

Consumer preferences for farm animal welfare: results from a telephone survey of US households

RW Prickett, F Bailey Norwood* and JL Lusk

Department of Agricultural Economics, Oklahoma State University, 426 Agricultural Hall, Stillwater, OK 74078, USA

* Contact for correspondence and requests for reprints: bailey.norwood@okstate.edu

Abstract

As animal industry and animal advocacy groups debate how farm animals should be treated, little research has focused on the attitudes of consumers in the United States. This study utilises results of a representative telephone survey to measure consumer attitudes towards farm animal welfare, and investigates how these attitudes vary across individuals. The survey finds that consumers desire high standards of animal care, even if it raises food prices and involves government regulation. Support is particularly strong from females, Democrats, and residents of the Northeastern United States. To provide high standards of animal care, consumers as a whole perceive allowing animals to exhibit natural behaviours and exercise outdoors to be more important than protection from other animals, shelter, socialisation, and comfortable bedding. Consumers vary in their perceptions though, and are divided into three classes: Naturalists, Price Seekers, and Basic Welfarists. Naturalists place great importance on allowing animals to exhibit natural behaviours and exercise outdoors, and comprise 46% of the sample. Price Seekers, comprising 14% of the sample, are primarily concerned with low prices. Basic Welfarists make up 40% of the respondents, and value animal welfare but perceive it can be achieved by simply providing food, water, and treatment for injury and disease. This last group perceives amenities, such as access to outdoors and ability to exhibit natural behaviours, unimportant for the well-being of farm animals.

Keywords: animal welfare, consumer attitudes, consumer preferences, factory farming, farm animal, food preferences

Introduction

Animal agriculture has experienced two significant changes in recent decades. One is the widespread adoption of confinement production facilities for layers, broilers, pigs, veal calves, and to a lesser extent dairy and beef cattle. Another is increased consumer concern for the well-being of farm animals. In the US, these two changes result in conflict, as exemplified by recent state referenda in Arizona, Florida, and California, which banned the housing of pigs and layers in small cages. Reconciling this conflict requires greater knowledge of consumer preferences for livestock and poultry production practices. The purpose of this research is to investigate such preferences for US consumers.

In the early part of the 20th century, most livestock were raised on diversified farms with plentiful space and outdoor access for the animals. As a result, farm animals exhibited many 'natural' behaviours. Pigs were free to root in the soil and graze, and chickens were free to forage outdoors and lay eggs in nests. These opportunities were provided by the farmer, not out of concern for the animal, but as a result of a lower level of technological and biological understanding. For example, pigs and chickens had to be allowed outdoors to obtain the vitamins, minerals, and other nutritional requirements that standard feed rations at the time did not contain (Davis *et al* 1928).

Over time, technologies were developed to overcome these feed deficiencies, in addition to other animal housing innovations, which made it more profitable to house laying hens, broilers, veal calves, and pigs indoors for their entire lives, often in space allotments slightly larger than the animal itself. For example, although one hen needs approximately 1,625 cm² to stand, lie comfortably, and turn around freely (Dawkins & Hardie 1989), modern confinement operations only furnish 310–432 cm² of space per bird (in the USA). While such farms provide enhanced protection from weather and predators, the expense of such buildings require they hold as many animals as possible, resulting in small space allowances. Moreover, technologies such as automatic egg retrieval belts and farrowing crates place the animal in unnatural settings. Although hens and sows have an instinct to build and raise offspring in nests, the retrieval belts and farrowing crates deny this behavioural need, resulting in stress for the animal (Wiepkema & Koolhaas 1993; Appleby *et al* 2004; Task Force Report 2005).

Consequently, people who believe animals suffer in such confinement facilities have formed interest groups and raised funds to oppose so-called 'factory' farms. Through this opposition, the farm animal welfare issue has become perhaps the most controversial and publicised animal agri-

culture topic over the past five years. Although the debate concerns numerous topics (eg, tail docking, feather pecking, lack of outdoor access, and the prohibition of other natural animal behaviours), the use of gestation crates and battery cages are the practices most targeted by animal advocacy groups, and have become symbols of the farm animal debate. Consumer reaction to farm practices and animal advocacy organisations has forced policy-makers, restaurants, and food retailers to consider animal welfare, often for the first time.

Studies have demonstrated that Americans as a whole are concerned about farm animal welfare. The Center for Food Integrity conducted a survey that revealed Americans consider humane farm animal treatment more important than worker care, but less important than nine other topics, such as cost of food and food safety (Bennett 2008; Center for Food Integrity 2008). A survey of Ohioans revealed that a large majority of Americans agreed with the following statements: (i) even though some farm animals are used for meat, the quality of their lives is important; (ii) the well-being of farm animals is just as important as the well-being of pets; and (iii) farm animals should be protected from feeling pain. The survey also revealed that most Americans said they would pay more for meat coming from humanely treated animals (Rauch & Sharp 2005), a result verified by two separate studies (Market Directions 2004; Wilson 2007; Arunachalam *et al* 2009).

The European Union has been more active in documenting consumer concerns. Published studies on animal welfare preferences within the Union are numerous and varied. On the qualitative side, studies such as Harper and Makatouni (2002) have utilised personal interviews to gain an intimate knowledge of how consumers seek and interpret food attributes associated with animal well-being. On the quantitative side are studies such as Frewer *et al* (2005) who conducted large-scale internet surveys regarding consumer attitudes, and Bennett *et al* (2002) who measured peoples' willingness to pay for farm animal welfare improvements. The most intensive survey conducted on the farm animal welfare issue was conducted by the Eurobarometer in 2005, which conducted personal interviews with citizens across the European Union on a range of topics related to animal well-being.

Farm animal welfare is becoming an increasingly important topic within the US, as evidenced by Proposition 2 in California. Food producers and policy-makers within the US must now learn how to respond to concerns about farm animal welfare. This requires an understanding of how consumers prefer animals to be treated, in addition to the preferences of animal advocacy organisations. For food producers who intend to target the compassionate consumer, understanding how people's demographics characteristics relate to concerns for animal welfare will help them segment markets and develop niche marketing strategies. The objectives of this study were as follows.

Objective 1 — Explore consumer attitudes toward farm animal welfare and how attitudes vary by demographic characteristics

While it is clear that some individuals exhibit great concern for the well-being of farm animals, whether this concern extends to the general public is less clear. Overall concern for farm animal welfare is measured in this study by responses to three key survey questions administered in a nationwide telephone survey.

Concern for farm animal welfare has induced some producers to distinguish their food products with labels claiming better animal treatment. For example, the American Humane Association and the Animal Welfare Institute have created certification programmes to assure consumers that products with their label have been raised under higher standards of care. These labels have varying standards that their members must adhere to in order to qualify for the programme. Additionally, some producers market their product directly to food retailers and restaurants, touting high welfare standards in their sales-pitch.

Effective marketing of animal-friendly products requires an understanding of how demographics correlate with animal welfare concerns. For example, conversations with one Iowa pork producer revealed that his customers on the West Coast placed a higher priority on animal welfare than those on the East Coast. If true, such information would aid other producers in establishing a profitable marketing campaign by concentrating on the Western US.

