# Consumer Preferences for Socially Responsible Production Attributes Across Food Products

**Jill J. McCluskey, Catherine A. Durham, and Brady P. Horn**

This study examines consumer preferences for three socially responsible products: minimal-pesticide strawberries, fair-trade bananas, and milk from pasture-fed cows. In-person survey data were collected in four states. Understanding preferences for these characteristics is difficult because they may appeal to different individuals depending on their personal attitudes and values. To address this issue, health, environmental and other attitudes are measured based on survey questions. Responses to these questions are used to produce explanatory factor scores. Stated preference models, both with and without factor scores, are estimated to evaluate the relative strengths of consumer preferences and motivations to purchase these products.

***Key Words:*** ecolabels, fair-trade, socially responsible

Products with socially responsible production attributes have been developed and marketed in response to a wide range of public concerns. Many of these attributes relate to environmental and social concerns, including such aspects as "fair-trade" for fair treatment of workers, humane treatment of domestic animals, minimizing the distance food is transported, wildlife and biodiversity preservation, and sustainability. Agricultural sustainability incorporates both the basic notion of preserving productivity and continuing land in its agricultural use. Recent studies have shown a greater interest in locally produced than organic products (Ostrom 2006).

In this study, we examine three food products with different socially responsible production attributes: minimal-pesticide strawberries, fair-trade bananas, and milk from pasture-fed cows. Survey data were collected for the purpose of this study in grocery stores and farmers markets in Minnesota, Oregon, Rhode Island, and Washington. A model based on random utility theory is estimated in order to evaluate the relative strengths of consumer preferences and motivations to purchase these products.

With many different options to choose from, a key research question is how socially aware consumers respond to expanded socially responsible choices and whether they respond differently across products. Understanding consumer preferences for characteristics such as reduced pesticides, fair-trade, and ethical treatment of animals is difficult because different ethical characteristics will appeal to different individuals, depending on their personal attitudes and values. In order to address this issue, health and environmental factors and other motivational factors were elicited through a series of survey questions. These factors are included in a separate model and are statistically significant.

Research on the economics of socially responsible products, though rarely targeted at actual consumer product demand, has covered a fairly broad range of topics. Some studies evaluate the overall impact of ecolabeling certification, includ-

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ing market inefficiencies (Swallow and Sedjo 2000). A number of studies have examined which consumers will purchase products with ecolabels based on survey results (Govindasamy and Italia 1998, Gumpper 2000, Loureiro, McCluskey, and Mittelhammer 2001, Nimon and Beghin 1999). These studies frequently indicate that consumers may prefer ecolabeled to standard products, and in some cases are willing to pay more for them. Teisl, Roe, and Hicks (2002) utilize actual sales data to evaluate whether the dolphin-safe label on tuna is effective in raising demand.

In general, studies find that ecolabels increase consumers' willingness to pay (WTP) for a particular product. Blend and van Ravenswaay (1999) examine willingness to pay for ecolabeled apples. Although Nimon and Beghin (1999) identify a premium for organic cotton fibers, they could not find evidence of a premium associated with environmentally friendly dyes. Loureiro, McCluskey, and Mittelhammer (2002) estimate mean willingness to pay for ecolabeled apples using a double-bounded logit model. They find that the ecolabeled apples command a small premium of about 5 percent. Loureiro and Lotade (2005) find that Colorado consumers were willing to pay a 4 percent premium for fair-trade coffee.

Some researchers have compared the consumer response across types of environmental marketing. Loureiro, McCluskey, and Mittelhammer (2001) elicit and compare consumers' preferences across conventional, ecolabeled, and organic apples. Given equal prices and quality, organic apples are preferred to ecolabeled apples, and ecolabeled apples are preferred relative to conventional apples. Their results suggest that ecolabels are perceived as an intermediate choice between organic and standard production. Wessells, Johnston, and Donath (1999) find that consumers do not value all certified fish and seafood species in the same way, stating higher subjective willingness to pay values for certified salmon compared with values for cod. Further, consumers from different countries may respond differently to the same ecolabel. Johnston et al. (2001) investigate differences in consumer preferences for ecolabeled seafood across the United States and Norway. They find that consumer preferences differ by price premium, species, consumer group, and certifying agency. The current article follows this line of research by comparing across socially responsible attribute claims and across food products.

## Data

The data utilized in this analysis were collected with 1,500 in-person convenience surveys conducted from June through August 2006 throughout the greater Portland, Oregon/Vancouver, Washington metropolitan area; the greater Minneapolis/St. Paul area; and throughout Rhode Island. Prior to the survey, focus groups were conducted in all three geographic areas to assess consumer issues related to ecolabels and assist in designing the survey. The survey was pre-tested in Portland, Oregon. Based on the pretests, the survey instrument was modified, and a time to complete the survey was estimated.

The survey instrument consisted of questions that were intended to collect information about consumer preferences and purchasing levels, consumer demographics, shopping habits, and their rating of characteristics that influence their produce choices (such as price and appearance). Further, dichotomous-choice contingent valuation (CV) questions with follow-up were included to elicit consumers' willingness to pay for these products. In addition, the survey included numerous questions intended to elicit information about the individual's attitudes. These measures are discussed in the next section.

