were made based on percentage of respondents choosing strongly agree. Different letters represent significant differences in proportions ($P \leq 0.05$).

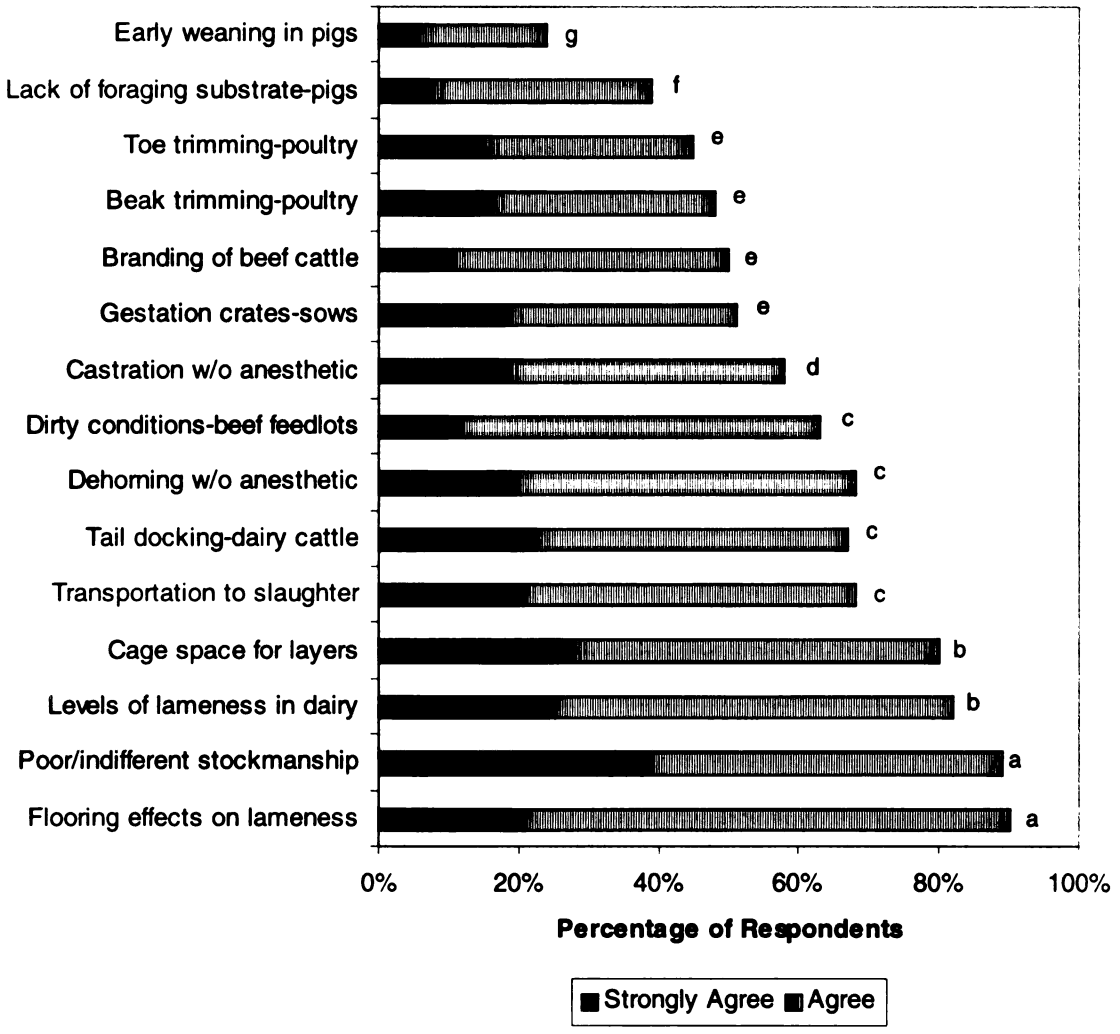


Figure 3 – Percentage of respondents strongly agreeing or agreeing that various husbandry practices/outcomes, previously identified in a student survey, do represent welfare concerns. Please refer to the text for more expanded explanations of the practices/outcomes than what are written along the Y-axis. Percentages expressed are the *valid* percentages; ie, those who chose not to answer certain questions in this section, or who chose neutral/unsure have not been calculated into the cited percentages. Bernoulli comparisons of proportions[48] were used to make statistical assessment that perceptions of the various practices/outcomes differed ($P \leq 0.05$) when noted with different letters.

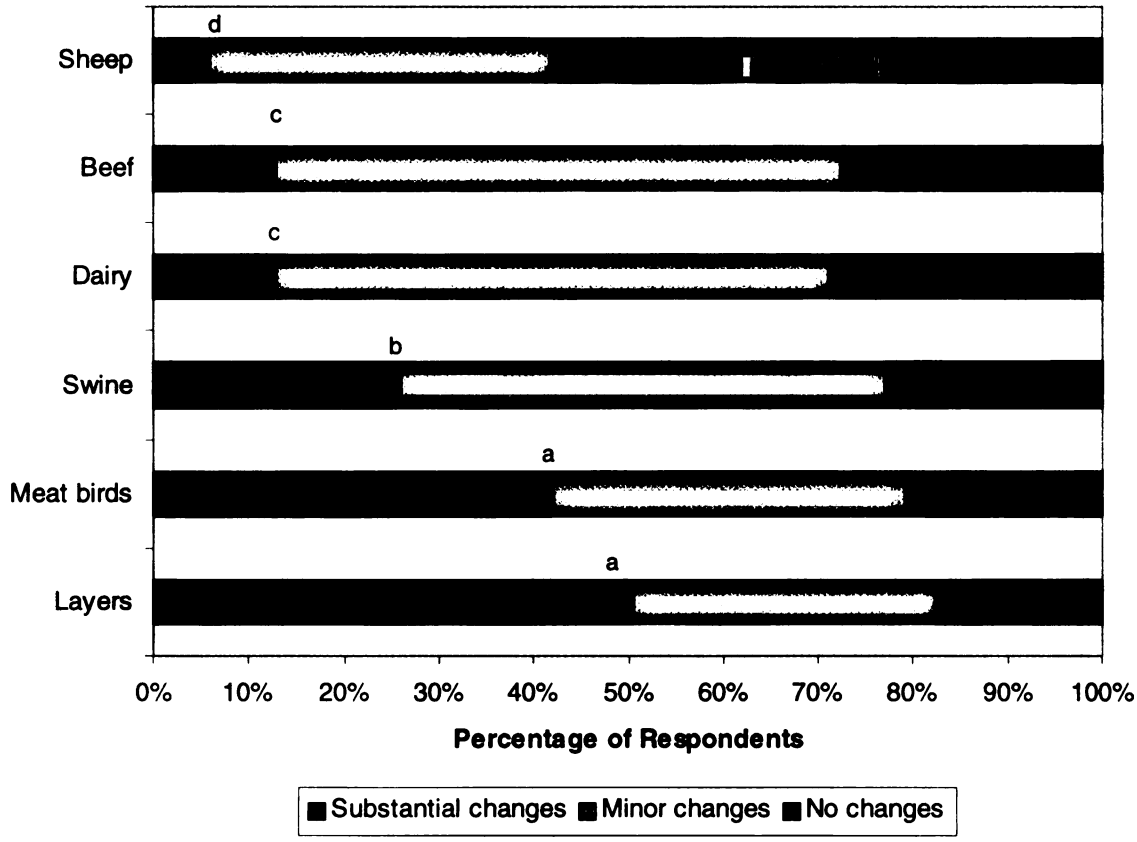


Figure 4 – Percentage of respondents stating "substantial," "minor," or "no" welfare-related changes are needed for each of the specific industries. Respondents choosing "not familiar enough with that industry to form an opinion" were not calculated into the percentages. It is for this reason that the difference between layer birds and meat birds represents only a trend (P = .09); ie, the "n" is lower than for other species (n = 107 and 102, respectively). Bernoulli comparisons of proportions[48] were used to make statistical assessment that proportions of respondents choosing "substantial" changes needed differed when noted with different letters ($P \leq 0.05$).

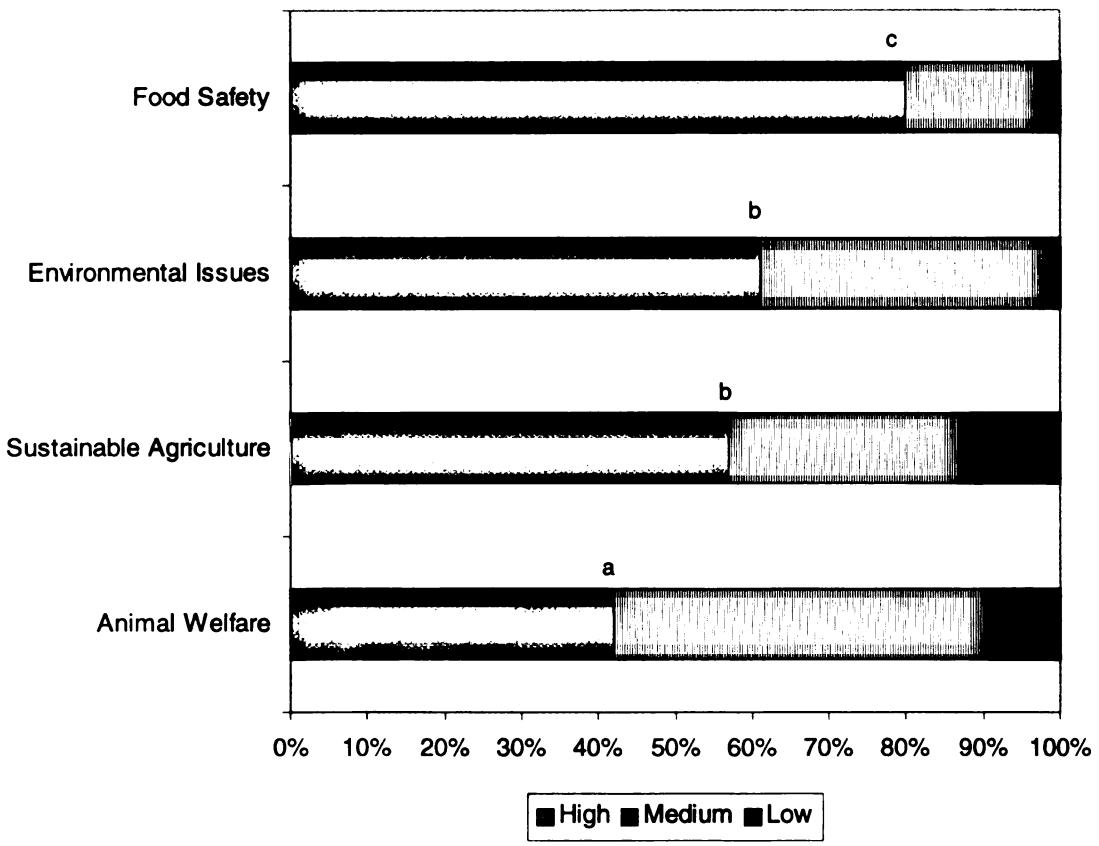


Figure 5 – Percentage of respondents prioritizing the following critical contemporary issues as "high," "medium," or "low" priority (in terms of how departmental resources should be allocated): food safety, environmental issues, sustainable agriculture and animal welfare. Bernoulli comparisons of proportions[48] were used to make a statistical assessment that the proportion of respondents choosing "high" priority differed (represented by different letters signifying $P \leq 0.005$.) Respondents were not limited as to how many options could receive a high priority ranking.

__1%___A (or 1)=I take a strong animal rights position; i.e. I believe a human, a dog, and a rat all have comparable rights and each individual's rights should be respected equally.

__7%___B (or 2)=Intermediate between A and D, but more nearly like A.

__11%__C (or 3)=Intermediate between A and D, but more nearly like D.

__71%__D (or 4)=I believe in using animals for the greater human good (could be in regards to food production, for providing work, for recreation purposes, etc.) but we have an obligation to provide for the majority of their physiological and behavioral needs.

__8%___E (or 5)=Intermediate between D and G, but more nearly like D.

__1%___F (or 6)=Intermediate between D and G, but more nearly like G.

__1%___G (or 7)=I am not at all concerned about animal welfare issues; animals were put on this earth for us to use in whatever possible way they can benefit us the most and in the least expensive way possible.

