CONSUMER PERCEPTION OF BEEF, PORK, LAMB, CHICKEN, AND FISH

A Thesis

by

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ABSTRACT

One of the greatest challenges to developing successful marketing strategies in the food sector is gaining a better understanding of the diversity of consumer needs (Onwezen et al., 2012). It is important to understand consumer perceptions of beef, pork, lamb, chicken, and fish regarding consumption levels, price, nutrition, animal handling, and animal welfare to help the industry educate and market to consumers, as well as understand perceived misconceptions. Moral and ethical beliefs, consisting of concerns for animal welfare, are reported as main reasons to avoid meat (Hoek et al., 2004). Consumers view high animal welfare standards at the production stage as an indicator that the resulting food is safe, healthy and of high quality (Verbeke et al., 2010). To gain a better understanding of consumer perceptions, an online survey was developed utilizing Qualtrics Q University Survey software (Qualtrics Labs, Inc., Provo, UT, United States). A total of 1,602 surveys were completed. Data was analyzed utilizing PROC Mixed procedure of SAS (v9.3, SAS Institute, Cary, NC). Data was also analyzed using PROC Factor to determine factor analysis and Principal Component Analysis (PCA). Three consumer groups were determined: protein eaters, fish-only eaters, and vegetable-only eaters. Econometric analysis was also conducted using the Multinomial Logit (MNL) Model with STATA Statistics/Data Analysis (v12, StataCorp, College Station, TX). This model was designed to explain choice of protein eaters, fish-only, and vegetarian consumers. Varying levels of significance (P > | z | ≤ 0.01, 0.05, and 0.1) were used. Three groups were identified: protein eaters, fish-only, and vegetable protein-

only. Consumer groups from both statistical analyses were evaluated for perceptions of beef, pork, lamb, chicken, and fish healthfulness, animal handling and animal welfare. The data indicated that females were less likely to consume animal protein by 4.4% while consumers with a history of family disease were more likely to consume animal protein by 3.3%. As income level increased, likelihood of consuming protein decreased for income levels of $30,000-$59,000 (9.9%), $60,000-$99,000 (9.4%), and $100,000-$199,000 (5.9%), respectively. Thirty-six percent of consumers indicated animal welfare was somewhat important, while another 22% and 11% responded that it was very important and extremely important, respectively. When asked how often they purchased natural/organic, grass-fed, and free-range/cage-free products, 50%, 60%, and 63%, respectively, indicated they purchased these products less than once every 2-3 months. Although consumers were emotionally invested in animal welfare, those emotions did not necessarily reflect purchasing habits.

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NOMENCLATURE

USDA   United States Department of Agriculture

NOP   National Organic Program

HHS   United States Department of Health and Human Services

HACCP   Hazard Analysis Critical Control Point

IP address   Internet Protocol address

WTP   Willingness to pay

MNL   Multinomial Logit

PCA   Principal Component Analysis

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

One of the greatest challenges to developing more successful marketing strategies in the food sector is gaining a better understanding of the diversity of consumer needs (Onwezen et al., 2012). Consumer perception of meat and meat products is a critical issue for the meat industry because it directly impacts profitability (Troy et al., 2010). Understanding consumer eating habits regarding the consumption of various protein sources can help the industry to identify target segments of consumers and how to best approach marketing toward those consumers. Not only is it important to identify why consumers follow purchasing patterns and trends, but this can allow the industry to realize and overcome consumer misconceptions while also educating the consumer.

Taking into account the impact that various factors have during consumer decision making and their effect on purchasing habits can allow us to better understand what motivates and influences consumers purchasing decisions. When brought to light, different perceptions of consumers can help the industry develop a wider variety of targeted advertising campaigns, educational materials, and quality products to help maintain and enhance consumer confidence. Additionally, price, flavor, nutrition, and emotional issues, such as, how animals are raised, management practices and animal welfare, can be addressed as components of consumer's decision making process. It is essential that the industry gain a better understanding of the importance of each of these

factors in order to bridge the gap between producers, distributors, retailers and the consumer.

Much of the previous research regarding consumer perspectives on meat has been on quality attributes and perceived quality; meat has increasingly become a subject of controversies during the past few decades relating to health and safety, the environment, and animal welfare (Latvala et al., 2012). Understanding consumer perception of beef, pork, lamb, chicken and fish can help the industry understand what drives consumer eating habits and perceptions on nutrition, food safety and animal welfare issues and to ultimately provide a better product for the consumer.

It has been made apparent that consumer attitudes impact consumer-purchasing decisions in regards to food. Therefore, the objective of this research was to gain a better understanding of consumer perception of beef, pork, lamb, chicken, and fish. Sub-objectives were to determine if price, nutrition, animal handling, and animal welfare issues are important to consumers, and to understand how these factors impact consumer purchasing decisions.

2. LITERATURE REVIEW

2.1 Consumer Attitudes

There are many factors that impact consumer eating habits and trends. Regardless if it is due to emotions related to animal welfare issues or if it is because of health-related reasons, there has been a rise in vegetarian and vegan consumers (Richardson et al., 1994). Comparisons showing vegetarians to be healthier than meat-eaters are potentially difficult to interpret since meat-avoiders may be more likely to be middle-class people who lead healthier life styles (lower levels of smoking and alcohol intake) or to have adopted their diet for reasons of preventative health or due to illness (Richardson et al., 1994). Polls conducted by the American Dietetic Association in 2003 indicated that 2.5% of Americans identify themselves as vegetarians (Ruby et al., 2011). A 2012 poll of 2,030 adults aged 18 and over conducted by the Vegetarian Resource Group indicated that a total of 4% of respondents self-identified as vegetarians (Vegetarian Resource Group, 2012). In contrast, a trend towards the consumption of lighter, more informal meals may have an effect on meat demand since such meals (pasta, salads, sandwiches, etc.) are frequently meat-free (Richardson et al., 1994). However, consumer's attitudes do not always correspond with their behavior (Tabacchi, 1987; de Barcellos et al., 2011). One *Vegetarian Times* poll found that most of the self-identified vegetarians actually consumed fish, poultry or beef (Pluhar, 2010). Ziehl et al. (2005) noted that consumers may value a product more because it has a positive externality or a public good, even though it may not necessarily be "more valuable" or "higher quality" than a conventional product.

2.2 Food Safety

Safety and quality associated with the production, marketing and consumption of food together with overall levels of trust in the food supply chain, are increasingly important in our society (Taylor et al., 2012). Product appearance, specifically packaging and packaging-related product characteristics significantly shape consumer's meat purchase intentions and decisions (Van Wezelmael et al., 2011). Van Wezemael et al. (2011) also stated that while the delivery of safe meat products is of major importance to the food industry, there is a discrepancy between producer and consumer concerns with meat packaging and product safety.

Increased media coverage and the rise in activists groups has caused an increased pressure for policy makers to ensure food safety and quality are kept at a high standard (Taylor et al., 2012). In a nation-wide consumer survey comparing the importance of societal issues, food safety ranked third at 21.75 percent, only behind human poverty, (23.95 %), and U.S. health care system (23.03%), (Lusk et al., 2007). consumers, however, have different ideas about food safety compared to experts (Verbeke et al., 2010). Recently, the perception of fish as a healthy food has been tainted by less favorable information regarding safety risks associated with human exposure to contaminants such as methyl mercury, polychlorinated biphenyls, dioxins, organochlorine pesticides and other environmental contaminants (Verbeke et al., 2004). Consumer food safety concerns were reflected through their demand for natural or grass-fed production practices, traceability throughout the production chain, testing for mad cow disease, and their willingness to pay a premium for these products (Ziehl et al.,

2005). Poultry consumers recognized the greater risk of food poisoning from microbial hazards such as Salmonella (Kennedy et al., 2004).

2.3 Nutrition

Since 1976, when the U.S. Senate's Select Committee on Nutrition and Human Needs recommended a diet lower in fat, sugar, sodium and calories, many consumers have been interested in eating a more nutritious diet (Tabacchi, 1987). The debate on food and health nowadays also encompasses the nutritional status of foods (and meats) and the potential role of nutritional labeling. Meat and meat products are nutritionally dense and are important sources of a wide range of nutrients, such as proteins, fat and vitamins (Verbeke et al., 2010). Greater emphasis on living a healthy lifestyle has lead to an increased interest in vegetarian diets over the past few decades (Forestell et al., 2012). Red meat is suffering due to its image of presumed high fat content and the subsequent linkage of consumption to specific health diseases such as cancer and heart disease. Yet this narrow view overlooks some of the most important micronutrients e.g., iron, selenium, vitamins A, B12, and folic acid that do not exist in plant-derived foods due to a lack of bioavailability (Troy et al., 2010). Troy et al. (2010) also stated that beef is high in protein and low in carbohydrates, leading to a low glycemic index. A low glycemic index has been associated with combating the effects of obesity and the decreased incidence of the development of diabetes and cancer. Latvala et al. (2012) noted that for consumers, healthfulness of meat is gradually overtaking food safety concerns. Although consumers have shown an increased interest in the nutrition of their food, it is also

evident that consumers may prefer the immediate benefits of a tasteful food product versus the long-term benefits of a nutritious product (Hoefkens et al., 2011).

As a protein source, fish is perceived to be a healthy food by consumers and is the main substitute source of protein particularly compared with meat (Verbeke et al., 2004). Consumers perceive chicken, and in particular chicken breast fillets, as a lean, low-fat food (Kennedy et al., 2004). Beef offers twenty-nine cuts of beef that meet government guidelines for lean, with less than 10 grams of total fat, 4.5 grams or less of saturated fat, and less than 95 milligrams of cholesterol per 3-ounce serving (National Cattlemen's Beef Association, 2012). The demand for organic food is constantly increasing due to consumer's perception it is healthier and safer than conventional foods (Magkos et al., 2003).While some consumers associate grass-fed, natural, and organic products as healthier options to conventionally raised beef products, it is important to understand that the USDA's National Organic Program (NOP) for meat, milk and eggs is a marketing program, not a food safety or food healthfulness program (Cattlemen's Beef Board, 2008).

The 2010 Dietary Guidelines for Americans, the most recent of the dietary guidelines established jointly by the USDA and the United States Department of Health and Human Services (HHS). Key recommendations in the 2010 Dietary Guidelines for Americans regarding balancing calories to manage weight included improved eating and physical activity, control of total calorie intake, and maintaining appropriate calorie balance. Regarding foods to reduce, the Dietary Guidelines for Americans included reducing sodium intake, consuming less saturated fatty acids and replacing them with

monounsaturated and polyunsaturated fatty acids, consuming less dietary cholesterol, limiting foods that contain synthetic sources of trans fats, reducing intake of calories from solid fats and added sugars, limit refined grains and added sugar, and consume alcohol in moderation. The Dietary Guidelines for Americans also indicated individuals should increase vegetable and fruit consumption, eat a variety of fruits and vegetables, consume at least half of all grains as whole-grains, increase intake of fat-free or low-fat milk and milk products, choose a variety of lean protein foods, increase amount and variety of seafood by choosing seafood in place of meat and poultry, replace protein foods higher in solid fat, use oils to replace solid fats, choose foods that provide more potassium, dietary fiber, calcium, and vitamin D.

2.4 Animal Welfare

Food choice is not merely about obtaining nutrition; it represents a world view, which is both moral and practical. Vigorous and ongoing debates regarding farm animal welfare has taken place at the intersection between science and public opinion (Lusk et al., 2008). Concerns about animals suffering are cited by up to 81% of vegetarians (Richardson et al., 1994). Moral and ethical beliefs, consisting of rejections of killing animals and concerns for animal welfare, are reported as main reasons to avoid meat (Hoek et al., 2004). Individuals who have considered becoming vegetarian or reducing their meat consumption also cited animal suffering as reasons for not eating meat (Richardson et al., 1994). In the case of animal husbandry, there is increased social concern regarding the welfare of animals used for food production (Frewer et al., 2005). It has also been shown that consumers perceive high animal welfare standards at the

production stage as an indicator that the resulting food is safe, healthy and of high quality (Verbeke et al., 2010). Animal welfare concerns, however, are not strictly tied to vegetarian and vegan consumer trends. Consumer demand for organic and natural products are also motivated by civic agricultural issues in the public domain (Ziehl et al., 2005). Additionally, Ziehl et al. (2005) also indicated that consumers are equally concerned with social benefits that natural beef may provide them beyond their personal benefits.

Much of the controversy in the animal welfare debate stems from who should have the authority to decide the manner in which farm animals are raised (Lusk et al., 2008). Citizens in Arizona and Florida, and most recently California, have voted to pass constitutional amendments to ban the use of gestation crates in hog production or cages in egg production (Norwood et al., 2011). This consumer reaction to animal production practices brings forth questions of production efficiency and keeping costs low for the producer, and, ultimately, for the consumer. These consumer attitudes are reflected through retail sales trends that indicate that organic meats and poultry are the fastest growing segments of the $23 billion organic food industry, with a growth of 77.8% from 2002 to 2003 (Organic Trade Association, 2004). However, it is important to understand that programs such as USDA NOP do not address the nutritional content of foods, food safety or animal wellbeing (Cattlemen's Beef Board, 2008). Regardless of the science, there is an emotional tie between consumers and their perceptions of food production systems and where they are willing to spend their food dollar.

Activists groups in the U.S. have begun to turn their attention to animal agriculture, and it is reasonable to expect U.S. society to eventually demand changes (Rollin, 2001). The increase in popularity of animal welfare advocacy groups can partly be attributed to the public's belief that their views need to be factored into the decision-making process (Lusk et al., 2008). It is also important to understand that consumers are not the only advocates for animal welfare; many within the meat and food industries are pushing for improved animal welfare standards. McDonald's and Burger King have adopted animal welfare standards resulting from pressures from animal activist groups. Similarly, Whole Foods is marketing "animal compassionate" meat. These developments suggest the need for better understanding of people's preferences for food produced under different conditions of animal wellbeing (Norwood et al., 2011).

Though there has been an articulated ethic regarding animal treatment, it has been very minimalistic, leaving most of the issue of animal treatment to people's personal ethics, rather than to social ethics (Rollin, 2001). Grandin (1998) noted the need for objective scoring methods for animal welfare, citing that what one inspector may consider to be an acceptable industry standard for handling, another inspector may call animal abuse. Research with cattle and pigs has indicated that vocalizations are an indicator of stress (Grandin, 1998). Grandin (1998) went on to state that vocalization scoring could be used as a practical way to pinpoint animal welfare problems in harvesting facilities. Because of growing animal welfare concerns, the McDonald's Corporation incorporated animal handling and stunning audits to their Hazard Analysis Critical Control Point (HACCP) program requirements of harvesting facilities (Grandin,

2000). In the United States, welfare requirements of the McDonald's Corporation and Wendy's International have greatly improved handling and stunning of cattle and pigs at harvesting facilities (Grandin, 2003).

2.5 Economic Factors

Reduction in red meat consumption reflects a historic trend resulting from industrialized farming. This has provided individuals with cheaper, more efficient production of animal proteins that are now available on a large scale (Kennedy et al., 2004). Economic factors driving consumer decision-making are reflected through willingness or unwillingness to pay premiums for products. Kennedy et al. (2004) indicated that consumers perceived chicken as having "added value" in terms of health, being low in fat, minimizing waste, and convenient. Pork has generally been considered good value for the cost compared to other meats, as it tends to be one of the cheapest protein sources available (Ngapo et al., 2003). Ziehl et al. (2005) reported that 167 of 872 people surveyed indicated a below average willingness to pay for natural products and rated their concern for production attributes relatively low. Norwood et al. (2011) concluded that people's value for egg and pork products are affected by animal living conditions and that the expressed WTP values are highly correlated with scientific models of animal well-being. Yet, there is not an established answer regarding how much of a tradeoff people are willing to make between the price they pay for meat, milk, and eggs and the well-being of farm animals (Lusk et al., 2008).

3. MATERIALS AND METHODS

3.1 Consumer Survey

This study was administered from October, 2012 to January, 2013. The survey (Appendix A) was created utilizing Qualtrics Q University (Qualtrics Labs, Inc., Provo, UT, United States) survey software. The study was approved by the Texas A&M University Institutional Review Board (Application 2012-0572).