Additionally, consumer research has shown that when advertising towards men, one should tout a single specific reason for purchasing the product, whereas women are more influenced by advertising if given multiple reasons (Meyers-Levy 1989; Gigerenzer, 2007). When developing promotion campaigns for products, such as meat labelled as more humane, it would be helpful to know whether women care more about animal welfare than men. For these and other reasons, to better understand how farm animal welfare views are affected by demographics, this research investigates how answers to survey questions about farm animal welfare varies across certain demographics such as gender, region and political affiliation.

Objective 2 — Explore the relative desirability of alternative animal production practices

The increased awareness of humane food products in the USA can be partly attributable to animal advocacy groups such as the HSUS, Farm Sanctuary, and PETA. With a combined 11.5 million members and roughly US\$134 million in revenue in recent years, these groups have substantial power to influence the food market (Sarasohn 2006; PETA 2007). These groups have made it clear what aspects of production they deem important for animal welfare. For example, such groups place a greater emphasis on space per animal rather than protection from

injury by other animals. It is unlikely that the membership of animal advocacy groups is representative of the US citizenry. Thus, it is not clear what the average American thinks is important for farm animal welfare. For example, is the American public more concerned about animals exhibiting 'natural' behaviours or are they more concerned about freedom from injury and disease? This study seeks to answer this, and similar related questions.

Such information will not only aid policy-making, but help firms seeking premiums for greater animal care by determining the animal practices consumers value most. When advertising how animals are raised or placing farm pictures on products, understanding the farm practices consumers perceive as best for the animal will help ensure a higher premium for these products and aid this nascent market in expanding. Thus, the second objective utilises a survey question to measure which farm practices are deemed the most important for animal welfare by the US population.

Objective 3 — Explore the importance of farm animal welfare relative to other social issues

Providing farm animals with better care could have consequences for the safety of food, the environment, and the health of the farm economy. Thus, the relative importance of animal well-being compared to these other topics is of interest. While the survey conducted by the Center for Food Integrity is useful, it utilised ratings, whereas this study uses pairwise comparisons which may facilitate more truthful responses (Oishi *et al* 1998; Center for Food Integrity 2008).

Survey description

A telephone survey was administered in July 2007 to a random sample of the United States population, and 1,019 usable responses were obtained. The survey is administered through a stratified sample of the US population citizenry who have home telephones. A large, stratified sample is pulled from the population with 17% of the sample from rural, 50% from suburban, and 33% from urban households, which is consistent with US demographics. To avoid sample selection bias, people were asked if they would participate in a 'food preference study', and were not aware that the specific topic related to farm animal welfare until after they agreed to participate.

Of the 6,365 phone numbers that were randomly selected from the US population with listed phone numbers, 1,019 usable survey responses (including 17 partially completed surveys) resulted, implying a raw response rate of 16%. Of course, we are not able to reach an individual at every phone number in the data set. Of those people where at least some contact is made, 37% agreed to participate. The sample size of 1,019 respondents implies a sampling error of $\pm 3\%$ at the 95% confidence level for a dichotomous choice question. This implies, for example, that we can be 95% confident that the estimated percentage of people agreeing to a statement in the sample is within $\pm 3\%$ of the true percentage of people agreeing to the statement in the population. Because these data are obtained from a sample of all US residents, the term 'consumer' refers to consumers of all

Table 1 Demographics of survey respondents and the US population.

	Survey sample	US population
Percentage male	35%	49%
Percentage female	65%	51%
Percentage Northeast	15%	18%
Percentage Midwest	28%	22%
Percentage South	34%	36%
Percentage West	23%	23%
Percentage Republican	28%	29% ^a
Percentage Democrat	33%	36% ^a
Percentage Independent	26%	28% ^a
Percentage other	13%	7% ^a
Average population density	1,068	80–2,562 ^b
Percentage without degree	61%	72% ^c
Percentage with degree	39%	28% ^c
Average age	52%	49 ^d

Sources: US Census Bureau, Annual Demographic Survey (2008).

^a Percentage is of registered voters.

^b Dividing the total land mass by the US population suggests an average population density of 80 people per square mile for the US, compared to the sample density of 1,068. Yet this number does not accurately describe places individuals actually live due to the vast empty spaces in the US. Other calculations (Lugo 2008) suggest the median American lives in an area of 2,561.6 people per square mile.

^c Individuals can be listed as Hispanic and another ethnicity, so the ethnicity percentages do not have to sum to one.

^d For the head of household (person who owns or leases the housing unit).

food products, and not just animal products. As Table 1 demonstrates, the survey sample closely matches the makeup of the US population, especially for region, political affiliation, and age. A greater proportion of females, individuals with college degrees, and higher income households participated than exists in the US population.

The survey consists of three types of questions. The first set of questions asks respondents whether they strongly agree, agree, disagree, or strongly disagree with a series of statements. The response 'neither agree nor disagree' is also an option. The second set of questions involves pair-wise comparison choices, where each individual is given two statements and must choose the statement that best meets some objective. For example, people may be asked which characteristic is more important for the welfare of farm animals: that they are allowed to exercise outdoors or that they are provided with comfortable bedding? For the first two question types, the ordering of the questions is varied randomly across surveys to prevent ordering effects. The

third set of questions elicits demographic information. Each respondent answers a total of 48 questions, though only a subset of all questions is analysed in the present research. The entire survey script and answers to questions not covered in this paper can be found at <http://asp.okstate.edu/baileynorwood/FAW/files/Appendices.pdf>.

Methodology

To measure attitudes towards farm animal welfare, respondents are asked to indicate the extent to which they agree with the following three statements: (Q1) I consider the well-being of farm animals when I make decisions about purchasing meat; (Q2) low meat prices are more important than the well-being of farm animals; and (Q3) the government should take an active role in promoting farm animal welfare. Respondents report their agreement with each statement on a scale from 1 to 5, where 1 is strongly disagree, 2 is disagree, 3 is neither disagree nor agree, 4 is agree, and 5 is strongly agree.

Overall welfare concerns are investigated by constructing histograms of responses to these three questions. The role of demographics in explaining variations in answers are examined in two ways. First, tabulated survey results across select demographics are conducted. Second, to better isolate the influence of any one demographic, an ordered logit model is employed using demographic variables as explanatory variables. Logit and ordered logit models are a class of discrete choice models appropriate for when the dependent variable takes on discrete values, such as the 1, 2, 3, 4, 5 discrete choices in this case.

Tabulated results demonstrate how attitudes towards farm animal welfare vary across each demographic, without holding other demographic variables constant. Ordered logit models measure the same correlation, but do hold other demographics constant. Consider the hypothetical scenario. Suppose that Democrats are more likely to be concerned with animal welfare, and females are more likely to be Democrats. The tabulated results would show that being female and a being Democrat is correlated with a greater concern for farm animals. However, ordered logit models would reveal that holding political affiliation constant, being a female does not influence attitudes, but holding gender constant, Democrats are more concerned with the well-being of farm animals.

