
Consumer Preferences and Perceptions of Food Safety, Production Practices and Food Product Labeling: A Spotlight on Dairy Product Purchasing Behavior in 2011

Melissa G. Short McKendree, Nicole J. Olynk and David L. Ortega

Introduction

Today's consumers are increasingly sensitive to the processes employed and safeguards in place in modern food production. Of particular interest to consumers are livestock products, namely meat and milk-based products. Livestock products often elicit consumer sentiment regarding livestock animal treatment and animal welfare (Frewer et al., 2005). Beyond animal handling and treatment, today's consumers are incorporating multiple criteria into their food purchasing decisions. These include environmental impacts, food safety concerns, and labor issues at the production and processing stages.

Unfortunately, the ability of consumers in retail shopping outlets or restaurants to determine and evaluate production process attributes of meat and dairy products is limited. Livestock may change hands several times throughout their lifetime, making tracing specific attributes of their housing or handling techniques difficult. Caswell and Mojduszka (1996) categorize food product attributes as search, experience or credence attributes; a credence attribute is classified as one for which quality could not be assessed by consumers even after the product was purchased and consumed. Livestock production process characteristics are classified as credence attributes, making verification of these attributes necessary. All information is not created equal in the mind of the consumer. Since credence attributes cannot be evaluated by consumers before, during or after the purchase, consumers rely on third-party information to make their purchasing decisions. Various sources are available to provide information to consumers regarding production process attributes. Discovering which sources consumers trust to provide information can improve the ability of producers to convey information effectively and efficiently to consumers. At the same time, producers, marketers and all those involved in the supply chain must remain vigilant to ensure that the sources consumers trust remain effective in providing trustworthy and verifiable information.

All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided this copyright appears on all such copies.

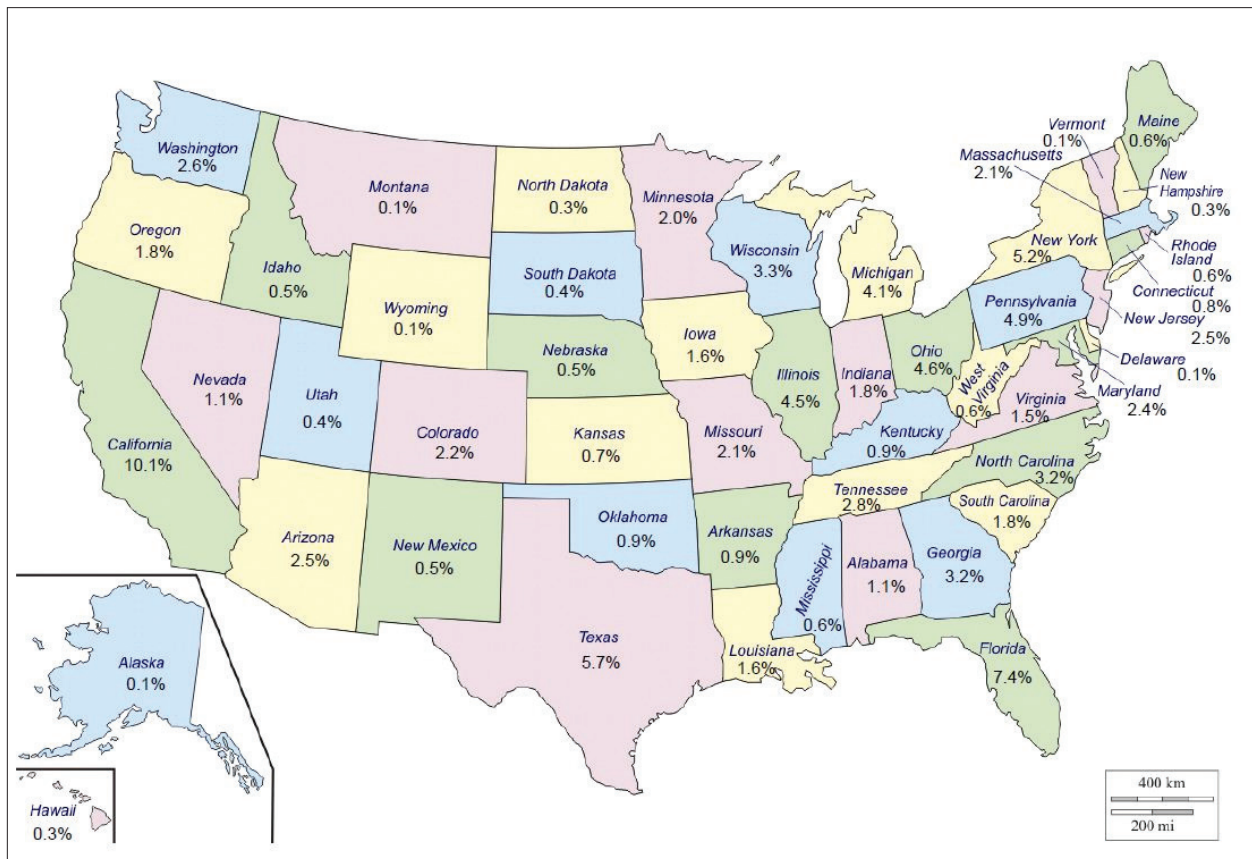
This research was funded, in part, with a mission-oriented, internal competitive grant from the Purdue University Office of Agricultural Research Programs and Cooperative Extension Service. Corresponding author: N. J. Olynk, Department of Agricultural Economics, Purdue University, nolynk@purdue.edu.

Specific to dairy cattle, claims surrounding cattle housing, handling and several production practices, such as the prohibition of or prescribed use of antibiotics in sick animals, were investigated in this study. The inability to test a finished product, such as fluid milk, ice cream or yogurt, complicates communication between producers and consumers regarding animal-rearing practices. Past studies have sought to identify consumer sentiments and purchasing behavior surrounding fluid milk. A recent study by Wolf, Tonsor and Olynk (2011) estimated willingness to pay for fluid milk production attributes through the use of a choice experiment. They found that consumers were willing to pay price premiums for fluid milk that was produced locally, without recombinant bovine somatotropin (rbST), had assured food safety enhancements and had various claims verified by the United States Department of Agriculture (USDA) (Wolf, Tonsor and Olynk, 2011).

Methods

A survey of U.S. consumers that focused heavily, but not exclusively, on dairy and other livestock products was completed in the spring of 2011. The survey was conducted online through Decipher Inc., a marketing research service provider that specializes in online survey programming, data collection, data processing and custom technology development. Participant households were recruited from a large opt-in panel by Survey Sampling International to be representative of the U.S. population, at least 18 years in age and familiar with the food-purchasing behavior of their household. A total of 1,000 respondents completed the survey.

Figure 1. Geographic Distribution of Sample



Results and Discussion

Demographic Characteristics

Of the 1,000 surveys administered, approximately 25 percent of the sample was from the Southeastern United States, 20 percent from the Northeast, 10 percent from the Southwest, 19 percent from the West, 26 percent from the Midwest, and less than 1 percent from Alaska and Hawaii. Figure 1 displays the percentage of survey respondents from each of the 50 states.

