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Which Livestock Production Methods Matter Most to Consumers?

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Abstract:

Consumers are becoming increasingly interested in how their food is produced. Many studies have focused on consumers' preferences and willingness-to-pay for specific production method claims; however, few studies have asked consumers to prioritize (rank) the importance of different production method claims. In this study, we use a best-worst scaling approach to have consumers rank the importance of seven common production method claims across four product types: beef, milk, chicken, and eggs. Results of the study show that consumers often prefer specific individual claims (e.g., animals were not treated with growth hormones, no GMOs used in production) as opposed to broader, more encompassing claims (such as product is certified organic). Additionally, the majority of preference shares were captured by the top three claims, so livestock producers could utilize this information to optimize their current labeling schemes.

Key Words: production method claims, best-worst scaling

JEL Codes: Q13, Q18

Introduction

Labeling of product attributes has become a standard communication and marketing tool for food products. Producers (or processors, retailers, etc.) use these labels to increase (1) consumer awareness of a particular product feature (say, organic) and (2) willingness to pay for the food product, assuming the featured label is of value to consumers. An increased willingness to pay, in turn, should allow producers to generate increased sales revenue.

While food labels can aid consumers in selecting products which align with their true preferences, Verbeke (2009) cautions the abundance of labels (nutrition, price, expiration date, production method claims, etc.) can potentially lead to a case of information overload. The rise of food label claims has caused food choice decisions to become higher-involvement decisions than they were in the past. Consumers are not only faced with sorting through and prioritizing the standard attributes such as brand, price, and shelf life, but now consumers are also considering a new set of attributes: food production methods. For many of today's consumers, buying a gallon of milk is much more complex than finding the preferred fat content and expiration date; now, consumers are asking about how the cows were treated, what they were fed, whether they received growth hormones and/or antibiotics, whether the milk is organic, and so on – and, in the current marketplace, labels exist for nearly every question. A second complication is that many of the production method claims made on food products today are difficult for consumers to verify – in other words, they are credence attributes (Caswell and Mojduszka, 1996). With credence attributes, producers must find ways to substantiate their claims to consumers in order to maintain consumer trust (Olynk, 2012). Finally, all of these labeling claims are fighting for limited product space (on the physical product label and/or package) as well as limited consumer attention while shopping. According to Hoyer (1984),

consumers make purchase decisions in a matter of seconds, so it is important to understand which product features garner consumers' attention during that brief window of time.

Thus, from a producer standpoint, the pertinent question becomes: *Which label(s) do consumers value the most?* Plenty of research has focused on how much consumers are willing to pay for specific attributes related to animal welfare (see Norwood and Lusk, 2011; Lagerkvist and Hess, 2011 for reviews), and the potential premiums are not lost on producers. However, adapting to these preferences can be a difficult and possibly costly process. Depending on which claim(s) a producer would like to use (and the size of the producer's farm/herd), a good deal of time and monetary resources may be required. Interestingly, there is also overlap in many of the labeling claims. For instance, many products will display the USDA Organic label as well as the Non-GMO Project Verified label. While utilizing both labels is acceptable, a requirement for obtaining organic certification is that genetically-modified organisms may not be used in production (USDAa, 2011); thus, the Non-GMO Project label is at least somewhat redundant. Gao and Schroeder (2009) and Barreiro-Hurle, Gracia, and de-Magistris (2010) have provided evidence that consumers may have a decreasing marginal utility for additional label attributes, meaning it may not be optimal for producers to utilize multiple (and especially repetitive) claims on a product label.

The purpose of this study is to examine one subset of labels, labels related to livestock production methods, to determine which label(s) are most and least important to consumers. This information should provide producers with a better understanding of what consumers value when purchasing livestock-derived products and which labels will give producers the most "bang for their buck."

Selection of Production Methods and Livestock Products

To determine which production-related claims should be utilized in this study, we first conducted background research in several Midwest grocery stores to compile a comprehensive list of labels and labeling claims currently in use. We visited all 'tiers' of grocery stores, including discount grocers (Aldi), local supermarkets, big box stores (Walmart and Meijer), and specialty stores (Whole Foods, Trader Joe's). In each store, we surveyed a common set of products: beef, pork, poultry, milk, cheese, and eggs.