The ordered logit results may suggest that gender has no impact on attitudes, but this is misleading. Suppose a firm is considering advertising certified humane pork, and wishes to target television programmes of Democrats — the demographic most concerned about animal welfare (in this hypothetical setting). It is difficult to determine which television programmes are popular among Democrats, but much easier to determine which programmes are popular among females. In this case, the firm would not want to disregard the fact that females are more concerned for farm animals, even if it is because females tend to be Democrats, and would find the tabulated results more useful than the ordered logit results.

Ordered logit models

The ordered logit model assumes latent attitudes towards the three statements follow the following equation:

$$(1) y^* = \beta'X + \varepsilon = \beta_0 + \beta_1 X_{\text{female}} + \beta_2 X_{\text{Republican}} + \beta_3 X_{\text{Democrat}} + \beta_4 X_{\text{Independent}} + \beta_5 X_{\text{Income}} + \beta_6 X_{\text{Population density}} + \beta_7 X_{\text{Northeast}} + \beta_8 X_{\text{Midwest}} + \beta_9 X_{\text{South}} + \beta_{10} X_{\text{BS}} + \beta_{11} X_{\text{Age}} + \varepsilon$$

where y^* is the latent or unobserved attitude, X is a vector of demographics, β is a parameter vector to be estimated, and ε is a Type I Extreme Value error term. The demographic variables shown above include a series of dummy variable for: females; those politically affiliated with Republicans, Democrats, or Independents; household incomes above US\$50,000; those residing in the Northeast, Midwest, or South; and respondents with at least a Bachelor's degree. The intercept then refers to males who do not consider themselves Republicans, Democrats, or Independents, have a household income less than US\$50,000, reside in the Western region of the US, and do not have a Bachelor's degree. Two continuous variables are the respondents' age divided by ten and the population density of each respondent's county, measured in thousands of people per square mile.

In (1), y^* indicates a general attitude towards a statement presented to the respondent. While their exact attitude is unobserved, people provide information on the degree to which they agree with the statement. The mapping of the latent attitude into statements of agreement is assumed to follow the process below.

$$(2) y = 0 \text{ if } y^* \leq 0, \text{ strongly disagree} \\ y = 1 \text{ if } 0 < y^* \leq \mu_1, \text{ disagree} \\ y = 2 \text{ if } \mu_1 < y^* \leq \mu_2, \text{ neither agree nor disagree} \\ y = 3 \text{ if } \mu_2 < y^* \leq \mu_3, \text{ agree} \\ y = 4 \text{ if } \mu_3 < y^*, \text{ strongly agree}$$

For example, if the person strongly disagrees with a statement the unobserved $y^* < 0$ but the observed $y = 0$. The μ_i 's are unknown parameters that are estimated with the β_i 's in the model. The ordered logit model describes the probability of a respondent answering in any of the five categories, where $\Phi(z)$ is the logistic distribution $e^z/1 + e^z$.

$$(3) \text{prob}(y = 0) = \Phi(-\beta'X) \\ \text{prob}(y = 1) = \Phi(\mu_1 - \beta'X) - \Phi(-\beta'X) \\ \text{prob}(y = 2) = \Phi(\mu_2 - \beta'X) - \Phi(\mu_1 - \beta'X) \\ \text{prob}(y = 3) = \Phi(\mu_3 - \beta'X) - \Phi(\mu_2 - \beta'X) \\ \text{prob}(y = 4) = 1 - \Phi(\mu_4 - \beta'X)$$

Given the probabilities for each category, the β_i 's and μ_i 's are chosen to maximise the following log-likelihood function, where i denotes a respondent, j refers to one of the five possible responses, and $I[a = b]$ is an indicator function that equals one if a equals b and zero otherwise.

$$(4) \text{LLF}(\beta, \mu) = \sum_{j=0}^4 \sum_i I[y = j] \log(\Phi(\mu_j - \beta'X) - \Phi(\mu_{j-1} - \beta'X))$$

Logit models

To achieve the second objective of determining which production practices consumers believe are most conducive to high animal welfare, respondents are given a series of six questions, where each question is a randomly assigned pair of practices and the respondent is asked which they believe is more important for animal well-being. For example, some respondents were asked, “Is it more important that farm animals be provided shelter at a comfortable temperature or be allowed to exercise outdoors?” The percentage of individuals who choose the former rather than the latter indicates its perceived relative importance for animal welfare. Each respondent faces six of these pairwise comparison questions.

The pairwise comparison question is a widely used method for eliciting attitudes, often seen as a desirable alternative to rankings and ratings. Asking respondents to rank nine practices would pose a large cognitive burden, and ratings make it easy for respondents to provide easy answers instead of honest answers. Asking respondents to choose one out of two options poses little cognitive burden and provides honest answers, and for this reason is often used to elicit human values (Oishi *et al* 1998).

A total of nine production practices are available for use in the pairwise comparison: (i) receiving treatment for injury and disease; (ii) being allowed to exhibit normal behaviours; (iii) receiving ample food and water; (iv) provided shelter at a comfortable temperature; (v) provided comfortable bedding; (vi) allowed to exercise outdoors; (vii) protected from being harmed by other animals; (viii) allowed to socialise with other animals; and (ix) raised in a way to keep prices low. These practices can be seen as a variation of the UK Farm Animal Welfare Council’s Five Freedoms (Farm Animal Welfare Council 1979). The last measure (raised in a way to keep prices low) does not directly concern farm animal welfare, but helps measure consumers’ willingness to pay higher prices in exchange for greater animal care.

To measure the relative importance of each production practice across all respondents, a conditional logit model is used to summarise the responses. It is assumed that the importance any one individual places on each attribute is determined as follows:

- (4) 4a Receiving treatment for injury and disease: $U_a = \beta_a + e_a$
- 4b Being allowed to exhibit normal behaviours: $U_b = \beta_b + e_b$
- 4c Receiving ample food and water: $U_c = \beta_c + e_c$
- 4d Provided shelter at a comfortable temperature: $U_d = \beta_d + e_d$
- 4e Provided comfortable bedding: $U_e = \beta_e + e_e$
- 4f Allowed to exercise outdoors: $U_f = \beta_f + e_f$
- 4g Protected from being harmed by other animals: $U_g = \beta_g + e_g$
- 4h Allowed to socialize with other animals: $U_h = \beta_h + e_h$
- 4i Raised in a way to keep prices low: $U_i = \beta_i + e_i$

The ‘U’ can be referred to as an importance index. In (4), β_i is a constant, common parameter across all individuals and e_i is a stochastic term that accounts for differences in individ-

uals. The term e_i is assumed to be distributed according to the Extreme I Value error distribution, which gives rise to the conditional logit model. The logit model calculates values of β_i consistent with responses given by the subjects. For example, if more individuals indicate issue i is more important than issue j than those who say issue j is more important, then the estimate of β_i will be larger than that of β_j . A more intuitive interpretation of the parameters is provided by calculating ‘importance scores’, discussed shortly.