Table 1 displays various socio-demographic characteristics of the survey respondents. Males totaled 49 percent of the sample, while 51 percent were female. The average age of survey

Table 1. Demographic Variables and Summary Statistics

Variable	Definition	% of Respondents
Gender	Male	49%
	Female	51%
Annual pre-tax income	Less than \$20,000	24%
	\$20,000 - \$39,999	29%
	\$40,000 - \$59,999	18%
	\$60,000 - \$79,999	13%
	\$80,000 - \$99,999	6%
	\$100,000 - \$119,999	4%
	\$120,000 - \$139,999	2%
	\$140,000 - \$159,999	2%
	\$160,000 - \$179,999	1%
	\$180,000 or more	1%
Educational Background	Did not graduate from high school	3%
	Graduated from high school, did not attend college	21%
	Attended College, no degree earned	30%
	Attended College, Associates or Trade Degree earned	13%
	Attended College, Bachelor's (B.S. or B.A.) Degree earned	22%
	Graduate or Advanced Degree (M.S., Ph.D., Law School)	9%
	Other	2%
Vegetarian	Percent of respondents reportedly considering themselves a vegetarian	5%
Vegan	Percent of respondents reportedly considering themselves a vegan	2%
Dogs currently in household	0	56%
	1	25%
	2 or more	19%
Cats currently in household	0	62%
	1	17%
	2 or more	21%

Figure 2. Households that Experienced Event in the Last 6 Months

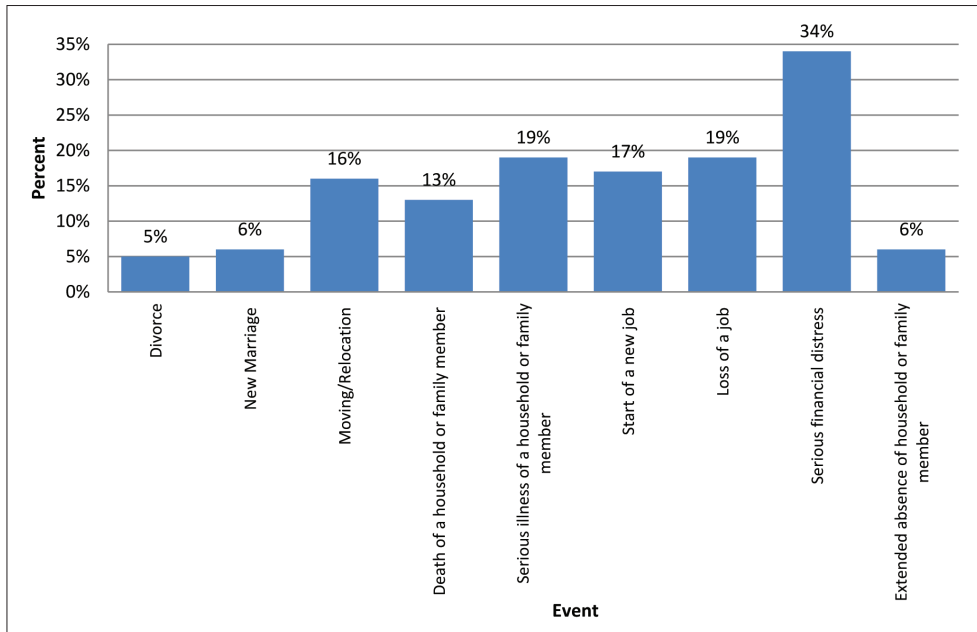
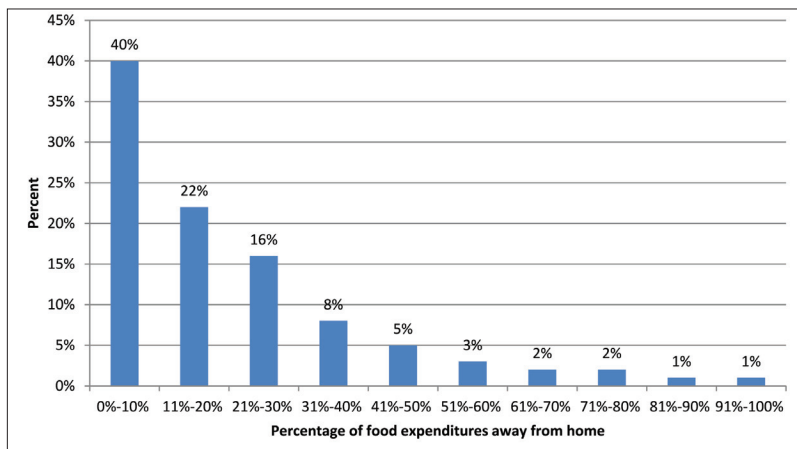


Figure 3. Household's Total Food Expenditures Away from Home



respondents was 45 years old. The average number of adults and children in a household from the study was 1.97 and 0.56, respectively. Fifty-three percent of participants reported incomes under \$40,000, while 37 percent of participants' pre-tax household income was

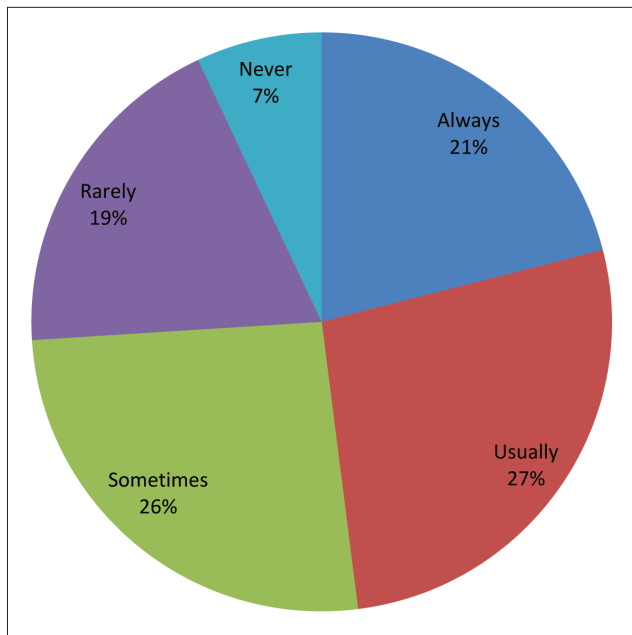
between \$40,000 and \$99,999, and 10 percent reported incomes of \$100,000 and over. When asked about their educational background, 97 percent of participants at least graduated high school, and 33 percent obtained a bachelor's degree or higher. Five percent of the participants classified themselves as a vegetarian, while 2 percent considered themselves vegan. For comparison, according to a 2008 study released by Vegetarian Times, 3.2 percent

of American adults consider themselves vegetarian and 0.5 percent vegan; further, they reported that 10 percent of adults "largely follow a vegetarian-inclined diet."

Respondents were asked to indicate whether a member of their household had experienced certain, typically considered stressful, events within the last six months. Figure 2 displays the percentage of survey respondents indicating they had experienced divorce (5 percent), new marriage (6 percent) or moving/relocation (16 percent) in the last six months. Of particular interest regarding purchasing behaviors was that nearly 20 percent reported loss of a job and 34 percent experienced serious financial distress.¹

¹ Answer selections shown to participants in random order.

Figure 4. How Often Information on Meat, Milk and Eggs was Used in Purchase Decisions



Household Purchasing Characteristics

On average, a household in the sample spent \$110.13 per week on total food consumption, including both at home and away-from-home purchases. According to the Bureau of Labor Statistics (2011), in 2010 the average household spent \$6,129 per year on food expenditures, or \$117.86 per week.² Of the \$6,129 spent on food, nearly 41 percent, or \$2,505, was spent away from home (Bureau of Labor Statistics, 2011). Figure 3 provides a breakdown of food expenditures away from home as reported by respondents in this sample. For the majority of participants, 20 percent or less of their food expenditures occur away from home, while 29 percent stated that 21 percent to 50 percent of food expenditures occurred away from home. Only 9 percent admitted to spending more than 50 percent of food expenditures away from home.