Our search yielded a number of common claims; however, some were more production-related than others. For instance, there was one group of labels that tended to deal more with the processing of meat products (e.g., 'no preservatives', 'no fillers', 'no nitrates', etc.); we opted to exclude these types of claims from the analysis as they seem to occur after the production stage. A second group of claims were excluded on the basis of being 'fuzzy'. These were claims such as 'agriculturally sustainable' and 'environmentally friendly'. While these most likely do relate to actual production, how they are defined was less clear (and likely less clear to consumers). A third 'fuzzy' term which warrants a separate discussion is the term 'natural'. While the USDA Food Safety and Inspection Service has defined 'natural' for meat and poultry products (containing no artificial ingredient or added color and is minimally processed; USDAb, 2011), consumers appear to have a great deal of confusion with the word (see Abrams, Meyers, and Irani, 2010), so we opted to remove 'natural' from our final list. Further, based on the USDA definition, 'natural' is actually more of a processing-phase claim than a production-phase claim. One final common term that we chose to exclude was the claim 'local'. Using the term 'local' is not expressing any specific production method per se; rather, it is promoting the location of production.

The goal of this study was to focus on specific on-farm practices. Our final list consisted of seven production method claims:

- Product is certified organic.
- Animals were humanely raised.
- Animals were grass-fed (or raised on a vegetarian diet).
- Animals were not administered growth hormones.
- Animals were not administered antibiotics.
- Animals were raised in a free-range (or cage-free) environment.
- Genetically modified organisms were not used in the production of this product (Non-GMO).

These seven claims were the most common across a wide range of livestock products. Only the organic, humane, and non-GMO claims had actual certification labels (USDA Organic; humane labels varied, but the more common ones were Certified Humane and Animal Welfare Approved; Non-GMO Project); the remaining claims were just written on product packaging. The exact phrasing for two of the claims is dependent on species. For instance, in terms of the feed composition, beef products were generally labeled as 'grass-fed' whereas poultry and pork products contained the phrase 'raised on a vegetarian diet'. Similarly, beef products tended to be labeled as 'free-range' whereas poultry was labeled as 'cage-free' (note: pork was most often termed 'crate-free'; however, pork was not one of the products we used in the study design, so this term is not included above).

It is important to note that overlap does exist in our list of production method claims. For instance, both the organic and humanely raised labels (regardless of humane certifying organization) prohibit the use of growth hormones in animals (HFAC, 2013; USDA, 2013).

Further, the USDA website notes "federal regulations have never permitted hormones or steroids in poultry, pork, or goat" (USDAb, 2011). In all actuality, the organic and humane claims encompass almost all of the other claims, with the exception of the grass-fed (vegetarian diet) claim (HFAC, 2013; USDA, 2013). However, it is less clear whether consumers are even aware this labeling is repetitive – numerous studies have shown perceptions of organic are broad and inaccurate at times (see Yiridoe, Bonti-Ankomah, and Martin, 2005; Hughner et al., 2007 for reviews), so it is possible consumers view each claim as a new piece of information. Producers' decisions to provide many of these claims on the same packaging suggest some skepticism about consumers' knowledge.

Once the labeling claims were selected, the next decision was which products to use in the study. Similar to Lister et al. (2014), it was important to select products which many consumers purchase regularly and that represent a variety of livestock-derived products. However, taking a slightly different approach from Lister et al. (2014), we also sought an array of products which included both livestock meat products and livestock non-meat products. It could be the case, for example, that an individual feels more strongly about a free-range/cage-free environment for animals which are continuously productive (as opposed to being fed for immediate slaughter). Conversely, raising cattle as grass-fed may only be important to beef consumers; it may be less important for dairy cows. Given these considerations, our four product categories were beef meat products, milk, chicken meat products, and eggs.[1]

[1] Originally, we designed the survey to look at ground beef and chicken breasts, specifically. However, upon consultation with our data collection partner, we opted to broaden the meat categories so as to not exclude consumers who may purchase beef steaks or chicken drumsticks, for example. For each of these categories, we did ask respondents to specify which types of meat or chicken products they purchase regularly.

Data and Methods

To determine the importance of the seven production method claims, two common approaches are suggested in the literature. First, respondents could be asked to rate the importance of each of the seven claims on a scale from 1 to 5 (where 1=not important and 5=very important), for example. While these are relatively simple and straightforward questions for respondents to answer (Lee, Soutar, and Louviere, 2007), the rating approach has some weaknesses. Namely, respondents could rate all seven production claims as very important (or not important); thus, no trade-offs have to be made between claims. Additionally, there is no guarantee all respondents will uniformly interpret the scale (Finn and Louviere, 1992; Lusk and Briggeman, 2009).