Questions were asked regarding the style of the consumer's eating habits, including average number of meals eaten in-home per week, average number of meals eaten out per week, and average number of meals eaten to-go per week. Consumers were asked to describe their protein consumption habits regarding whether they consumed animal protein, if they followed a variety of vegetarian-based diets, or if they followed vegan-based diets. Consumers were then asked a series of questions regarding their weekly protein consumption habits in regards to the average number of times they consumed beef, pork, chicken, lamb, fish, and vegetable-based protein. Survey logic was used to bypass questions regarding protein sources that the consumer indicated they did not consume. If the consumer indicated that they consumed a specific protein source, they were asked a series of preference questions regarding factors that influenced their purchase intent within a protein. Questions regarding influential factors as a percentage of purchase intent were asked for protein sources that the consumer indicated they consumed. Additionally, all consumers were asked a series of questions regarding perceived nutrition, food safety, animal background, animal handling, animal welfare, and meat and food industry related questions. It is understood that not all consumers

consume all animal protein sources; questions regarding perception of healthfulness were asked to better understand consumer opinion and perception.

Following the body of the questionnaire, consumers were asked a series of question regarding background and demographics. This was to determine the consumer's age, sex, education level, average annual income, field of employment, if they were involved in agriculture, number in household, what size city or town in which they reside, and which state in which they reside. Demographic questions were located at the end of the survey in order to not offend or induce a negative bias by locating questions at the start of the survey.

3.2 Survey Distribution

The survey was presented to consumers via an email which introduced the survey to the consumer and explained their rights if they chose to participate in the research project. At the end of the email was a hyperlink to the survey. If the consumer decided to participate, they clicked the hyperlink, which opened the survey in a new window or tab. One hyperlink was created for the survey. This allowed all consumers to remain anonymous throughout the survey process. The goal of distributing surveys via e-mail was to obtain a large consumer base across the United States, ($n \geq 1,000$) by utilizing list-serve databases.

3.3 Data Analysis

Statistical analyses were conducted using mixed model procedures (PROC Mixed procedure) in SAS (v9.3, SAS Institute, Cary, NC). Factor analysis and principal component analysis (PCA) were also conducted using the PROC Factor function of

SAS. PCA were used as a variable reduction technique that reduces the number of observed variables to a smaller number of principal components which account for most of the variance of the observed variables, and factor analysis is a variable reduction technique which estimates factors which influence responses on observed variables (Hatcher, 1994). Data was exported from the Qualtrics Survey website into an Excel spreadsheet. IP addresses were sorted to ensure ballot stuffing did not take place. Experimental units were individual consumers. The first model included fixed effects of gender, age (18-24, 25-35, 36-50, 51-65, and 65+), education (High School/GED, Associates Degree/Technical Degree, Bachelor's Degree, or Masters or Doctorate), and Occupation (Education [Pre-school – College/University], Service Industry, Involved in Agriculture, Business Management, or Retail) and independent variables were defined as attitude questions. An α of <0.05 was used. Data was also analyzed using frequency distributions.

Econometric analyses were also conducted using the Multinomial Logit (MNL) Model with STATA Statistics/Data Analysis (v12, StataCorp, College Station, TX). This model was designed to explain choice of protein consumers, the consumption of fish-only, or vegetarian consumers based on number of meals eaten at home, use of dietary guidelines, history of family disease, food safety, household size, age in years, gender, education level, income level, and size of city of the consumer category of individuals. A $0.100 \geq P > |z|$ was used to determine significance.

4. RESULTS AND DISCUSSION

4.1 SAS Analysis

4.1.1 Consumer Demographics

A total of 1,602 consumers responded to the online portion of the survey between October 2012 and January 2013. As identified in Table 1, 50% of consumers were female and 50% were male, 46% received at least a Bachelor's degree and 44% received a Master's degree or higher, the majority of respondents (39%) lived in a household of 2, and most consumers (81%) were not involved in the beef, pork, lamb, poultry, fish, or meat or food industries. Regarding protein consumption habits, as depicted in Table 2, 94% of respondents consumed animal protein, 1% were pescatarian, and 4% were flexitarian. In relation to 2010 Census data regarding United States populations, 49% of individuals in the United States were male, and 51% were female. The population of the consumers who participated in the survey were more highly educated than the averages reported in the 2010 Census. Individuals who received a high school degree or GED comprised 28.4% of the population, 29.0% received and associates or technical degree, 17.9% received their Bachelor's degree, and only 10.6% received a graduate or professional degree. Figure 1 indicates consumer state demographics.

To gain a better understanding of consumer eating habits, consumers were asked the number of meals eaten at home in a week, the majority of consumers (39%) responded that they eat at home 11 or more times each week (Table 3). Consumers were also asked how often they eat out per week and at what types of restaurants they eat out at. Thirty-five percent of consumers indicated that they eat at fast food restaurants 1 time

a week, 43% eat at moderately priced establishments 1 time a week, 47% eat at local/specialty restaurants 1 time per week, and 10% eat at high end establishments 1 time a week. In addition to the number of meals eaten out per week, 50% of consumers indicated that they take-out meals 1-2 times per week.

Consumer protein consumption habits (Table 4) indicated that 53% consumed beef 1-3 times a week, 42% consumed beef 4-8 times a week or more, and only 5% of consumers do not eat beef. Sixty-nine percent of respondents indicated that they consumed pork 1-3 times a week, while only 11% consumed pork 4-8 times a week or more, however 20% designated that they did not consume pork. Ninety percent of consumers did not consume lamb, and only 10% of consumers ate lamb once a week or more. Forty-six percent and 40% consumed chicken 1-3 and 4-8 times a week, respectively. Ten percent of consumers ate chicken more than nine times per week, and only 3% of consumers indicated they did not eat chicken. The majority of fish consumption (69%) was between 1-3 times a week and 23% of consumers did not consume fish on a weekly basis. Twenty-eight percent of both meat and non-meat eaters consumed vegetable-based protein as a large portion of their diet 1-3 times a week and 7% consumed vegetable-based protein more frequently than nine times per week.

4.1.2 Animal Welfare

Table 5 is focused on understanding the emotional connection between consumers and animal welfare issues to better understand consumer willingness to pay (WTP) for various protein sources. When asked the importance of animal welfare, 36% of consumers responded that animal welfare was somewhat important, while another

22% and 11% responded that it was very important and extremely important, respectively. Consumers were also asked a series of specific questions regarding animal welfare. These questions were worded to ensure the consumer understood the purpose of the respective actions in question. While there was some consumer feedback concerning influencing or introducing a biased decision to the consumers, it was important to understand that the phrasing of each question utilized the same vocabulary and text found in current literature.

When consumers were asked, "Do you believe that pregnant sows should be kept in stalls so that their individual needs can be better met?", 35% and 10% selected agree and strongly agree, respectively. Regarding the question, "Do you believe that sows and newborn piglets should be kept in stalls to minimize injury and potential mortality of piglets due to being stepped on by sows?", 47% and 15% of consumers selected agree and strongly agree, respectively. Legislation is already in place regarding gestation crates and farrowing crates, it is only a matter of time before similar measures are on the horizon nationwide (Norwood et al., 2011).

Similar to the animal welfare questions regarding hog production practices, consumers were also asked about the production practices of chickens. When asked, "Do you believe the wings of chickens should be clipped to reduce or prevent the possibility of breaking a wing or sustaining other injuries?", 23% of consumers indicated that they agreed. Also, in regards to chickens, consumers were asked, "Do you believe that the beaks of chickens should be trimmed to decrease pecking, cannibalism and mortality of other birds?", 28% indicated that they agreed.

An explanation for the seeming disconnect between consumers and the animal, meat and food industries is a simple lack of communication. Table 6 addressed broader industry questions. When asked if consumers felt the animal industry did a good job of informing the public of production procedures and practices, 59% of consumers disagreed, specifically, 39% disagreed and 20% strongly disagreed. When asked if consumers thought the animal industry treated animals humanely, only 33% agreed, while 37% neither agreed nor disagreed. Additionally, consumers were asked if they believed the meat industry practiced good food safety practices, 69% of respondents agreed.

To determine if animal welfare perceptions influenced purchasing trends, consumers were asked a series of questions regarding background preferences for protein sources, as defined in Table 7. In order to anchor questions for comparison to one another, definitions of each answer option were listed: rarely (once every 2-3 months), sometimes (at least once a month), most of the time (at least once every two weeks), always (every time I go to the grocery store). Seventeen percent of consumers indicated they purchase natural and/or organic products most of the time. When asked to define what drove their decision to purchase such products, 42% indicated it was because of less residual hormones and antibiotics. Twenty-six percent sometimes purchased grass-fed protein sources. It was identified that this preference was because of the preferred production method for 29% of consumers. Regarding free-range and cage-free products, 18% and 12% indicated that they purchased these products sometimes and

most of the time, respectively. Fifty-one percent indicated this was because they preferred the production methods.

The data indicated that consumers are emotionally invested in animal welfare and animal handling. However, as indicated by responses to purchasing natural and/or organic, grass-fed, free-range and cage-free products, what consumers indicated regarding animal welfare and animal handling are not necessarily reflected through their purchasing habits.

Consumers were sorted into groups of animal protein consumers and non-animal protein consumers to further evaluate animal welfare perceptions. Table 8 reported the responses of animal protein consumers. Sixty-nine percent of animal protein consumers indicated animal welfare was important, specifically, somewhat important (37%), very important (22%), and extremely important (10%), whereas Table 9 indicated a much stronger importance of animal welfare among non-animal protein consuming respondents. An overwhelming 86% of non-animal protein consuming individuals indicated that animal welfare was of importance with the largest group (42%) indicating animal welfare was extremely important.

Table 8 and Table 9 also addressed the question, "Do you think the animal industry treats animals humanely?". Thirty-four percent of animal protein consumers indicated that they agreed, 38% neither agreed nor disagreed, and only 27% disagreed with the question. Among non-animal protein consumers only 10% agreed, 24% neither agreed nor disagreed, and 66% disagreed.

The non-animal protein consumer group did include flexitarians and semi-vegetarians, or those who occasionally consumed animal proteins. Because some consumers associated more desirable production practices with natural, organic, grass-fed, free-range, and cage-free products (Table 7), both consumer groups were evaluated for the frequency that they purchased natural and/or organic, grass-fed, and free-range and/or cage-free products in regards to animal welfare. Twenty-three percent of protein consumers indicated that they purchased natural and/or organic products at least once every two weeks (Table 8). Seventy-three percent of non-animal protein consumers indicated the same frequency regarding the purchase of natural and/or organic products (Table 9). Similarly, for grass-fed products, 13% of protein consumers indicated that they made purchases at least once every two weeks (Table 8) compared to the 25% of non-animal protein consumers (Table 9). Regarding the frequency of purchase of free-range and cage-free products, only 18% of protein consumers indicated they purchased products at least once every two weeks (Table 8) versus 47% of non-animal protein consumers (Table 9).

Principal Component Analysis (PCA) was also used to better understand consumer perceptions of animal welfare, nutrition, and food safety. This consumer group was determined by utilizing individuals that indicated they were consumers according to Question 62 (Appendix A) of the survey. Three categories were identified within the consumer group: protein-only, fish-only, and vegetable-only consumers. Animal Welfare Principal Component Analysis (Figure 2) showed that protein-only consumers most closely identified with animal welfare issues regarding production procedures and

management practices in place to ensure optimal health and well-being of animals that were raised for food production. Vegetable-only consumers were most likely to purchase natural and/or organic food products and strongly identified with no added ingredients and no added hormones. Those same consumers also regarded animal welfare as very important, but did not agree with management practices in place to improve animal welfare. Fish-only consumers indicated a higher probability of purchasing grass-fed, cage-free, and free-range products. Principal Component 1 accounted for 84.35% variation, and Principal Component 2 accounted for 15.65% variation.

4.1.3 Nutrition

In addition to the consumers that were concerned about animal welfare, the health conscious consumer was also of interest. Table 10 shows consumer food label preferences. When asked, "Do you purchase low-fat, reduced-fat, or fat-free products?", 32% and 26% of consumers indicated that they purchased these products sometimes and most of the time, respectively. Twenty-eight percent of consumers indicated that they sometimes purchased low-sodium or reduced-sodium products. Consumers were asked how important no added hormones were to them, 67% responded that no added hormones was somewhat important (25%), very important (21%), or extremely important (21%). Consumers were also asked the importance of no added ingredients. Seventy-one percent indicated no added ingredients was somewhat important (29%), very important (24%), or extremely important (18%).

All consumers were specifically asked about their perceptions of the healthfulness of beef, pork, lamb, chicken, and fish (Table 11). Of the 1,254 responses

regarding perceived healthfulness of beef, only 15% of consumers perceived beef as being unhealthful, and 79% regarded beef as being healthful. One thousand two hundred sixty-three consumers responded to perceived healthfulness of pork. Again, 15% of consumers perceived pork as unhealthful, 74% perceived it as being healthful. Only 8% of the 1,226 responses for lamb perceived lamb as unhealthful, while 36% regarded it as being neither healthful nor unhealthful, and 54% indicated it was healthful. Chicken and fish were perceived as being the most healthful animal protein products. Of the 1,243 responses for chicken consumers, 4% indicated they perceived chicken as being unhealthful, while 92% perceived it as healthful. There were 1,241 responses regarding the healthfulness of fish, 3% of consumers perceived it as being unhealthful, and 94% perceived fish as healthful.

To further understand the perception of nutrition regarding each of the protein sources, consumers were broken into two groups based on their response regarding having a history of family disease or not. Both groups were evaluated for frequency of consumption of the protein sources evaluated in this study. Only slight differences were identified between the two groups. Eighty-six percent of consumers with a history of family disease consumed beef between 1-8 times per week (Table 12), whereas 85% of consumers without a history of family disease consumed beef between 1-8 times per week (Table 13). More consumers with a history of family disease (21%) did not consume pork (Table 12) versus 18% of consumers without a history of disease (Table 13). Similarly, more consumers with a history of family disease (92%) did not consume lamb (Table 12) compared to those without a history of family disease (87%); (Table

13). Chicken was consumed slightly more by those with a history of family disease (87%) 1-8 times per week (Table 12) when compared to those without a history of family disease (84%); (Table 13). Table 13 indicated that more people with a history of family disease did not consume fish (24%) versus the 21% of consumers without a history of family disease. More consumers with a history of family disease did not consume vegetable protein (57%) as part of their weekly diet (Table 12) compared to 55% of consumers without a history of family disease (Table 13).

The same two groups were also used to determine if having a history of family disease impacted the types of food products purchased by consumers. Thirty-six percent of consumers with a history of family disease purchased low-fat, reduced-fat, or fat-free products at least once every two weeks (Table 14), only 30% of those without a history of family disease purchased low-fat, reduced-fat, or fat-free products in the same time period (Table 15). Consumers were also asked how frequently they purchased low-sodium or reduced-sodium products, 27% of those with a history of family disease and 25% of those without a history of family disease purchased them at least once every two weeks. Regarding low-carbohydrate products, 22% of those with a history of family disease purchased those products at least once every two weeks, compared to only 17% of those without a history of family disease. Finally, consumers were asked how often they purchased protein-enhanced products. Six percent of consumers with a history of family disease purchased those products at least once every two weeks, compared to 7% of those without a history of family disease.

Nutrition PCA (Figure 3) was also conducted. Protein-only consumers regarded animal protein, beef, pork, lamb, chicken, and fish, as being more healthful and also indicated that they believed the meat industry did a good job of informing the public about products. Vegetable-only consumers, again, most closely identified with a higher probability of purchasing natural and/or organic products and products that contained no added hormones and no added ingredients. Additionally, they are also more likely to purchase low carbohydrate and protein-enhanced foods. It can be assumed that vegetable-only consumers are more likely to purchase protein enhanced products due to lack of animal protein in the diet. Fish-only consumers indicated a higher probability of purchasing grass-fed, free-range, and cage-free products, and also low-sodium and reduced-sodium foods. Principal component 1 accounted for 88.68% of variation, and principal component 2 accounted for 11.32% of variation.