Figure 5. Percent of Respondents Reviewing Information

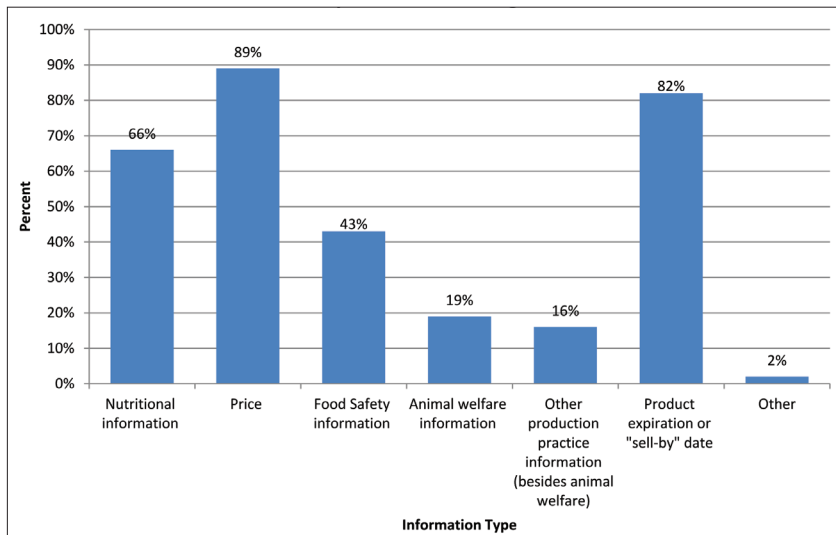


Figure 4 details how often participants read the information on meat, egg or milk product packaging while making their purchasing decisions. Only 21 percent reported that they always read the information, more than half read usually or sometimes, and approximately one quarter of participants rarely or never read the product information.

The 931 participants who reported reading product information were polled about what information they assessed when reviewing meat, egg or milk product packaging. Price and product expiration or “sell-by” date were the most commonly cited, followed by nutritional information as shown in Figure 5³.

² Bureau of Labor Statistics (2011) reported the annual spending of \$6,129 for the average household. Assuming that the annual spending was evenly allocated throughout the year, the weekly expenditure reported here was calculated by simply dividing the \$6,129 evenly over 52 weeks.

³ Throughout the survey, answer selections shown to participants were presented in random order.

In addition to asking what types of information respondents used in making food purchase decisions, they were also asked whether they felt that they were provided with adequate information overall. Figure 6 shows that only 3 percent of consumers felt that there was too much information to make desired food purchases given current labeling and nutritional information. On the other hand, 34 percent believe too little information is provided, and 63 percent feel adequate information is provided in current labeling and nutritional information.

Dairy Purchasing Characteristics

In order to better understand dairy purchasing behavior, consumers were surveyed about fluid milk, yogurt and ice cream purchases.

Fluid Milk Shopping Characteristics

Figure 7 reports how much fluid milk participants' households purchased in a typical week: 9 percent reported that they purchase no milk, 46 percent one gallon or less, and 45 percent more than one gallon of fluid milk per week. These findings are similar to those of Wolf, Tonsor and Olynk (2011), which are displayed in Figure 8. The majority of

Figure 6. Information for Food Purchase Decisions

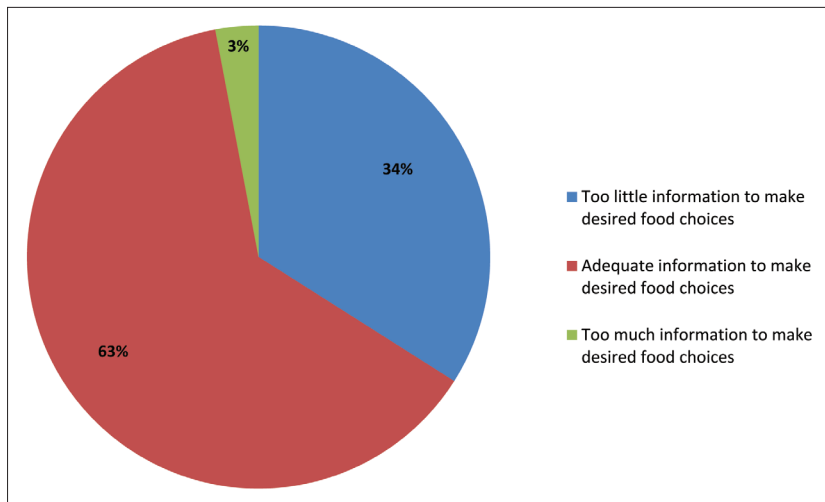


Figure 7. Weekly Fluid Milk Purchases

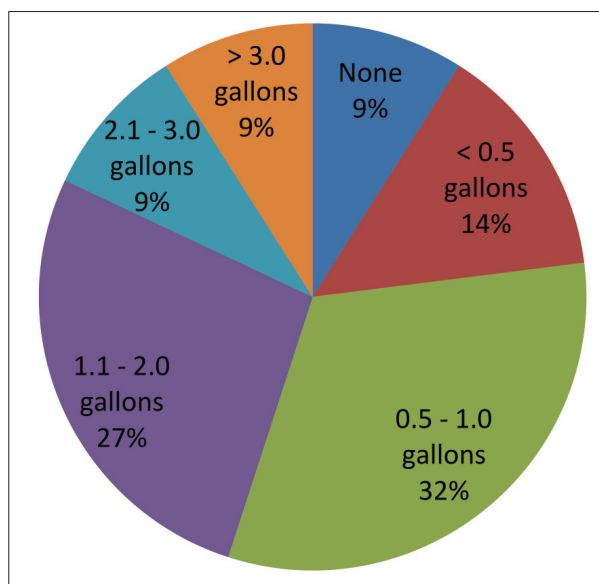
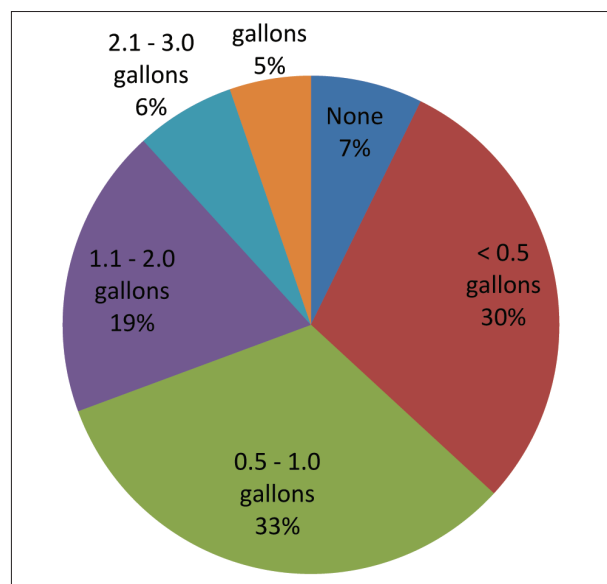


Figure 8. Weekly Fluid Milk Purchases (Wolf, Tonsor and Olynk, 2011)



respondents either purchase 2 percent, reduced-fat milk (40 percent) or whole milk (26 percent), while 18 percent buy fat-free, skim milk, and 16 percent purchase 1 percent, low-fat milk.