An alternative to a rating system is the best-worst scaling approach. Introduced by Finn and Louviere (1992), this approach forces respondents to discriminate (make trade-offs) between production claims. In a given choice set of production claims, respondents would be asked to select one claim as most important and one claim as least important; then, this procedure would be repeated multiple times with different sets of production claims. Ultimately, this exercise provides an estimate of where each production claim would fall on a scale of importance for respondents (Finn and Louviere, 1992; Lusk and Briggeman, 2009). The best-worst scaling method has been used increasingly recently in the agricultural economics literature to determine consumers' food values (Lusk and Briggeman, 2009; Lister et al., 2014), preferences for sustainable farming practices (Sackett, Shupp, and Tonsor, 2013), and preferences for USDA market reports (Pruitt, Tonsor, Brooks, and Johnson, 2014).

To design our production claim choice sets, we used a 2^7 main-effects orthogonal experimental design. The optimal design (D-efficiency of 100; zero correlation across or within choice sets) contained eight choice sets. There were four choice sets with four production claims,

three choice sets with two production claims, and one choice set with six production claims. All claims were seen by respondents a total of four times. The choice sets were held constant across the four product blocks for comparison purposes. Figure 1 provides a sample best-worst question from the beef product block.

Survey

We distributed an online survey through Clear Voice Research in the spring of 2014. Clear Voice Research recruits participants from a large panel that is designed to be representative of the U.S. population.[2] In total, 1,176 responses were collected; however, 137 observations were removed for incompleteness or incorrectly answering trigger ('captcha') questions (Mason and Suri, 2012), so the final number of usable responses was 1,039 – approximately 260 responses per product block.

Upon formally agreeing to participate in the study (using standard IRB protocol), participants were screened to determine (1) whether they were a practicing vegan and (2) whether they regularly purchased beef, milk, chicken, or eggs. Practicing vegans were excluded from participating in this study since they would not consume livestock products; participants who also did not purchase at least one of the four product categories were ineligible for participation. If all screening criteria were met, respondents were then randomly assigned to one of the four product category treatment blocks (Note: respondents would only be assigned to a product block which they regularly purchased, so if a respondent only regularly purchased eggs, that would be the assigned block). Within each block, participants were provided with an example best-worst question to demonstrate that two answers would need to be provided for each

[2] For more information, visit www.clearvoiceresearch.com.

question. In total, participants answered eight best-worst scaling questions (as described previously) in addition to a host of standard demographic questions.

Table 1 provides the demographic profile of our sample respondents. As can be seen in the table, we had an even mix of males and females (50.8% female). The average age was 54 years and the average income was $58,000. Fifty-three percent of our respondents had obtained a college degree, and the vast majority of respondents (91.4%) were the primary shopper in their household. We did test for demographic differences by product block and found that the chicken product block had a higher proportion of males and respondents with no children under 12 living in the household relative to the other product blocks; however, these differences did not significantly impact the final results; thus, we present the aggregate demographic information.

Data Analysis

In the best-worst framework, if there are *J* options (production method claims, in this case) in a choice set, then $J(J-1)$ best-worst combinations exist that an individual could choose. The individual's choice will be the pair of production method claims that maximizes the difference in importance – as perceived by the individual.

Following Lusk and Briggeman (2009), let γ_j represent the location of production method claim *j* on the underlying scale of importance, and let the true level of importance for individual *i* be given by $I_{ij} = \gamma_j + \varepsilon_{ij}$, where ε_{ij} is a random error term. The probability that an individual selects production method claim *j* as most important and production method claim *k* as least important in a choice set with *J* total claims is the probability that $I_{ij} - I_{ik}$ is greater than all other $J(J-1) - 1$ differences in the choice set. Assuming the ε_{ij} are distributed i.i.d. type I

extreme value, then this probability takes on the familiar multinomial logit (MNL) form as shown in equation 1:

(1) Prob (j is chosen best and k chosen worst) = $\frac{e^{\gamma_j - \gamma_k}}{\sum_{l=1}^{J} \sum_{m=1}^{J} e^{\gamma_l - \gamma_m - J}}$

The γ_j parameters can be estimated via maximizing the log-likelihood function based on the probability statement in equation 1. The dependent variable will be equal to one for the best-worst pair that is chosen and zero for the remaining $J(J-1)-1$ non-selected best-worst pairs. The estimated γ_j represents the level of importance for production method claim j relative to another production method claim which is dropped to avoid the dummy variable trap.