The probability that factor i is more important than factor j equals the probability that $U_i > U_j$, which equals the probability that: $\beta_i + e_i > \beta_j + e_j$, or $\beta_i - \beta_j > e_j - e_i$. Given the distributional assumption of e , this probability equals $Pr_{i>j} = e^{\beta_i - \beta_j} / (1 + e^{\beta_i - \beta_j})$ (Kutner *et al* 2004). Consequently, the probability that j is more important equals $1 - Pr_{i>j}$.

A variable Y is created which equals one if factor i is indeed more important to the respondent and $Y = 0$ if factor j is more important. The β_i ’s are chosen to maximise the following log-likelihood function, where i denotes an individual and q denotes which of the six pairwise comparisons is being asked.

$$(5) LLF = \sum_i \sum_q [Y_{i,q} \ln(Pr_{i>j}) + (1 - Y_{i,q}) \ln(1 - Pr_{i>j})]$$

For estimation, the logit model requires one β_i be normalised to zero. Although the signs of the logit estimates are instructive, the magnitudes of the estimates have no meaningful interpretation. For an intuitive interpretation of the logit model results, the estimated parameters are used to construct importance scores indicating the relative importance of each attribute on a ratio scale where all scores must sum to 100. This score can also be interpreted as the percent of individuals predicted to perceive any one practice to be the most important for animal well-being. If twice as many individuals indicate issue i is more important than issue j than those who say issue j is more important, then the importance score of issue i will be roughly twice the value of the score for issue j . The percentage of people who say issue i is the most important issue is calculated as:

$$(6) I_i = e^{\beta_i} / \sum_j e^{\beta_j} \text{ (Kutner } et al \text{ 2004).}$$

The use of logit models have the drawback that they are subject to misspecification. The possible bias due to misspecification is much lower in this case because there is no ambiguity as to the decision of which explanatory variables to use. The only source of misspecification is in the assumption regarding the error term in (4). However, given the large sample size, the coefficients should converge approximately to a normal distribution as described by Train (2003). Moreover, the use of logit models allows the investigation of preference heterogeneity using latent class logit models, as discussed below.

To calculate the importance of farm animal welfare relative to a host of other social issues, an identical methodology is employed. Each respondent is presented with two randomly chosen social issues and is asked which is more important to them personally. The set of social issues include: human

poverty, US healthcare system, food safety, the environment, the financial well-being of US farmers, food prices, and the well-being of farm animals. After the first pairwise comparison, the respondent is then presented with five additional pairwise comparison questions, using different combinations of social issues. Using the same logit model as for ranking production practices, importance scores as described in (6) are calculated for each social issue.

Latent class logit

It is likely that individuals differ in their preferences for how animals should be treated. For example, some may feel animals which have retained natural instincts should be able to express behaviours such as rooting in the soil and nest-building, while others may believe animals only require basic needs such as food, water, and shelter.

To capture potential preference differences, a latent class logit model is estimated. The model is similar to the conditional logit in the previous section in that a parameter vector β is estimated containing elements representing the importance of each farm practice. The difference is that consumers are divided into distinct groups, and a separate parameter vector β is estimated for each group. This model assumes a fixed number of classes, c , and estimates a different set of parameters for each class. For example, if there are three classes ($c = 3$), three separate values of β are calculated, one for each class. Additionally, a class membership parameter is estimated signifying the proportion of the sample estimated to belong to each class. To determine the number of classes, latent class logit models are estimated for various numbers of classes and the Bayesian Information Criterion (BIC) is calculated for each model. The number of classes which minimises the BIC is then chosen as the optimal number of classes.

Finally, the probability of a respondent belonging in any one class can be calculated by comparing their survey responses to the parameter values for each class. This allows each class to be described by the demographics of its members. Each individual is assumed to belong to the class for which they possess the highest probability of belonging, and the demographics of each class membership is tabulated to determine how differences in preferences for production practices are determined by demographics. All estimations are conducted in *NLOGIT* using the methods described in Greene (2002).

Results

To gauge the general attitude of Americans towards farm animal welfare topics, Figure 1 displays a histogram of responses to three statements about farm animal welfare. A large proportion of respondents state they consider animal well-being when purchasing food products. The majority of respondents consider animal well-being to be more important than low meat prices. This suggests consumers are willing to pay higher food prices if they believe doing so would ensure greater animal well-being. Finally, the vast majority of individuals state that the government should be active in promoting farm animal welfare. This suggests that

regulation of livestock production practices intended to promote animal care, while unwelcome to most producers, may not be opposed by consumers at-large.

Contrasting the percentage of responses in the strongly agree and strongly disagree categories, relative to the more moderate categories, indicates the degree of polarity in farm animal welfare views. For example, if half of respondents indicated strongly agrees and the other half strongly disagrees, this would be the largest degree of polarity possible. Observing Figure 1, the strongest polarity exists for whether people consider animal well-being in their purchasing decisions. This topic also has the largest proportion of 'neither' responses, however, suggesting both polarity and neutrality across subjects. Most individuals have some opinion as to whether government should promote farm animal welfare, and though a significant portion is against regulation, most are for government regulation.

To assess how certain demographics alter attitudes towards these three statements, tabulated results are provided in Table 2. Additionally, ordered logit models are estimated with demographic variables as explanatory variables.

Demographic effects — tabulated results

The tabulated results for the statement, 'I consider the well-being of farm animals when I make decisions about purchasing meat', suggest animal welfare is a larger concern for females than males: 44% of males agree with this statement compared to 60% of females. Responses to the other two statements confirm this finding. While little regional effect is displayed for Question 2 (Q2), large differences exist for the Northeast region in Q1 and Q3. This is contrary to the conventional wisdom that people living in the Western US have greater animal welfare concerns — it is people in the Northeast who exhibit the greatest concern.