Figure 9 details consumption behavior of purchased fluid milk. Interestingly, equal percentages of fluid milk were reportedly consumed as a beverage (34 percent) and in conjunction with cereal (34 percent). The remaining fluid milk was used in cooking or preparing food (14 percent), consumed in coffee or other beverages (9 percent), used in baked goods (7 percent) or used for other purposes (2 percent). Responses for other ways in which fluid milk was consumed included in conjunction with cookies or for their pet's consumption.

Figure 10 reveals that 25 percent, 15 percent, 16 percent and 22 percent of consumers purchased at least one pint of half-and-half, heavy cream, buttermilk or evaporated milk a week, respectively. More than 75 percent of the consumers did not purchase any half-and-half, heavy cream, buttermilk or evaporated milk in the average week.

Yogurt and Ice Cream Shopping Characteristics
Differences in shopping characteristics for dairy products with various levels of processing (i.e., yogurt, ice cream, fluid milk) were investigated through questions about yogurt and ice cream consumption habits. Yogurt is typically packaged in a 6 ounce, individual-sized container.

Figure 9. How is Fluid Milk Consumed at Home?

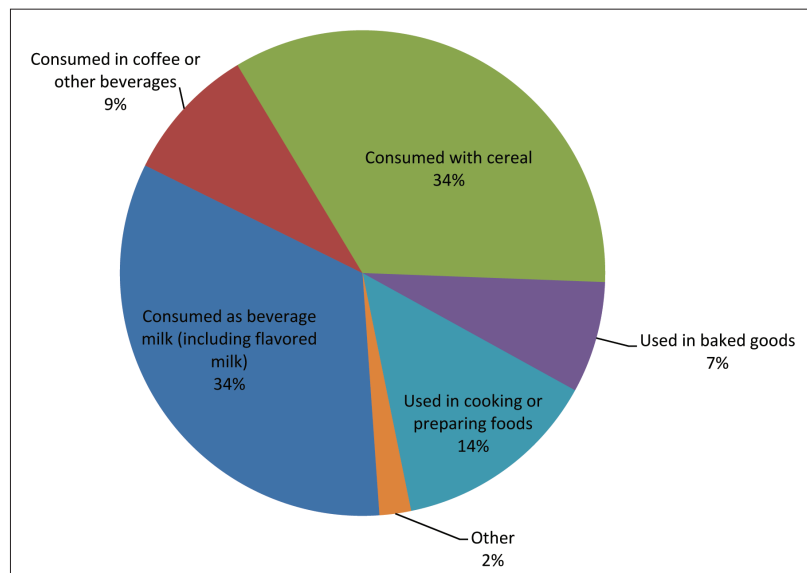


Figure 10. Half & Half, Heavy Cream, Buttermilk & Evaporated Milk Weekly Purchases

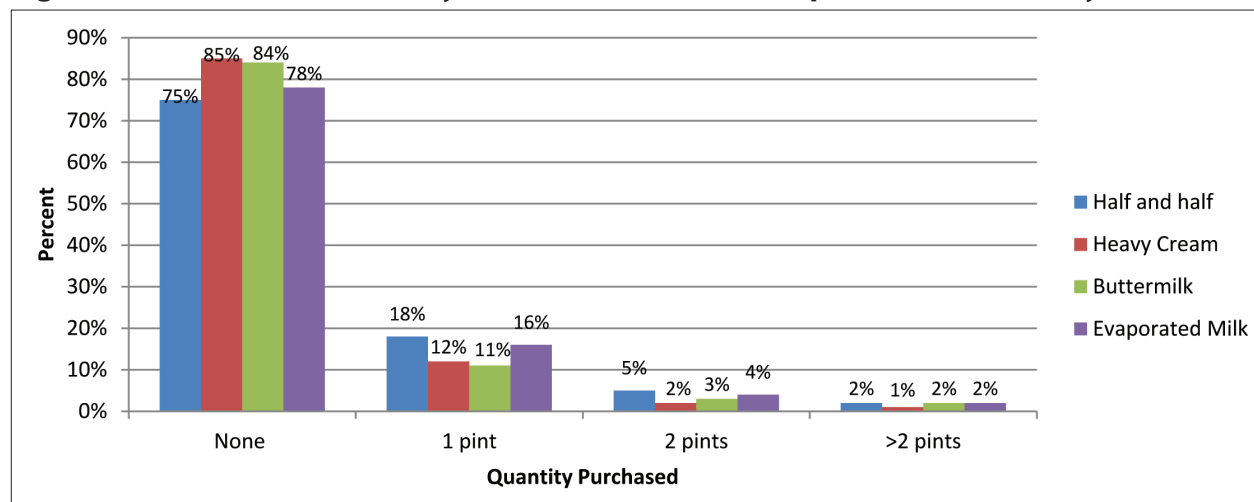


Figure 11 reveals the number of 6 ounce containers typically purchased per week by responding households. Twenty-three percent of households did not consume yogurt, 34 percent purchased one to four 6 ounce containers and 43 percent purchased five or more containers per week.

Ice cream comes in a wide variety of container sizes. The size of ice cream container that respondents typically purchased is displayed in Figure 12. Nearly half (45 percent) of the responding households bought half-gallon containers of ice cream. The next most popular container sizes were gallon (14 percent) and quart (13 percent).

In addition to the container size of ice cream purchased, the total amount of ice cream purchased in a typical week was also investigated. Figure 13 explains that the majority of consumers purchased a half gallon of ice cream or less per week.

General Dairy Purchasing Behavior

One major area of interest was which attributes were important to consumers when making their dairy purchasing decisions. Participants were presented a series of Likert-scale questions where they were asked to rank 12 attributes