Using the estimates, we can then calculate a preference share for each of the production method claims. These shares offer the probability that a given production method claim would be selected as most important (Lusk and Briggeman, 2009). The share of preference calculation is shown in equation 2:

(2) Share of preference for production method claim j = $\frac{e^{\hat{\gamma}_j}}{\sum_{k=1}^{J} e^{\hat{\gamma}_k}}$

The sum of preference shares across the seven production method claims must sum to one. When interpreting the share of preference results, note that the levels of importance are reported on a ratio scale such that if one production method claim has a share value twice as large as another claim, it can be concluded that the former claim is twice as important as the latter.

One weakness with the MNL model is that it assumes all individuals place the same level of importance on each value, which is unlikely the case in reality. Thus, in addition to the MNL model, we estimate a random parameters logit (RPL) model for each of the four treatment blocks. RPL models are more general than the standard MNL because they allow each coefficient to vary randomly across respondents. Further, it allows for efficient estimation when

there are repeated choices by the same respondents, which is the case in this study (Revelt and Train, 1998). Lusk and Briggeman (2009), Lister et al. (2014), and Pruitt, Tonsor, Brooks, and Johnson (2014) also employ RPL model specifications in their best-worst applications, so this is a common practice in the literature. In the RPL specification, let the importance parameter for individual *i* and production method claim *j* be specified as $\tilde{\gamma}_{ij} = \bar{\gamma}_j + \sigma_j \mu_{ij}$, where $\bar{\gamma}_j$ and σ_j are the mean and standard deviation of γ_j in the population, and μ_i is a random term normally distributed with mean zero and unit standard deviation.

Results

Tables 2 and 3 present the MNL and RPL model results, respectively. Likelihood ratio tests revealed that individual models for each product category block were preferred over one pooled model across products in both the MNL and RPL specifications. Further, a final likelihood ratio test showed that the RPL specification was preferred to the MNL specification. Since both specifications tell a similar story across all products, we will discuss the RPL results (shown in table 3) in detail.

First we consider the beef and milk product block results. As can be seen in table 3, all production method claims were significantly different from the 'Animals were grassfed' claim at a 1% significance level with the exception of the 'Animals were raised in a free-range environment' claim. The most important production method claims were 'Animals were not treated with growth hormones,' 'No genetically-modified organisms used in production,' and 'Animals were humanely raised.' Together, these three claims capture 63.5% and 69.0% of beef and milk preference shares, respectively. Comparing across the two product blocks, note that the no growth hormones and humanely raised claims were rated as more important under the milk

product block, whereas beef consumers placed slightly more importance on the no antibiotics, free-range, organic, and grass-fed production method claims.

Moving to the chicken and eggs product blocks, we see that all production method claims were significantly different ($p < 0.01$) from the 'Animals were raised on a vegetarian diet' claim with the exception of the 'Product is certified organic' claim. In terms of claim importance, we see a similar pattern to the beef and milk results in that the 'Animals were not treated with growth hormones,' 'No genetically-modified organisms used in production,' and 'animals were humanely raised' production method claims easily sorted themselves to the top (combined 68.4% and 74.5% preference share for chicken and eggs, respectively). Additionally, the 'Animals were not treated with antibiotics' claim proved to be more important for the chicken and eggs blocks relative to the beef and milk blocks, whereas the diet claim (vegetarian fed for chicken and eggs; grass-fed for beef and milk) was far less important for respondents in the chicken and eggs product blocks. Comparing the chicken and eggs results directly, we see that the no growth hormones and humanely raised claims are slightly more important in the egg purchase decision; conversely, chicken purchasers placed slightly more importance on the no GMOs, no antibiotics, cage-free, organic, and vegetarian fed production method claims.

Looking at the results more broadly, we can see that the no growth hormones production method claim is most important to respondents, regardless of product block. However, the second most important claim seems to vary between meat and non-meat products. For beef and chicken, the second most important claim is no GMOs used; yet, for milk and eggs, the humanely raised claim came in second. While humanely raised was in the top three claims across all products, perhaps this claim is of higher importance for non-meat products where the animals are continual producers of a product rather than the case when animals are intended for slaughter.