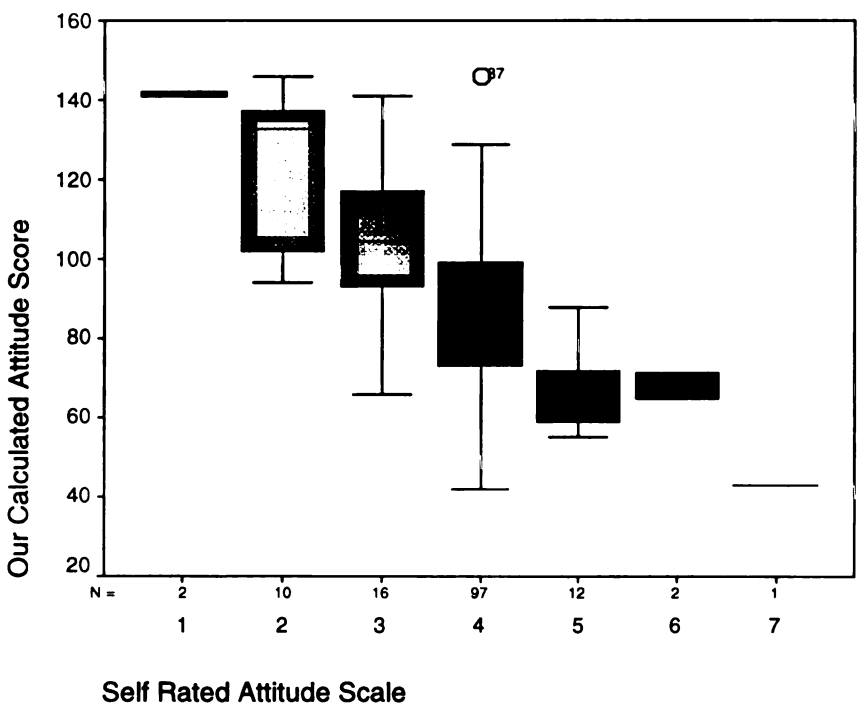


Figure 6 – In an effort to validate our attitude scores with respondents' self-assessment of their attitudes, we asked them to identify themselves along the depicted scale. The box plots depicted below this chart represent how our calculated attitude scores correlated with VCF self-assessments. (r = -0.617); significant at P = 0.01.

Table 1 – Background variables for our VCF respondents.

Background Variable	**Percentage of Respondents**
Gender n=154	
Male	68%
Female	32%
Ethnicity n=154	
Caucasian	96%
Non-Caucasian	4%
Age n=141	
57 yrs or older	25%
51 – 56 yrs	25%
44 – 50 yrs	25%
27 – 43 yrs	25%
Species Emphasis (they could list >1) n=157	
Beef	27%
Dairy	31%
Horse	33%
Poultry	3%
Sheep	10%
Small Animal	11%
Swine	15%
State they've spent greatest % of life n=152	
Midwestern state	28%
New England state	15%
Greater Plains state	8%
West Coast state	10%
Southern state	10%
Mid Atlantic state	6%
Southwestern state	7%
Non-US country	12%
Political Ideology n=149	
Primarily liberal	25%
Somewhat liberal	17%
Moderate	26%
Somewhat conservative	14%
Primarily conservative	16%
Unsure	2%
Religiosity n=151	
Very	18%
Moderately	33%
Somewhat	17%
Slightly	17%
Not at all	17%

Was/Is having a pet important? n=153	As a child?	As an adult?
Very	73%	65%
Somewhat	20%	20%
Not that much	5%	9%
Not at all	1%	2%
Did not/Do not have a pet	1%	2%
Nature of appointment n=148		
Primarily Clinical Service	15%	
Primarily Extension/Outreach	4%	
Primarily Research	12%	
Primarily Teaching	6%	
Combination	57%	

CHAPTER SIX

Attitudes toward farm animal welfare – a comparison of US animal science and veterinary science faculty. Submitted to Applied Animal Behaviour Science.
C.R. Heleski, A.G. Mertig, A.J. Zanella

Attitudes toward farm animal welfare – a comparison of US animal science and veterinary science faculty

C.R. Heleski, A.G. Mertig, A.J. Zanella

Abstract: We developed a survey to measure attitudes toward farm animal welfare, then targeted two US groups considered highly influential to this area: veterinary college faculty with large animal/food animal emphasis (VCF) and animal science faculty (ANS). The survey was conducted via e-mail. Our addresses were gathered from 58 animal science department and 27 veterinary college websites. Our respondents consisted of 446 ANS and 157 VCF. In general, VCF had more empathetic attitudes toward farm animal welfare than did ANS. Both populations expressed greater comfort with the current production systems for beef and sheep than for meat birds and layers; dairy and swine were viewed intermediately. When asked about 15 specific husbandry practices/outcomes, more than 80% of our respondents agreed that three of these issues were concerns – flooring effects on lameness in intensively farmed animals, levels of lameness in dairy cattle, and poor/indifferent stockmanship. Four issues had less than 50% agreement – early weaning in pigs, lack of foraging substrate for pigs, beak trimming in poultry and toe trimming in poultry.

Several background variables showed significant relationships with our summed attitude scale scores: females were more concerned about farm animal welfare than were males ($P < 0.01$); those with liberal political views were more concerned than those with conservative views ($P < 0.01$); and those expressing higher religiosity had less concern than those with lower religiosity ($P < 0.05$). In this study, age was not significantly related to animal welfare attitudes. When presented with a 7-point scale where

respondents could pick between two anchor definitions, one midpoint definition, "I believe in using animals for the greater human good, but we have an obligation to provide for the majority of their physiological and behavioral needs," or points in between, 71% VCF and 70% ANS chose the midpoint. There was a significant correlation ($P < 0.01$; $r = -0.541$) between respondents' self-assessed appraisal on this 7-point scale and their summed scores on our scale of concern for animal welfare.

When asked to provide an open-ended (qualitative) response to a question asking respondents to identify obstacles to enhancing farm animal welfare (if they felt enhancements were necessary), over 60% of our respondents chose to answer. The five most common themes were economics, lack of consumer willingness to pay, tradition, producer attitudes, and inadequate welfare science research (in terms of quality, quantity, or ability to offer practical solutions).

Key Words: Animal welfare; Attitudes; Surveys

Introduction: Concerns over farm animal welfare have been expressed by the public for several decades (Ruth Harrison, 1964; Millman et al., 2004). A recent Gallup Poll (2003) found 62% of the general US public saying they support stricter legislation for farm animal treatment. Applied ethologists researching farm animal behavior and welfare issues have responded to these concerns with an ever-increasing body of scientific evidence (Broom and Johnson, 1993; Appleby and Hughes, 1997; Grandin, 1998; Rushen et al., 1999; Taylor and Weary, 2000; Hemsworth, 2003; Grant, 2004). Despite this, progress in implementing more welfare-friendly practices into US production systems

sometimes seems slow (Millman et al., 2004). When research demonstrates evidence of problems, often coupled with potential alternatives/solutions, the inertia impeding improvements in farm animal welfare can seem troubling.

In examining this problem more closely, we predicted that one obstacle in this area might be the attitudes of some of the primary stakeholders in animal agriculture; e.g. animal science and veterinary college faculty. The definition of attitude we are using is that of Eagly and Chaiken (1993), "Attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor." In the study of other social issues, resistant attitudes, often bolstered by the rationalization of supportive subcultures, have been found to subvert progress. Examples can be seen in the social psychology literature surrounding racial and gender stereotypes (Smith and Mackie, 2000), prejudice toward various groups (Eagly and Chaiken, 1993), as well as attitudes toward smoking (Janis and Mann, 1965). Recently, Serpell (2004) presented a review highlighting the importance of understanding attitudes toward animal welfare where he discusses the conflicting attitudes likely to surround those that work with farm animals. On the one hand, these animals are produced because of their inherent instrumental value; on the other hand, traditional pastoral values expect care and affection from the farmer toward his/her charges. Additionally, Hemsworth (2003) summarizes much of the research related to how people's attitudes influence their actual behavior toward the animals they work with. This provides support to earlier work by Azjen and Fishbein (1977) that behaviors, or at least behavioral intentions, are likely to follow attitudes.

In this study we compared the attitudes of two stakeholder populations – US animal science faculty (ANS) and US veterinary college faculty (VCF) – via electronic survey, to determine their attitudes toward farm animal welfare. This paper compares the attitudes of these two populations via their quantitative answers to our survey, and also explores the more subtle nuances of these attitudes via a qualitative assessment to an open-ended question. This question asked our respondents to express what, if anything, they perceive to be the primary obstacle(s) to enhancing farm animal welfare. Further substantiation for the benefit of conducting the qualitative analysis can be seen in work by Greenhalgh and Taylor (1997), Gale et al. (2003), Tudor-Locke et al. (2003), and Jobes et al. (2004).

Methodology:

More detailed methodology is presented in the articles dedicated to VCF and ANS independently (Heleski et al., 2004 and Heleski et al., submitted).

Designing the survey

Our survey was initially developed through the use of pilot interviews and testing with 34 animal science faculty at a large, Midwestern university. Our final version entailed 51 quantitative questions, 1 qualitative question and 13 background questions. Question categories for the quantitative section were as follows: do the predominant methods currently used to produce animal products for each of the respective industries provide appropriate levels of animal welfare?; questions pertaining to the Five Freedoms (Farm Animal Welfare Council, 2004) and related items; beliefs about agricultural animals (e.g., "Agricultural animals can experience something akin to boredom"; are welfare-related

changes needed for each of the respective industries?; level of agreement as to whether 15 husbandry issues/outcomes warrant concern; predicted consumer behaviors; and prioritizing the contemporary topics of animal welfare, environmental issues, food safety, and sustainable agriculture. Sample questions follow within the Results section and in Figure captions. The complete seven-page survey can be obtained from the authors.

Implementing the survey

We compiled an e-mail address listing by searching online websites for 27 US veterinary colleges and 58 US animal science departments. We then made a minimum of three electronic contacts to 795 VCF (large animal emphasis) and 1,466 ANS.

We followed the general guidelines for the Total Design Method (Dillman, 2000) for electronic surveys. We first sent a pre-notice explaining the salience of the survey that participants would soon receive. Several days later, we sent a cover letter and survey via e-mail to our participants. This was followed approximately one week later by a thank you/reminder letter and another copy of the survey. ANS were contacted during the spring of 2003; VCF were contacted during the fall of 2003. Due to low response rate, a fourth inquiry was made to VCF.

Quantitative data processing

Data were entered into Microsoft Excel spreadsheets, then transferred to SPSS (Version 11.5, Chicago, IL). SPSS was used for frequency counts, descriptive statistics, comparisons of means, Pearson correlations, partial correlations, Chi-square testing or

Fisher's exact tests (Chi-square testing was used unless a given cell had an expected count of less than five), summation of attitude scores into a scale score, factor analysis, and reliability analysis. For most calculations, responses "NTF" – not familiar enough with the practice or species to form an opinion – were treated as missing data. Where the survey responses involved 4- or 5-choice Likert-scale, ordinal responses (e.g., 5 = strongly agree, 4 = agree, 3 = unsure or undecided, 2 = disagree, and 1 = strongly disagree), we numerically coded the answers to facilitate a more quantitative analysis.

To calculate an overall farm animal welfare attitude score for each respondent, we summed responses to each of the following questions: comfort level with predominant methods of beef production, dairy production, layer production, meat bird production, sheep production, and swine production + level of agreement with agricultural animals having freedom to express a majority of their normal behaviors + level of agreement with agricultural animals having room to move around freely + level of agreement with whether we have a responsibility to meet the majority of behavioral needs possessed by agricultural animals + level of agreement with welfare only being enhanced if it can be done without increasing costs + personal willingness to pay slightly more for welfare-enhanced products + level of agreement with the use of anesthetic for acute interventions that cause pain + personal willingness to pay slightly more for products using anesthetic/analgesic for potentially painful procedures + prioritization of animal welfare compared to other contemporary topics (environmental issues, food safety, sustainable agriculture). Higher numbers on each questionnaire item were used to represent greater concern for farm animal welfare issues. Only those questions that had face validity,

relatively high degrees of response variation, and did not increase Cronbach's Alpha when deleted from the scale (DeVellis, 2003.)

We combined the numerical code for each of the above responses into a sum that was used as each person's attitude score. In order to receive an overall scale score, a respondent needed to answer at least 75% of the items included in the scale. For those with 25% or fewer missing responses, a numerical midpoint value was used for any missing items. Using this criteria resulted in 139 VCF receiving an attitude scale score (89% of respondents) and 379 ANS (85% of respondents).

Qualitative data processing

Though we asked primarily quantitative questions in our survey, we did ask one qualitative (open-ended) question, " If you feel changes related to animal welfare are needed, what do you see as the major obstacle(s) to affecting changes in our current production systems?" Responses to this question were entered into a Microsoft Access database. We then performed content analysis (Berg, 2001) to identify common theme areas. Fifteen common theme areas were identified for the VCF; these same themes plus an additional four were identified for the ANS. Some responses fell into more than one theme area. We did not limit how many themes a particular respondent's answer could fall into.

Results

Quantitative:

Four hundred forty-six ANS returned their surveys (response rate = 45%) and one hundred fifty-seven VCF returned responses (response rate = 31%).