Figure 11. Weekly Quantity of 6 oz Yogurt Containers Purchased

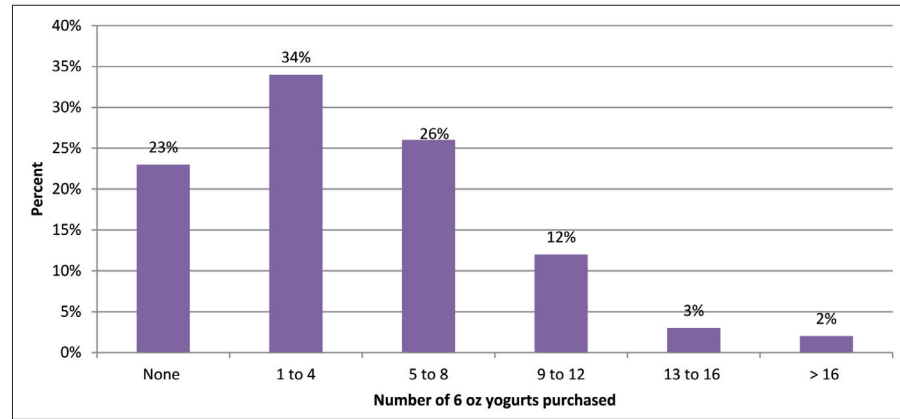


Figure 12. Typical Container Size of Ice Cream Purchased

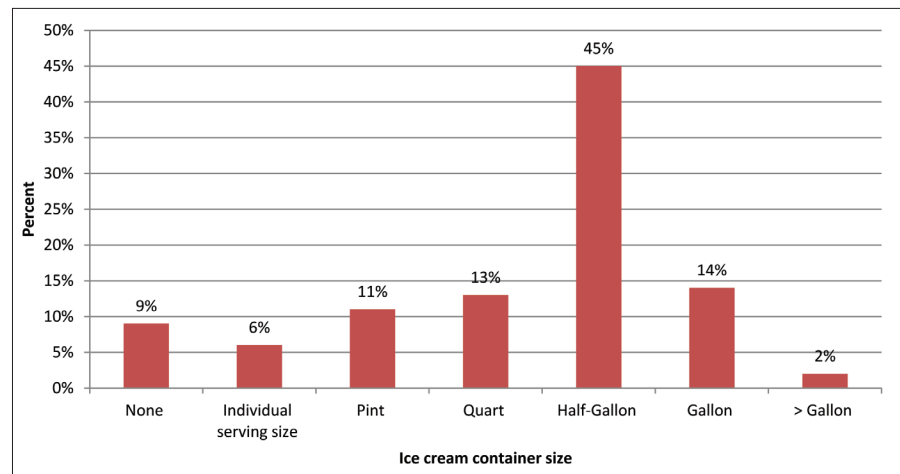
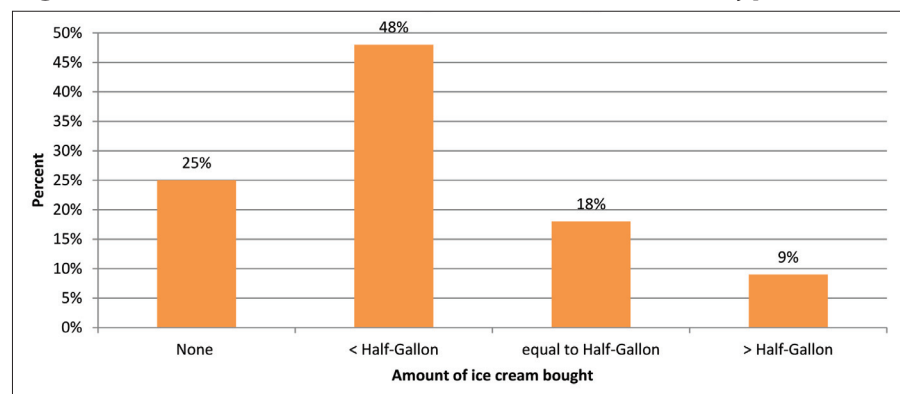


Figure 13. Amount of Ice Cream Purchased in a Typical Week



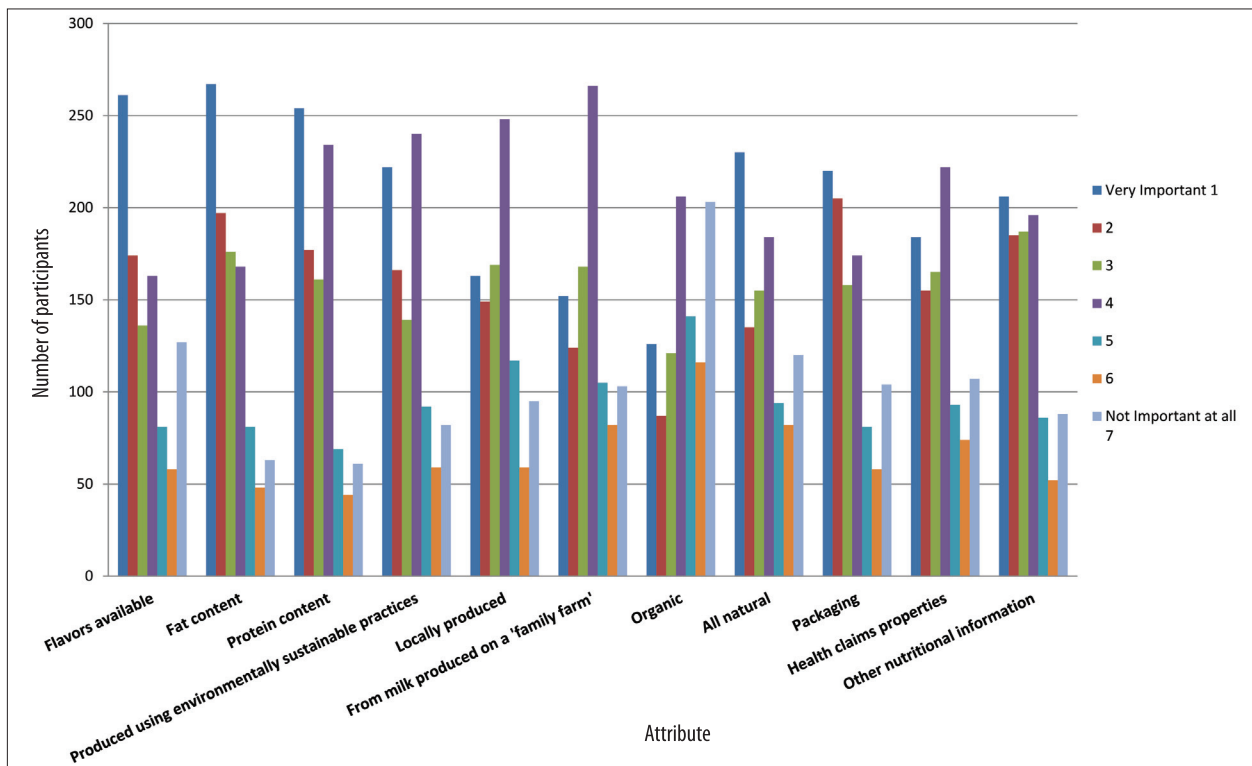
independently — one indicating the most important and seven indicating not important at all. Table 2 orders these attributes from most important to least important based on the mean scores of the sample group.

Figure 14 provides additional detail regarding how respondents rated dairy product attributes in level of importance. Each grouping of seven bars in the graph represents a selected attribute, and each individual bar in the grouping specifies how many participants ranked the attribute from one to seven (each grouping will sum to 1,000). “Produced on farms with animal welfare and handling standards in place” had the largest number of participants rank as “most important;” however, it ranked third when assessing the overall mean. For the “not important at all” rankings, “organic” was the leader with 203 responses; “organic” was also last in the level of importance means.

Table 2. Importance of Dairy Product Attributes

Attribute	Mean Level of Importance
Fat content	3
Protein content	3.06
Produced on farms with animal welfare and handling standards in place	3.13
Packaging (single serve, package size, re-closable)	3.28
Other nutritional information (aside from fat and protein content)	3.28
Flavors available	3.31
Produced using environmentally sustainable practices	3.32
All natural	3.5
Health claims properties (i.e., digestive health and yogurt)	3.54
Locally produced	3.56
From milk produced on a “family farm”	3.71
Organic	4.31

Figure 14. Importance of Attributes Considered When Purchasing Dairy Products



Food Safety

Figure 15 demonstrates that overall, most participants were concerned about the safety and quality of both imported and domestically produced food; however, more participants were concerned about imported food (74 percent ranking one to three⁴) than domestically produced food (62 percent ranking one to three).

As shown in Figure 16, two-thirds of respondents indicated that country-of-origin labeling was extremely important, important or somewhat important; only 16 percent felt that it was not important.

Table 3 ranks sources for information on the safety and quality of imported food in order of perceived accuracy by participants. On a scale from one to seven, with one indicating very accurate and seven very inaccurate, each source from the United States ranked higher than foreign sources. In addition, each government source was ranked higher in accuracy than the corresponding third-party source.