Secondly, information on the animals' diet seems to be much more important for beef and milk purchasers than for chicken and eggs purchasers. One reason for this may be that the 'vegetarian fed' claim is relatively new in the labeling world (Price, 2008); further, since chickens are naturally omnivores (versus cattle who are naturally herbivores), having a vegetarian diet may be less important relative to cattle having a grass-fed diet. Finally, it is interesting to note the lack of importance respondents placed on the 'Product is certified organic' production method claim – a finding which held across all four product blocks. This result is especially surprising given that the USDA Organic standards encompass many of the claims which were ranked as more important than organic (USDA, 2013). That being said, there is evidence of increasing skepticism toward the organic label. Kindy and Layton (2009) question the stringency (or lack there of) of the organic label requirements; in addition, a 2013 Harris Poll found that 59% of Americans agreed that using the 'organic' label is just an excuse to charge more for a product (The Harris Poll, 2013). This skepticism could lead to the higher valuation of other production method claims over the 'certified organic' claim, even if these claims are repetitive.

Conclusion

Production method claims are becoming increasingly popular on food products today. While many production claims have been studied in isolation (e.g., what you would be willing to pay for cage-free eggs?), little research has forced consumers to prioritize all the different production claims. We use a best-worst scaling framework to determine the importance of seven common production method claims. We compare the importance of these claims across four product types – beef meat products, milk, chicken meat products, and eggs – to determine if the importance of claims vary by species or between meat and non-meat products.

Results of our study show that the 'Animals were not treated with growth hormones' claim was most important across all product types. This was a particularly interesting finding in the case of chicken as the USDA prohibits the use of hormones in poultry already (USDAb, 2011); whether consumers know this, however, is unclear. The 'No genetically-modified organisms used in production' and 'Animals were humanely raised' were also rated as very important claims. The attention to GMO claims was not surprising given the recent ballot initiatives in many states (Center for Food Safety, 2014). Claims viewed as less important were 'Animals were grass-fed (or raised on a vegetarian diet)', 'Animals were raised in a free-range (cage-free) environment', and 'Product is certified organic'.

The most surprising result in this study was the lack of importance attributed to the 'certified organic' production claim. The USDA Organic requirements, as well as the different humane certification schemes, are actually quite comprehensive in nature, encompassing virtually all the other production claims we studied. For these reasons, we expected consumers to sort the 'certified organic' and 'humanely raised' production method claims to the top, yet this is not what we observed. Rather, consumers identified many of the individual components (such as no growth hormones, no GMOs, no antibiotics, etc.) of these broader certifications as more important. One possible reason for this may be that consumers are unaware of the complete requirements for these certification systems. Particularly in the case of organic, consumers may be less aware of what organic means for livestock-derived products compared to produce crops (fruits and vegetables). The most common definitions for organic are 'no chemicals, no pesticides, no fertilizers' (Yiridoe, Bonti-Ankomah, and Martin, 2005; Hughner et al., 2007), so consumers may find it more difficult to translate these definitions to livestock-derived products.

For producers, this research provides some key takeaway messages. First, the majority of consumers' preference shares fell within the top three production method claims, so these are likely the claims which will generate the most attention in the grocery store setting. That being said, should a producer prefer to use one of the broader, all-encompassing claims, our results suggests one of the humane certification labels would be received more positively by consumers (as opposed to the organic label). A final important note for producers is, again, that production methods are but only one factor in the consumer decision making process. As Lusk and Briggeman (2009) and Lister et al. (2014) show, consumers also value safety, taste, price, and freshness when making food decisions, often placing more value on these attributes than the method of production. Thus, producers may be better served by reducing the number of production method claims on their product packaging – a move which can simplify package design and may also simultaneously result in some cost savings.

References

Abrams, Katie M., Courtney A. Meyers, Tracy A. Irani. 2010. "Naturally Confused: Consumers' Perceptions of All-Natural and Organic Pork Products." *Agriculture and Human Values*, 27:365-374.

Barreiro-Hurle, Jesus, Azucena Gracia, and Tiziana de-Magistris. 2010. "The Effects of Multiple Health and Nutrition Labels on Consumer Food Choices." *Journal of Agricultural Economics*, 61(2):426-443.

Caswell, J. A., and E. M. Mojduszka. 1996. "Using Informational Labeling to Influence the Market for Quality in Food Products." *American Journal of Agricultural Economics*, 78:1248-1253.

Center for Food Safety. 2014. "State Labeling Initiatives." Center for Food Safety, http://www.centerforfoodsafety.org/issues/976/ge-food-labeling/state-labeling-initiatives#.

Finn, Adam, and Jordan J. Louviere. 1992. "Determining the Appropriate Response to Evidence of Public Concern: The Case of Food Safety." *Journal of Public Policy and Marketing*, 11(1):12-25.

Gao, Zhifeng, and Ted C. Schroeder. 2009. "Effects of Label Information on Consumer Willingness-to-Pay for Food Attributes." *American Journal of Agricultural Economics*, 91(3):795-809.