4.1.4 Additional Factors Affecting Consumption of Protein Products

To determine which factors affected consumer decisions to purchase and consume protein products, if the consumer indicated they consumed a protein source at least once or more a week, they received a matrix question to determine the importance of flavor, tenderness, price, nutrition, convenience, animal welfare/handling, and food safety. There were more beef consumers (1,351) than consumers in any other protein source. The majority of beef consumers (55%) indicated that flavor was very important (Table 16). Most consumers (92%) indicated that tenderness was important, and more specifically somewhat important (23%), very important (48%), and extremely important (21%). Only 21% of consumers indicated that price was not of high importance with

23

10% indicating it was neither important nor unimportant, 6% as somewhat unimportant and 2% as very unimportant. Thirty-five percent, 29%, and 11%, respectively, indicated that nutrition was somewhat important, very important, and extremely important. Convenience was determined to be important by 69% of beef consumers. In regards to animal welfare and animal handling, 46% of consumers responded that it was somewhat important (21%), very important (12%), and extremely important (9%). Food safety induced some of the strongest responses of importance (91%).

The same question was presented to the 1,093 consumers who indicated they consumed pork at least one time per week. Pork flavor was determined to be important by 91% of consumers (Table 17). Tenderness also proved to be of great importance, 29% of consumers indicated it was somewhat important, 45% very important and 16% extremely important. Price appeared to play a stronger role in the consumption of pork as 80% of consumers ranked it as important. Nutrition was also determined to be important by 76% of pork consumers. Eighty-four percent of consumers indicated that convenience was an important factor in their decision to purchase and consume pork. Interestingly, only 21%, 12%, and 9% of consumers indicated that animal welfare and animal handling was somewhat important, very important, and extremely important, respectively. Food safety was also determined to be of importance by 84% of consumers.

The data indicated more variation between the 306 consumers that indicated that they consumed lamb (Table 18). Only 36% indicated that flavor was of importance when consuming lamb. Most lamb consumers (64%) identified tenderness as important. Fifty percent of consumers indicated that price was of importance, while 24% responded that

it was neither important nor unimportant. Forty-three percent of lamb consumers declared that convenience was an important factor, and 32% said it was neither important nor unimportant. Thirty percent of lamb consumers stated animal welfare and animal handling was unimportant, 33% neither important nor unimportant, and 37% specified that it was important. However, the majority of consumers did indicate that food safety was important (56%).

Table 19 represents the 1,263 chicken consumers' perception of factors affecting chicken consumption. Ninety-one percent indicated flavor was important, and tenderness was declared important by 86% of consumers. Most chicken consumers (83%) stated price was important and 84% indicated nutrition was important. Convenience was said to be important by 77% of chicken consumers. Only 50% of chicken consumers indicated animal welfare and animal handling was important. However, 83% of chicken consumers did indicated that food safety was important, with 42% declaring food safety to be extremely important.

One thousand and eight consumers indicated that they consumed fish on a weekly basis (Table 20). Eighty-six percent stated that flavor was important, and 72% said the same for tenderness. Most consumers (83%) specified that price was an important factor in choosing to consume fish, and 87% said nutrition was important to them. Seventy-four percent of regular fish consumers indicated convenience was important. Animal welfare and animal handling for fish consumers was determined to be important by 41% of consumers. Food safety, again, was identified as being an important aspect of 83% of fish consumer's decision to consume fish.

The consumers that indicated that they consumed animal protein were asked to rank price of product, lean to fat ratio, visual appearance, added ingredients, how the animal is raised, and animal welfare as a percentage of their decision to purchase beef, pork, lamb and chicken. Averages were calculated for each attribute for respective protein sources (Table 21). The average consumer decision to purchase beef was based on price (29.0%), lean to fat ratio (22.9%), visual appearance (21.0%), added ingredients (10.7%), how the animal was raised (9.1%), and animal welfare (7.4%). The decision to purchase pork was determined to be 31.9% for price, 22.1% for visual appearance, 20.4% for lean to fat ratio, 11.0% for added ingredients, 7.9% for how the animal was raised, and 6.8% for animal welfare. Lamb consumers based their decision primarily on price (35.9%), followed by visual appearance (17.6%), lean to fat ratio (15.6%), animal welfare (10.8%), how the animal was raised (10.4%), and added ingredients (10.0%). The decision to purchase chicken was based on price of product (32.2%), visual appearance (21.6%), lean to fat ratio (17.1%), added ingredients (11.9%), how the animal was raised (9.4%), and animal welfare (7.9%). Similarly, fish consumers were asked to rank price of product, lean to fat ratio, visual appearance, and how the animal was raised as a percentage of their decision to purchase fish. Results indicated the decision to purchase fish was based on price of product (36.3%), visual appearance (29.6%), how the animal was raised (19.0%), and lean to fat ratio (15.1%).

Food safety PCA (Figure 4) was conducted in order to address expressed concern regarding food safety. Fish-only consumers indicated that they really cared about food safety and that it was a concern for them. Protein-only consumers expressed greater

confidence in meat and food industry food safety techniques and practices and in the industry's ability to inform consumers of products and production procedures and practices. Principal component 1 accounted for 98.86% of variation, and principal component 2 accounted for 1.14% of variation.

Factor analysis was conducted on fish-only and vegetable-only consumers, and on protein-only consumers (Figure 5). The same questions used to determine PCA data for animal welfare, nutrition, and food safety were also used for factor analysis. Only significant questions ($P \leq 0.3$) were plotted. Fish- and vegetable-only eaters had three main clusters of questions. The most important factors for fish and vegetable consumers were the questions pertaining to animal welfare and animal production practices. Those questions included agree-disagree questions regarding gestation stalls, farrowing crates, dehorning, wing clipping, beak trimming, growth implants, and if the industry did a good job informing the public of production procedures and practices. The second driving factor for fish- and vegetable-only eaters was nutrition. Those questions included healthfulness perception of beef, pork, lamb, chicken, and fish, and purchase frequency of grass-fed, low- or reduced-sodium products, low-, reduced-, or fat-free products, low-carbohydrate products, and protein-enhanced products, as well as the ability of the meat and animal industries to inform consumers about their products and if they treat animals humanely. The final cluster of questions driving fish- and vegetable-only consumers included whether or not consumers purchased natural and/or organic, free-range and/or cage-free products, and importance of no added hormones.

Protein-only eaters were defined by two clusters of questions. The most important factors for protein-only eaters were nutrition-based questions. These consisted of importance of no added ingredients, how frequently low-sodium or reduced-sodium, low-fat or fat-free products, low-carbohydrate, and protein-enhanced products are purchased, and whether or not the meat industry does a good job informing consumers about products. The second cluster included importance of grass-fed and no added hormones, and animal welfare and production practices including castration, clipping the tails of piglets, farrowing crates, de-horning, clipping the wings of chickens, trimming the beaks of chickens, growth implants, and whether the industry does a good job informing consumers of production procedures and if the industry treated animals humanely.

4.2 Multinomial Logit Analysis

4.2.1 Consumer Demographics for Multinomial Logit Analysis

In an experimental setting, people know their behavior is being scrutinized and social concerns may lead people to give "socially acceptable" answers (Chang et al., 2009). Multinomial Logit (MNL) is a model in which the choices were described by the characteristics of individuals, not by the attributes of the choice itself (Greene, 2012). Similar to the PCA conducted for animal welfare, nutrition, and food safety question 62 of the survey (Appendix A) was as the dependent variable for the MNL model (Table 22). Of the respondents who indicated they were consumers and not involved in the beef, pork, lamb, chicken, fish or food industries, three categories were identified based on those responses to Question 5 of the survey (Appendix A).

Outcomes, m = 1, 2, and 3, were recorded in y, where y = 1 (protein-only), y = 2 (fish-only), and y = 3 (vegetable-only). The MNL model estimated a set of parameters (Table 23) for outcome 1 (protein-only), outcome 2 (fish-only), and outcome 3 (vegetable-only). Protein-only was set as the base outcome. The variables y (1 < no order) were unordered. Their association with one group was not dependent on the other groups. For the parameters of fish-only and vegetable-only, the variable x was represented as: number of meals eaten at home, usage of dietary guidelines, history of family disease, concern for food safety, household size, 25-35 years of age, 36-50 years of age, 51-65 years of age, 65 and older, female, associate's or technical degree, bachelor's degree, average annual income of $30,001 - $59,999, $60,000 - $99,999, $100,000 - $199,999, and more than $200,000. A set of coefficients, $\beta^{(1)}$, $\beta^{(2)}$, and $\beta^{(3)}$, were estimated based on the parameters and corresponded with each outcome. For coefficients to be effectively estimated, the base outcome was set to 1. After the parameters were estimated, these equations were used to obtain the marginal effects:

$$\text{Protein} - \text{only Pr}(y = 1) = \frac{1}{1 + e^{x\beta(2)} + e^{x\beta(3)}}$$

$$\text{Fish} - \text{only Pr}(y = 2) = \frac{e^{x\beta(2)}}{1 + e^{x\beta(2)} + e^{x\beta(3)}}$$

$$\text{Vegetable} - \text{only Pr}(y = 3) = \frac{e^{x\beta(3)}}{1 + e^{x\beta(2)} + e^{x\beta(3)}}$$

The probability of y = 2 to the base outcome was:

$$\frac{\text{Pr}(y = 2)}{\text{Pr}(y = 1)} = e^{x\beta(2)}$$

29

Based on the random utility model, or the preference of some set of goods and services, where the ith consumer's utility of choosing option j out of total J options, and where V_{iv} was a deterministic component, or a model that allows predictions of y based on x ($y = $ f(x)), was:

$$\text{Prob}\{j \text{ is chosen}\} = \frac{\exp V_{ij}}{\sum_{k=1}^{J}(V_{ik})}$$

Although the survey allowed consumers to select which vegetarian or vegan category they most closely identified themselves, for MNL analysis, those consumers were broken into categories of consumers that consumed fish-only, and all others were categorized as vegetable-only consumers.

As seen in Table 22, most consumers utilized for MNL analysis were over the age of 35 (91.12%). There were an equal number of male (50.61%) and female (49.39%) consumers, a large majority of which received a Bachelor's degree or higher (91.21%). Parameters for the data were established utilizing protein eaters as the base group. The data were analyzed using the delta method. The delta method takes a function that is too complex for analytically computing the variance, creates a linear approximation of that function, and then computes the variance of the simpler linear function that can be used for large sample inference (Xu et al., 2005). A $0.100 \leq P > |z|$ was used to determine significance. The parameters established in Table 23 were not directly interpretable, marginal effects for each value of y, protein-only, fish-only, and vegetable-only, must be used to interpret data.

4.2.2 Protein-only Consumers

Number of meals eaten at home (P = 0.006), use of dietary guidelines (P = 0.076), history of family disease (P = 0.087), female (P = 0.037), and average annual income levels of $30,001-$59,999 (P = 0.006), $60,000-$99,999 (P = 0.007), $100,000-$199,999 (P = 0.057) were determined to be significant for protein-only consumers (Table 24). Each unit increase in number of meals eaten at home was associated with a -0.011 decrease in consuming protein-only. Similarly, a unit increase in the use of dietary guidelines was associated with a -0.033 decrease in consuming protein-only. However, if a consumer indicated a history of family disease, they were 0.032 times more likely to consume protein-only. Female consumers are less likely to consume protein-only by (dy/dx = -0.044). As income level increased, likelihood of consuming protein decreased (dy/dx = 0.099, 0.094, and 0.059) for income levels of $30,000-$59,000, $60,000-$99,000, and $100,000-$199,000, respectively.

It can be determined that consumers are more likely to consume protein when they go out to eat versus when they eat at home where they are more likely to be financially conservative and not eat animal protein. Using dietary guidelines, such as the Dietary Guidelines for Americans, which suggest a decrease in red meat and poultry, have subsequently resulted in a decrease in protein consumption. Females tend to be more health conscious thus following the Dietary Guidelines for Americans trend of decreasing red meat and poultry.

4.2.3 Fish-only Consumers

Female (P > | z | = 0.007) and average annual income level of $30,000-$59,999 (P > | z | = 0.020) were the only two variables determined to be significant for the fish-only consumer group (Table 25). Females were more likely to consume only fish (dy/dx = 0.050). Consumers with an average annual income of $30,000-$59,999 were less likely to consume only fish (dy/dx = -0.078). Price was determined to be an important factor among consumers when deciding which protein sources to purchase and consume. With fish typically being more expensive than other protein sources, it can be determined that lower income consumers are less likely to purchase fish because of price.

4.2.4 Vegetable Protein-only Consumers

Number of meals eaten at home (P = 0.003), history of family disease (P = 0.010), and average annual income of $60,000-$99,999 (P = 0.024) were determined to be significant for vegetarian only consumers (Table 26). Each additional meal eaten at home increased the likelihood of the consumer only consuming vegetable based protein (dy/dx = 0.006). However, consumers with a history of family disease were less likely to consume a vegetarian only diet (dy/dx = -0.020), as were those with an average annual income of $60,000-$99,999 (dy/dx = -0.055). Beef provides essential nutrients including protein, zinc, and iron to the diet unlike vegetable-based proteins. For those with a history of family disease who may be more susceptible to health-related illnesses, consuming a vegetable-only diet is not necessarily the most health conscious decision.

5. CONCLUSIONS

One of the greatest challenges to developing successful marketing strategies in the food sector is gaining a better understanding of the diversity of consumer needs (Onwezen et al., 2012). This study was conducted to gain a better understanding of consumer perceptions pertaining to protein products in order to ultimately provide the consumer with a more desirable end product. The focus of this study was consumer perception of animal welfare and animal background, nutrition, and other factors that contribute to consumer perceptions of beef, pork, lamb, chicken, and fish in order to help producers and the industry to provide a more desirable product.

The preference for consumers to stray from processed products and animals that have been treated with vaccines and antibiotics has triggered a change in food consumption with a gradual increase in the purchase of organic versus conventional products (Fotopoulos et al., 2008). Thirty-six percent of consumers indicated animal welfare was somewhat important, while another 22% and 11% responded that it was very important and extremely important, respectively (Table 5). Other studies have shown people who were concerned about animal welfare and believed the welfare of pigs to be poor were more negative towards pork (Latvala et al., 2012). In response to sensitivities to animal welfare, consumers were asked how often they purchased natural/organic, grass-fed, and free-range/cage-free products, 50%, 60%, and 63%, respectively, indicated they purchased these products less than once every 2-3 months (Table 7). While vegetable-only consumers indicated the highest level for concern regarding animal welfare, protein-only consumers indicated higher confidence in the

production management practices in place by producers to ensure animal welfare among food production animals (Figure 2). Although consumers were emotionally invested in animal welfare, those emotions did not necessarily reflect purchasing habits. Vegetable-only and fish-only consumers were more likely to purchase natural, organic, grass-fed, free-range, and cage-free products due to more desirable perceptions of production practices and animal welfare. However, the majority of consumers did not express the willingness to purchase those products as frequently. Zander et al., (2010), also found that respondents tend to answer in order to satisfy social norms instead of revealing their true preferences.

Nutrition of beef, pork, lamb, chicken, and fish was also of importance to consumers. Consumers regarded fish (94%) and chicken (92%) as being the most healthful, beef (79%) and pork (74%) were also considered to be healthful proteins by the majority of consumers, and finally, lamb (54%) maintained a perception of healthfulness by most consumers (Table 11). Though fish was regarded as being the most healthful of the protein sources evaluated in this study, fewer people with a history of family disease consumed fish than those without a history of family disease. Similarly, fewer consumers with a history of family disease consumed lamb than those without a history of family disease. It was determined that a history of family disease resulted in a reduced possibility of an individual consuming only vegetable protein. When consumers were sorted into categories, consumers with a history of family disease indicated they consumed vegetable protein as a portion of their weekly diet less frequently than consumers without a history of family disease.