A more detailed breakdown of which sources consumers trust is provided in Figure 17. U.S. federal government agencies were clearly viewed as the most accurate source of information out of the polled sources,

Figure 15. Level of Concern Regarding the Safety of Food Products

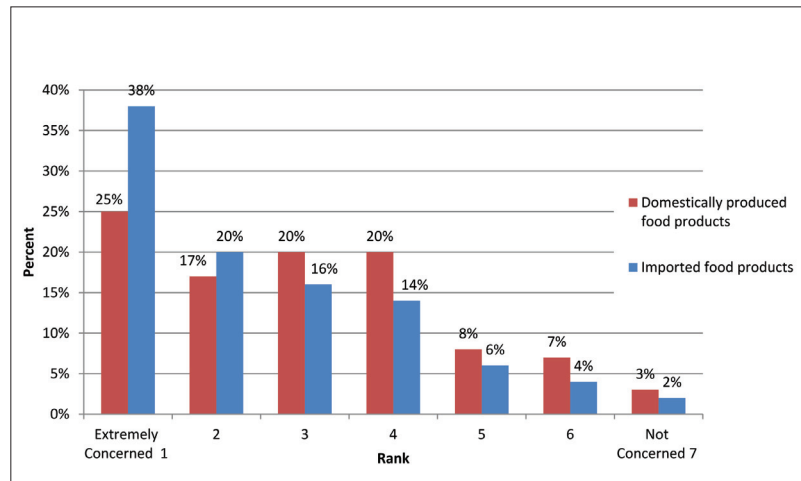


Figure 16. Importance of Country-of-Origin Labeling in Imported Food Product Purchasing Decisions

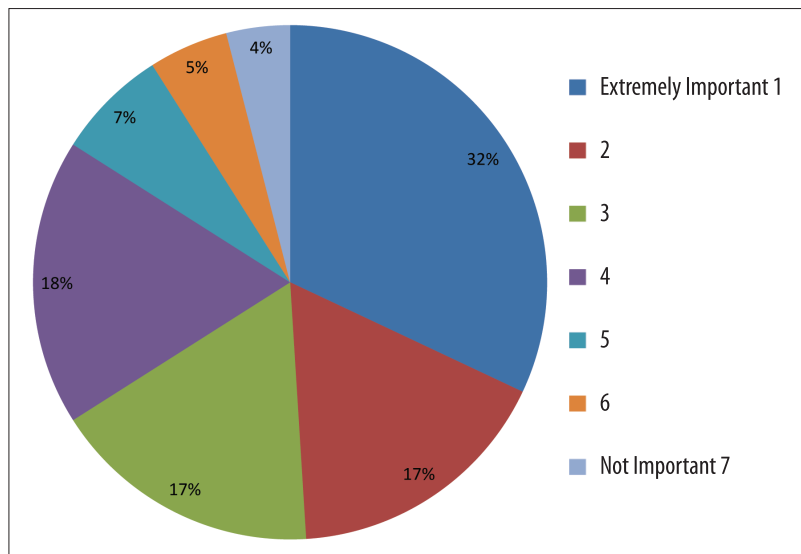


Table 3. Safety and Quality of Imported Food

Source for information on imported food	Mean Level of Accuracy
U.S. federal government agencies	3.29
U.S. third party agencies	3.87
Exporting country government agencies	4.12
Exporting country third party agencies	4.36

⁴One indicating extremely concerned and seven meaning not concerned.

with 56 percent of participants viewing them as very accurate, accurate or somewhat accurate. Exporting country third-party agencies are the least trusted of the polled sources, with 43 percent of participants selecting somewhat inaccurate, inaccurate or very inaccurate.

Table 4 and Table 5 detail concern for various imported and domestic foods. One represents extremely concerned and seven represents not concerned. Overall, participants were more concerned about the safety of imported products than domestic products. Chicken, seafood and beef demanded the most concern for both domestic and imported foods, while fruits/vegetables and canned/processed foods generated the lowest average concern.