Hoyer, Wayne D. 1984. "An Examination of Consumer Decision Making for a Common Repeat Purchase Product." *Journal of Consumer Research*, 11(3):822-829.

Hughner, Renee Shaw, Pierre McDonagh, Andrea Prothero, Clifford J. Shultz II, and Julie Stanton. 2007. "Who Are Organic Food Consumers? A Compilation and Review of Why People Purchase Organic Food." *Journal of Consumer Behavior*, 6:94-110.

Humane Farm Animal Care (HFAC). 2013. "Humane Farm Animal Care Comprehensive Animal Welfare Standards Comparison by Program – Chicken, Beef Cattle and Pigs." Humane Farm Animal Care, http://certifiedhumane.org/wp-content/uploads/2014/01/Comp.Standards.Comparison.Chart_.wappendix.11.26.13.pdf.

Kindy, Kimberly, and Lyndsey Layton. 2009. "Integrity of Federal 'Organic' Label Questioned." *The Washington Post*, July 3, http://www.washingtonpost.com/wp-dyn/content/article/2009/07/02/AR2009070203365.html?sid=ST2009070203371.

Lagerkvist, C. J., and S. Hess. 2011. "A Meta-Analysis of Consumer Willingness to Pay for Farm Animal Welfare." *European Review of Agricultural Economics*, 38(4):55-78.

Lee, Julie Anne, Geoffrey N. Soutar, and Jordan Louviere. 2007. "Measuring Values Using Best-Worst Scaling: The LOV Example." *Psychology and Marketing*, 24(12):1043-1058.

Lister, Garrett, Glynn Tonsor, Marcus Brix, Ted Schroeder, and Chen Yang. 2014. "Food Values Applied to Livestock Products." Working Paper, http://www.agmanager.info/livestock/marketing/WorkingPapers/WP1_FoodValues-LivestockProducts.pdf.

Lusk, Jayson L., and Brian C. Briggeman. 2009. "Food Values." *American Journal of Agricultural Economics*, 91(1):184-196.

Mason, Winter, and Siddharth Suri. 2012. "Conducting Behavioral Research on Amazon's Mechanical Turk." *Behavioral Research*, 44(1):1-23.

Norwood, F. Bailey, and Jayson L. Lusk. 2011. *Compassion by the Pound: The Economics of Farm Animal Welfare*. Oxford, UK: Oxford University Press.

Olynk, Nicole J. 2012. "Assessing Changing Consumer Preferences for Livestock Production Practices." *Animal Frontiers*, 2(3):32-38.

Price, Catherine. 2008. "Sorting Through the Claims of the Boastful Egg." *The New York Times*, September 16, http://www.nytimes.com/2008/09/17/dining/17eggs.html?pagewanted=all&_r=0.

Pruitt, J. Ross, Glynn T. Tonsor, Kathleen R. Brooks, and Rachel J. Johnson. 2014. "End User Preferences for USDA Market Information." *Food Policy*, 47:24-33.

Revelt, David, and Kenneth Train. 1998. "Mixed Logit with Repeated Choices: Households' Choices of Appliance Efficiency Level." *Review of Economics and Statistics*, 80(4):647-657.

Sackett, Hillary M., Robert Shupp, and Glynn Tonsor. 2013. "Consumer Perceptions of Sustainable Farming Practices: A Best-Worst Scenario." *Agricultural and Resource Economics Review*, 42(2):275-290.

The Harris Poll. 2013. "Majority of Americans See Organic Label as an Excuse to Charge More." April 15, http://www.harrisinteractive.com/vault/Harris%20Poll%2021%20-%20Earth%20Day_4.15.13.pdf.

United States Department of Agriculture (USDAa). 2011. "What is Organic?" Agricultural Marketing Service, http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5103286.

United States Department of Agriculture (USDAb). 2011. "Meat and Poultry Labeling Terms." Food Safety and Inspection Service,

http://www.fsis.usda.gov/wps/wcm/connect/e2853601-3edb-45d3-90dc-1bef17b7f277/Meat_and_Poultry_Labeling_Terms.pdf?MOD=AJPERES.

United States Department of Agriculture (USDA). 2013. "National Organic Program" Agricultural Marketing Service, http://www.ams.usda.gov.

Verbeke, W. 2009. "Stakeholder, Citizen, and Consumer Interests in Farm Animal Welfare." *Animal Welfare*, 18:325-333.