Demographics of our respondents (see Table 1) –

Regarding the background make-up of our respondents, VCF were 68% male, 32% female, ANS were 83% male, 17% female (gender breakdown was statistically different, $P < 0.01$). Ninety-six percent of both groups were Caucasian in their ethnicity. Age breakdowns were similar, but did differ slightly. Political ideology between the two groups differed ($P < 0.01$) with the VCF being considerably more liberal in their political views. Self-reported religiosity/spirituality was statistically higher in ANS than VCF ($P < 0.01$). VCF placed somewhat more importance on having had a pet as a child than ANS did. This difference was more pronounced when asked if having a pet as an adult was important (VCF: 65% - very important, ANS: 37% - very important; $P < 0.001$). The breakdown of which area of the US (or non-US country) where they had spent the greatest percentage of their life was strikingly similar between VCF and ANS (Table 1).

Table 1. Background variables that we used to assess relationships between demographics and attitude scores.

Background Variable	Percentage of VCF respondents		Percentage of ANS respondents	
Gender, n=154 VCF, 437 ANS				
Male	68 %		83 %	
Female	32 %		17 %	
Ethnicity, n=154 VCF, 433 ANS				
Caucasian	96 %		96 %	
Non-Caucasian	4 %		4 %	
Age, n=141 VCF, 415 ANS				
60 yr or older	26 %		25 %	
52 – 59 yr	30 %		25 %	
45 – 51 yr	30 %		25 %	
26 – 44 yr	14 %		25 %	
Political ideology, n=149 VCF, 427 ANS				
Primarily liberal	25 %		8 %	
Somewhat liberal	17 %		12 %	
Moderate	26 %		26 %	
Somewhat conservative	14 %		27 %	
Primarily conservative	16 %		26 %	
Unsure	2 %		2 %	
Religiosity/spirituality, n=151 VCF, 431 ANS				
Very religious/spiritual	17 %		34 %	
Moderately religious/spiritual	33 %		37 %	
Somewhat religious/spiritual	17 %		13 %	
Slightly religious/spiritual	17 %		7 %	
Not at all religious/spiritual	17 %		9 %	
Area where greatest % of life spent n=152 VCF, 432 ANS				
Midwestern state	28 %		27 %	
New England state	15 %		15 %	
Southern state	10 %		15 %	
Southwestern state	7 %		12 %	
West Coast state	10 %		7 %	
Central/Greater Plains state	8 %		9 %	
Mid Atlantic state	6 %		10 %	
Non-US country	12 %		5 %	
Was/Is having a pet important n=153 VCF, 436 ANS	As a child?	As an adult?	As a child?	As an adult?
Very	73 %	65 %	52 %	37 %
Somewhat	20 %	20 %	32 %	31 %
Not that much	5 %	9 %	11 %	17 %
Not at all	1 %	2 %	2 %	7 %
Did not/Do not have a pet	1 %	2 %	2 %	8 %

Current production systems –

We asked our respondents two different questions relating to their perceptions of current animal production systems. In the first, they were asked to express their level of agreement/disagreement with the following statement, "The predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in the ... beef cattle, dairy cattle, layer chicken, meat bird, sheep, and swine ... industries." Respondents could choose one of the following Likert-scale response choices: strongly agree, agree, neutral/unsure, disagree, strongly disagree.

The beef and sheep industries had reasonably high levels of agreement with 78% of VCF and 87% of ANS agreeing/strongly agreeing to this statement for beef; 76% VCF, 86% ANS agreeing/strongly agreeing for sheep. The meat bird and layer bird industries had substantially lower agreement with regard to this question with 35% VCF and 58% agreeing/strongly agreeing to this statement for meat birds; 32% VCF, 51% ANS agreeing/strongly agreeing for layers (Fig. 1). Dairy and swine industries had intermediate levels of agreement with dairy receiving higher levels of agreement than swine. Perceived differences across the industries were significant in some cases and are discussed further in Heleski et al. (2004) and Heleski et al. (Submitted). This study was primarily concerned with the comparison of VCF and ANS. In all six industries the differences between our two respondent groups were significant ($P < 0.01$).

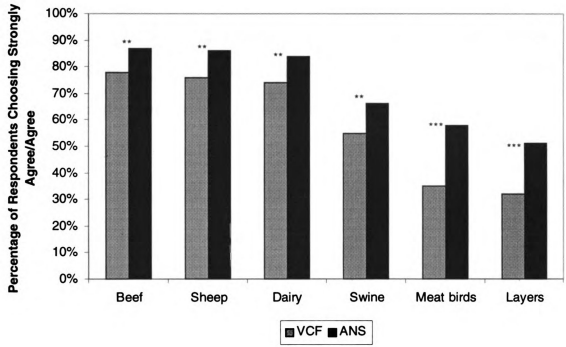


Fig. 1. Percentage of VCF (Veterinary College Faculty) and ANS (Animal Science Faculty) strongly agreeing/agreeing with the following statement for each species, "The predominant methods that are currently used to produce animal products provide an appropriate level of animal welfare in the _____ industry." Chi-square tests were used to determine significant differences between our target groups. ** ($P < 0.01$); *** ($P < 0.001$)

The second related question, that served to validate the across-industries differences that we saw in the previous question, was "For the following industries…beef production, dairy production, egg production, meat bird production, sheep production, swine production…do you think 'NC' – no welfare-related changes are needed, 'MC' – minor welfare-related changes are needed, or 'SC' – substantial welfare-related changes are needed." Once again, we saw respondents demonstrating the greatest comfort with the current management of sheep and beef cattle (6% VCF, 0.8% ANS said substantial changes are needed in the sheep industry; 13% VCF, 4% ANS said substantial changes are needed in the beef industry), and the least amount of comfort with the production of

meat birds and eggs (42% VCF, 21% ANS said substantial changes are needed in the meat bird industry; 51% VCF, 29% ANS said substantial changes are needed in the egg production industry). (Fig. 2). As in the responses to the former question, VCF and ANS differed significantly from each other across all six industries ($P < 0.01$).

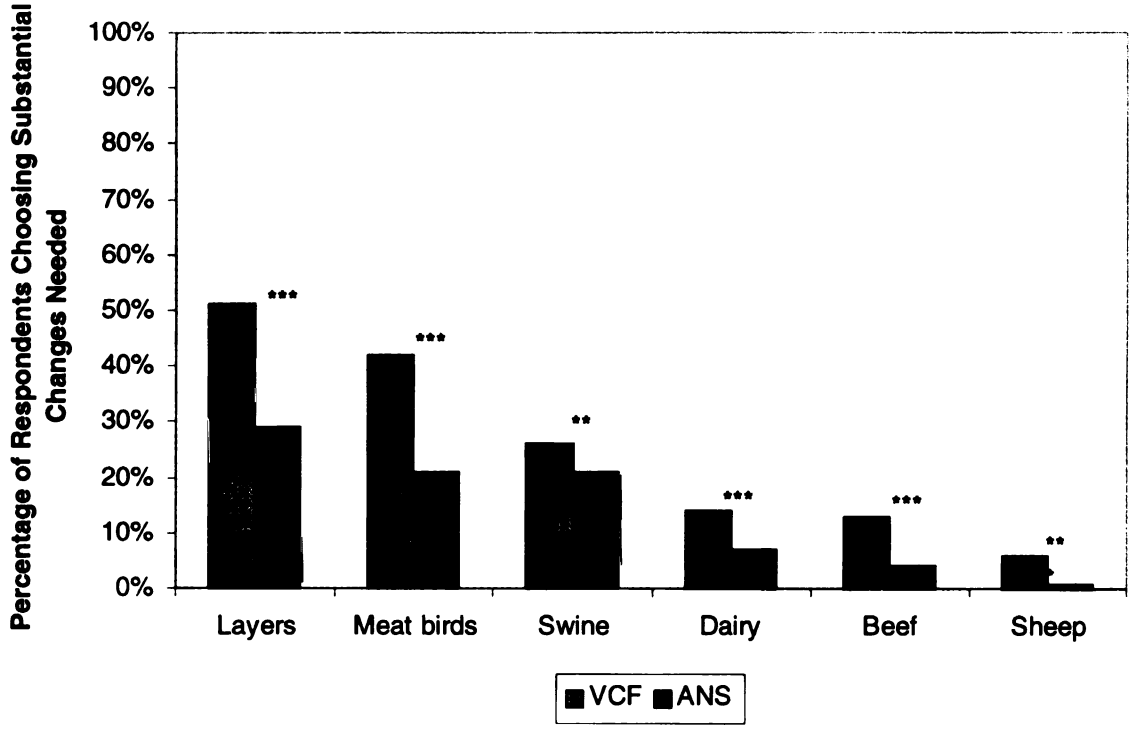


Fig. 2. Percentage of VCF and ANS that felt substantial welfare-related changes (versus minor changes or no changes) were needed in each of the respective current production systems. Chi-square tests were used to determine significant differences between our target groups. ** ($P < 0.01$); *** ($P < 0.001$).

Specific husbandry practices/outcomes -

From a previous survey of students' farm animal welfare concerns (unpublished data), where the students were competing in an intercollegiate animal welfare assessment competition (Heleski et al., 2003), we compiled 15 specific husbandry

practices/outcomes for respondents to express their level of agreement/disagreement as to whether they felt these issues were concerns. The following exact wording was used in the questionnaire (Fig. 3 contains abbreviated wording for visual clarity):

- branding of beef cattle
- dirty conditions of beef feedlots
- dehorning without local anesthetic
- levels of lameness in dairy cattle
- tail docking in dairy cattle
- toe trimming in poultry
- beak trimming in poultry
- cage space for layers
- gestation crates for sows
- early weaning in pigs
- lack of foraging substrate for pigs
- castration without anesthetic
- flooring effects on lameness in intensively farmed animals
- poor or indifferent stockmanship
- methods of transportation to slaughter

In all but one case, VCF expressed greater concern for each issue than did ANS; however, the order of concern from high to low was quite similar between the two groups (Fig. 3). The four issues garnering the highest levels of concern were flooring effects on lameness in intensively farmed animals, levels of lameness in dairy cattle, poor or indifferent stockmanship, and cage space for layers. The four issues garnering the lowest levels of concern were early weaning in pigs, lack of foraging substrate for pigs, beak trimming in poultry and toe trimming in poultry. It should be noted, however, that beak trimming and toe trimming had the highest level of respondents who chose "not familiar enough to form an opinion" (NTF) with 35% VCF and 20% ANS responding NTF to beak trimming and 49% VCF, 28% ANS choosing NTF when asked about toe trimming in poultry.