Convenience was determined to play an important role in consumers' lives. Thirty-seven percent of consumers indicated they ate away from home six to ten times per week, and an additional 39% eat away from home eleven or more times (Table 3). Food safety was also an expressed concern of consumers, mainly of fish-only and protein-only consumers (Figure 4). Confidence in the meat industry's food safety practices and procedures was also strongly expressed by protein-only consumers (Figure 4).

This study indicated that consumers do have strong perceptions of the meat industry and its various products and practices. Perceptions of animal welfare in regards to current industry practices were a main focus of this study. Though animal welfare issues were of importance to consumers, there is not a strong relationship between purchasing habits and the emotional attributes of animal welfare concerns. For implications within the industry, this study could help to better prepare for future areas of consumer concern regarding animal welfare, food safety, protein consumption habits, nutrition, and other factors that influence consumer intent to purchase animal protein products. Understanding the specific factors that influenced purchasing trends of animal protein products are essential for the sustainability of beef, pork, lamb, chicken, and fish consumption.

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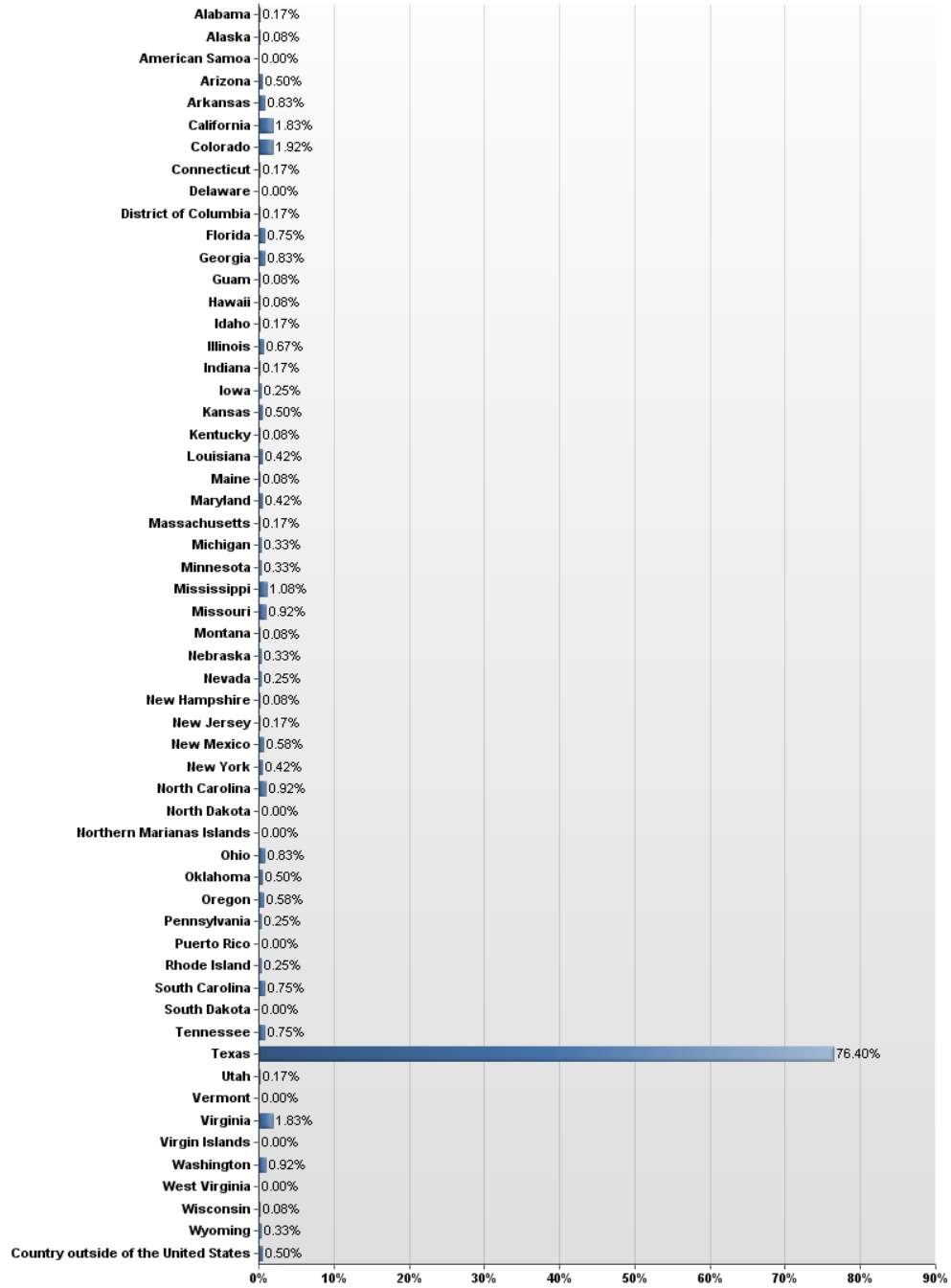
Figure 1. Consumer state demographics and frequency
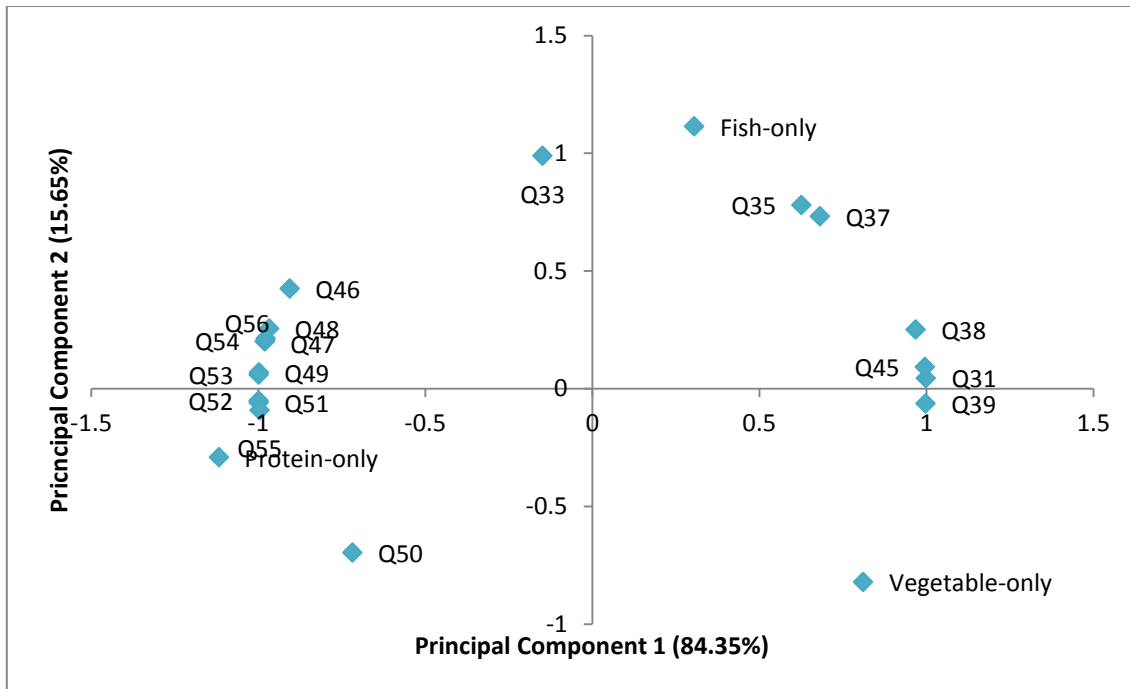
Figure 2. Animal welfare principal component analysis

Q31   Do you purchase natural and/or organic products?
Q33   Do you purchase grass-fed products?
Q35   Do you purchase free-range or cage-free products?
Q37   How important is grass-fed to you?
Q38   How important are no added hormones to you?
Q39   How important are no added ingredients to you?
Q45   How important is animal welfare to you?
Q46   How do you feel about the term factory farm?
Q47   Do you believe male animals should be castrated?
Q48   Do you believe the tails of piglets should be clipped to prevent biting?
Q49   Do you believe that pregnant sows should be kept in stalls so that their individual needs can be better met?
Q50   Do you believe sows and newborn piglets should be kept in stalls to minimize injury and potential mortality of piglets due to being stepped on by sows?
Q51   Do you believe cattle should be de-horned to prevent injury to other cattle?
Q52   Do you believe that the wings of chickens should be clipped to reduce or prevent the possibility of breaking a wing or sustaining other injuries?
Q53   Do you believe that the beaks of chickens should be trimmed to decrease pecking, cannibalism, and mortality of other birds?

Figure 2. Continued

Q54   Do you feel that the animal industry does a good job of informing the public of production procedures and practices?

Q55   Do you believe cattle should be given growth implants to increase feed efficiency and growth rate?

Q56   Do you think the animal industry treats animals humanely?

Figure 3. Nutrition principal component analysis

Q19	Which of the following statements best describes your view of beef?
Q21	Which of the following statements best describes your view of pork?
Q23	Which of the following statements best describes your view of lamb?
Q25	Which of the following statements best describes your view of chicken?
Q27	Which of the following statements best describes your view of fish?
Q31	Do you purchase natural and/or organic products?
Q33	Do you purchase grass-fed products?
Q35	Do you purchase free-range or cage-free products?
Q37	How important is grass-fed to you?
Q38	How important are no added hormones to you?
Q39	How important are no added ingredients to you?
Q40	Do you purchase "low-sodium" or "reduced-sodium" meat and food products?
Q41	Do you purchase "low-fat", "reduced-fat", or "fat-free" meat and food products?
Q42	Do you purchase low carbohydrate foods?
Q43	Do you purchase protein enhanced foods?
Q44	Do you feel that the meat industry does a good job informing consumers about their products?

42
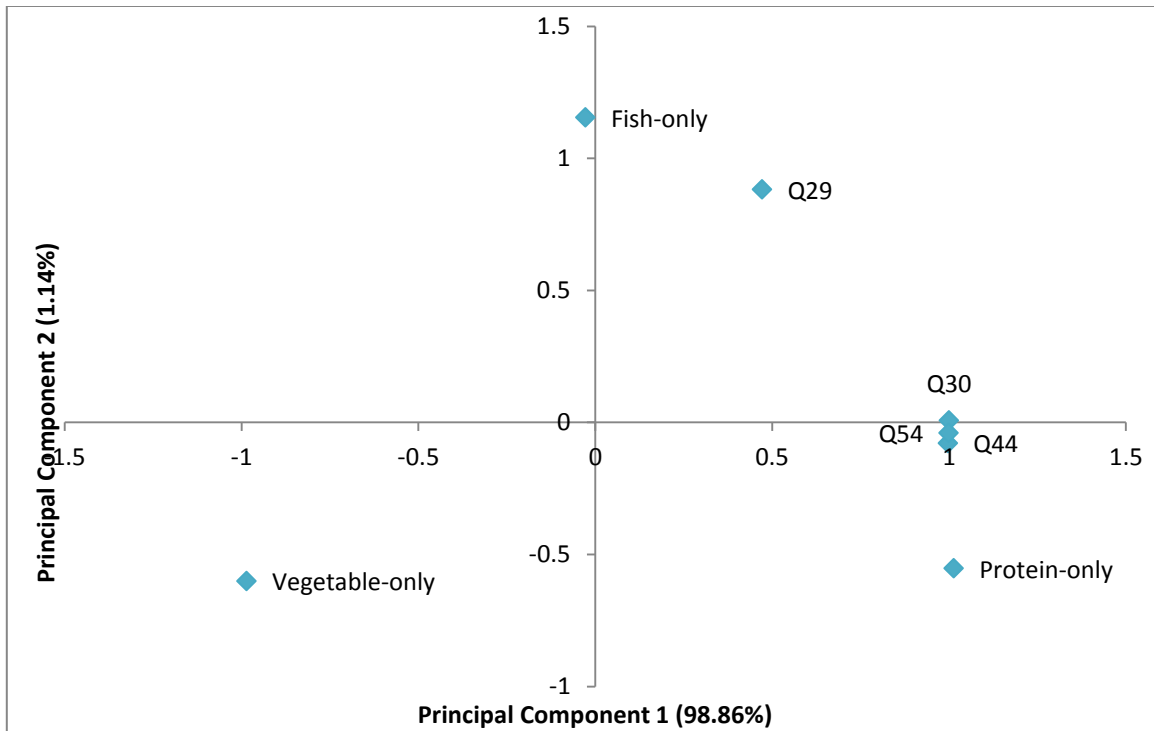
Figure 4. Food safety principal component analysis

Q29	How important is food safety to you?
Q30	Do you believe the meat industry practices good food safety techniques?
Q44	Do you feel that the meat industry does a good job of informing consumers about their products?
Q54	Do you feel that the animal industry does a good job of informing the public of production procedures and practices?
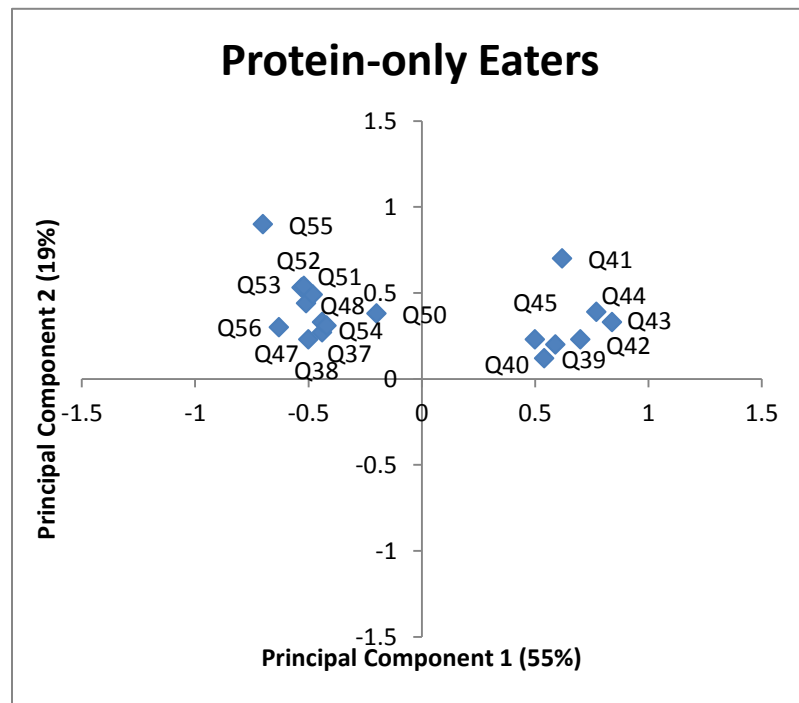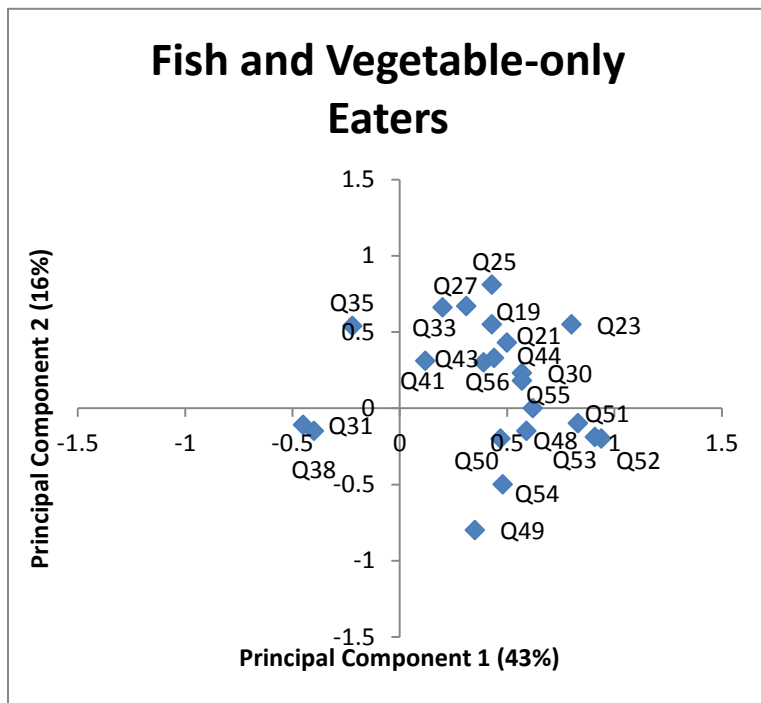
Figure 5. Factor analysis for fish and vegetable-only eaters and protein-only eaters

Q19	Which of the following statements best describes your view of beef?
Q21	Which of the following statements best describes your view of pork?
Q23	Which of the following statements best describes your view of lamb?
Q25	Which of the following statements best describes your view of chicken?
Q27	Which of the following statements best describes your view of fish?
Q29	How important is food safety to you?
Q30	Do you believe the meat industry practices good food safety techniques?
Q31	Do you purchase natural and/or organic products?