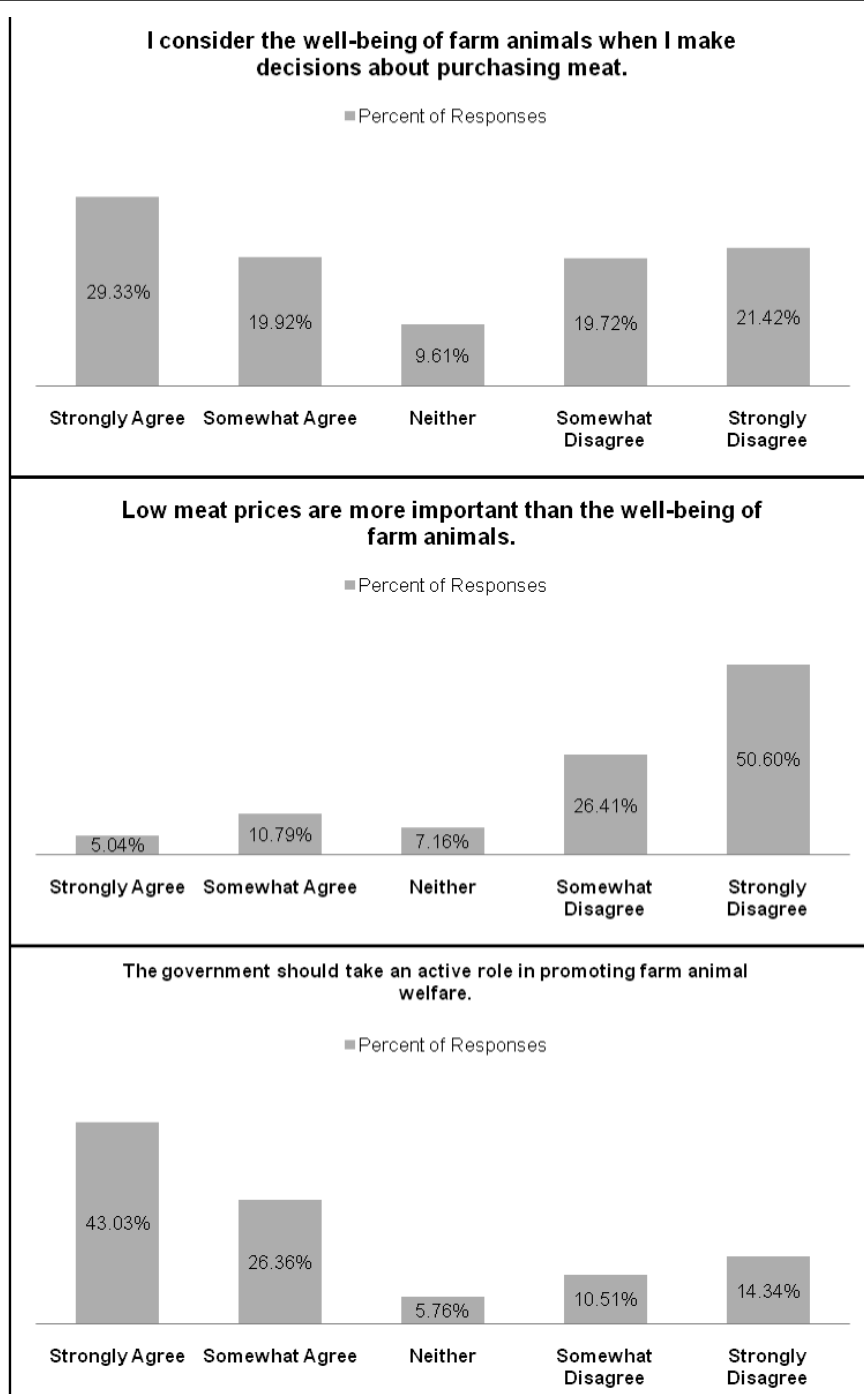
Regarding political affiliation, it is not surprising that Republicans are less enthusiastic about government regulation in Q3, but they are also much less likely to consider animal welfare when making meat purchases. Independents better resemble Democrats in Q1, but are closer to Republicans in Q3, with little difference for any political group in Q2.

Surprisingly, those with larger incomes and more education are less likely to state they consider animal welfare at the grocery store, as shown in Q1. Income differences in the other two questions are small. Population density and age have little impact on the variability of responses.

Demographic effects — ordered logit models

The ordered logit results in Table 3 also suggest a greater concern among females, as the female coefficient is statistically significant for all questions. A positive coefficient indicates a greater propensity to agree with the statement, so the positive sign for the first question, negative sign in the second question, and positive sign in the third question signifies greater animal concern. Also, note that *female* is the only coefficient that is statistically significant across all questions.

Figure 1



Histogram of responses to three farm animal welfare statements (n > 1,000).

The dummy variable for Democrats is significant in two of the three models. Consistent with the tabulated results, the coefficients for Democrats in Q2 and Q3 indicate a greater concern for animal well-being and higher acceptance of government regulation to ensure well-being. With significant, negative coefficients in Q1 and Q3, Republicans exhibit less concern for animal care and government regulation of animal

care. Also significant in two models are the dummy variables for Northeast residents of the US, indicating they are more likely to consider animal welfare at the grocery store and support government regulation. Respondents with high income again displayed counter-intuitive results: they place less importance on animal care at the grocery store and are less enthusiastic about farm animal regulation.

Table 2 Tabulated results to select farm animal welfare questions.

	Question 1: I consider the well-being of farm animals when I make decisions about purchasing meat			Question 2: Low meat prices are more important than the well-being of farm animals			Question 3: The government should take an active role in promoting farm animal welfare		
	Agree	Disagree	Responses	Agree	Disagree	Responses	Agree	Disagree	Responses
<i>Gender</i>									
Male	44%	56%	307	24%	76%	310	67%	33%	323
Female	60%	40%	581	14%	86%	601	77%	23%	600
<i>Region</i>									
Northeast	66%	34%	127	17%	83%	134	84%	16%	125
Midwest	53%	47%	234	17%	83%	246	70%	30%	252
South	50%	50%	292	16%	84%	294	74%	26%	306
West	55%	45%	198	18%	82%	198	70%	30%	198
<i>Politics</i>									
Republican	39%	61%	235	21%	79%	243	64%	36%	238
Democrat	61%	39%	284	15%	85%	296	84%	16%	297
Independent	57%	43%	221	15%	85%	216	71%	29%	226
Other	60%	40%	99	20%	80%	102	70%	30%	109
<i>Household income</i>									
0–US\$49,999	65%	35%	329	17%	83%	341	76%	24%	342
US\$50,000+	44%	56%	402	19%	81%	408	70%	30%	418
<i>Population density</i>									
0–1,067	56%	44%	701	16%	84%	721	72%	28%	721
1,068+	47%	53%	150	19%	81%	161	78%	22%	161
<i>Education</i>									
Non BS	60%	40%	537	19%	81%	563	72%	28%	567
BS	45%	55%	344	14%	86%	341	76%	24%	349
<i>Age</i>									
18–34	50%	50%	159	16%	84%	164	78%	22%	167
35–59	54%	46%	470	17%	83%	477	73%	27%	479
60 or older	57%	43%	240	17%	83%	249	73%	27%	258

Population density is measured in people per square mile. Given the sample size, the standard error for the percentages in each category will be approximately 3%. Strongly agree and somewhat agree are combined to form the agree category. Also, strongly disagree and somewhat disagree are combined to form the disagree category. All neither responses were thrown out, as well as any responses with unknown demographics.

Variables with one significant coefficient include the dummy variable for Midwest residents, who are more likely to agree that low meat prices take precedence over farm animal welfare, and the population density variable, which suggests residents living in counties with greater population densities are more accepting of government regulation of farm production practices. For space considerations, and statistical parsimony, other demographic variables, such as religion, race, vegetarianism, and pet ownership are not shown, though tabulated results can be found online, along

with the tabulated results to other related survey questions, at http://asp.okstate.edu/bailey_norwood/FAW/files/Appendices.pdf. These online results reveal that the relatively low number of non-Christians make religion comparisons difficult. Sometimes Hispanics' preferences better resemble African Americans, and other times they better resemble White Americans. Vegetarians exhibited a greater concern for farm animal care, but surprisingly, the responses for pet owners and non-pet owners are almost indistinguishable.

Table 3 Ordered logit results.