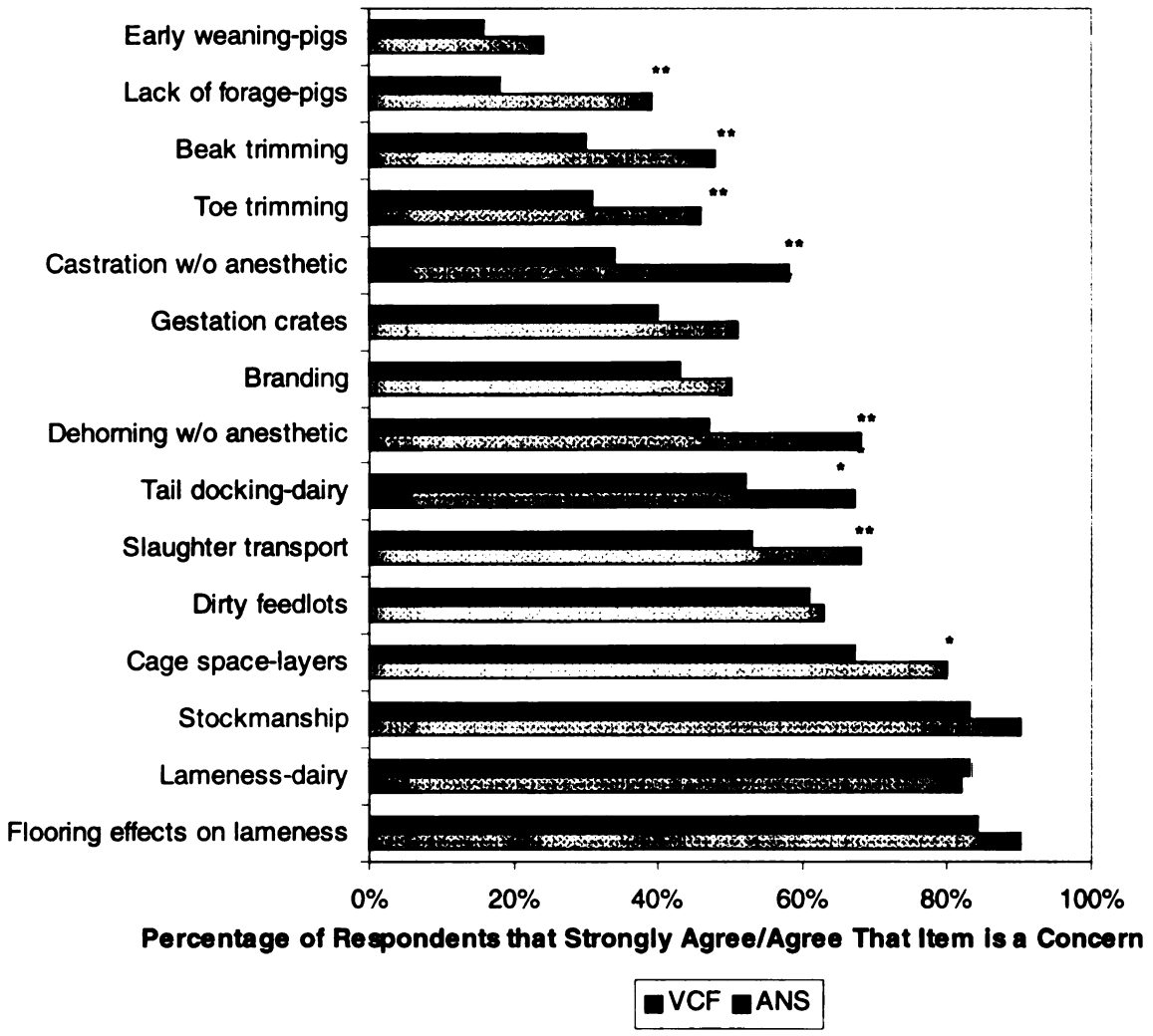


Fig. 3. Percentage of VCF and ANS strongly agreeing/agreeing that the above husbandry issues/outcomes warrant concern. These concerns were gathered from an earlier survey of animal science undergraduate students (unpublished data). Please see text for fuller reference to the wording for each statement. Chi-square tests were used to determine if VCF and ANS were significantly different in their views. * ($P < 0.05$); ** ($P < 0.01$); *** ($P < 0.001$).

Beliefs about animals and related statements -

The following three statements had nearly identical results between VCF and ANS. In response to the statement, "Agricultural animals have individual temperaments," 93%

VCF and 92% ANS agreed/strongly agreed. When asked for their level of agreement to the statement, "Agricultural animals can experience something akin to boredom," 63% VCF and 61% ANS agreed/strongly agreed. And when asked, "It is important to meet the majority of behavioral needs possessed by agricultural animals (we are defining behavioral needs as those behaviors animals have evolved to perform and are highly motivated to engage in)," 51% VCF and 48% ANS agreed/strongly agreed.

The Five Freedoms (Farm Animal Welfare Council, 2004) and related values -
Once again we observed very similar results between VCF and ANS (Fig. 4). The results indicate high levels of agreement toward these general goals for farm animal welfare, with nearly all concepts having > 80% agreement. The two concepts that ranked significantly lower ($P < 0.01$) were "Agricultural animals should have freedom to express a majority of their normal behavioral repertoire," and "Agricultural animals should have room to move around freely."

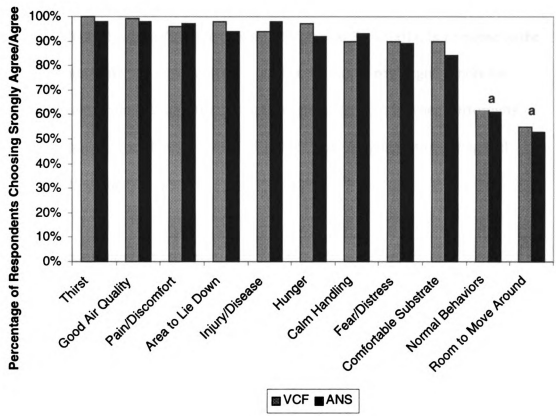


Fig. 4. VCF and ANS did not differ significantly on these values and related items. The following represent the full statements our participants were asked to express their level of agreement toward: Agricultural animals should have… 1) freedom from hunger most of the time, 2) freedom from thirst most of the time, 3) freedom from unnecessary pain and/or discomfort, 4) freedom from injury and disease (or prompt treatment should they arise), 5) freedom to express a majority of their normal behavioral repertoire, 6) freedom from unnecessary fear and/or distress, 7) room to move around freely, 8) calm handling during "processing" and transportation situations, 9) sufficient area to lie down, 10) the ability to lie down on a comfortable substrate, and 10) good ventilation/air quality provided in their environment. Freedom to express a majority of their normal behavioral repertoire and room to move around freely, however, differed from the other values/freedoms ("a", $P < 0.01$). Wording differs in some cases from the exact wording of the Five Freedoms (Farm Animal Welfare Council, 2004) based on suggestions from our pilot interviewees.

Consumer behavior -

When asked to express their level of agreement/disagreement with the following statement, "As a consumer, I would be willing to pay slightly more for products coming

from facilities that are enhancing welfare beyond current industry-common levels," 66% VCF and 40% ANS agreed/strongly agreed (different at $P < 0.001$). In response to the following statement, "As a consumer, I would be willing to pay slightly more for products coming from facilities that provide anesthetic/analgesic when performing potentially painful procedures," 52% VCF and 27% ANS agreed/strongly agreed (different at $P < 0.001$).

Prioritizing contemporary issues -

We asked respondents to rank four contemporary topics as to how they would suggest animal science departments/veterinary colleges prioritize the utilization of resources. Respondents could choose "high," "medium," or "low" priority and were not restricted as to how many times they could use each ranking. The ranking for food safety and environmental issues did not statistically differ between VCF and ANS (food safety: 81% VCF and 80% ANS chose high priority; environmental issues: 61% VCF and 67% ANS chose high priority). For sustainable agriculture, 58% VCF and 38% ANS chose high priority (different at $P < 0.01$). Regarding animal welfare, 42% VCF and 28% ANS chose high priority ($P < 0.01$).

Overall attitudes toward animal welfare and relationships with background variables -

The overall mean for the general attitude scale was 39.8 ± 9.3 with a range from 15 to 70. In subjecting our scale to reliability testing with SPSS, our Cronbach's alpha for this set of items was 0.903 and did not go up if any of the items was deleted. (A Cronbach's

alpha greater than 0.7 is typically considered the standard for accepting a scale as a reliable measure of the attitude it is purported to assess (Mueller, 1986).)

There was a significant difference in attitude scores by gender with females expressing greater concern/more empathy for farm animal welfare (male mean = 38.2 ± 9.3; female mean = 46.1 ± 9.9; different at $P < 0.001$). There was also a significant relationship between attitude scores and political views ($P < 0.01$; $r = -0.328$) with respondents expressing more liberal political views also having greater concern for farm animal welfare. Higher religiosity was associated with lower concern for farm animal welfare ($P < 0.01$; $r = 0.275$). Even when controlling for gender and political views (since there were more females in the VCF and also more liberal political views in the VCF), we still observed a significant difference in attitude scores between VCF and ANS with VCF having a mean of 43.8 ± 11.3, and ANS having a mean of 38.3 ± 8.9 ($P < 0.01$).

Self Rating -

We asked respondents to identify themselves in terms of their attitude toward animal welfare on a 7-point scale (Fig. 5). The correlation between this single-item self-report and our summed attitude scores was significant ($r = 0.541$; $P < 0.01$), with those self-reporting themselves as lower in concern toward animal treatment also having lower attitude scale scores.

Fig. 5a. Percentage of VCF and ANS respondents selecting each definition category on our seven-point scale. Correlation between this one-item self-assessment and our summed attitude score proved significant ($P < 0.01$, $r = 0.541$) (see Fig. 5b).

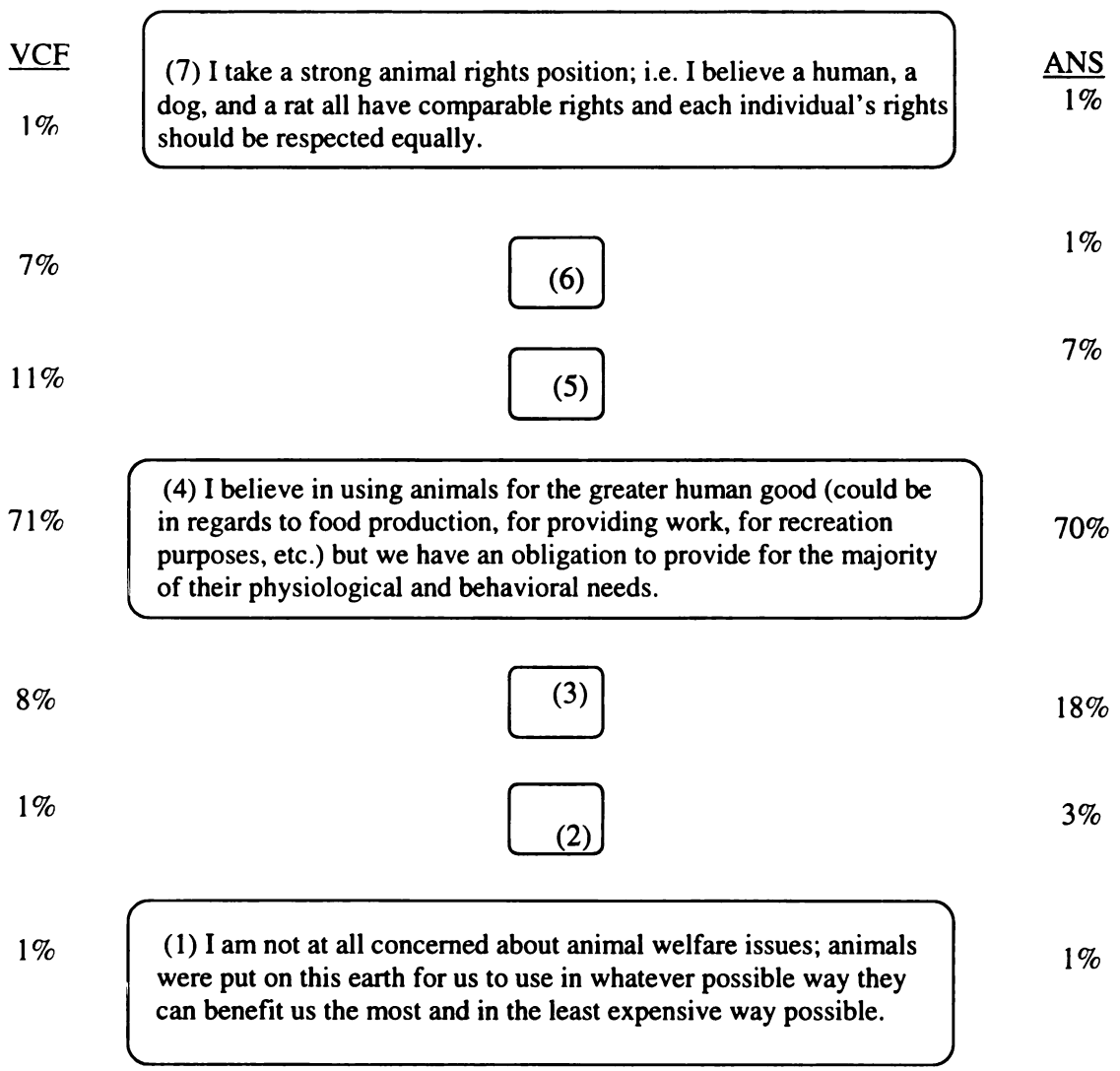
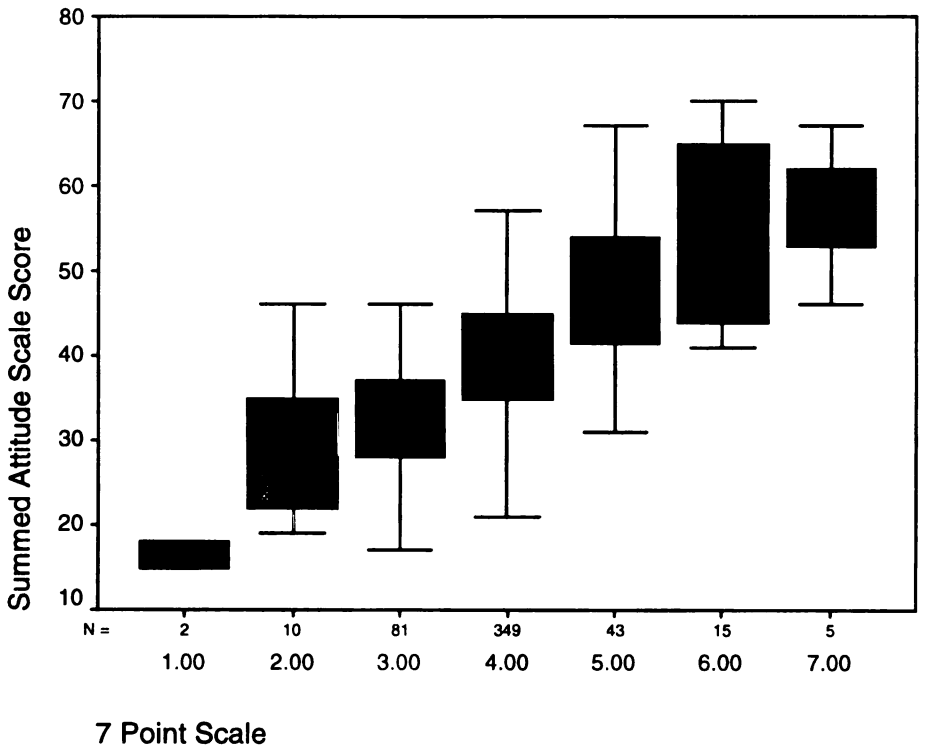


Fig. 5b. Correlation between respondents' self-assessed attitudes with our summed attitude scores. Our calculated scale score for respondents is on the Y-axis; the respondent's single-measure, self-assessment (from the definitions in Fig. 5a) is noted on the X-axis.