Yiridoe, Emmanuel K., Samuel Bonti-Ankomah, and Ralph C. Martin. 2005. "Comparison of Consumer Perceptions and Preference Toward Organic versus Conventionally Produced Foods: A Review and Update of the Literature." *Renewable Agriculture and Food Systems*, 20(4):193-205.

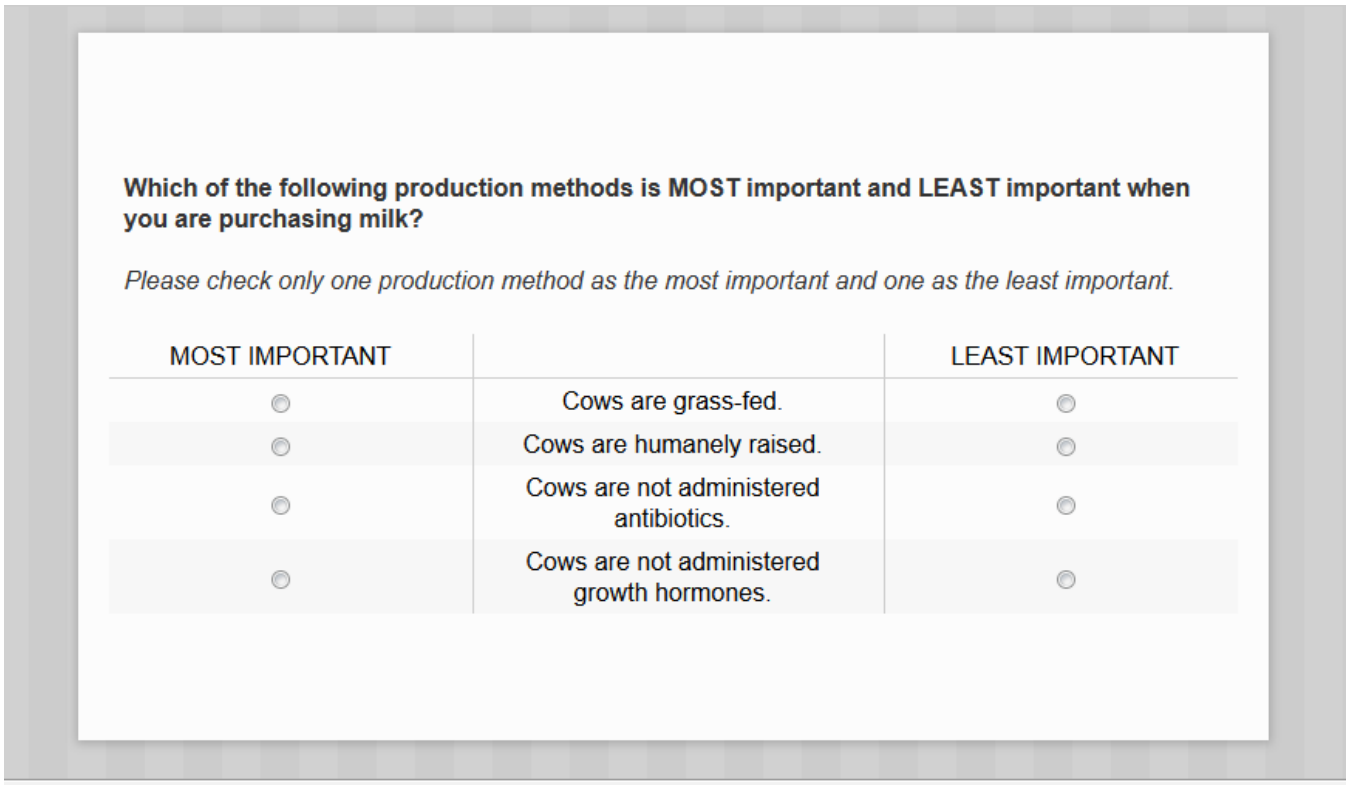

Figure 1. Sample Best-Worst Question (Milk Product Block)

Table 1. Demographic Composition of Survey Respondents (*N* = 1,039 respondents)

Variable	*Definition*	*Mean*
Female	1 if female; 0 if male	0.508
Age	Age in years	54.148
Income	Annual household income in $1,000s	58.820
Degree	1 if obtained a college degree; 0 otherwise	0.530
Kids	1 if children under the age of 12 reside in the household; 0 otherwise	0.177
PrimShop	1 if primary shopper in household; 0 otherwise	0.914
Northeast	1 if resides in Northeast U.S. census region; 0 otherwise	0.232
Midwest	1 if resides in Midwest U.S. census region; 0 otherwise	0.263
South	1 if resides in South U.S. census region; 0 otherwise	0.307
West	1 if resides in West U.S. census region; 0 otherwise	0.198