Explanatory variables	Q1: I consider the well-being of farm animals when I make decisions about purchasing meat	Q2: Low meat prices are more important than the well-being of farm animals	Q3: The government should take an active role in promoting farm animal welfare
Intercept	1.48 (0.32)	0.38 (0.35)	1.93** (0.35)
Female	0.56** (0.14)	-0.62** (0.15)	0.46** (0.14)
Northeast	0.40** (0.22)	0.14 (0.24)	0.57** (0.24)
Midwest	-0.23 (0.19)	0.33** (0.20)	0.00 (0.19)
South	-0.17 (0.18)	0.16 (0.19)	0.16 (0.18)
Republican	-0.48** (0.23)	0.08 (0.24)	-0.45** (0.24)
Democrat	0.27 (0.22)	-0.49** (0.24)	0.53** (0.23)
Independent	0.05 (0.23)	-0.25 (0.24)	-0.19 (0.24)
High income	-0.67** (0.15)	0.23 (0.16)	-0.43** (0.15)
Population density	-0.02 (0.01)	-0.02 (0.01)	0.05** (0.02)
BS degree	-0.20 (0.15)	-0.05 (0.15)	0.10 (0.15)
Age	0.02 (0.04)	-0.01 (0.05)	-0.06 (0.04)

Threshold levels for the ordered logit models are as follows:

0 = Strongly disagree	$X < 0$	$X < 0$	$X < 0$
1 = Disagree	$0 \leq X < 1.05$	$0 \leq X < 1.20$	$0 \leq X < 0.76$
2 = Neither	$1.05 \leq X < 1.45$	$1.20 \leq X < 1.69$	$0.76 \leq X < 1.06$
3 = Agree	$1.45 \leq X < 2.40$	$1.69 \leq X < 3.03$	$1.06 \leq X < 2.17$
4 = Strongly agree	$2.40 > X$	$X > 3.03$	$2.17 > X$

** Refers to statistical significance at 0.05.

Population density measured as every thousand people per square mile. Age is the age of the respondent divided by ten. The high income dummy variable refers to respondents with a household income above US\$50,000. Excluded dummy variables include 'other' political affiliations, no BS degree, residents of the Western US and males.

Table 4 Importance of livestock production practices as perceived by consumers.

Production practice refers to farm animal...	Conditional logit estimate (Parameter estimates \pm SEM)	Importance score
Receiving ample food and water	1.87** (0.11) \neq	38.43%
Receiving treatment for injury and disease	1.59** (0.10) \neq	29.05%
Being allowed to exhibit normal behaviours	0.31** (0.08) =	8.01%
Allowed to exercise outdoors	0.30** (0.09) \neq	7.95%
Protected from being harmed by other animals	0 \neq	5.90%
Provided shelter at a comfortable temperature	-0.29** (0.09) \neq	4.43%
Allowed to socialise with other animals	-0.76** (0.09) \neq	2.76%
Raised in a way to keep food prices low	-1.22** (0.09) =	1.75%
Provided comfortable bedding	-1.23** (0.09)	1.72%

** Denotes significance at the level of 0.05. The coefficient for 'protected from' is normalised to equal zero and therefore has no standard error.

\neq Indicates coefficients above and below are statistically different as indicated by *t*-tests assuming asymptotic normality of coefficients. The importance score is the predicted percentage of respondents that said the corresponding characteristic was the most important out of all other characteristics. It is calculated as Importance score = $\exp(x)/A$ where *x* is the coefficient for the production practice shown to the left of the score and *A* is the sum of the $\exp(x)$'s for all production practices (eg *x* for the Importance score for ample food and water is 1.87).

Preferences for livestock production practices — conditional logit results

The importance of various farm production practices, as perceived by consumers, is reported in Table 4. The characteristics are listed in descending order of importance. All the factors are statistically significant, which indicates that the importance of each factor is statistically different from the factor ‘protected from being harmed by other animals’, which is normalised to zero. Furthermore, as indicated by the \neq symbols in Table 4, most coefficients are statistically different from each other. However, the coefficients for allowing animals to exhibit natural behaviours and access to outdoors are not statistically different, and neither are the coefficients for low prices and comfortable bedding.

The importance scores convert the coefficients to a scale which makes the estimates easier to interpret. The importance scores can be interpreted as the predicted probability an individual would deem a practice the single most important practices from the set. For example, the estimates predict that of the nine practices, 38% would deem food and water the most important in terms of animal welfare, while only 1.72% would deem comfortable bedding the most important practice. Consequently, the importance scores sum to 100% and have a useful interpretation. The greater the importance score the more important the practice, and the relative values of the scores provides a measure of their relative importance. For example, the score for exercise outdoors is about 8%, compared to the score of about 4% for shelter. This implies that individuals consider providing animals opportunities to exercise outdoors to be twice as important as providing shelter at a comfortable temperature.

To further explain why ratios of importance scores provide meaningful inferences about relative importance, consider an alternative interpretation of the ratios. The values of the β_i 's indicate the contribution of a practice to the overall level of the importance index. They exist on a cardinal scale, meaning they lie on a similar, comparable quantitative scale. To measure relative importance, one would not want to take the ratio of two β_i 's because one of the β_i 's is zero (yielding a ratio of infinity). Instead, one can take the ratio $e\beta_i/e\beta_j$, which is mathematically identical to the ratio of two importance scores.

Receiving ample food and water and receiving treatment for injury and disease are the two most important practices. This is not surprising given they are the most important needs for survival. Being allowed to exhibit normal behaviours and exercise outdoors are next in importance. This may imply that for consumers who believe farm animals still maintain natural instincts, allowing them to exhibit these instincts is important (even if the purpose of the behaviour is no longer necessary). This is consistent with Wilson (2008), who found a significant demand for natural labeling, especially when combined with humane traits.

Protection from harm by other animals is next in importance, followed by shelter at a comfortable temperature and socialisation. Protection and shelter are the main advantages of modern confinement facilities, where

animals are housed in temperature-controlled buildings for comfort and small groups to prevent fighting. The fact that shelter and protection are more important than socialisation has implications for sow management. Sows are kept in individual stalls instead of groups, partly because sows frequently injure one another in groups. The numbers in Table 4 indicate that consumers support this practice, but also suggest they do not approve of the fact that gestation stalls prevent natural behaviours, such as rooting, and do not allow access to outdoors. All practices considered, one could reasonably conclude that consumers prefer pasture systems that include access to shelter over confinement facilities, but if a confinement facility is used, consumers prefer gestation stalls over gestation pens, assuming both provide the same space per sow.

Raising animals in a way to keep food prices low is the next to lowest practice in terms of consumer importance. The low priority given to food prices reiterates the previous finding (ie responses to Q2 in Figure 1 and Table 2) that consumers do not wish low prices to be realised at the expense of animal well-being. The practice lowest in importance is the provision of comfortable bedding. Overall, Table 4 suggests that consumers view farm animals as sentient beings with natural instincts, which should be allowed to exhibit their normal behaviours and have access to outdoors, which is not an accurate description of modern pig, broiler, and layer confinement facilities.