Figure 17. Accuracy of Food Safety and Quality Information

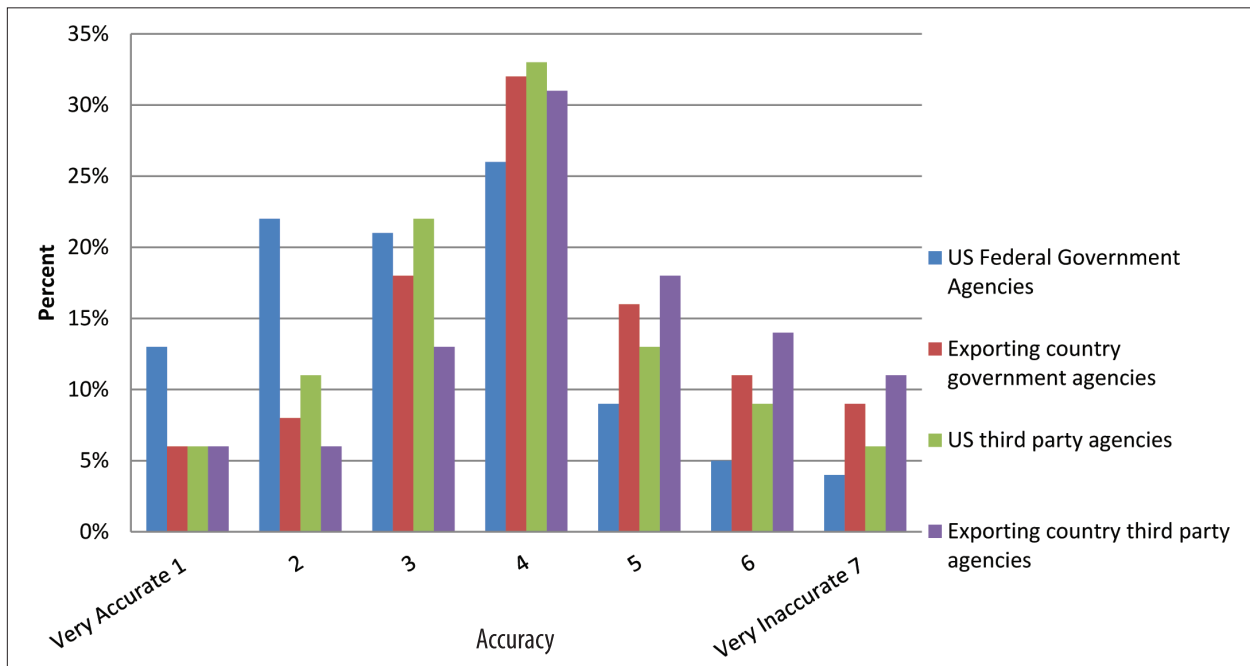


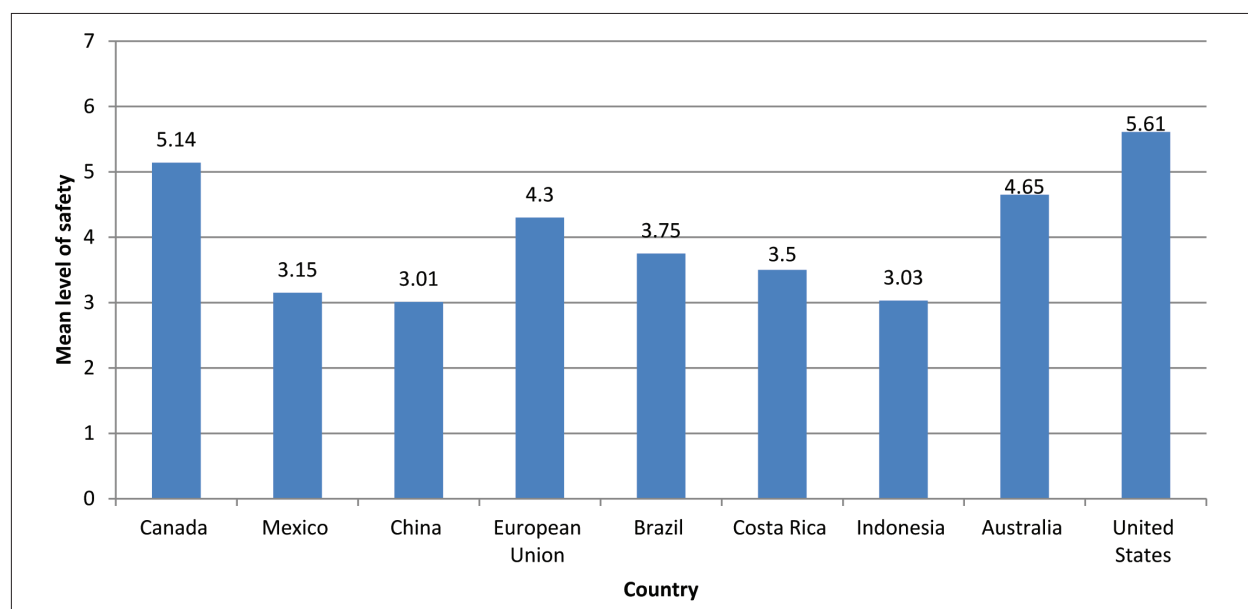
Table 4. Concern for Imported Food

Product	Mean Level of Concern
Chicken	2.49
Seafood/Aquaculture	2.52
Beef	2.55
Dairy Products	2.58
Pork	2.59
Fruits/Vegetables	2.84
Canned/Processed Foods	2.96

Table 5. Concern for Domestically Produced Food

Product	Mean Level of Concern
Chicken	3.17
Seafood/Aquaculture	3.18
Beef	3.29
Dairy Products	3.29
Pork	3.33
Fruits/Vegetables	3.5
Canned/Processed Foods	3.61

Figure 18. Rating of Food Safety and Quality by Country



Participants were asked to indicate on a scale from one (unsafe) to seven (safe) the level of safety and quality that they associated with food produced in selected countries. Figure 18 reveals that outside of the United States, Canada conjured the highest feeling of food safety and quality among imported food, followed by Australia and the European Union. China and Indonesia had the lowest consumer perceptions of safety and quality of the countries included in this analysis.

This study also explored changes in consumption behavior due to concern regarding food safety. In the past three years, 4 percent of the sample lowered consumption of yogurt, ice cream and cheese because of food safety concerns, and 5 percent lowered their fluid milk and butter consumption.

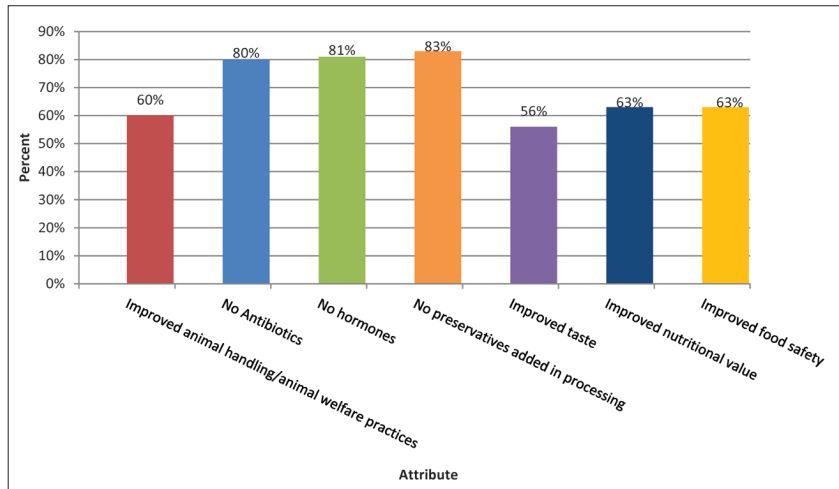
All Natural

Table 6 displays the means when consumers were asked on a scale from one to seven (one meaning very likely and seven meaning very unlikely) how likely the “all natural” label was to increase their likelihood of purchasing selected products. The results show that for all products consumers were neither likely nor unlikely to somewhat unlikely to be influenced by the “all natural” label. However, these means need to be carefully interpreted. For each product, nearly 50 percent of consumers would be very likely to somewhat likely to be influenced by the “all natural” label.

Table 6. Increased Likelihood of Purchasing Selected “All Natural” Products

Product	Mean	Percentage Ranking 1 to 3
Pork	4.39	49%
Bread and bakery products	4.49	51%
Yogurt	4.5	53%
Beef	4.55	54%
Poultry	4.55	54%
Soft Dairy Products (sour cream and cottage cheese)	4.56	53%
Ice Cream	4.58	54%
Cheese	4.61	55%
Milk	4.62	55%

Figure 19. Agreement that the Attribute is Associated with the “All Natural” Label on Food Products



Because there is no clear definition of “all natural,” a goal of the study was to determine what attributes characterized “all natural” in the minds of participants. Interestingly, Figure 19 discloses that for all attributes in question at least 55 percent of participants agreed that attribute was associated with “all natural.” No preservatives added in processing, no hormones and no antibiotics had the

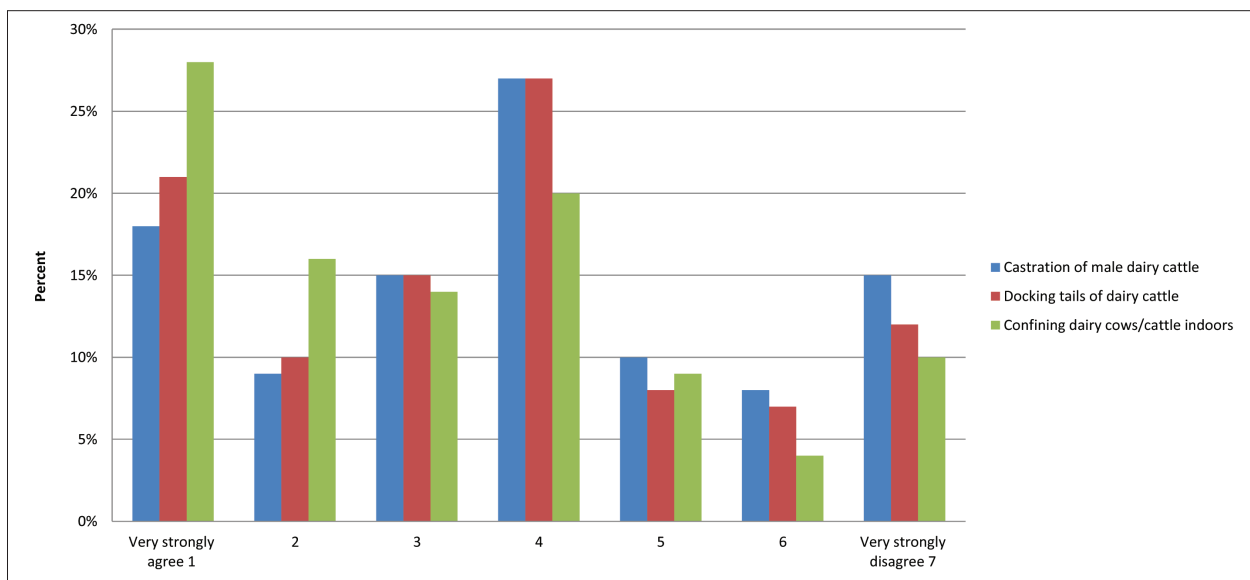
highest level of agreement among consumers that these attributes indicated “all natural” products, out of those attributes assessed in this analysis.