Qualitative results to "If you feel changes related to animal welfare are needed, what do you see as the major obstacle(s) to affecting changes in our current production systems?"

The results of content analysis to our open-ended question were strikingly similar between VCF and ANS, in terms of percentage of respondents volunteering specific theme areas in their answers. One hundred five of our 157 VCF respondents (67%) elected to respond to our open-ended question; 278 of our 446 ANS respondents (62%) chose to do the same (see Table 2). The overwhelmingly popular answer for both groups was an answer centering around economics (VCF: n = 74, 70% of respondents; ANS: n =

150, 54% of respondents). Closely related to that theme were responses relating to the belief that consumers would not support enhanced welfare, often expressed as the public's "expectation for cheap food" or "unwillingness to pay more" (VCF: n = 13; ANS: n = 25). Another commonly expressed theme was that of "tradition" (VCF: n = 19; ANS: n = 42). Tied closely to that theme, were responses related to producer attitudes (VCF: n = 17; ANS: n = 42).

Table 2. Common themes from the qualitative assessment of responses to the following question, "If you feel changes related to animal welfare are needed, what do you see as the major obstacle(s) to affecting changes in our current production systems?"

Theme Area	VCF (n=105)	ANS (n=278)
Economics	n=74	n=150
Lack of consumer support to pay	n=13	n=25
Tradition	n=19	n=42
Producer attitudes	n=17	n=42
Inadequate welfare science research	n=11	n=22
Disbelief of welfare science research	n=4	n=17
Anthropomorphism concerns	n=4	n=11
Fear of animal rights agenda	n=10	n=20
Lack of understanding by producers/consumers	n=15	n=33
Fear over-regulation	n=3	n=14
Undereducated/underpaid help	n=7	n=11
Corporate agriculture	n=3	n=11
Politics/government	n=10	n=8
Current housing designs	n=4	n=8
Insufficient monitoring by 3rd party	n=2	n=8
Lack of research money for welfare research	n=1	n=11
Too many animals to monitor	n=4	n=11
Lose business to other countries	n=3	n=11
Just want to defend current practices	n=3	n=42

One issue that became clear in reading all responses to this question were the sometimes passionate answers cited by respondents who simply wanted to defend current practices. For example, "Major obstacles are that there are very few changes that should be made,

and, in general, the public agrees with that and is unwilling to pay more for different production systems...;" "Those objecting to the current practices do not have adequate knowledge to support their opinion;" "No major changes are needed. Better understanding of animal behavior will allow us to produce animals more efficiently (lower cost, less illness, etc.)," and "The noise created by self-styled 'welfarists' who think they know all the answers (but don't) interfering with the understanding of the facts presented by scientific exploration (not personal emotion) and husbandrymen who actually care for and 'live with' the animals. These are more highly qualified to discern the facts because they learn how from the animals themselves rather than from some philosophical dreamer...No one who is truly hungry every day has any concern about animal welfare. That is a fact! One must be careful not to destroy a system that can feed those who are hungry."

Other sample responses follow:

Economics theme - "Profit margins are very thin on livestock operations. Increasing production costs without an economic return would be disastrous to animal agriculture and would likely force small operations out of business;"

"Farmers/producers cannot even break even in their operations so how can they think about more investment that does not provide tangible returns?"

Lack of consumer support theme - "In my research, the vast majority of consumers do not indicate a preference or ability to pay premium prices for animal products;" "The major obstacle is the unwillingness of consumers to pay for needed change;" "...a major obstacle to affecting changes in production systems that could improve animal welfare is consumer/political acceptance of higher food prices. The cheap food policy guarded by

the politicians to placate their constituents is at least partially to blame for the need of producers to take advantage of economies of scale (get big) and minimize production costs to make a living."

Research-related theme - "Finding practical alternatives that demonstrate sufficient benefit for the additional cost and are scientifically substantiated;" "...adequate scientific data to prove that certain practices we are currently utilizing are harmful or inhumane and that other practices are substantially better;" "...the dearth of properly conducted and analyzed experiments that define animal comfort, animal pain, animal stress, etc.;" "Lack of science-based information. Many concerns based on perceptions. Lack of research workers in animal welfare who research for practical on-farm solutions. Most simply research the problem...not (the) solution."

Tradition theme - "Tradition of production methods; traditional attitudes and unwillingness to change; extreme priority placed on efficiency of production;" "...overcoming the perception of 'that is how it has always been done' and look for alternatives that improve quality without dramatically altering costs. We have to get past the concept of 'that is how my father did it, so why does it need to be changed?' That is going to take a lot of education effort at all levels."

Producer attitudes theme - "The attitudes of livestock producers towards animal welfare must be changed. By increasing producer awareness and enhancing producer sensitivity to the need for improved animal care and handling, many of the everyday 'problems' in the industry could be 'cured';" "Changing the mindset of producers...loss of viewing animal husbandry as vocation...;" "Producers and extension educators need to stand back

and objectively examine what they are doing...too often we never notice or think about 'those lame cows' or 'those hock sores' etc...it has become 'normal'."

Fear of animal rights agenda - "The animal rights people have distorted the image of many justifiable production systems in an attempt to make all animal production systems undesirable. We need to educate the public about how animals are produced and not let the radicals dictate the picture;" "The only change needed is a change in the liberal interpretation of animal welfare that slants toward the animal rights point of view...major obstacle affecting change in our current system is government intervention based on liberal environmental myths and animal rights misinformation;" "Those proposing welfare changes do not have an agenda to devise change, their agenda is the cessation of animal production."

Discussion

We are somewhat concerned that the response rates for these populations (45% ANS, 31% VCF) may not accurately depict the entire population. We believe we have good representativeness in that demographic profiles appear to be in line with the national profiles for these two populations. Furthermore, in both populations, we did receive responses across the continuum of possible attitudes toward this topic. Regarding ANS, we do have additional validation in that their responses very closely paralleled those of our pilot ANS respondents (66% response rate).

We find intriguing how closely the result patterns for the two populations parallel one another. If the effects of gender differences and political view differences are accounted for, the numbers become strikingly similar. However, perhaps this should not come as a

surprise since many veterinary students in the US will have taken some animal science courses before entering veterinary school, and a number of those pursuing large animal/food animal emphasis will have two – five years of animal science undergraduate work as part of their academic preparation prior to veterinary school. Alternately, it could be a simple matter of working with the same industries, discussing topics with the same producers, and often being exposed to the same industry media, e.g. magazines. One other possibility, that remains to be tested, is that consumers and producers would respond to our questions in a like pattern.

It merits further exploration as to why our respondents seem rather definitive in viewing the different animal industries with differing levels of comfort. In two populations, in two distinct questions, sheep and beef industries were viewed preferentially to dairy, which was viewed preferentially to swine, which was viewed preferentially to the meat bird and layer industries. We believe this is likely a response to the level of perceived intensification of the industries, with people's level of comfort decreasing as an industry becomes more intensive. An alternate explanation is that the poultry and swine industries have received more media attention in the past several years.

With regards to the practices/outcomes results in Figure 3, we feel several explanations might pertain to these results. Lameness in dairy cattle, flooring effects on lameness of intensively managed animals, and poor/indifferent stockmanship can all be related to in a very direct, immediate sense. Very few people would question that these issues will relate to decreased animal welfare, and in all these situations, the impact of these factors on

productivity have been quite straightforward. On the other end of the spectrum for concern were early weaning in pigs, lack of foraging substrate for pigs, beak trimming in poultry and toe trimming in poultry. Several explanations are likely. For one, the effects of early weaning on pigs may take considerably longer to see; for example, aggressive tendencies and stereotypic behaviors. These concerns might also be countered by people's beliefs that early-weaned piglets still lead to increased herd health. Based on the occasional clarifying points written alongside people's survey responses, the relatively low concern about providing pigs with foraging substrates comes from practical considerations about the cost and time this would involve, plus the additional problem of removing the extra material from waste systems. Other clarifying points suggested that there still is not sufficient proof that hunger in breeding stock pigs is a concern or that stereotypic behavior in pigs is a concern. With regard to toe trimming and beak trimming, these results should be looked at cautiously. Over one-third of our respondents did not feel familiar enough with these procedures to offer an opinion. Of the remaining respondents, offered clarifiers often spoke to the issue that the alternatives to beak trimming and toe trimming - possible feather pecking and cannibalism – far outweighed any perceived problems with the former. One compelling difference between the ANS views and VCF views was the responses to both castration and dehorning without the use of anesthetic. VCF were significantly more concerned about these two issues. It may be their training sensitizes them more to animals feeling pain. It may be their training makes them more aware of anesthetics that may be available. It is also possible that this was a social desirability effect, with VCF trying to give the response they would most be expected to give.

In reading over the responses to our qualitative question, it becomes clear that if "perception is reality," we have a complex, multifactorial issue to contend with. Even if we do not agree with all of the obstacles that our respondents presented, those perceptions do exist, and are held by a percentage of industry leaders that are influencing the next generation of students, current and future producers, and, most likely, consumers. If much of the welfare science literature is largely known only by the welfare scientists, and we do not disseminate the results to students, producers and consumers, our progress is likely to continue to be very slow. Certainly in our free market society, this issue of how can farm animal welfare be enhanced without financially disabling one producer over another must be dealt with. Even if many producers should want to enhance farm animal welfare beyond current levels, with our current market structure, they are likely to lose market share if they raise their prices to cover any costs associated with welfare enhancements. Appleby (2004) raises the point that the public may fill out a survey that claims they value enhanced animal welfare, and, at that point in time, they are acting like citizens. But at the store, they are pulled by multiple factors (e.g. money, time) and may, at that point, behave as consumers and buy the cheapest products, when those products appear to be comparable. Subsequently, Appleby (2004) suggests that strictly letting a capitalistic market drive value-laden choices may not be sufficient.

The relationships between background variables and attitude scores are in line with other studies' findings on relationships with attitudes toward animal treatment. Similar gender findings have been observed by (Pifer et al., 1994; Wells and Hepper, 1997; Paul and Podberscek, 2000), similar findings with religiosity have been observed by (Bowd and

Bowd, 1989; Preece and Fraser, 2000). Similar findings related to political views have been seen with the often parallel values related to environmental concern (Dunlap et al., 2000).

Conclusion

Our results offer evidence that resistant attitudes toward farm animal welfare do exist in the ANS and VCF populations, but certainly are not the majority. Many respondents showed a high level of support/empathy for farm animal welfare. Perhaps equal to the need for continued research in the field of farm animal welfare is the obvious need for more dissemination of the welfare science research findings. We would certainly echo the sentiments of Millman and others (2004) that "it is critical that applied ethologists strive to present our work to a wide audience through publications, symposia, interdisciplinary research collaborations, and through curriculum development in veterinary and agricultural colleges."

We feel these survey-based studies represent an important step in understanding attitudes of stakeholders involved with animal agriculture. Important follow up research would also examine the attitudes of producers and consumers.

Acknowledgements

The authors express gratitude to P.Vidigal, D. Mace, J. Hammer, K. Mikula and S. Malone for assistance with data entry; to our MSU animal science faculty for assistance with pilot interviews and survey development; our national ANS and VCF respondents; and financial support from our USDA-Higher Education Challenge Grant.

References

Appleby, M.C., Hughes, B.O., editors, 1997. Animal Welfare. CAB International, Wallingford, UK.

Azjen, I., Fishbein, M., 1977. Attitude-behavior relations: A theoretical analysis and review of empirical research. Psychological Bulletin 84, 888-918.

Berg, B.L., 2001. Chapter 11 in Qualitative Research Methods for the Social Sciences. Allyn and Bacon, Needham Heights, MA.

Bowd, A.D., Bowd, A.C., 1989. Attitudes toward the treatment of animals: A study of Christian groups in Australia. Anthrozoos 3, 20-24.