Heterogeneous preferences for livestock production practices — latent class logit results

A latent class model consisting of three classes produces the lowest BIC value, the results of which are seen in Table 5. Class 1, referred to as Naturalists, value allowing animals to exhibit normal behaviours and exercise outdoors far more than individuals in the other two classes. These consumers view animals more akin to their wild counterparts, in that little management is needed to ensure animal well-being other than allowing animals to act naturally. Shelter, bedding, and protection are relatively unimportant compared to outdoor access and ability to exhibit natural behaviours. As Table 5 shows, approximately 46% of consumers belong to this class. The description of Naturalists mirrors the interpretation of the logit model in Table 4, and the Naturalists constitutes the largest of the three classes. The preferences revealed in the logit model of Table 4 are therefore driven largely by this class of consumers.

For the Naturalists, price is relatively unimportant, possessing an importance score of only 0.83 compared to the 19.27% score for allowing animals to exhibit normal behaviours. The second class, however, has an importance score for price of 22.23%, which is much larger than the other two classes. Consequently, this class is referred to as Price Seekers. Besides food, water, and injury and disease treatment, which are the most important practices for all groups, Price Seekers place the most importance on protection from harm by other animals. Only 14% of respondents belong to the Price Seekers class, and

Table 5 Importance of livestock production practices as perceived by consumers: segmented by three preferences classes.

Production practice refers to farm animal...	Class 1: Naturalists		Class 2: Price Seekers		Class 3: Basic Welfarists	
	Parameter (± SEM)	Importance score	Parameter (± SEM)	Importance score	Parameter (± SEM)	Importance score
Receiving ample food and water	2.20** (± 0.36)	33.20%	1.14** (± 0.51)	31.39%	2.29** (± 0.42)	42.58%
Receiving treatment for injury and disease	1.75** (± 0.30)	21.59%	0.79 (± 0.49)	22.11%	2.24** (± 0.40)	40.49%
Being allowed to exhibit normal behaviours	1.64** (± 0.36)	19.27%	-0.29** (± 0.54)	7.54%	-0.96** (± 0.45)	1.65%
Allowed to exercise outdoors	0.96** (± 0.30)	9.79%	-0.70 (± 0.63)	4.96%	-0.15 (± 0.47)	3.70%
Protected from being harmed by other animals	0.00 (± 0.00)	3.74%	0.00 (± 0.00)	10.03%	0.00 (± 0.00)	4.31%
Provided shelter at a comfortable temperature	-0.25 (± 0.36)	2.91%	-2.17** (± 0.68)	1.14%	0.17 (± 0.42)	5.11%
Allowed to socialise with other animals	0.60** (± 0.28)	6.83%	-3.26 (± 1.95)	0.39%	-2.15** (± 0.61)	0.50%
Raised in a way to keep food prices low	1.50** (± 0.39)	0.83%	0.80 (± 0.50)	22.23%	-2.33** (0.46)	0.42%
Provided comfortable bedding	-1.12** (± 0.35)	1.22%	-3.84** (± 1.13)	0.21%	-1.25 (± 0.42)	1.24%
Probability of being in class	46%** (± 0.08)		14%** (± 0.04)		40%** (± 0.08)	

Table 6 Demographic characteristics of latent class members.

	Class 1: Naturalists (482 members)	Class 2: Price Seekers (116 members)	Class 3: Basic Welfarists (411 members)
	Percentage of class members who are...		
<i>Gender</i>			
Male	36%	45%	31%
Female	64%	55%	70%
<i>Region</i>			
Northeast	15%	14%	15%
Midwest	27%	26%	30%
South	32%	39%	36%
West	26%	21%	19%
<i>Politics</i>			
Republican	25%	35%	30%
Democrat	34%	29%	34%
Independent	27%	19%	27%
Other	14%	17%	9%
<i>Household income</i>			
0-US\$49,999	47%	34%	47%
US\$50,000+	53%	66%	53%
<i>Population density</i>			
0-1,067	83%	79%	80%
1,068+	17%	21%	20%
<i>Education</i>			
Non BS	62%	57%	61%
BS	38%	43%	39%
<i>Age</i>			
18-34	18%	17%	17%
35-59	53%	55%	50%
60 or older	29%	29%	32%

Population density is measured in people per square mile. Demographic characteristics are calculated as follows. First, based on the choices each individual made in the questions used to estimate the coefficients in Table 5, the probability of each individual belonging in each class is calculated. Individuals are then assumed to belong to the class with the highest probability. Then, the demographics for each class are calculated based on these membership assignments.

Table 7 Importance of farm animal welfare compared to other social issues

Issue	Importance score
Human poverty	23.95%
US Healthcare system	23.03%
Food safety	21.75%
The environment	13.91%
Financial well-being of US farmers	8.16%
Food prices	5.06%
Well-being of farm animals	4.15%

The numbers associated with issues indicate its relative importance compared to other issues. The logit models used to calculate the importance scores utilise the same methodology as those in Table 4.

members of this class will quickly sacrifice farm animal amenities, such as comfortable bedding and access to outdoors, in return for lower food prices.

The third class is labelled Basic Welfarists, where the two practices of providing the basic needs of food, water, and injury/disease treatment importance scores sum to over 80%. According to Basic Welfarists, as long as animals are fed, watered, and kept alive, little else is of importance. While this description initially paints members of this class as insensitive to animal well-being, note the low importance score assigned to price — the lowest score of the three classes and very close to the Naturalists. Compared to Naturalists, Basic Welfarists have a much shorter list of animals' needs, but like the Naturalists, will pay higher prices to ensure these needs are met. In many respects, Basic Welfarists resemble Price Seekers closely, save for the importance place on price. Moreover, the third class has a much larger membership, representing 40% of the sample.

The demographics of the individuals comprising each class of Table 5 are provided in Table 6. Across the three classes, the class membership profiles do not change drastically within any category. Males comprise a larger proportion of Price Seekers relative to the other classes, as do Republicans, while Democrats and those with lower household incomes are less likely to belong to the Price Seekers class. This is consistent with the results in Tables 2 and 3, which show Republicans and males are more likely to sacrifice animal well-being in exchange for lower food prices. Class members do not differ greatly along regional, population density, educational attainment, or age. Whatever factors are responsible for creating heterogeneity in preferences for livestock production practices, they are not measured well by demographic variables.

Finally, Table 7 illustrates the relative importance of farm animal welfare to other issues. Note the importance scores in Table 7 are interpreted the same as importance scores in previous tables, and that the original logit model coeffi-

cients for each social issue (used to calculate importance scores) are all statistically different from one another. Of the social issues considered, farm animal welfare was the least important, and was less important than food prices. This is similar to the results in other studies (Center for Food Integrity 2008). The financial well-being of US farmers is twice as important as animal well-being, and food safety, the environment, healthcare, and poverty are the most important issues. The results in Table 7 illustrate why animal advocacy groups seek to link the farm animal welfare issue with food safety and the environment, as these other issues are of greater importance to the average American than farm animal welfare *per se*.

Conclusion

Utilising a phone survey of over 1,000 Americans, this research investigates the extent to which individuals agree with three statements regarding farm animal welfare. The responses indicate a concern for farm animal treatment, with a majority of individuals stating they consider animal well-being in their shopping decisions, consider animal well-being more important than low meat prices, and approve of government regulation to promote farm animal welfare.