Figure 5. Continued

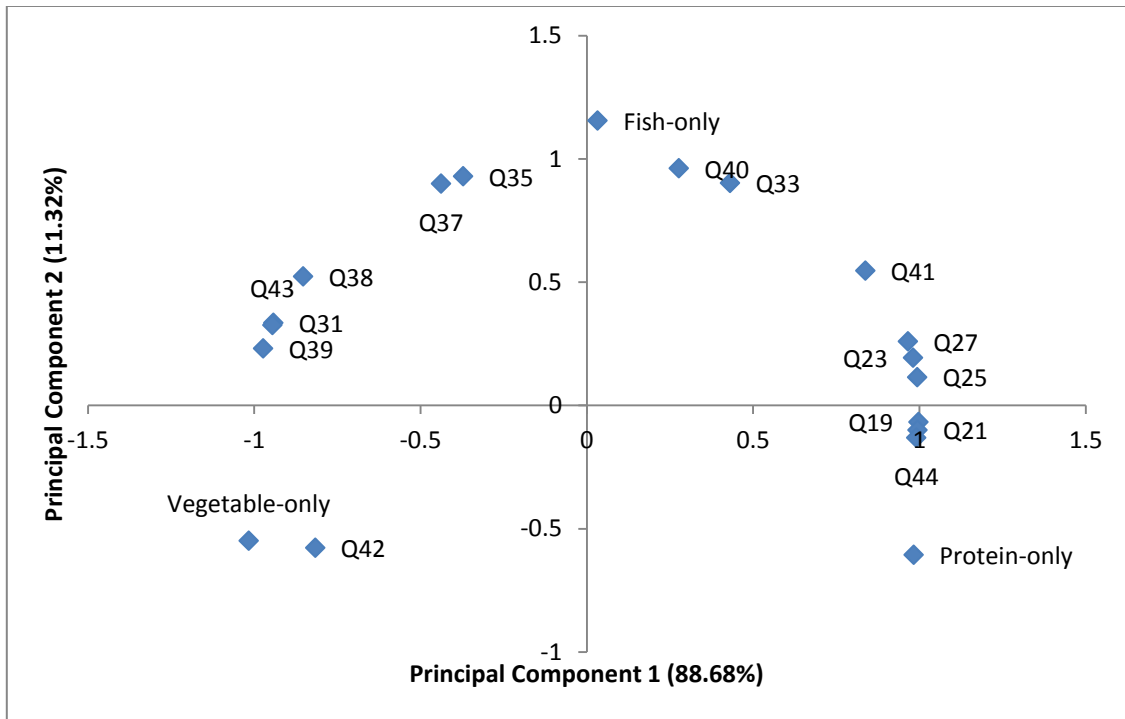|	
Q33	Do you purchase grass-fed products?
Q35	Do you purchase free-range or cage-free products?
Q37	How important is grass-fed to you?
Q38	How important are no added hormones to you?
Q39	How important are no added ingredients to you?
Q40	Do you purchase "low-sodium" or "reduced-sodium" meat and food products?
Q41	Do you purchase "low-fat", "reduced-fat", or "fat-free" meat and food products?
Q42	Do you purchase low carbohydrate foods?
Q43	Do you purchase protein enhanced foods?
Q44	Do you feel that the meat industry does a good job informing consumers about their products?
Q45	How important is animal welfare to you?
Q47	Do you believe male animals should be castrated?
Q48	Do you believe the tails of piglets should be clipped to prevent biting?
Q49	Do you believe that pregnant sows should be kept in stalls so that their individual needs can be better met?
Q50	Do you believe sows and newborn piglets should be kept in stalls to minimize injury and potential mortality of piglets due to being stepped on by sows?
Q51	Do you believe cattle should be de-horned to prevent injury to other cattle?
Q52	Do you believe that the wings of chickens should be clipped to reduce or prevent the possibility of breaking a wing or sustaining other injuries?
Q53	Do you believe that the beaks of chickens should be trimmed to decrease pecking, cannibalism, and mortality of other birds?
Q54	Do you feel that the animal industry does a good job of informing the public of production procedures and practices?
Q55	Do you believe cattle should be given growth implants to increase feed efficiency and growth rate?
Q56	Do you think the animal industry treats animals humanely?

Table 1. Number of observations, mean, standard deviation, minimum and maximum values, and frequency for demographics of online survey respondents

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Age	1227	2.9	1.18	1.0	5.0	
18 to 24 years	154					13
25 to 35 years	311					25
36 to 50 years	342					28
51 to 65 years	301					25
65 and older	120					10
Gender	1227	1.5	0.50	1.0	2.0	
Male	610					50
Female	618					50
Level of Education	1227	3.3	0.82	1.0	4.0	
High School/GED	84					7
Associates Degree/ Technical Degree	41					3
Bachelor's Degree	567					46
Masters or Doctorate	536					44
Annual Income	1176	3.2	1.22	1.0	5.0	
≥$30,000	149					13
$30,001-$59,999	200					17
$60,000-$99,999	303					26
$100,000-$199,999	371					32
≤$200,000	154					13
Household Size	1185	2.8	1.61	1.0	11.0	
1	199					17
2	458					39
3	179					15
4	198					17
5	101					9
6	33					3
≤7	18					1

Table 1. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Occupation	1227	1.5	1.51	1.0	7.0	
Consumer	992					81
Beef Industry	138					11
Pork Industry	10					1
Lamb Industry	5					0
Poultry Industry	2					0
Fish Industry	3					0
Meat or Food Industry						6
						6
Occupation	1174	2.5	1.28	1.0	5.0	
Education	362					31
Service Industry	288					25
Agriculture	129					11
Business Management	370					32
Retail	25					2
Size city/town	1228	3.4	1.47	1.0	5.0	
≥5,000	187					15
5,001-24,999	201					16
25,000-99,999	235					19
100,000-249,999	180					15
≤250,000	425					35

Table 2. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of consumer protein consumption habits

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)	
						Meat Eater	Non-Meat Eater
Protein Consumption Habits	1529	1.2	0.71	1.0	8.0		
Consume Animal Protein	1439					94	
Pesecatarian	10						1
Flexitarian	58						4
Lacto-Ovo-Vegetarian	6						0
Lacto-Vegetarian	3						0
Ovo-Vegetarian	5						0
Vegan	5						0
Raw-Vegan	3						0

Table 3. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of weekly eating habits

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Number of meals eaten at home weekly	1480	4.1	0.76	1.0	5.0	
0	4					0
1-2	56					4
3-5	302					20
6-10	547					37
11+	571					39
Number of meals eaten out (including take-out) weekly						
Fast food	1458	2.3	1.26	1.0	6.0	
0	459					31
1	515					35
2	261					18
3	123					8
4	55					4
5+	45					3
Moderately priced	1424	2.2	1.10	1.0	6.0	
0	411					29
1	612					43
2	249					17
3	94					7
4	31					2
5+	27					2
Local/Specialty	1431	2.3	1.18	1.0	6.0	
0	318					22
1	667					47
2	249					17
3	113					8
4	47					3
5+	44					3
High end	1243	1.2	0.49	1.0	6.0	
0	1093					88
1	121					10
2	20					2
3	5					0
4	2					0
5+	2					0

Table 3. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Number of meals						
taken-out	1505	2.0	0.81	1.0	5.0	
0	415					28
1-2	760					50
3-5	261					17
6-10	62					4
11+	7					0

Table 4. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of weekly protein consumption habits

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Beef	1513	2.5	0.83	1.0	6.0	
0	80					5
1-3	811					53
4-8	483					32
9-13	99					7
14-18	30					2
19-21	10					1
Pork	1441	2.0	0.65	1.0	6.0	
0	283					20
1-3	989					69
4-8	143					10
9-13	17					1
14-18	5					0
19-21	4					0
Lamb	1262	1.1	0.42	1.0	6.0	
0	1138					90
1-3	112					9
4-8	8					1
9-13	0					0
14-18	1					0
19-21	3					0
Chicken	1510	2.6	0.78	1.0	6.0	
0	48					3
1-3	701					46
4-8	599					40
9-13	136					9
14-18	19					1
19-21	7					0

Table 4. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Fish	1421	1.9	0.78	1.0	6.0	
0	327					23
1-3	980					69
4-8	94					7
9-13	14					1
14-18	3					0
19-21	3					0
Vegetable-based protein	1212	1.7	1.06	1.0	6.0	
0	681					56
1-3	344					28
4-8	107					9
9-13	39					3
14-18	20					2
19-21	21					2

Table 5. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of consumer perception of animal welfare

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
How important is animal welfare to you?	1238	4.9	1.44	1.0	7.0	
Not at all important	42					3
Very unimportant	52					4
Somewhat unimportant	94					8
Neither important nor unimportant	183					15
Somewhat important	442					36
Very important	277					22
Extremely important	149					11
Should male animals be castrated?	1238	3.5	0.91	1.0	5.0	
Strongly disagree	31					3
Disagree	58					5
Neither agree nor disagree	644					52
Agree	303					24
Strongly agree	203					16
Should the tails of piglets be clipped?	1241	3.3	0.92	1.0	5.0	
Strongly disagree	47					4
Disagree	80					6
Neither agree nor disagree	674					54
Agree	279					22
Strongly agree	162					13
Should pregnant sows be kept in stalls?	1223	3.4	0.85	1.0	5.0	
Strongly disagree	24					2
Disagree	91					7
Neither agree nor disagree	554					45
Agree	430					35
Strongly agree	125					10

Table 5. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Should sows and newborn piglets be kept in stalls?	1222	3.7	0.84	1.0	5.0	
Strongly disagree	19					2
Disagree	56					5
Neither agree nor Disagree	392					32
Agree	569					47
Strongly agree	187					15
Should cattle be dehorned?	1223	3.4	0.95	1.0	5.0	
Strongly disagree	26					2
Disagree	153					13
Neither agree nor disagree	485					40
Agree	391					32
Strongly agree	169					14
Should the wings of chickens be clipped?	1212	3.2	0.93	1.0	5.0	
Strongly disagree	53					4
Disagree	180					15
Neither agree nor disagree	594					49
Agree	282					23
Strongly agree	104					9
Should the beaks of chickens be trimmed?	1216	3.2	0.99	1.0	5.0	
Strongly disagree	63					5
Disagree	186					15
Neither agree nor disagree	514					42
Agree	336					28
Strongly agree	118					10

Table 6. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of consumer perception of meat and food industry standards

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Good job informing the public of production procedures and practices?	1218	2.4	1.03	1.0	5.0	
Strongly disagree	239					20
Disagree	471					39
Neither agree nor disagree	318					26
Agree	159					13
Strongly agree	32					3
Do you think the animal industry treats animals humanely?	1224	3.0	1.05	1.0	5.0	
Strongly disagree	103					8
Disagree	264					22
Neither agree nor disagree	458					37
Agree	307					25
Strongly agree	93					8
Do you believe the meat industry practices good food safety?	1255	3.7	0.98	1.0	5.0	
Strongly disagree	47					4
Disagree	123					10
Neither agree nor disagree	227					18
Agree	663					53
Strongly agree	196					16

Table 7. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of background preferences of protein sources

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Do you purchase natural and/or organic products?	1258	2.7	1.20	1.0	5.0	
Never	221					18
Rarely	397					32
Sometimes	311					25
Most of the time	220					17
Always	110					9
Why?	1035			1.0	4.0	
More healthful	401					39
Less residual hormones and antibiotics	431					42
Less processed	459					44
Other	326					31
Do you purchase grass-fed products?	1250	2.2	1.12	1.0	5.0	
Never	412					33
Rarely	341					27
Sometimes	324					26
Most of the time	130					10
Always	44					4
Why?	826			1.0	4.0	
More healthful	420					51
Prefer the taste	230					28
Prefer production method	284					34
Other	236					29
Do you purchase free-range or cage-free products?	1246	2.3	1.29	1.0	5.0	
Never	471					38
Rarely	312					25
Sometimes	219					18
Most of the time	144					12
Always	101					8

Table 7. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Why?	771			1.0	5.0	
More healthful	338					44
Prefer production method	391					51
Less processed	265					34
Other	178					23

Table 8. Number of observations, mean, standard deviation, minimum and maximum values, and frequency for animal welfare perception among protein consumers

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
How important is animal welfare to you?	1158	4.8	1.42	1	7	
Not at all important	41					4
Very unimportant	51					4
Somewhat unimportant	91					8
Neither important nor unimportant	177					15
Somewhat important	423					37
Very important	260					22
Extremely important	115					10
Do you think the animal industry treats animals humanely?	1146	3.1	1.02	1	5	
Strongly disagree	74					6
Disagree	241					21
Neither agree nor disagree	439					38
Agree	300					26
Strongly agree	92					8
Do you purchase natural and/or organic products?	1177	2.6	1.16	1	5	
Never	219					19
Rarely	390					33
Sometimes	297					25
Most of the time	188					16
Always	83					7
Do you purchase grass-fed products?	1169	2.2	1.11	1	5	
Never	391					33
Rarely	325					28
Sometimes	299					26
Most of the time	114					10
Always	40					3

Table 8. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Do you purchase free-range or cage-free products?	1164	2.2	1.26	1	5	
Never	475					39
Rarely	296					25
Sometimes	205					18
Most of the time	124					11
Always	82					7

Table 9. Number of observations, mean, standard deviation, minimum and maximum values, and frequency for animal welfare perception among non-protein consumers

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
How important is animal welfare to you?	81	5.8	1.33	1	7	
Not at all important	1					1
Very unimportant	1					1
Somewhat unimportant	3					4
Neither important nor unimportant	6					7
Somewhat important	19					23
Very important	17					21
Extremely important	34					42
Do you think the animal industry treats animals humanely?	79	2.1	1.04	1	5	
Strongly disagree	29					37
Disagree	23					29
Neither agree nor Disagree	19					24
Agree	7					9
Strongly agree	1					1
Do you purchase natural and/or organic products?	82	3.9	1.03	1	5	
Never	2					2
Rarely	7					9
Sometimes	14					17
Most of the time	32					39
Always	27					33
Do you purchase grass-fed products?	82	2.6	1.21	1	5	
Never	21					26
Rarely	16					20
Sometimes	25					30
Most of the time	16					20
Always	4					5

Table 9. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Do you purchase cage-free and/or free-range products?	83	3.2	1.42	1	5	
Never	14					17
Rarely	16					19
Sometimes	14					17
Most of the time	20					24
Always	19					23

Table 10. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of food label preferences

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Do you purchase low-fat, reduced-fat, or fat-free products?	1242	2.9	1.19	1.0	5.0	
Never	213					17
Rarely	213					17
Sometimes	395					32
Most of the time	324					26
Always	98					8
Do you purchase low-sodium or reduced-sodium products?	1246	2.6	1.23	1.0	5.0	
Never	327					26
Rarely	248					20
Sometimes	352					28
Most of the time	250					20
Always	70					6
Do you purchase low carbohydrate products?	1241	2.9	1.19	1.0	5.0	
Never	344					28
Rarely	282					23
Sometimes	366					29
Most of the time	184					15
Always	66					5
Importance of grass-fed?	1249	3.8	1.76	1.0	7.0	
Not at all important	231					18
Very unimportant	100					8
Somewhat unimportant	102					8
Neither important nor unimportant	341					27
Somewhat important	302					24
Very important	106					8
Extremely important	68					5