Broom, D.M., Johnson, K.G., 1993. Stress and Animal Welfare. Chapman and Hall, London.

DeVellis, R.F., 2003. Scale Development: Theory and Applications. 2nd ed., Sage Publications, Thousand Oaks, CA.

Dillman, D.A., 2000. Mail and Internet Surveys: The Tailored Design Method, 2nd ed., John Wiley & Sons, Inc., NewYork.

Dunlap, R.E., Van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. Measuring endorsement of the new ecological paradigm: A revised NEP scale. J. Social Issues 56, 425-442.

Eagly, A.H., Chaiken, S., 1993. The Psychology of Attitudes. Harcourt Brace College Publishers, Orlando, FL.

Farm Animal Welfare Council. 2004. The Five Freedoms. Available: http://www.fawc.org.uk/freedoms.htm. Accessed Feb. 25, 2004.

Gale, G., Franck, L.S., Kools, S., Lynch, M., 2004, Parents' perceptions of their infant's pain experience in the NICU. Intl. J. of Nursing Studies 41(1), 51-58.

Gallup Poll, Analysis by D W Moore, 2003. Public lukewarm on animal rights. Available: http://www.gallup.com/poll/releases/pr030521.asp. Accessed June 2, 2003.

Grandin, T., 1998. Objective scoring of animal handling and stunning practices at slaughter plants. J. Am. Vet. Med. Assoc. 212(1), 36-39.

Grant, C., 2004. Behavioural responses of lambs to common painful husbandry procedures. Appl. Anim. Behav. Sci. 87, 255-273.

Greenhalgh, T., Taylor, R., 1997. Papers that go beyond numbers (qualitative research). BMJ 315, 740-743. Available: http://bmj.bmjjournals.com/cgi/content/full/315/7110/740. Accessed June 17, 2004.

Harrison, R., 1964. Animal Machines. Vincent Stuart, London.

Heleski, C.R., Zanella, A.J., Pajor, E.A. 2003. Animal welfare judging teams: A way to interface welfare science with traditional animal science curricula? Appl. Anim. Behav. Sci. 81, 279-289.

Heleski, C.R., Mertig, A.G., Zanella, A.J., 2004. Assessing attitudes toward farm animal welfare: A national survey of animal science faculty members. J. Anim. Sci. 82, 2806 – 2814.

Hemsworth, P.H., 2003. Human-animal interactions in livestock production. Appl. Anim. Behav. Sci. 81, 185-198.

Janis, I.L., Mann, L., 1965. Effectiveness of emotional role-playing in modifying smoking habits and attitudes. J. of Experimental Res. in Personality 1, 84-90.

Jobes, D.A., Nelson, K.N., Peterson, E.M., Pentiuc, D., Downing, V., Francini, K., Kiernan, A., 2004. Describing suicidality: an investigation of qualitative SSF responses. Suicide Life Threat Behav. 34(2), 99-112.

Millman, S.T., Duncan, I.J.H., Stauffacher, M., Stookey, J., 2004. The impact of applied ethologists and the International Society for Applied Ethology. Appl. Anim. Behav. Sci. 86, 299-311.

Mueller, D.J., 1986. Measuring Social Attitudes: A Handbook for Researchers and Practitioners. Teachers College Press, New York.

Paul, E.S., 2000. Empathy with animals and with humans: Are they linked? Anthrozoös 13, 194-202.

Paul, E.S., Podberscek, A.L., 2000. Veterinary education and students' attitudes towards animal welfare. Vet. Rec. 146, 269-272.

Pifer, L., Shimizu, K., Pifer, R., 1994. Public attitudes toward animal research: some international comparisons. Society and Animals 2, 95-113.

Preece, R., Fraser, D., 2000. The status of animals in Biblical and Christian thought: A study in colliding values. Society and Animals 8, 245-263.

Rushen, J., de Passille, A.M.B., Munksgaard, L., 1999. Fear of people by cows and effects on milk yield, behaviour and heart rate at milking. J. Dairy Sci. 82, 720-727.

Serpell, J.A., 2004. Factors influencing human attitudes to animals and their welfare. Anim. Welfare 13, S145-151.

Smith, E.R., Mackie, D.M., 2000. Chapter 8 in Social Psychology, 2nd ed., Psychology Press, Philadelphia, PA.

Tudor-Locke, C., Henderson, K.A., Wilcox, S., Cooper, R.S., Durstine, J.L., Ainsworth, B.E., 2003. In their own voices: definitions and interpretations of physical activity. Womens Health Issues 13(5), 194-199.

Wells, D.L., Hepper, P.G., 1997. Pet ownership and adults' views on the use of animals. Society and Animals 5, 45-63.

CHAPTER SEVEN - Conclusion

Summary of the research

The survey of student knowledge of/attitudes toward farm animal welfare showed the following: university animal science students, who represent both potential consumers, and future industry stakeholders, were surveyed via hard-copy questionnaires. Eighty-seven students were surveyed to assess attitudes and knowledge base regarding farm animal welfare. In 2003, 58 introductory animal science (INTRO) and 29 applied animal behavior (AN BEH) students were surveyed at the beginning (week 1, Early) and end (week 14, Late) of spring semester via a 58-question survey. Evidence of students' knowledge base was lower than anticipated. Some clear species perception differences were revealed. Students perceived that horses felt pain more similarly to humans than did other farm animal species, experienced boredom more similarly to humans than did other species, and students were more concerned about horses being kept in industry-typical scenarios than they were for other species. When presented with hypothetical (but industry-typical) scenarios for egg production facilities, dairy operations, pig facilities and horse training facilities, greater than 50% of all sampled groups stated they would either "not be very comfortable buying/using product from said facility" or "would not buy/use product from said facility." This goes counter to information commonly given out by some of the animal agriculture commodity groups. These groups purport that if people are informed about modern animal agriculture, without being exposed to radical messages from animal rights groups, that recipients of the communication will have a high comfort level with today's systems.

Chapter three explored one possible mechanism for enhancing awareness and fostering appreciation for animal welfare science...animal welfare judging as an assessment-based competition. Following a similar framework to traditional livestock judging, a competition-based model was developed to educate undergraduate students about animal welfare. The belief is that this helps integrate animal welfare science into the mainstream of animal science curricula. Students take a background course in understanding evolutionary biology, biological needs, behavioral and physiological indicators of differing levels of welfare, and how to holistically evaluate facilities, stockmanship and management schemes. Students are taught that while the assessment of various aspects of animal welfare can be objective and quantifiable, judgment decisions of which area will be acceptable in the continuum between very poor and very good welfare still comes down to ethics-based choices. Animal welfare assessment teaches students to integrate science-based knowledge with ethical values for an interdisciplinary approach to problem solving. Students evaluate competition scenarios on CD-ROMs for each species being judged, prepare an analysis, then make an oral presentation of why they assess one scenario as demonstrating a higher level of welfare than another. The knowledge of welfare science in making the assessment, as well as the persuasion in the presentation, are key factors in scoring these students. Furthermore, team assessment problems have now been integrated into these competitions, and mirror what is expected of welfare assurance scheme inspectors.

Competitions have now been held in 2002, 2003, and 2004 with a total of 64 student participants from the following schools: University of Wisconsin, University of Guelph, Purdue University, Michigan State University, University of Vermont, Cornell

University, Pennsylvania State University and Oregon State University. Post-contest surveys demonstrated that 99% of the students felt the development of animal welfare judging teams was a good idea and that they would recommend the course to fellow students.

It should be noted that while I did collect and assess perceptions of the participants to the welfare judging competitions, I did not have a sufficient number of controls to compare the impact of welfare judging, versus other teaching strategies, on affecting attitudes toward farm animal welfare.

Another goal of my Ph.D. process was to research attitudes of some of the primary stakeholders known to influence the animal agriculture industry. Animal science faculty (ANS) and Veterinary college faculty (VCF) were chosen as key stakeholders, who would be accessible via electronic surveys. Developing the questionnaire involved an initially long, but valuable step of interviewing 34 (69%) of the faculty members within our MSU animal science department. These interviews lent support to one of my early predictions: that most of these people have more empathetic attitudes toward farm animal welfare than what they may appear to have in a larger group of peers. In the "safe" environment of a one-on-one, confidential interview, using terms that deflect undue attention (e.g., animal husbandry vs. animal welfare), many of these interviewees expressed very high levels of concern for farm animal welfare.

The national ANS results showed, with an n = 446 (response rate = 45%), that respondents had reasonably high levels of comfort with the methods used for raising beef cattle and sheep; intermediate levels of comfort for dairy cattle and swine; and lower levels of comfort for meat birds and layer birds. From what I learned during my

interviews with pilot respondents, along with the assessment of national respondents' open-ended responses, I believe this finding would be consistent among other knowledgeable, U.S. stakeholders. Despite interests in economic efficiencies, which favor poultry and swine systems, a majority of our respondents still placed a high value on the opportunity for animals to move around, and the opportunity to engage in a broad spectrum of natural behaviors. Additionally, over half of the respondents also supported the concept that animals have sufficient space to lie down and comfortable substrate to lie upon. These four opportunities are provided for more frequently in U.S. beef and sheep facilities, than U.S. swine and poultry facilities. I believe this was reflected in our respondents' answers.

Greater than 90% of respondents supported general principles of animal welfare, such as keeping animals free from unnecessary fear and distress. Yet specific practices that have been shown to elicit pain indicators, e.g. castration without anesthetic, were deemed a concern by only one-third of the respondents. Again, based largely on interview responses and open-ended answer responses, I believe there are several reasons behind this apparent conflict. Even though research has shown that animals do show pain responses to interventions that are beyond mere restraint, many respondents still expressed the opinion that most of these responses come from the restraint and not the procedure itself. Others expressed the concern that anesthetic or analgesic would add too much expense to the marketed product. Still others expressed concern about the long-term food safety issues that might be associated with any increased use of anesthetic or analgesic.

The national VCF, with an n = 157 (response rate = 31%), showed higher, yet parallel, levels of concern for farm animal welfare. Several possibilities for this difference exist. One possibility is that our VCF respondents were simply more welfare-empathic than were our ANS respondents. Our VCF was represented by a higher percentage of females, and a higher percentage of liberals; however, even when these factors were controlled for, the VCF still had higher levels of concern for farm animal welfare. Another possibility is that veterinarians receive more training in the recognition of pain than most animal scientists. Though recognizing and trying to alleviate pain are just one aspect of animal welfare, these areas would have contributed to higher attitude scale scores in our respondents.

Concern amongst the VCF respondents appeared to be greater for those industries typically perceived as more intensive: layer birds, meat birds and swine (less than 50% agreed/strongly agreed that the predominant methods of production for these species provides appropriate animal welfare), as compared to the beef and sheep industries (greater than 75% agreed/strongly agreed). When asked to express their level of concern with various husbandry practices/outcomes - previously identified from a student survey – responses ranged from 89% agreeing that poor/indifferent stockmanship is a concern to a minimum of 24% agreeing that early weaning of piglets is a concern.

When comparing these two stakeholder groups, several background variables showed significant relationships with the summed attitude scale scores and were in line with the findings of other related studies. Females were more concerned about farm animal welfare than were males ($P < 0.01$) (Pifer et al., 1994; Wells and Hepper, 1997; Paul and Podberscek, 2000). Those with liberal political views were more concerned

about farm animal welfare than those with conservative views ($P < 0.01$) (Dunlap et al., 2000). Those expressing higher religiosity had less concern about farm animal welfare than those with lower religiosity ($P < 0.05$) (Bowd and Bowd, 1989; Preece and Fraser, 2000).

When presented with a 7-point scale where respondents could pick between two anchor definitions, one midpoint definition - "I believe in using animals for the greater human good, but we have an obligation to provide for the majority of their physiological and behavioral needs," or points in between, 71% VCF and 70% ANS chose the midpoint. There was a significant correlation ($P < 0.01$; $r = -0.541$) between respondents' self-assessed appraisal on this 7-point scale and their summed attitude scores on our scale of concern for animal welfare.

When asked to provide an open-ended (qualitative) response to a question asking the respondents to identify obstacles to enhancing farm animal welfare (if they felt enhancements were necessary), the five most common response themes were: economics, lack of consumer willingness to pay, tradition, producer attitudes, and inadequate welfare science research (in terms of quality, quantity, or ability to offer practical solutions). Specific sample quotes were presented in chapter six.

Limitations

Readers should take note of several points regarding the interpretation of the data contained in this dissertation. The first caution is that care should be used in extrapolating the information to other countries. These findings should be viewed as specific to United States' attitudes, and, specifically, the attitudes toward farm animal welfare of animal

science faculty and veterinary college faculty with a large animal/food animal emphasis. It is likely that cultural values of other countries would impact respective attitudes.