Understanding how attitudes towards farm animal treatment vary by demographics may help meat producers tailor meat products towards those with a greater concern for animal well-being, and help predict how future livestock regulations will vary across regions. The results indicate that gender, geography, political affiliation, and income helps predict farm animal welfare views. Females, residents in the Northeastern US, and Democrats exhibit a greater concern for farm animal welfare. They, along with consumers from densely populated areas, also favour government regulation to protect farm animals. Republicans are less concerned with animal welfare and are more likely to oppose government regulation, and consumers from the Midwest are more willing to sacrifice animal well-being in return for low food prices.

Many of these results are similar to previous surveys, such as the finding by Rauch and Sharp (2005) regarding the stated importance of farm animal welfare to US consumers, and those by Arunachalam (2009) and Wilson (2008) on the importance of allowing animals to behave naturally. The relationship between demographics and attitudes mirrors that found in the Eurobarometer (2005), such as the finding that females place greater importance on animal care.

If consumer demand for increased animal well-being is to translate into changes at the farm level, it is helpful to understand what specific production practices consumers deem most important for animal welfare. The survey results show that, not surprisingly, providing ample food, water, and treatment for injury and disease are the most importance practices. Respondents favour production practices that allow animals to behave naturally, by giving them access to outdoors and the opportunity to exhibit normal behaviours. Protecting farm animals from the weather and predators follows in importance, while shelter, socialisation, and comfortable bedding are the least importance practices.

A closer investigation reveals that respondents do not all agree on the ranking of animal production practices, and are best categorised into one of three groups. The largest group of respondents place great importance in allowing animals to behave naturally and be granted access to outdoors. The second largest group deem it of utmost importance to make sure animals are well fed and watered and receive treatment for injury and disease, while other production practices are considered relatively unimportant. The third and smallest group places a greater emphasis on low food prices, and less importance on animal well-being in general.

Animal welfare regulations that would impose large costs on the farm community may not be welcomed by society at large, given the fact that the financial well-being of US farmers is revealed to be roughly twice as important as farm animal welfare. However, if animal advocacy groups are successful in linking animal welfare with food safety and environmental issues, animal welfare will gain in prominence as a social issue.

There are many questions that warrant future research. How attitudes respond to information would be of interest. Surveys are almost always subject to social desirability bias and hypothetical bias; experiments where subjects are asked to pay real money in exchange for animal welfare improvements would help us understand preferences for animal care in the absence of these biases. Though many questions remain regarding the contentious issue of farm animal welfare, many are answered in this research. Should farmers and food processors decide to pursue premiums in exchange for higher standards of care, the results of this study provide insights into the attitudes and demographics of the target market. This study also articulates what attributes consumers desire in the raising of farm animals. Additionally, the current trend is for increased regulation of livestock production, and this study provides evidence on the degree of enthusiasm for increased regulation, and what consumers believe those regulations should seek in the everyday lives of farm animals.

References

- Appleby MC, Mench JA and Hughes BO** 2004 *Poultry Behavior and Welfare*. CABI Publishing: Cambridge, MA, USA
- Arunachalam B, Henneberry SR, Lusk JL and Norwood FB** 2009 An empirical investigation into the excessive-choice effect. *American Journal of Agricultural Economics* 91: 810-825
- Bennett D** 2008 *Consumers' Strange Views of Farmers' Role*. Delta Farm Press: New York, USA
- Bennett RM, Anderson J and Blaney RJP** 2002 Moral intensity and willingness to pay concerning farm animal welfare issues and the implications for agricultural policy. *Journal of Agricultural and Environmental Ethics* 15: 187-202
- Center for Food Integrity** 2008 *Consumer Trust in the Food System*. Center for Food Integrity: Kansas City, MO, USA
- Davis HP, Smith WH, Dickinson S, Coffey WC and Nisonger HW** 1928 *Livestock Enterprises*. JB Lippincott Company: Chicago, IL, USA
- Dawkins M and Hardie S** 1989 Space needs of laying hens. *British Poultry Science* 30: 413-416
- Eurobarometer** 2005 *Attitudes of Consumers Towards the Welfare of Farmed Animals*. European Commission: Brussels, Belgium
- Farm Animal Welfare Council** 1979 *Press Statement*. FAWC: London, UK
- Frewer LJ, Kole A, Van De Kroon SMA and De Lauwere C** 2005 Consumer attitudes towards the development of animal-friendly husbandry systems. *Journal of Agricultural and Environmental Ethics* 18: 345-367
- Gigerenzer G** 2007 *Gut Feelings: The Intelligence of the Unconscious*. Penguin Books: London, UK
- Greene WH** 2002 *Limdep New York*. Econometric Software Inc: Plainview, NY, USA
- Harper GC and Makatouni A** 2002 Consumer perception of organic food production and farm animal welfare. *British Food Journal* 104: 287-299
- Kutner MJ, Neter J and Nachtsheim C** 2004 *Applied Linear Regression Models, Fourth Edition*. McGraw-Hill Higher Education: Columbus, OH, USA
- Lugo M** 2008 *Population Densities Vary Over Nine Orders of Magnitude. God Plays Dice*. Philadelphia, Pennsylvania, USA. <http://godplaysdice.blogspot.com/2008/07/population-densities-vary-over-ninehtml>
- Market Directions** 2004 *Consumer Attitudes About Animal Welfare: 2004 National Public Opinion Survey*. Boston, MA, USA. http://www.animalagalliance.org/images/ag_insert/2004_Pub_Op_PRppt
- Meyers-Levy J** 1989 Gender differences in information processing: a selectivity interpretation. In: Cafferate P and Tybout AM (eds) *Cognitive and Affective Responses to Advertising* pp 219-260. Lexington Books: Lexington MA, USA
- Oishi S, Schimmack U, Diener E and Suh E** 1998 The measurement of values and individualism-collectivism. *Personality and Social Psychology Bulletin* 24: 1177-1189
- PETA** 2007 *Yearly Financial Reports*. PETA: Washington DC, USA. <http://www.peta.org/about/numbersasp>
- Rauch A and Sharp JS** 2005 *Ohioans' Attitudes About Animal Welfare Social Responsibility Initiative*. Department of Human and Community Resource Development. The Ohio State University: Ohio, USA
- Sarasohn J** 2006 *Merger Adds to Humane Society's Bite* pp A25, September 7. Washington Post: Washington DC, USA
- Task Force Report** 2005 A comprehensive review of housing for pregnant sows. *Journal of the American Veterinary Medicine Association* 227: 1580-1590
- Train K** 2003 *Discrete Choice Methods With Simulation*. Cambridge University Press: Cambridge, MA, USA
- United States Census Bureau** 2008 *The Census Bureau*. Washington DC, USA. www.census.gov
- Wiepkema PR and Koolhaas JM** 1993 Stress and animal welfare. *Animal Welfare* 2: 195-218
- Wilson M** 2008 Natural, humane labels studied. *Feedstuffs* 80: 4