Table 2. Importance Levels of Production Methods by Product Block (MNL Estimates)

	Block 1: Beef		*Block 2: Milk*		*Block 3: Chicken*		*Block 4: Eggs*	
Production Method	Estimate	Preference Share	Estimate	Preference Share	Estimate	Preference Share	Estimate	Preference Share
Animals were not Treated with Growth Hormones	0.724**	0.204	0.871**	0.219	1.530**	0.234	1.794**	0.232
	(0.061)		(0.062)		(0.066)		(0.073)	
No Genetically-Modified Organisms Used in Production (Non-GMO)	0.706**	0.200	0.776**	0.199	1.471**	0.221	1.666**	0.204
	(0.061)		(0.062)		(0.066)		(0.073)	
Animals were Humanely Raised	0.658**	0.191	0.827**	0.210	1.278**	0.182	1.750**	0.222
	(0.062)		(0.063)		(0.065)		(0.074)	
Animals were not Treated with Antibiotics	0.324**	0.137	0.364**	0.132	1.142**	0.159	1.371**	0.152
	(0.061)		(0.062)		(0.065)		(0.072)	
Animals were Raised in a Free-Range (Cage-Free) Environment[a]	0.092	0.108	0.130*	0.104	0.629**	0.095	0.993**	0.104
	(0.061)		(0.062)		(0.063)		(0.071)	
Product is Certified Organic	-0.474**	0.062	-0.757**	0.043	0.143*	0.058	0.244**	0.049
	(0.062)		(0.064)		(0.063)		(0.068)	
Animals were Grassfed (Raised on a Vegetarian Diet)[b]	0.000	0.099	0.000	0.092	0.000	0.051	0.000	0.039
Number of Individuals	256		264		272		247	
Log Likelihood	-3626		-3554		-3585		-3109	

*, **Denotes mean importance level was significantly different from the 'Animals were Grassfed' option at the 5% or 1% significance level, respectively.
[a]For beef and milk, the term 'free-range' was used; for chicken and eggs, the term 'cage-free' was used.
[b]For beef and milk, the term 'grassfed' was used; for chicken and eggs, the term 'raised on a vegetarian diet' was used.

Table 3. Importance Levels of Production Methods by Product Block (RPL Estimates)

Production Method	*Block 1: Beef*		*Block 2: Milk*		*Block 3: Chicken*		*Block 4: Eggs*	
	Estimate	Preference Share	Estimate	Preference Share	Estimate	Preference Share	Estimate	Preference Share
Animals were not Treated with Growth Hormones	0.899**	0.220	1.184**	0.246	1.950**	0.258	2.714**	0.269
	(0.083)		(0.103)		(0.131)		(0.164)	
No Genetically-Modified Organisms Used in Production (Non-GMO)	0.857**	0.211	1.024**	0.210	1.861**	0.236	2.458**	0.208
	(0.086)		(0.103)		(0.129)		(0.158)	
Animals were Humanely Raised	0.822**	0.204	1.134**	0.234	1.646**	0.190	2.710**	0.268
	(0.083)		(0.103)		(0.124)		(0.169)	
Animals were not Treated with Antibiotics	0.472**	0.144	0.562**	0.132	1.531**	0.170	2.164**	0.155
	(0.074)		(0.079)		(0.111)		(0.144)	
Animals were Raised in a Free-Range (Cage-Free) Environment[a]	0.039	0.093	0.080	0.082	0.698**	0.074	1.280**	0.064
	(0.078)		(0.079)		(0.080)		(0.113)	
Product is Certified Organic	-0.845**	0.038	-1.349**	0.020	-0.041	0.035	0.001	0.018
	(0.110)		(0.140)		(0.095)		(0.126)	
Animals were Grassfed (Raised on a Vegetarian Diet)[b]	0.000	0.090	0.000	0.075	0.000	0.037	0.000	0.018
Number of Individuals	256		264		272		247	
Log Likelihood	-3593		-3502		-3547		-3042	

**Denotes mean importance level was significantly different from the 'Animals were Grassfed' option at the 1% significance level.
[a]For beef and milk, the term 'free-range' was used; for chicken and eggs, the term 'cage-free' was used.
[b]For beef and milk, the term 'grassfed' was used; for chicken and eggs, the term 'raised on a vegetarian diet' was used.