To repeat an earlier caution, the relatively low response rate for veterinary college faculty (VCF) does merit consideration.

Two attitude theories that relate to my observations

The research work presented in this thesis should provide a meaningful springboard toward enhanced understanding of attitudes toward farm animal welfare. As with other social issues, many peoples' attitudes toward farm animal welfare are complex. Two attitude theories that may explain some of this complexity follow. These theories were not tested, per se, within the context of this dissertation. However, in coupling what I learned from my readings in the social psychology/attitudes literature with what I observed in my data, I do feel these two theories help explain some of the complexity related to peoples' attitudes toward farm animal welfare.

The study of attitudes in the field of animal welfare has not yet been explored to the degree that I consider adequate. Given the fact that animal welfare research is not having the impact that scientists expect (Dawkins, 1997; Millman, 2004) the data generated here may provide some insights into the potential explanations. We may look at Festinger's (1957) published work on the Cognitive Dissonance Theory that states, in essence, if a person "needs" to behave in a way that is not in keeping with his/her internal attitude, they may feel cognitive dissonance (emotional discomfort); i.e. they may feel like they are being hypocritical. When this occurs, a person has essentially two options: he/she can change their behavior so it more nearly aligns with their attitude, or he/she can

change their attitude through rationalization so that it more nearly aligns with their behavior.

As an example, imagine that you are a young instructor just hired at an animal science department. You have always been very fond of animals and have tried to provide them with high standards of care. During the first year of your teaching appointment, you need to help teach introductory animal science laboratories. During tours of the campus farms, several students ask questions such as, "why are the sows in such small pens?" and "why don't the hens have more space?" You have been thinking the same questions, but did not want to appear naïve so you appreciate the students' questions. The farm managers answer to the effect, "the sows will fight too much if they're in group pens, and it's more cost effective to have the pens smallish" and "the hens actually do better in these cages than when they're all grouped together" and "if we don't have this many hens per building, we can't show an industry-typical example of making money." The senior instructors of the course back up the managers with comparable comments that support the status quo of the sample production systems. The following year, you find yourself in charge of the laboratories and similar student questions are raised. You mimic the answers you heard last year, even though you do not necessarily believe them. Nonetheless the students appear to accept them, and the following year they are that much easier to explain. In all likelihood, this hypothetical instructor's empathetic attitude toward farm animals has moved several degrees toward a hardened position on animal treatment. In other words, to reduce his/her own cognitive dissonance and feelings of hypocrisy, this person has rationalized him/herself into altering their attitude. This instructor might even try to further bolster his/her newly

refined, less empathetic attitude by seeking out additional information that supports current, intensive housing systems.

Another attitude theory that I feel is relevant to stakeholder attitudes toward farm animal welfare is that of McGuire's Inoculation theory (1964), even though the manner in which I am about to use it is not precisely in line with the classic definition of McGuire's theory. The classic definition of McGuire's theory is where you purposely try to assist a person or group in resisting attitude change because you know they are going to be subjected to a persuasive message. For example, McAlister et al., (1980) wanted to help seventh-graders resist the temptations of smoking brought on by peer pressure, so they had these students go through role-play exercises with high school juniors and seniors who tried to get them to smoke. They provided the younger students with prepared counter arguments (e.g. "I'd be a real chicken to smoke just to impress you.") Two years later, the control students were smoking at a rate of 18% of the student population; whereas the inoculated test group was smoking at a rate of 7% of the student population. McGuire's concept behind the inoculation theory was the same as providing a vaccine that would elicit immunity by exposing the body to weak doses of infection.

Though no one, to the best of my knowledge, has specifically been trying to provide "inoculation" to stakeholders who might be at risk of becoming more empathetic toward farm animal welfare, I do feel there is a subculture that often provides each other rationalization counterarguments, thus bolstering resistant attitudes. Sample quotes to this effect can be seen in chapter six.

For example, if a welfare scientist says, "Farm mammals feel pain in a way similar to humans based on all current evidence regarding their neural circuitry and their

behavioral and physiological responses to painful stimuli," a resistant stakeholder may respond, "Prove it...they can't talk. Besides they vocalize just from being handled." The welfare scientist might follow with, "Yes, but they vocalize more frequently and at a higher frequency when receiving the painful stimuli plus handling, as compared to just being handled." The resistant stakeholder might follow with, "Well, even if a local anesthetic might reduce pain, the producers will never invest the time or money to do that, and besides, the anesthetic might have more side effects than the painful stimuli itself." These are examples of counterarguments used to bolster one's current attitude position.

Work still to be done

A further question is, once we have this information, how do we most constructively use it to initiate changes? Should it be given to industry leaders with the hope that it will incite producer-driven change? Should it serve as a springboard to develop education programs for consumers with the hope that changes will be consumer-driven? Should it be given to legislative bodies to try to enforce changes desired by the people?

I believe that we need comparable attitude surveys of the U.S. consumers and U.S. producers. These will be expensive, time-consuming endeavors, but valuable to a clearer understanding of U.S. attitudes toward farm animal welfare. If the public does not support enhanced farm animal welfare at a high level, legislative bodies will need to decide if there is sufficient rationale to justify enhancements for the long-term good of society. If, on the other hand, the public does support enhanced farm animal welfare at a

high level, industry influencers need to decide how best to accomplish this without making the producer's opportunity for success yet more difficult.

There is a tremendous need for educating stakeholders about the findings from welfare science research. For many people, all that is needed to alter their attitudes is education about animal behavior and how various production methods, husbandry practices and housing systems impact farm animal welfare. For those with truly resistant attitudes toward farm animal welfare, more creative persuasion messages need to be developed. Both of these avenues, education and persuasion, need to be explored.

References

Bowd, A.D., Bowd, A.C., 1989. Attitudes toward the treatment of animals: A study of Christian groups in Australia. Anthrozoos 3, 20-24.

Dawkins, M.S., 1997. D.G.M. Wood-Gush memorial lecture: why has there not been more progress in animal welfare research? Appl. Anim. Behav. Sci. 53, 59-73.

Dunlap, R.E., Van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. Measuring endorsement of the new ecological paradigm: A revised NEP scale. J. Social Issues 56, 425-442.

Festinger, L., 1957. A Theory of Cognitive Dissonance. Row, Peterson, Evanston, IL.

McGuire, W.J., 1964. Inducing resistance to persuasion: Some contemporary approaches. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology (Vol. 1), Academic Press, New York, pp. 192-229.

Millman, S.T., Duncan, I.J.H., Stauffacher, M., Stookey, J., 2004. The impact of applied ethologists and the International Society for Applied Ethology. Appl. Anim. Behav. Sci. 86, 299-311.

Paul, E.S., Podberscek, A.L., 2000. Veterinary education and students' attitudes towards animal welfare. Vet. Rec. 146, 269-272.

Pifer, L., Shimizu, K., Pifer, R., 1994. Public attitudes toward animal research: some international comparisons. Society and Animals 2, 95-113.

Preece, R., Fraser, D., 2000. The status of animals in Biblical and Christian thought: A study in colliding values. Society and Animals 8, 245-263.

Wells, D.L., Hepper, P.G., 1997. Pet ownership and adults' views on the use of animals. Society and Animals 5, 45-63.

Compiled References

Alwin, D.F., Krosnick, J.A., 1991. The reliability of survey attitude measurement; the influence of question and respondent attributes. Sociological Meth. & Res. 20(1), 139-181.

American Veterinary Medical Association Web site. Veterinary market statistics. Available at www.avma.org/membshp/marketstats/usvets.asp. Accessed May 19, 2004.

Animal Agriculture Alliance poll (2004) Consumers' attitudes about animal welfare. Accessed at: www.animalagalliance.org/images/ag_insert/2004_Pub_Op_PR.ppt. Accessed May 19, 2004.

Animal Agriculture Alliance Web site. Trust in agriculture and support for freedom of food choice is high. Available at www.animalagalliance.org/main/home.cfm?Section=Trust_In_Agriculture&Category=PressReleases. Accessed May 19, 2004.

Appleby, M.C., Hughes, B.O., editors, 1997. Animal Welfare. CAB International, Wallingford, UK.

Armstrong, J.D., Zanella, A., Sigurdson, C., Pajor, E.A., 2002. Exceeding expectations in animal welfare. Proceedings of the American Association of Swine Veterinarians pp 237-244. Kansas, Missouri, USA.

Association of American Veterinary Medical Colleges Web site. VMCAS applicant and class data. Available at http://aavmc.org/vmcasstat.htm. Accessed May 18, 2004.

Azjen, I., Fishbein, M., 1977. Attitude-behavior relations: A theoretical analysis and review of empirical research. Psychological Bulletin 84, 888-918.

Azjen, I., Fishbein, M., 1980. Understanding Attitudes and Predicting Social Behavior. Prentice-Hall, Englewood Cliffs, NJ.

Babbie, E., 1990. Survey Research Methods, 2nd Ed., Wadsworth Publishing: California.

Barnett, J.L., Hemsworth, P.H., 2003. Science and its application in assessing the welfare of laying hens in the egg industry. Aust. Vet. J. 81(10), 615-624.

Berg, B.L., 2001. Chapter 11 in Qualitative Research Methods for the Social Sciences. Allyn and Bacon, Needham Heights, MA.

Bennett, R., 1998. Measuring public support for animal welfare legislation: A case study of cage egg production. Anim. Welfare 7(1), 1-10.

Blokhuis, H.J., Ekkel, E.D., Korte, S.M., Hopster, H., van Reenen, C.G. 2000. Farm animal welfare research in interaction with society. Veterinary Quarterly. 22(4), 217-222.

Bowd, A.D., Bowd, A.C., 1989. Attitudes toward the treatment of animals: A study of Christian groups in Australia. Anthrozoos 3, 20-24.

Broom, D.M., Johnson, K.G., 1993. Stress and Animal Welfare. Chapman and Hall, London.

Broom, D.M., 2003. Transport stress in cattle and sheep with details of physiological, ethological and other indicators. Dtsch. Tierarztl. Wochenschr. 110(3), 83-89.

Cheeke, P.R. 1999. Shrinking membership in the American Society of Animal Science: does the discipline of poultry science give us some clues? Journal of Animal Science 77, 2031-2038.

Converse, J.M., Presser, S. 1986. Survey Questions – Handcrafting the Standardized Questionnaire. Sage Publications: Thousand Oaks, California.

Coorts, G.D., 1987. Updating today's college curriculum for tomorrow's agriculture. Nat. Assoc. Coll. Teachers' Agric. J. 31(2), 20.

Davis, S.L., Cheeke, P.R. 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.

Dawkins, M.S., 1997. D.G.M. Wood-Gush Memorial lecture: Why has there not been more progress in animal welfare research? Appl. Anim. Beh. Sci. 53: 59-73.

DeVellis, R.F., 2003. Scale Development: Theory and Applications. 2nd ed., Sage Publications, Thousand Oaks, CA.

Dillman, D.A., 2000. Mail and Internet Surveys: The Tailored Design Method, 2nd ed., John Wiley & Sons, Inc., NewYork.

Driscoll, J.W. 1992. Attitudes toward animal use. Anthrozoös. 5(1), 32-39.

Duncan, I.J.H., 2001. Animal welfare issues in the poultry industry: is there a lesson to be learned? J. Appl. Anim. Welf. Sci., 4(3), 207-221.

Dunlap, R.E., Van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. Measuring endorsement of the new ecological paradigm: A revised NEP scale. J. Social Issues 56, 425-442.

Eagly, A.H., Chaiken, S., 1993. The Psychology of Attitudes. Harcourt Brace College Publishers, Orlando, FL.

4-H web site. 2002. Available: http://www.4-H.org. Accessed Jan. 14, 2002.

FFA web site. 2002. Available: http://www.FFA.org. Accessed Jan. 14, 2002.

Farm Animal Welfare Council. 2004. The Five Freedoms. Available: http://www.fawc.org.uk/freedoms.htm. Accessed Feb. 25, 2004.

FASS (Federation of Animal Science Societies), 1999. GUIDE For the Care and Use of Agricultural Animals in Agricultural Research and Teaching. Federation of Animal Science Societies, Savoy, Illinois, USA.

Festinger, L., 1957. A Theory of Cognitive Dissonance. Row, Peterson, Evanston, IL.

Field, T.G., Green, R.D., Gosey, J.A., Ritchie, H.D., 1998. A summary of intercollegiate judging activity, funding and philosophy. Nat. Assoc. Coll. Teachers' Agric. J. September, 27-31.

Fink, E.L., Kaplowitz, S.A., Hubbard, S.M., 2002. Oscillation in beliefs and decisions. In: Dillard JP, Pfau M, eds. The Persuasion Handbook: Developments in Theory and Practice. Thousand Oaks, CA: Sage, 17-38.