Table 10. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Importance of no added hormones?	1241	4.9	1.86	1.0	7.0	
Not at all important	132					11
Very unimportant	51					4
Somewhat unimportant	59					5
Neither important nor unimportant	160					13
Somewhat important	307					25
Very important	266					21
Extremely important	267					21
Importance of no added ingredients?	1249	5.0	1.66	1.0	7.0	
Not at all important	90					7
Very unimportant	48					4
Somewhat unimportant	60					5
Neither important nor unimportant	160					13
Somewhat important	368					29
Very important	303					24
Extremely important	221					18

Table 11. Number of observations, mean, standard deviation, minimum, maximum, and frequency of consumer perceived healthfulness of animal protein

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Beef	1254	5.1	1.25	1.0	7.0	
Not at all healthful	9					1
Very unhealthful	24					2
Somewhat unhealthful	150					12
Neither healthful nor unhealthful	75					6
Somewhat healthful	475					38
Very healthful	382					30
Extremely unhealthful	139					11
Pork	1263	4.9	1.24	1.0	7.0	
Not at all healthful	21					2
Very unhealthful	39					3
Somewhat unhealthful	132					10
Neither healthful nor unhealthful	137					11
Somewhat healthful	532					42
Very healthful	339					27
Extremely unhealthful	63					5
Lamb	1226	4.7		1.0	7.0	
Not at all healthful	22					2
Very unhealthful	18					1
Somewhat unhealthful	65					5
Neither healthful nor unhealthful	447					36
Somewhat healthful	382					31
Very healthful	239					19
Extremely unhealthful	53					4

Table 11. Continued

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Chicken	1243	5.8	1.04	1.0	7.0	
Not at all healthful	9					1
Very unhealthful	17					1
Somewhat unhealthful	23					2
Neither healthful nor unhealthful	49					4
Somewhat healthful	266					21
Very healthful	631					51
Extremely unhealthful	248					20
Fish	1241	6.1	1.01	1.0	7.0	
Not at all healthful	11					1
Very unhealthful	8					1
Somewhat unhealthful	11					1
Neither healthful nor unhealthful	47					4
Somewhat healthful	117					9
Very healthful	568					46
Extremely unhealthful	479					39

Table 12. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of protein consumption habits for consumers who have a history of family disease

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
How often do you consume the following protein sources? (On a weekly basis)						
Beef	971	2.5	0.83	1	6	
0	53					5
1-3	524					54
4-8	310					22
9-13	59					6
14-18	17					1
19-21	8					1
Pork	918	1.9	0.65	1	6	
0	191					21
1-3	616					67
4-8	99					11
9-13	5					1
14-18	4					0
19-21	3					0
Lamb	811	1.1	0.44	1	6	
0	746					92
1-3	57					7
4-8	4					0
9-13	0					0
14-18	1					0
19-21	3					0
Chicken	969	2.6	0.78	1	6	
0	28					3
1-3	451					47
4-8	392					40
9-13	81					8
14-18	12					1
19-21	5					1

Table 12. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Fish	919	1.9	0.62	1	6	
0	221					24
1-3	621					68
4-8	67					7
9-13	6					1
14-18	1					0
19-21	3					0
Vegetable-based protein	784	1.7	1.04	1	6	
0	446					57
1-3	224					29
4-8	65					8
9-13	26					3
14-18	9					1
19-21	14					2

Table 13. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of protein consumption habits for consumers without a history of family disease

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)

How often do you consume the following protein sources? (On a weekly basis)

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Beef	542	2.5	0.83	1	6	
0	27					5
1-3	287					53
4-8	173					32
9-13	40					7
14-18	13					2
19-21	2					0
Pork	523	2.0	0.63	1	6	
0	92					18
1-3	373					71
4-8	44					8
9-13	12					2
14-18	1					0
19-21	1					0
Lamb	451	1.1	0.37	1	3	
0	392					87
1-3	55					12
4-8	4					1
9-13	0					0
14-18	0					0
19-21	0					0
Chicken	541	2.6	0.80	1	6	
0	20					4
1-3	250					46
4-8	207					38
9-13	55					10
14-18	7					1
19-21	2					0

Table 13. Continued

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Fish	502	1.9	0.59	1	5	
0	106					21
1-3	359					72
4-8	27					5
9-13	8					2
14-18	2					0
19-21	0					0
Vegetable-based protein	428	1.8	1.10	1	6	
0	235					55
1-3	120					28
4-8	42					10
9-13	13					3
14-18	11					3
19-21	7					2

Table 14. Number of observations, mean, standard deviation, minimum and maximum values, and frequency for purchasing habits of meat and food products for consumers who have a history of family disease

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
How often do you purchase the following meat and food products?						
Low-fat, reduced-fat, or fat-free	800	2.9	1.17	1	5	
Never	120					15
Rarely	131					16
Sometimes	260					33
Most of the time	224					28
Always	65					8
Low-sodium or reduced-sodium	802	2.6	1.21	1	5	
Never	190					24
Rarely	168					21
Sometimes	232					29
Most of the time	167					21
Always	45					6
Low-carbohydrate	801	2.6	1.18	1	5	
Never	192					24
Rarely	193					24
Sometimes	239					30
Most of the time	133					17
Always	44					5
Protein-enhanced	802	1.9	0.99	1	5	
Never	360					45
Rarely	223					28
Sometimes	169					21
Most of the time	38					5
Always	12					1

Table 15. Number of observations, mean, standard deviation, minimum and maximum values, and frequency for purchasing habits of meat and food products for consumers without a history of family disease

Question	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
How often do you purchase the following meat and food products?						
Low-fat, reduced-fat, or fat-free	443	2.8	1.22	1	5	
Never	93					21
Rarely	82					19
Sometimes	135					30
Most of the time	100					23
Always	33					7
Low-sodium or reduced-sodium	445	2.5	1.26	1	5	
Never	137					31
Rarely	80					18
Sometimes	120					27
Most of the time	83					19
Always	25					6
Low-carbohydrate	441	2.3	1.20	1	5	
Never	152					34
Rarely	89					20
Sometimes	127					29
Most of the time	51					12
Always	22					5
Protein-enhanced	443	1.8	1.00	1	5	
Never	221					50
Rarely	114					26
Sometimes	75					17
Most of the time	27					6
Always	6					1

Table 16. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of the importance of factors affecting beef consumption

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Flavor	1351	5.9	0.99	1.0	7.0	
Not at all important	4					0
Very unimportant	30					2
Somewhat unimportant	13					1
Neither important nor unimportant	20					1
Somewhat important	204					15
Very important	737					55
Extremely important	345					26
Tenderness	1349	5.7	1.05	1.0	7.0	
Not at all important	5					0
Very unimportant	27					2
Somewhat unimportant	25					2
Neither important nor unimportant	56					4
Somewhat important	313					23
Very important	648					48
Extremely important	277					21
Price	1350	5.2	1.31	1.0	7.0	
Not at all important	26					2
Very unimportant	34					3
Somewhat unimportant	80					6
Neither important nor unimportant	134					10
Somewhat important	484					36
Very important	387					29
Extremely important	207					15

Table 16. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Nutrition	1346	5.1	1.26	1.0	7.0	
Not at all important	20					1
Very unimportant	32					2
Somewhat unimportant	84					6
Neither important nor unimportant	202					15
Somewhat important	466					35
Very important	395					29
Extremely important	149					11
Convenience	1344	4.8	1.28	1.0	7.0	
Not at all important	39					3
Very unimportant	36					3
Somewhat unimportant	104					8
Neither important nor unimportant	245					18
Somewhat important	547					41
Very important	286					21
Extremely important	89					7
Animal welfare/handling	1350	4.2	1.77	1.0	7.0	
Not at all important	153					11
Very unimportant	110					8
Somewhat unimportant	156					12
Neither important nor unimportant	307					23
Somewhat important	313					23
Very important	163					12
Extremely important	150					11
Food safety	1350	5.8	1.35	1.0	7.0	
Not at all important	20					2
Very unimportant	35					3
Somewhat unimportant	44					3
Neither important nor unimportant	67					5
Somewhat important	266					20
Very important	435					32
Extremely important	525					39

Table 17. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of the importance of factors affecting pork consumption

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Flavor	1093	5.9	1.04	1.0	7.0	
Not at all important	9					1
Very unimportant	22					2
Somewhat unimportant	8					1
Neither important nor unimportant	27					2
Somewhat important	182					17
Very important	595					54
Extremely important	251					23
Tenderness	1089	5.6	1.09	1.0	7.0	
Not at all important	12					1
Very unimportant	12					1
Somewhat unimportant	28					3
Neither important nor unimportant	62					6
Somewhat important	312					29
Very important	488					45
Extremely important	176					16
Price	1091	5.2	1.27	1.0	7.0	
Not at all important	26					2
Very unimportant	19					2
Somewhat unimportant	51					5
Neither important nor unimportant	119					11
Somewhat important	404					37
Very important	329					30
Extremely important	144					13

Table 17. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Nutrition	1085	5.1	1.22	1.0	7.0	
Not at all important	31					3
Very unimportant	22					2
Somewhat unimportant	43					4
Neither important nor unimportant	182					17
Somewhat important	401					37
Very important	312					29
Extremely important	105					10
Convenience	1086	4.8	1.25	1.0	7.0	
Not at all important	33					3
Very unimportant	25					2
Somewhat unimportant	63					6
Neither important nor unimportant	218					20
Somewhat important	432					40
Very important	256					24
Extremely important	60					5
Animal welfare/handling	1082	4.0	1.79	1.0	7.0	
Not at all important	154					14
Very unimportant	79					7
Somewhat unimportant	104					10
Neither important nor unimportant	284					26
Somewhat important	228					21
Very important	134					12
Extremely important	100					9
Food safety	1082	5.7	1.52	1.0	7.0	
Not at all important	40					4
Very unimportant	22					2
Somewhat unimportant	39					3
Neither important nor Unimportant	78					7
Somewhat important	191					18
Very important	313					29
Extremely important	400					37

Table 18. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of the importance of factors affecting lamb consumption

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Flavor	306	5.1	2.01	1.0	7.0	
Not at all important	45					15
Very unimportant	3					1
Somewhat unimportant	3					1
Neither important nor unimportant	52					17
Somewhat important	22					7
Very important	10					3
Extremely important	81					26
Tenderness	306	4.9	1.94	1.0	7.0	
Not at all important	45					15
Very unimportant	5					2
Somewhat unimportant	4					1
Neither important nor unimportant	55					18
Somewhat important	40					13
Very important	102					33
Extremely important	55					18
Price	306	4.4	1.88	1.0	7.0	
Not at all important	51					17
Very unimportant	4					1
Somewhat unimportant	13					4
Neither important nor unimportant	74					24
Somewhat important	73					24
Very important	50					16
Extremely important	41					13

Table 18. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Nutrition	304	4.4	1.83	1.0	7.0	
Not at all important	49					16
Very unimportant	5					2
Somewhat unimportant	10					3
Neither important nor unimportant	80					26
Somewhat important	67					22
Very important	62					20
Extremely important	31					10
Convenience	305	4.1	1.76	1.0	7.0	
Not at all important	54					18
Very unimportant	5					2
Somewhat unimportant	18					6
Neither important nor unimportant	97					32
Somewhat important	73					24
Very important	36					12
Extremely important	22					7
Animal welfare/handling	305	4.0	1.92	1.0	7.0	
Not at all important	58					19
Very unimportant	14					5
Somewhat unimportant	18					6
Neither important nor unimportant	100					33
Somewhat important	37					12
Very important	43					14
Extremely important	35					11
Food safety	306	4.8	2.04	1.0	7.0	
Not at all important	45					15
Very unimportant	7					2
Somewhat unimportant	10					3
Neither important nor unimportant	71					23
Somewhat important	35					11
Very important	55					18
Extremely important	83					27

Table 19. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of the importance of factors affecting chicken consumption

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Flavor	1263	5.8	1.10	1.0	7.0	
Not at all important	8					1
Very unimportant	19					2
Somewhat unimportant	27					2
Neither important nor unimportant	62					5
Somewhat important	278					22
Very important	550					44
Extremely important	320					25
Tenderness	1262	5.5	1.13	1.0	7.0	
Not at all important	9					1
Very unimportant	19					2
Somewhat unimportant	40					3
Neither important nor unimportant	110					9
Somewhat important	365					29
Very important	507					40
Extremely important	213					17
Price	1259	5.3	1.26	1.0	7.0	
Not at all important	27					2
Very unimportant	20					2
Somewhat unimportant	49					4
Neither important nor unimportant	134					11
Somewhat important	422					34
Very important	412					33
Extremely important	196					16

Table 19. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Nutrition	1259	5.5	1.16	1.0	7.0	
Not at all important	13					1
Very unimportant	22					2
Somewhat unimportant	27					2
Neither important nor unimportant	143					11
Somewhat important	357					28
Very important	488					39
Extremely important	210					17
Convenience	1253	5.1	1.28	1.0	7.0	
Not at all important	30					2
Very unimportant	33					3
Somewhat unimportant	48					4
Neither important nor unimportant	180					14
Somewhat important	441					35
Very important	389					31
Extremely important	133					11
Animal welfare/handling	1247	4.3	1.83	1.0	7.0	
Not at all important	144					12
Very unimportant	101					8
Somewhat unimportant	95					8
Neither important nor unimportant	285					23
Somewhat important	275					22
Very important	181					15
Extremely important	167					13
Food safety	1251	5.7	1.56	1.0	7.0	
Not at all important	49					4
Very unimportant	38					3
Somewhat unimportant	30					2
Neither important nor unimportant	95					8
Somewhat important	178					14
Very important	340					27
Extremely important	525					42

Table 20. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of the importance of factors affecting consumer fish consumption

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Flavor	1008	6.1	1.07	1.0	7.0	
Not at all important	11					1
Very unimportant	18					2
Somewhat unimportant	4					0
Neither important nor unimportant	18					2
Somewhat important	106					11
Very important	470					47
Extremely important	381					28
Tenderness	1007	5.1	1.32	1.0	7.0	
Not at all important	22					2
Very unimportant	24					2
Somewhat unimportant	41					4
Neither important nor unimportant	203					2
Somewhat important	269					27
Very important	320					32
Extremely important	128					13
Price	1008	5.4	1.26	1.0	7.0	
Not at all important	22					2
Very unimportant	12					1
Somewhat unimportant	47					5
Neither important nor unimportant	89					9
Somewhat important	326					32
Very important	352					35
Extremely important	160					16

Table 20. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Frequency (%)
Nutrition	1006	5.6	1.16	1.0	7.0	
Not at all important	12					1
Very unimportant	18					2
Somewhat unimportant	13					1
Neither important nor unimportant	86					9
Somewhat important	247					25
Very important	427					42
Extremely important	203					20
Convenience	999	5.0	1.31	1.0	7.0	
Not at all important	32					3
Very unimportant	21					2
Somewhat unimportant	46					5
Neither important nor unimportant	167					17
Somewhat important	365					37
Very important	266					27
Extremely important	102					10
Animal welfare/handling	984	4.1	1.86	1.0	7.0	
Not at all important	147					15
Very unimportant	68					7
Somewhat unimportant	75					8
Neither important nor unimportant	289					29
Somewhat important	168					17
Very important	115					12
Extremely important	122					12
Food safety	1000	5.8	1.55	1.0	7.0	
Not at all important	39					4
Very unimportant	21					2
Somewhat unimportant	26					3
Neither important nor unimportant	88					9
Somewhat important	145					15
Very important	253					25
Extremely important	428					43

Table 21. Number of observations, mean, standard deviation, minimum and maximum values, and frequency of the percentage of consumer decision to purchase and consume protein sources