Animal Welfare

On average, consumers were more concerned with welfare of livestock animals outside the United States than those in the United States, with average levels of concern at 2.95 and 3.26, respectively (one being extremely concerned and seven being not concerned).

Consumers were specifically asked how much they thought castration of males, docking tails and indoor confinement of dairy cattle reduced the animal’s welfare. Figure 20 details the responses. Confining dairy cows/cattle indoors generated the most concern.

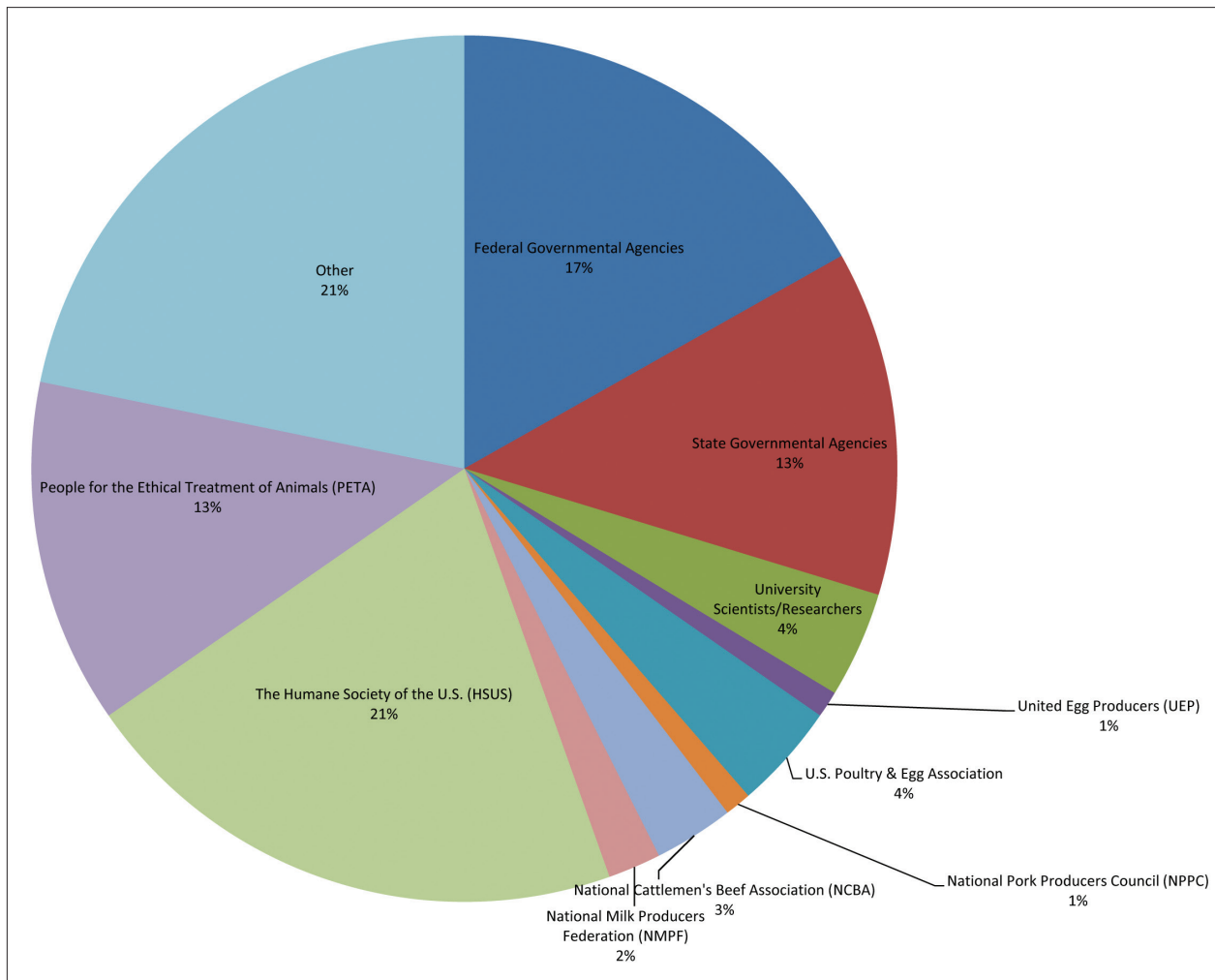
Figure 20. How much do you agree that the following practices seriously reduce the welfare of dairy cattle?



With a wealth of information regarding animal welfare available, consumers were polled about the source they used most to find information on animal welfare issues. Results surrounding which sources were used most often are presented in Figure 21. The Humane Society of the United States (HSUS) was the most frequently cited, with 21 percent of consumer responses — 4 percent more than federal government agencies and more than marketing boards and academic sources combined. More than one-third of consumers use HSUS and People for the Ethical Treatment of Animals (PETA) as their main source of information. If “other” was selected as the main source for animal welfare information, the participants were then asked to open-ently indicate the source. Of the 215 people that selected “other,” 140 indicated that they either do not have a source for animal welfare information or that they did not seek this information out. The next most popular response was news either from the television, Internet or newspaper. Other responses included local farmers, blogs and various independent agencies.

Participants ranked animal industry segments and production stages in order of animal welfare and handling concerns. The ranking based on the mean level of concern, from most concerned to least concerned, was — processors/locations of animal slaughter and meat processing, farmer/on-

Figure 21. Most Frequent Source for Obtaining Information Regarding Animal Welfare



the-farm production, transportation/hauling and moving of animals between farms or to points of sale, and auction markets/locations where animals change ownership.

Survey respondents were specifically asked if they had reduced consumption of dairy products over the past three years due to animal welfare concerns. Seven percent of consumers indicated they had reduced their ice cream consumption, while 7 percent reduced butter consumption, 6 percent reduced yogurt consumption, 6 percent reduced cheese consumption and 5 percent reduced fluid milk consumption.

Conclusions

Consumers today are particularly interested in how their food is produced. Perhaps it is easiest for consumers to associate livestock products with the animals that produced them when the product is “closer to the cow.” For example, consumers’ purchasing behavior for various dairy products, ranging from fluid milk and yogurt to cheese and ice cream, differs depending on the product in question. Dairy producers, processors and marketers alike can benefit from knowing consumers’ purchasing patterns and preferences, and knowing how products are used and consumed in the home. This information can be employed to explore new marketing opportunities, co-branding strategies and emerging markets for dairy products.

References

- Caswell, J. A. and E. M. Mojduszka. "Using Informational Labeling to Influence the Market for Quality in Food Products. *American Journal of Agricultural Economics* 78(1996): 1248-1253.
- Consumer Expenditures (2011). *Bureau of Labor Statistics*. Accessed at <http://www.bls.gov/news.release/cesan.nr0.htm>.
- Frewer, L. J., A. Kole, S. A. A Van de Kroon, and C. de Lauwere. "Consumer Attitudes Towards the Development of Animal-Friendly Husbandry Systems. *Journal of Agricultural and Environmental Ethics* 18(2005):345-67.
- Vegetarianism in America. *Vegetarian Times*. Accessed at http://www.vegetariantimes.com/features/archive_of_editorial/667.
- Wolf, C.A, G.T. Tonsor, and N.J. Olynk. Understanding U.S. Consumer Demand for Milk Production Attributes. *Journal of Agricultural and Resource Economics* 36(2011): 326-342.