Fraser, A.F., Broom, D.M., 1990. Farm Animal Behaviour and Welfare. 3rd Ed. Ballihre Tindall, London, UK.

Fraser, D. 2003. Assessing animal welfare at the farm and group level: the interplay of science and values. Animal Welfare. 12, 433-443.

Freese, B., 2000. Survey says people will pay more for family farm-raised pork. Successful Farming. Accessed at http://www.agriculture.com/default.sph/gNews.class?FNC=DetailNews_Asearch_listAgNews_html_43600. Accessed November 14, 2001.

Furnham, A., McManus, C., Scott, D. 2003. Personality, empathy and attitudes to animal welfare. Anthrozoös. 16(2), 135-146.

Gale, G., Franck, L.S., Kools, S., Lynch, M., 2004, Parents' perceptions of their infant's pain experience in the NICU. Intl. J. of Nursing Studies 41(1), 51-58.

Gallup Poll, Analysis by D W Moore, 2003. Public lukewarm on animal rights. Available: http://www.gallup.com/poll/releases/pr030521.asp. Accessed June 2, 2003.

Graf, B., Senn, M., 1999. Behavioural and physiological responses of calves to dehorning by heat cauterization with or without local anaesthesia. Appl. Anim. Beh. Sci. 62(2-3), 153-171.

Grandin, T., 1998. Objective scoring of animal handling and stunning practices at slaughter plants. J. Am. Vet. Med. Assoc. 212(1), 36-39.

Grandin, T., 2000. Effect of animal welfare audits of slaughter plants by a major fast food company on cattle handling and stunning practices. J. Amer. Vet. Med. Assoc. 216: 848-851.

Grant, C., 2004. Behavioural responses of lambs to common painful husbandry procedures. Appl. Anim. Behav. Sci. 87, 255-273.

Greenhalgh, T., Taylor, R., 1997. Papers that go beyond numbers (qualitative research). BMJ 315, 740-743. Available: http://bmj.bmjjournals.com/cgi/content/full/315/7110/740. Accessed June 17, 2004.

Guthrie, L.D., Majeskie, J.L., 1997. Dairy cattle judging teaches critical life skills. J. Dairy Sci. 80(8), 1884-1887.

Harrison, R., 1964. Animal Machines. Vincent Stuart, London.

Heleski, C.R., Zanella, A.J., Pajor, E.A. 2002. A novel method for teaching animal welfare concepts: animal welfare judging teams. J. Anim. Sci. 80 (Suppl. 1 Abstracts) p. 164.

Heleski, C.R., Zanella, A.J., Pajor, E.A. 2003. Animal welfare judging teams: A way to interface welfare science with traditional animal science curricula? Appl. Anim. Behav. Sci. 81, 279-289.

Heleski, C.R., Mertig, A.G., Zanella, A.J., 2004. Assessing attitudes toward farm animal welfare: A national survey of animal science faculty members. J. Anim. Sci. 82, 2806-2814.

Hemsworth, P.H., Barnett, J.L., Hansen, C. 1986. The influence of handling by humans on the behaviour, reproduction and corticosteroids of male and female pigs. Applied Animal Behaviour Science. 15, 303-314.

Hemsworth, P.H., Barnett, J.L., Breuer, K., Coleman, G.J., Matthews, L.R. 1995. An investigation of the relationships between handling and human contact and the milking behaviour, productivity and welfare of commercial dairy cows. Research Report on Dairy Research and Development Council Project, Atwood, Australia.

Hemsworth, P.H., Coleman, G.J., 1998. Human-Livestock Interactions: The Stockperson and the Productivity and Welfare of Intensively Farmed Animals. CAB International, Oxon, UK.

Hemsworth, P.H., Coleman, G.J., Barnett, J.L., Borg, S., Dowling, S., 2002. The effects of cognitive behavioral intervention on the attitude and behavior of stockpersons and the behavior and productivity of commercial dairy cows. J. Anim. Sci. 80, 68-78.

Hemsworth, P.H., 2003. Human-animal interactions in livestock production. Appl. Anim. Behav. Sci. 81, 185-198.

Holloway, L.A., Waran, N., Austin, E.J., 1999. Assessing public attitudes towards pig welfare in the UK. The Pig Journal 44, 38-51.

Janis, I.L., Mann, L., 1965. Effectiveness of emotional role-playing in modifying smoking habits and attitudes. J. of Experimental Res. in Personality 1, 84-90.

JAVMA News Website. Sow housing task force members appointed. Available at: www.avma.org/onlnews/javma/jun04/04060lm.asp. Accessed May 31, 2004.

Jobes, D.A., Nelson, K.N., Peterson, E.M., Pentiuc, D., Downing, V., Francini, K., Kiernan, A., 2004. Describing suicidality: an investigation of qualitative SSF responses. Suicide Life Threat Behav. 34(2), 99-112.

Kellert, S.R., 1980. American attitudes toward and knowledge of animals: an update. Int. J. Stud. Anim. Prob. 1(2), 87-119.

Kellert, S.R., 1988. Human-animal interactions: a review of American attitudes to wild and domestic animals in the twentieth century. In A.N. Rowan (Ed.) Animals and People Sharing the World. pp. 137-175.

Kent, J.E., Molony, V., Graham, M.J., 1998. Comparison of methods for the reduction of acute pain produced by rubber ring castration or tail docking of week-old lambs. Vet. J. 155(1), 39-51.

LaPiere, R.T., 1934. Attitudes vs. actions. Soc. Forc. 13, 230-237.

Lawrence, A.B., Terlouw, E.M., 1993. A review of behavioral factors involved in the development and continued performance of stereotypic behaviors in pigs. J. Anim. Sci. 71(10), 2815-2825.

Lindberg, A.C., Nicol, C.J., 1996. Space and density effects on group size preferences in laying hens. Br. Poult. Sci. 37(4), 709-721.

Lindgren, B.W., 1976. Statistical Theory. Third edition. Macmillan Publishing Co., Inc., New York, NY.

Litwin, M.S., 1995. How to Measure Survey Reliability and Validity. Thousand Oaks, CA: Sage Publications.

Matthews, S., Herzog, H.A. 1997. Personality and attitudes toward the treatment of animals. Society and Animals. 5(2), 169-175.

McAlister, A., Perry, C., Killen, J., Slinkard, L.A., Maccoby, N., 1980. Pilot study of smoking, alcohol and drug abuse prevention. American J. of Public Health 70, 719-721.

McCann, J.S., McCann, M.A., 1992. Judging team members reflection on the value of livestock, horse, meats, and wool judging programs. Prof. Anim. Sci. 8, 7-13.

McGuire, W.J., 1964. Inducing resistance to persuasion: Some contemporary approaches. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology (Vol. 1), Academic Press, New York, pp. 192-229.

Milligan, B.N., Duffield, T., Lissemore, K., 2004. The utility of ketoprofen for alleviating pain following dehorning in young dairy calves. Canad. Vet. J.-Revue Veterinaire Canadienne 45(2), 140-143.

Millman, S.T., Duncan, I.J.H., Stauffacher, M., Stookey, J., 2004. The impact of applied ethologists and the International Society for Applied Ethology. Appl. Anim. Behav. Sci. 86, 299-311.

Molony, V., Kent, J.E., McKendrick, I.J., 2002. Validation of a method for assessment of an acute pain in lambs. Appl. Anim. Beh. Sci. 76(3), 215-238.

Morris, M., 2000. Animal care ethics, ANZCCART, and public perceptions of animal use ethics. J. of Agricultural & Environmental Ethics 13(3-4), 249-257.

Mueller, D.J., 1986. Measuring Social Attitudes: A Handbook for Researchers and Practitioners. Teachers College Press, New York.

National Pork Producers Council Web site. Gestation stalls – the facts. Available at: www.nppc.org/public_policy/gestation_stalls.html. Accessed May 31, 2004.

NCR-131, 2001, North Central Regional Committee for Animal Care and Behavior. Membership list, also as retrieved on January 3, 2002 from http://www.liru.asft.ttu.edu/Collab/NCR-131/ncr131.htm.

Newman, I., McNeil, K., 1998. Conducting Survey Research in the Social Sciences. University Press of America.

NHJTCA Handbook. 1997. Offical Handbook of the National Horse Judging Team Coaches' Association. http://www.showscene.com/Handbook2000.PDF.

Paul, E.S., Serpell, J., 1992. Why children keep pets – the influence of child and family characteristics. Anthrozoös 5(4), 231-244.

Paul, E.S., 2000. Empathy with animals and with humans: Are they linked? Anthrozoös 13, 194-202.

Paul, E.S., Podberscek, A.L., 2000. Veterinary education and students' attitudes towards animal welfare. Vet. Rec. 146, 269-272.

Pifer, L., Shimizu, K., Pifer, R., 1994. Public attitudes toward animal research: some international comparisons. Society and Animals 2, 95-113.

Potter, D.L., 1999. Is George Mason a learning-centered university? Inventio, Feb. 1, 1, Sec. 6. Retrieved January 3, 2002 from http://www.doiiit.gmu.edu/Archives/feb98/dpotter_7.htm.

Preece, R., Fraser, D., 2000. The status of animals in Biblical and Christian thought: A study in colliding values. Society and Animals 8, 245-263.

Rollin, B.E., 1995. Farm Animal Welfare (Social, Bioethical and Research Issues). Iowa State University Press, Ames, Iowa, USA.

Rushen, J., 1996. Using aversion learning techniques to assess the mental state, suffering, and welfare of farm animals. J. Anim. Sci. 74(8), 1990-1995.

Rushen, J., de Passille, A.M.B., Munksgaard, L., 1999. Fear of people by cows and effects on milk yield, behaviour and heart rate at milking. J. Dairy Sci. 82, 720-727.

Schillo, K.K., 1997. Teaching animal science: education or indoctrination? J. Anim. Sci. 75(4), 950-953.

Schuman, H., Johnson, M.P., 1976. Attitudes and behavior. Ann. Rev. of Soc. 2, 161-207.

Schuman, H., 1995. Attitudes, beliefs, and behavior. In: Cook K S, Fine GA, House JS, eds. Sociological perspectives on social psychology. Pearson Education POD, 68-89.

Serpell, J.A., Parsons, T.D., 2001. Food animal husbandry and the new millennium. J. Appl. Anim. Welf. Sci. 4(3), 169-173.

Serpell, J.A., 2004. Factors influencing human attitudes to animals and their welfare. Anim. Welfare 13, S145-151.

Smith, E.R., Mackie, D.M., 2000. Chapter 8 in Social Psychology, 2nd ed., Psychology Press, Philadelphia, PA.

Smith, G.C., 1989. Developing critical thinking, communication skills, and leadership in animal science students. J. Anim. Sci. 67 (Suppl. 1), 601.

Snyder, M., Ickes, W., 1985. Personality and social behavior. In: Lindzey G., Aronson E., eds. Handbook of Social Psychology. 3rd ed. New York: Random House, 883-947.

Squires, M.W., Bokyani, R.P.Jr., Toelle, V.D., Stephens, J.F, 1991. Development and evaluation of an intramural poultry judging contest. Poultry Sci. 70(2), 260-264.

Swanson, J.C., 1995. Farm animal well-being and intensive production systems. J. Anim. Sci. 73, 2744-2751.

Swanson, J.C., 1999. What are animal science departments doing to address contemporary issues? J. Anim. Sci. 77, 354-360.

Taylor, A.A, Weary, D.M., 2000. Vocal responses of piglets to castration: identifying procedural sources of pain. Appl. Anim. Beh. Sci. 70(1), 17-26.

Taylor, M.E., 1990. Empowering freshmen to design their own learning experiences, Nat. Assoc. Coll. Teachers' Agric. J. June, 46-49.

Tudor-Locke, C., Henderson, K.A., Wilcox, S., Cooper, R.S., Durstine, J.L., Ainsworth, B.E., 2003. In their own voices: definitions and interpretations of physical activity. Womens Health Issues 13(5), 194-199.

Veissier, I., Sarignac, C., Capdeville, J. 1999. Methods to assess the welfare of domestic animals. Productions Animales 12(2), 113-121.

Waltman, 2002. The impact of the animal welfare judging team experience on undergraduate students. Proceedings of the Regional ISAE, Quebec City, Canada.

Wells, D.L., Hepper, P.G., 1997. Pet ownership and adults' views on the use of animals. Society and Animals 5, 45-63.

Wohlt, J.E., Allyn, M.E., Zajac, P.K., Katz, L.S., 1994. Cortisol increases in plasma of Holstein heifer calves from handling and method of electrical dehorning. J. Dairy Sci. 77(12), 3725-3729.

Zanella, A.J., Broom, D.M., Hunter, J.C., Mendl, M.T., 1996. Brain opioid receptors in relation to stereotypies, inactivity and housing in sows. Physiol. Behav. 59(4/5), 769-775 and 60(2):685.