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Beef					
Price of product	1357	29.0	19.92	0.00	95.00
Lean to fat ratio	1357	22.9	15.66	0.00	100.00
Visual appearance	1357	21.0	15.29	0.00	100.00
Added ingredients	1357	10.7	10.50	0.00	80.00
How the animal is raised	1356	9.1	12.96	0.00	100.00
Animal welfare	1353	7.4	10.89	0.00	100.00
Pork					
Price of product	1104	31.9	21.32	0.00	100.00
Lean to fat ratio	1104	20.4	15.47	0.00	100.00
Visual appearance	1103	22.1	16.48	0.00	100.00
Added ingredients	1103	11.0	11.22	0.00	85.00
How the animal is raised	1101	7.9	11.96	0.00	100.00
Animal welfare	1103	6.8	10.07	0.00	100.00
Lamb					
Price of product	319	35.9	31.67	0.00	100.00
Lean to fat ratio	319	15.6	15.58	0.00	100.00
Visual appearance	319	17.6	19.71	0.00	100.00
Added ingredients	319	10.0	11.83	0.00	100.00
How the animal is raised	319	10.4	15.24	0.00	100.00
Animal welfare	319	10.8	18.85	0.00	100.00
Chicken					
Price of product	1275	32.2	23.50	0.00	100.00
Lean to fat ratio	1274	17.1	15.54	0.00	100.00
Visual appearance	1275	21.6	16.18	0.00	100.00
Added ingredients	1275	11.9	11.63	0.00	85.00
How the animal is raised	1272	9.4	13.25	0.00	100.00
Animal welfare	1275	7.9	11.19	0.00	100.00

Table 21. Continued

Response	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Fish					
Price of product	1018	36.3	22.43	0.00	100.00
Lean to fat ratio	1016	15.1	16.19	0.00	100.00
Visual appearance	1018	29.6	18.98	0.00	100.00
How the animal is raised	1016	19.0	22.25	0.00	100.00

Table 22. Number of observations and frequency of respondent demographic of consumers[a] for Multinomial Logit Analysis

Variable	Number of Observations	Frequency (%)
Age	991	
18-24	88	8.88
25-35	260	26.24
36-50	291	29.36
51-65	248	25.03
65 +	104	10.49
Gender	990	
Male	501	50.61
Female	489	49.39
Education	990	
High school/GED	59	5.96
Associate/Technical	28	2.83
Bachelor's degree	459	46.36
M.S./Ph.D.	444	44.85
Income	941	
≤ $30,000	98	10.41
$30,001-$59,999	147	15.62
$60,000-$99,999	249	26.46
$100,000-$199,999	319	33.90
≥ $200,000	128	13.60

[a] See question 62 of the survey (Appendix A)

Table 23. Parameters for fish-only consumers and vegetable-only consumers

Variable	Coefficient	Standard Error	P > | z |
Protein-only (base outcome)			
Fish-only			
Number of meals eaten at home	0.108	0.062	0.083
Use of dietary guidelines	0.488	0.318	0.125
History of family disease	-0.280	0.328	0.393
Food safety	0.140	0.173	0.420
Household size	-0.033	0.121	0.788
Age			
25-35	0.084	0.610	0.891
36-50	-0.466	0.656	0.478
51-65	-0.589	0.700	0.400
65+	-0.644	0.963	0.504
Female[a]	0.988	0.357	0.006
Education level			
Associates/Technical degree	-15.261	2404.869	0.995
Bachelor's degree	0.610	0.868	0.482
M.S./Ph.D.	1.056	0.894	0.237
Average annual income			
$30,001-$59,999[a]	-1.599	0.659	0.015
$60,000-$99,999	-0.872	0.539	0.106
$100,000-$199,999	-0.752	0.548	0.170
More than $200,000	-0.869	0.669	0.194
City size	0.115	0.336	0.733

Table 23. Continued

Variable	Coefficient	Standard Error	P > |z|
Vegetable-only			
Number of meals eaten at home	0.350	0.145	0.016
Use of dietary guidelines	0.526	0.536	0.326
History of family disease	-1.092	0.534	0.041
Food safety	0.013	0.223	0.954
Household size	0.229	0.145	0.114
Age			
25-35	0.822	0.996	0.409
36-50	-15.031	833.541	0.986
51-65	0.256	1.105	0.817
65+	1.287	1.125	0.252
Female[a]	-0.240	0.589	0.684
Education level			
Associates/Technical degree	15.459	1773.113	0.993
Bachelor's degree	15.327	1773.113	0.993
M.S./Ph.D.	15.721	1773.113	0.993
Average annual income			
$30,001-$59,999[a]	-1.265	0.864	0.143
$60,000-$99,999	-3.026	1.212	0.013
$100,000-$199,999	-1.333	0.833	0.110
More than $200,000	-1.316	1.074	0.220
City size	0.064	0.549	0.908

[a] $0.100 \leq P > |z|$ was used to determine significance

Table 24. Likelihood of consumers to consume animal protein-only

Variable	dy / dx	Error	P > |z|
Protein-only[abc]			
Number of meals eaten at home[d]	-0.011	0.004	0.006
Use of dietary guidelines[d]	-0.033	0.018	0.076
History of family disease[d]	0.032	0.019	0.087
Food safety	-0.007	0.009	0.457
Household size	-0.002	0.007	0.721
Age			
25-35	-0.018	0.035	0.608
36-50	0.279	14.230	0.984
51-65	0.024	0.040	0.544
65+	0.009	0.052	0.858
Female[d]	-0.044	0.021	0.037
Education level			
Associates/Technical degree	0.47612	0.469	0.997
Bachelor's degree	-0.2913	0.270	0.992
M.S./Ph.D.	-0.3203	0.270	0.992
Average annual income			
$30,000-$59,999[d]	0.099	0.036	0.006
$60,000-$99,999[d]	0.094	0.035	0.007
$100,000-$199,999[d]	0.059	0.031	0.057
More than $200,000[d]	0.065	0.038	0.092
City size	-0.007	0.019	0.729

[a] $n = 866$
[b] mean = 0.92
[c] Standard Deviation = 0.070
[d] $0.100 \leq P > |z|$ was used to determine significance

Table 25. Likelihood of consumers to consume fish-only

Variable	dy / dx	Standard Error	P > | z |
Fish-only[abc]			
Number of meals eaten at home	0.005	0.003	0.118
Use of dietary guidelines	0.024	0.016	0.141
History of family disease	-0.012	0.016	0.448
Food safety	0.007	0.009	0.423
Household size	-0.002	0.006	0.744
Age			
25-35	0.003	0.030	0.922
36-50	-0.001	1.239	0.999
51-65	-.0298	0.035	0.395
65+	-0.034	0.048	0.479
Female[d]	0.050	0.019	0.007
Education level			
Associates/Technical degree	-0.786	120.206	0.995
Bachelor's degree	0.008	2.635	0.998
Average annual income			
$30,001-$59,999[d]	-0.078	0.034	0.020
$60,000-$99,999	-0.039	0.027	0.144
$100,000-$199,999	-0.036	0.027	0.193
More than $200,000	-0.042	0.033	0.215
City size	0.006	0.017	0.737

[a] $n = 866$
[b] mean = 0.06
[c] Standard Deviation = 0.049
[d] $0.100 \leq P > \mid z \mid$ was used to determine significance

Table 26. Likelihood of consumers to consume vegetable-only

Variable	dy / dx	Standard Error	P > | z |
Vegetable-only[abc]			
Number of meals eaten at home[d]	0.006	0.003	0.029
Use of dietary guidelines	0.009	0.010	0.366
History of family disease[d]	-0.020	0.010	0.056
Food safety	0.000	0.004	0.994
Household size	0.004	0.003	0.117
Age			
25-35	0.015	0.019	0.416
36-50	-0.278	15.469	0.986
51-65	0.006	0.021	0.783
65+	0.025	0.021	0.240
Female	-0.006	0.011	0.586
Education level			
Associates/Technical degree	0.310	33.098	0.993
Bachelor's degree	0.284	32.905	0.993
Average annual income			
$30,001-$59,999	-0.021	0.016	0.192
$60,000-$99,999[d]	-0.055	0.024	0.024
$100,000-$199,999	-0.024	0.016	0.135
More than $200,000	-0.023	0.020	0.252
City size	0.001	0.010	0.921

[a] $n = 866$
[b] mean = 0.02
[c] Standard Deviation = 0.042
[d] $0.100 \leq P > | z |$ was used to determine significance

CONSUMER PERCPETION SURVEY

Consumer Perception

Q1 The purpose of this survey is to gather information about consumer perception related to beef, pork, lamb, chicken and fish and to help create a more desirable product for the consumer. Your participation in this online survey is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you. None of your personal information such as name or other identifiable information will be collected. The data from this survey will be published as a Texas A&M University Masters of Science in Animal Science Thesis project.You have rights as a research participant. If you have questions about your rights or complaints about this research, you may contact the Texas A&M Office of Research Compliance and Biosafety at 979-458-1467 or by mail at: 750 Agronomy Road, Suite 3501 TAMU 1186 College Station, Texas 77843-1186.

❍ Yes, I agree to the terms and am willing to participate in this study. (1)
❍ I do not wish to participate in this study. (2)

If I do not wish to participate in this study. Is Selected, Then Skip To End of Survey

Q2 On average, how many meals do you eat at home in a week? (Not including take-out)

❍ 0 (1)
❍ 1-2 (2)
❍ 3-5 (3)
❍ 6-10 (4)
❍ 11+ (5)

Q3 On average, how many meals do you eat out a week? (Including take-out)

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5+ (6)
Fast Food (McDonald's, Burger King, Chick-fil-A) (1)	❍	❍	❍	❍	❍	❍
Moderately Priced, Dine-In Restaurants (T.G.I.Friday's, Chili's, Jason's Deli) (2)	❍	❍	❍	❍	❍	❍
Local/Specialty Restaurants (3)	❍	❍	❍	❍	❍	❍
High End/White Tablecloth Restaurants (Ruth Chris, Morton's of Chicago) (4)	❍	❍	❍	❍	❍	❍

Q4 On average, how many meals do you take-out in a week?

❍ 0 (1)
❍ 1-2 (2)
❍ 3-5 (3)
❍ 6-10 (4)
❍ 11+ (5)

Q5 What are your protein consumption habits?

- ❍ I consume animal protein (1)
- ❍ I am a Pescaterian/Pescetarian - abstain from all animal meats, except fish (2)
- ❍ I am a Flexitarian/Semi-Vegetarian - mostly consume a vegetarian diet, but occasionally eat meat (3)
- ❍ I am a Lacto-Ovo-Vegetarian - abstain from all animal meats, fish, and shellfish, but do consume eggs and dairy (4)
- ❍ I am a Lacto-Vegetarian - abstain from all animal meats, fish, shellfish, and eggs, but do consume dairy (5)
- ❍ I am an Ovo-Vegetarian - abstain from all animal meats, fish, shellfish, and dairy, but do consume eggs (6)
- ❍ I am a Vegan - abstain from all meats, eggs, dairy and processed foods containing animal derived products (7)
- ❍ I am a Raw-Vegan - only consume unprocessed Vegan foods that have not been heated over 115 degrees Fahrenheit (8)

Q6 Do you use any dietary guidelines when making your purchasing decisions? (Please select all that apply)

- ❑ Dietary Guidelines for Americans (1)
- ❑ Atkins Diet (2)
- ❑ Weight Watchers (3)
- ❑ South Beach Diet (4)
- ❑ U.S.D.A. My Plate (Formerly the Food Guide Pyramid) (5)
- ❑ Other (Please specify) (6) _____
- ❑ None (7)

Q7 Do you have a family history of disease or illness? (i.e. Diabetes, High Blood Pressure, High Cholesterol, Celiac Disease, etc.)

- ❍ Yes (1)
- ❍ No (2)

Q8 How many times a week do you consume the following protein sources?

	0 (1)	1-3 (2)	4-8 (3)	9-13 (4)	14-18 (5)	19-21 (6)
Beef (1)	○	○	○	○	○	○
Pork (2)	○	○	○	○	○	○
Lamb (3)	○	○	○	○	○	○
Chicken (4)	○	○	○	○	○	○
Fish (5)	○	○	○	○	○	○
Vegetable Based Protein (As main portion of protein consumption) (6)	○	○	○	○	○	○

Answer If How many times a week do you consume the following protein sources... Beef - 0 Is Not Selected

Q9 Regarding your consumption of beef, how important are the following factors?

	Not at all Important (1)	Very Unimportant (2)	Somewhat Unimportant (3)	Neither Important nor Unimportant (4)	Somewhat Important (5)	Very Important (6)	Extremely Important (7)
Flavor (1)	○	○	○	○	○	○	○
Tenderness (2)	○	○	○	○	○	○	○
Price (3)	○	○	○	○	○	○	○
Nutrition (4)	○	○	○	○	○	○	○
Convenience (5)	○	○	○	○	○	○	○
Animal Welfare/Handling (6)	○	○	○	○	○	○	○
Food Safety (7)	○	○	○	○	○	○	○

Q10 Please rate the importance of the following aspects as a percentage of your decision to purchase and consume beef. (Please ensure your Total equals 100)

_____ Price of Product (1)

_____ Lean to Fat Ratio of Product (2)

_____ Visual Appearance (3)

_____ Added Ingredients (If there are or are not any in the product) (4)

_____ How the Animal is Raised (Natural, Organic, Grass-Fed, etc.) (5)

_____ Animal Welfare (Free-Range, Handling Practices, etc.) (6)

Q11 Regarding your consumption of pork, how important are the following factors?

	Not at all Important (1)	Very Unimportant (2)	Somewhat Unimportant (3)	Neither Important nor Unimportant (4)	Somewhat Important (5)	Very Important (6)	Extremely Important (7)
Flavor (1)	○	○	○	○	○	○	○
Tenderness (2)	○	○	○	○	○	○	○
Price (3)	○	○	○	○	○	○	○
Nutrition (4)	○	○	○	○	○	○	○
Convenience (5)	○	○	○	○	○	○	○
Animal Welfare/Handling (6)	○	○	○	○	○	○	○
Food Safety (7)	○	○	○	○	○	○	○

Q12 Please rate the importance of the following aspects as a percentage of your decision to purchase and consume pork. (Please ensure your Total equals 100)

_____ Price of Product (1)

_____ Lean to Fat Ratio of Product (2)

_____ Visual Appearance (3)

_____ Added Ingredients (If there are or are not any in the product) (4)

_____ How the Animal is Raised (Natural, Organic, Grass-Fed, etc.) (5)

_____ Animal Welfare (Free-Range, Handling Practices, etc.) (6)

Q13 Regarding your consumption of lamb, how important are the following factors?

	Not at all Important (1)	Very Unimportant (2)	Somewhat Unimportant (3)	Neither Important nor Unimportant (4)	Somewhat Important (5)	Very Important (6)	Extremely Important (7)
Flavor (1)	○	○	○	○	○	○	○
Tenderness (2)	○	○	○	○	○	○	○
Price (3)	○	○	○	○	○	○	○
Nutrition (4)	○	○	○	○	○	○	○
Convenience (5)	○	○	○	○	○	○	○
Animal Welfare/Handling (6)	○	○	○	○	○	○	○
Food Safety (7)	○	○	○	○	○	○	○

Q14 Please rate the importance of the following aspects as a percentage of your decision to purchase and consume lamb. (Please ensure your Total equals 100)

_____ Price of Product (1)

_____ Lean to Fat Ratio of Product (2)

_____ Visual Appearance (3)

_____ Added Ingredients (If there are or are not any in the product) (4)

_____ How the Animal is Raised (Natural, Organic, Grass-Fed, etc.) (5)

_____ Animal Welfare (Free-Range, Handling Practices, etc.) (6)

Q15 Regarding your consumption of chicken, how important are the following factors?

	Not at all Important (1)	Very Unimportant (2)	Somewhat Unimportant (3)	Neither Important nor Unimportant (4)	Somewhat Important (5)	Very Important (6)	Extremely Important (7)
Flavor (1)	○	○	○	○	○	○	○
Tenderness (2)	○	○	○	○	○	○	○
Price (3)	○	○	○	○	○	○	○
Nutrition (4)	○	○	○	○	○	○	○
Convenience (5)	○	○	○	○	○	○	○
Animal Welfare/Handling (6)	○	○	○	○	○	○	○
Food Safety (7)	○	○	○	○	○	○	○

Q16 Please rate the importance of the following aspects as a percentage of your decision to purchase and consume chicken. (Please ensure your Total equals 100)

_____ Price of Product (1)

_____ Lean to Fat Ratio of Product (2)

_____ Visual Appearance (3)

_____ Added Ingredients (If there are or are not any in the product) (4)

_____ How the Animal is Raised (Natural, Organic, Grass-Fed, etc.) (5)

_____ Animal Welfare (Free-Range, Handling Practices, etc.) (6)

Q17 Regarding your consumption of fish, how important are the following factors?

	Not at all Important (1)	Very Unimportant (2)	Somewhat Unimportant (3)	Neither Important nor Unimportant (4)	Somewhat Important (5)	Very Important (6)	Extremely Important (7)
Flavor (1)	○	○	○	○	○	○	○
Tenderness (2)	○	○	○	○	○	○	○
Price (3)	○	○	○	○	○	○	○
Nutrition (4)	○	○	○	○	○	○	○
Convenience (5)	○	○	○	○	○	○	○
Animal Welfare/Handling (6)	○	○	○	○	○	○	○
Food Safety (7)	○	○	○	○	○	○	○

Q18 Please rate the importance of the following aspects as a percentage of your decision to purchase and consume fish. (Please ensure your Total equals 100)

_____ Price of Product (1)

_____ Lean to Fat Ratio of Product (2)

_____ Visual Appearance (3)

_____ How the Fish is Raised (Farm Raised or Wild) (4)

Q19 Which of the following best describes your view of beef?

- ○ Not at all Healthful (1)
- ○ Very Unhealthful (2)
- ○ Somewhat Unhealthful (3)
- ○ Neither Healthful nor Unhealthful (4)
- ○ Somewhat Healthful (5)
- ○ Very Healthful (6)
- ○ Extremely Healthful (7)

Q20 What factors influenced your view of beef?

	Very Non-Influential (1)	Non-Influential (2)	Somewhat Non-Influential (3)	Neutral (4)	Somewhat Influential (5)	Influential (6)	Very Influential (7)
Fat (1)	○	○	○	○	○	○	○
Calories (2)	○	○	○	○	○	○	○
Protein Source (3)	○	○	○	○	○	○	○
Hormones (4)	○	○	○	○	○	○	○
Added Ingredients (5)	○	○	○	○	○	○	○
Food Safety (6)	○	○	○	○	○	○	○

Q21 Which of the following statements best describes your view of pork?

○ Not at all Healthful (1)
○ Very Unhealthful (2)
○ Somewhat Unhealthful (3)
○ Neither Healthful nor Unhealthful (4)
○ Somewhat Healthful (5)
○ Very Healthful (6)
○ Extremely Healthful (7)

Q22 What factors influenced your view of pork?

	Very Non-Influential (1)	Non-Influential (2)	Somewhat Non-Influential (3)	Neutral (4)	Somewhat Influential (5)	Influential (6)	Very Influential (7)
Fat (1)	○	○	○	○	○	○	○
Calories (2)	○	○	○	○	○	○	○
Protein Source (3)	○	○	○	○	○	○	○
Hormones (4)	○	○	○	○	○	○	○
Added Ingredients (5)	○	○	○	○	○	○	○
Food Safety (6)	○	○	○	○	○	○	○

Q23 Which of the following statements best describes your view of lamb?

○ Not at all Healthful (1)
○ Very Unhealthful (2)
○ Somewhat Unhealthful (3)
○ Neither Healthful nor Unhealthful (4)
○ Somewhat Healthful (5)
○ Very Healthful (6)
○ Extremely Healthful (7)

Q24 What factors influenced your view of lamb?

	Very Non-Influential (1)	Non-Influential (2)	Somewhat Non-Influential (3)	Neutral (4)	Somewhat Influential (5)	Influential (6)	Very Influential (7)
Fat (1)	○	○	○	○	○	○	○
Calories (2)	○	○	○	○	○	○	○
Protein Source (3)	○	○	○	○	○	○	○
Hormones (4)	○	○	○	○	○	○	○
Food Safety (5)	○	○	○	○	○	○	○

Q25 Which of the following statements best describes your view of chicken?

○ Not at all Healthful (1)
○ Very Unhealthful (2)
○ Somewhat Unhealthful (3)
○ Neither Healthful nor Unhealthful (4)
○ Somewhat Healthful (5)
○ Very Healthful (6)
○ Extremely Healthful (7)

Q26 What factors influenced your view of chicken?

	Very Non-Influential (1)	Non-Influential (2)	Somewhat Non-Influential (3)	Neutral (4)	Somewhat Influential (5)	Influential (6)	Very Influential (7)
Fat (1)	○	○	○	○	○	○	○
Calories (2)	○	○	○	○	○	○	○
Protein Source (3)	○	○	○	○	○	○	○
Hormones (4)	○	○	○	○	○	○	○
Added Ingredients (5)	○	○	○	○	○	○	○
Food Safety (6)	○	○	○	○	○	○	○

Q27 Which statement best describes your view of fish?

- ○ Not at all Healthful (1)
- ○ Very Unhealthful (2)
- ○ Somewhat Unhealthful (3)
- ○ Neither Healthful nor Unhealthful (4)
- ○ Somewhat Healthful (5)
- ○ Very Healthful (6)
- ○ Extremely Healthful (7)

Q28 What factors influenced your view of fish?

	Very Non-Influential (1)	Non-Influential (2)	Somewhat Non-Influential (3)	Neutral (4)	Somewhat Influential (5)	Influential (6)	Very Influential (7)
Fat (1)	○	○	○	○	○	○	○
Calories (2)	○	○	○	○	○	○	○
Protein Source (3)	○	○	○	○	○	○	○
Hormones (4)	○	○	○	○	○	○	○
Added Ingredients (5)	○	○	○	○	○	○	○
Food Safety (6)	○	○	○	○	○	○	○

Q29 How important is food safety to you?

○ Not at all Important (1)
○ Very Unimportant (2)
○ Somewhat Unimportant (3)
○ Neither Important nor Unimportant (4)
○ Somewhat Important (5)
○ Very Important (6)
○ Extremely Important (7)

Q30 Do you believe the meat industry practices good food safety techniques?

○ Strongly Disagree (1)
○ Disagree (2)
○ Neither Agree nor Disagree (3)
○ Agree (4)
○ Strongly Agree (5)

Q31 Do you purchase Natural and/or Organic products?

❍ Never (1)
❍ Rarely (Once every 2-3 months) (2)
❍ Sometimes (At least once a month) (3)
❍ Most of the Time (At least every two weeks) (4)
❍ Always (Every time I go to the grocery store) (5)

Answer If Do you purchase Natural and/or Organic products? Never Is Not Selected

Q32 Why do you purchase Natural and/or Organic products?

❑ I believe these products are healthier, more nutritious and better for me. (1)
❑ I believe there are residual hormones and antibiotics present in conventional products. (2)
❑ I believe that Natural and/or Organic products are less processed. (3)
❑ Other (4) _____

Q33 Do you purchase Grass-fed products?

❍ Never (1)
❍ Rarely (Once every 2-3 months) (2)
❍ Sometimes (At least once a month) (3)
❍ Most of the Time (At least once every two weeks) (4)
❍ Always (Every time I go to the grocery store) (5)

Answer If Do you purchase Grass-fed products? Never Is Not Selected

Q34 Why do you purchase Grass-fed products?

❑ I believe Grass-fed products are healthier, more nutritious and better for me than those from grain-fed animals. (1)
❑ I prefer the taste of Grass-fed products. (2)
❑ I prefer the production method of Grass-fed animals over grain-fed animals. (3)
❑ Other (4) _____

Q35 Do you purchase Free-range or Cage-free products?

❍ Never (1)
❍ Rarely (Once every 2-3 months) (2)
❍ Sometimes (At least once a month) (3)
❍ Most of the Time (At least once every two weeks) (4)
❍ Always (Every time I go to the grocery store) (5)

Q36 Why do you purchase Free-range or Cage-free products?

- ❑ I believe that Free-range and/or Cage-free products are healthier, more nutritious and better for me. (1)
- ❑ I believe that Free-range and/or Cage-free animals are treated more humanely. (2)
- ❑ I believe that Free-range and/or Cage-free products are less processed. (3)
- ❑ Other (4) _____

Q37 How important is Grass-fed to you?

- ❍ Not at all Important (1)
- ❍ Very Unimportant (2)
- ❍ Somewhat Unimportant (3)
- ❍ Neither Important nor Unimportant (4)
- ❍ Somewhat Important (5)
- ❍ Very Important (6)
- ❍ Extremely Important (7)

Q38 How important are no added hormones to you?

- ❍ Not at all Important (1)
- ❍ Very Unimportant (2)
- ❍ Somewhat Unimportant (3)
- ❍ Neither Important nor Unimportant (4)
- ❍ Somewhat Important (5)
- ❍ Very Important (6)
- ❍ Extremely Important (7)

Q39 How important are no added ingredients to you?

- ❍ Not at all Important (1)
- ❍ Very Unimportant (2)
- ❍ Somewhat Unimportant (3)
- ❍ Neither Important nor Unimportant (4)
- ❍ Somewhat Important (5)
- ❍ Very Important (6)
- ❍ Extremely Important (7)

Q40 Do you purchase "low-sodium" or "reduced-sodium" meat and food products?

○ Never (1)
○ Rarely (Once every 2-3 months) (2)
○ Sometimes (At least once a month) (3)
○ Most of the Time (At least once every two weeks) (4)
○ Always (Every time I go to the grocery store) (5)

Q41 Do you purchase "low-fat", "reduced-fat", or "fat-free" meat and food products?

○ Never (1)
○ Rarely (Once every 2-3 months) (2)
○ Sometimes (At least once a month) (3)
○ Most of the Time (At least once every two weeks) (4)
○ Always (Every time I go to the grocery store) (5)

Q42 Do you purchase low carbohydrate food products?

○ Never (1)
○ Rarely (Once every 2-3 months) (2)
○ Sometimes (At least once a month) (3)
○ Most of the Time (At least once every two weeks) (4)
○ Always (Every time I go to the grocery store) (5)

Q43 Do you purchase protein enhanced food products?

○ Never (1)
○ Rarely (Once every 2-3 months) (2)
○ Sometimes (At least once a month) (3)
○ Most of the Time (At least every two weeks) (4)
○ Always (Every time I go to the grocery store) (5)

Q44 Do you feel that the meat industry does a good job of informing consumers about their

products?

○ Strongly Disagree (1)
○ Disagree (2)
○ Neither Agree nor Disagree (3)
○ Agree (4)
○ Strongly Agree (5)

Q45 How important is animal welfare to you?

- ○ Not at all Important (1)
- ○ Very Unimportant (2)
- ○ Somewhat Unimportant (3)
- ○ Neither Important nor Unimportant (4)
- ○ Somewhat Important (5)
- ○ Very Important (6)
- ○ Extremely Important (7)

Q46 How do you feel about the term factory farm?

- ○ I believe that animals are raised and produced in a factory setting (1)
- ○ I believe the term is a misconception (2)
- ○ I have never heard the term (3)
- ○ Other (4) _____

Q47 Do you believe male animals should be castrated?

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither Agree nor Disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q48 Do you believe the tails of piglets should be clipped to prevent biting?

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither Agree nor Disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q49 Do you believe that pregnant sows should be kept in stalls so that their individual needs can

be better met?

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither Agree nor Disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q50 Do you believe that sows and newborn piglets should be kept in stalls to minimize injury

and potential mortality of piglets due to being stepped on by sows?

❍ Strongly Disagree (1)
❍ Disagree (2)
❍ Neither Agree nor Disagree (3)
❍ Agree (4)
❍ Strongly Agree (5)

Q51 Do you believe cattle should be de-horned to prevent injury to other cattle?

❍ Strongly Disagree (1)
❍ Disagree (2)
❍ Neither Agree nor Disagree (3)
❍ Agree (4)
❍ Strongly Agree (5)

Q52 Do you believe that the wings of chickens should be clipped to reduce or prevent the

possibility of breaking a wing or sustaining other injuries?

❍ Strongly Disagree (1)
❍ Disagree (2)
❍ Neither Agree nor Disagree (3)
❍ Agree (4)
❍ Strongly Agree (5)

Q53 Do you believe that the beaks of chickens should be trimmed to decrease pecking,

cannibalism and mortality of other birds?

❍ Strongly Disagree (1)
❍ Disagree (2)
❍ Neither Agree nor Disagree (3)
❍ Agree (4)
❍ Strongly Agree (5)

Q54 Do you feel that the animal industry does a good job of informing the public of production

procedures and practices?

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither Agree nor Disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q55 Do you believe cattle should be given growth implants to increase feed efficiency and

growth rate?

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither Agree nor Disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q56 Do you think the animal industry treats animals humanely?

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither Agree nor Disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q57 How old are you?

- ○ 18-24 (1)
- ○ 25-35 (2)
- ○ 36-50 (3)
- ○ 51-65 (4)
- ○ 65+ (5)

Q58 Gender?

- ○ Male (1)
- ○ Female (2)

Q59 What is your highest level of education?

- ○ High School/GED (1)
- ○ Associates Degree/Technical Degree (2)
- ○ Bachelor's Degree (3)
- ○ Master's or Doctorate (4)

Q60 Average annual income?

- ○ Less than $30,000 (1)
- ○ $30,001 - $59,999 (2)
- ○ $60,000 - $99,999 (3)
- ○ $100,000 - $199,999 (4)
- ○ More than $200,000 (5)

Q61 Number in household?

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)
- ○ 11+ (11)

Q62 Which answer best describes you?

- ○ Consumer - not involved in any of the below (1)
- ○ Beef Producer/Involved in the Beef Industry (2)
- ○ Pork Producer/Involved in the Pork Industry (3)
- ○ Lamb Producer/Involved in the Lamb Industry (4)
- ○ Poultry Producer/Involved in the Poultry Industry (5)
- ○ Involved in the Fish Industry (6)
- ○ Involved in the Meat or Food Industry (7)

Q63 What is your occupation?

○ Education (Pre-school - College/University) (1)
○ Service Industry (2)
○ Involved in Agriculture (3)
○ Business Management (4)
○ Retail (5)

Q64 What size city or town do you live in?

○ Rural Area - Less than 5,000 (1)
○ Small Town - 5,001-24,999 (2)
○ Small Suburban - 25,000-99,999 (3)
○ Large Suburban - 100,000-249,999 (4)
○ Metro Area - More than 250,000 (5)

Q65 What state do you live in?

○ Alabama (1)
○ Alaska (2)
○ American Samoa (3)
○ Arizona (4)
○ Arkansas (5)
○ California (6)
○ Colorado (7)
○ Connecticut (8)
○ Delaware (9)
○ District of Columbia (10)
○ Florida (11)
○ Georgia (12)
○ Guam (13)
○ Hawaii (14)
○ Idaho (15)
○ Illinois (16)
○ Indiana (17)
○ Iowa (18)
○ Kansas (19)
○ Kentucky (20)
○ Louisiana (21)
○ Maine (22)
○ Maryland (23)
○ Massachusetts (24)
○ Michigan (25)

- Minnesota (26)
- Mississippi (27)
- Missouri (28)
- Montana (29)
- Nebraska (30)
- Nevada (31)
- New Hampshire (32)
- New Jersey (33)
- New Mexico (34)
- New York (35)
- North Carolina (36)
- North Dakota (37)
- Northern Marianas Islands (38)
- Ohio (39)
- Oklahoma (40)
- Oregon (41)
- Pennsylvania (42)
- Puerto Rico (43)
- Rhode Island (44)
- South Carolina (45)
- South Dakota (46)
- Tennessee (47)
- Texas (48)
- Utah (49)
- Vermont (50)
- Virginia (51)
- Virgin Islands (52)
- Washington (53)
- West Virginia (54)
- Wisconsin (55)
- Wyoming (56)
- Country outside of the United States (57)