Respondents answered the surveys on touchscreen or laptop computers set up at grocery stores, food cooperatives, and farmers markets, taking approximately 20 minutes per survey. In contrast to studies that use mostly telephone or mail survey data, our survey data were collected in person at the same time and place where actual purchase decisions are made. The intention of conducting the in-person surveys at locations where consumers buy food is to obtain data directly from the actual decision-makers. This mitigates possible population choice bias, in which the population chosen does not adequately correspond to the population that will purchase ecolabeled food products.

Each respondent was paid $5 in store or market credit (useable at any time) or cash upon completion of the survey. The incentives increased the respondent participation rate and were effective in encouraging the stores to allow the survey to be

conducted on their premises. Survey locations were chosen to ensure that the population studied incorporated sufficient variation in the variables expected to explain the ecolabel related choices without requiring an extremely large sample. The locations included conventional supermarkets, farmers markets, and at least one natural food store or food cooperative in each geographic area. Each location offered both organic and conventional food products for sale. Thirty-eight percent of the surveys were conducted at conventional supermarkets, 45 percent at farmers markets, and 17 percent at natural food stores or cooperatives.

Of course, this data set does not constitute a purely random sample. The literature on sample design supports alternatives to random sampling because they can reduce the cost of data collection along with improving estimator efficiency. The critical piece is whether the sample is selected based on an endogenous or exogenous variable. An endogenous selection process is termed "choice based" and the exogenous process is referred to as "stratified" (Manski and McFadden 1981). In stratification, a population is broken into groups on the basis of one or more exogenous characteristics and a random sample is drawn from each group. The observations are generally not sampled in numbers based on their portion of the population; the aim is to obtain more variation in the exogenous variables than would be drawn at random from a limited sample, thus reducing the variance of the estimators for a given sample size.

The demographic variables are well dispersed across age and income, though somewhat higher than the average population. The majority (66 percent) of those surveyed had at least a four-year college degree, which is higher than the general population. Seventy-eight percent of those surveyed indicated they are the primary shoppers in their household, and 66 percent are female. The questions used in the analysis are discussed in the following sections, and means, standard deviations, minimums, maximums, and variable definitions and transformations are reported in Table 1.

## Eliciting Consumer Attitudes

Researchers interested in the impact of environmental, ethical, or health motivations on organic or ecolabel purchases have used various strategies to elicit information about the strength of the individual's values and concerns. Loureiro, McCluskey, and Mittelhammer (2001) used a selection of individual questions that incorporate the tradeoff between decreasing environmental or health risks and costs. Analysts have also used a series of questions to elicit the strength of those motivations and convert them to a component score that is a weighted linear combination of the original variables using principal components analysis (PCA). The current study utilizes this approach.

An advantage with the PCA approach for measuring attitudes is that it uses multiple questions to measure an individual's level of concern or interest in an issue rather than relying on a single question, which might measure an individual's attitude less accurately due to the wording or context. Johnston et al. (2001) use this approach to evaluate the impact of environmental interests on ecolabel preferences, and Durham (2007) uses it to examine the impact of health concerns and environmental attitudes on organic preferences. These studies draw upon Roberts (1996), who segments consumers for their environmental orientations, and Kraft and Goodell (1993), who evaluate consumers' wellness orientations.

Going beyond the personal health concerns and environmentalism evaluated in the previous literature, the current study developed questions relating to the individual's attitudes about protecting wildlife, domestic animal welfare, food interest, farm preservation, and farm labor welfare. In total, the survey included twenty-three Likert-scale questions intended to be used for the factor analyses. Thirteen environmental and health questions were drawn from the sets developed by Roberts (1996) and Kraft and Goodell (1993). Eleven additional questions were developed for the current study to evaluate consumer attitudes about protecting wildlife, domestic animal welfare, farm labor, farms preservation, and general food interest.

### *Principal Components Analysis Details and Results*

The PCA approach starts with a covariance or correlation matrix of the Likert question responses. Eigenvalues and eigenvectors are calculated to provide for the examination of the responses and produce the weights that transform the response

**Table 1. Variables Descriptions and Means/Distributions**

| Variable | Description and Coding | Mean |
|---|---|---|
| **Gender** | Female | 0.662 |
| **States** | Oregon and Washington | 0.347 |
| | Minnesota | 0.317 |
| | Rhode Island | 0.336 |
| **Race or Ethnicity** | White | 0.840 |
| | Black | 0.017 |
| | Asian | 0.035 |
| | Hispanic | 0.015 |
| | Native American | 0.016 |
| | Other | 0.021 |
| | No answer | 0.055 |
| **Store type** | Natural Food Store | 0.098 |
| | Farmers Market | 0.453 |
| | Food-coop | 0.069 |
| | Conventional | 0.380 |
| **Education** | High School | 0.165 |
| | Two-Year Degree | 0.172 |
| | Bachelors Degree | 0.367 |
| | Advanced Degree | 0.297 |
| **Children** | Presence of Children = 1, no = 0 | 0.295 |
| **Factors** | Environment | 0.017 |
| | Wildlife | 0.003 |
| | Health | 0.013 |
| | Food Aficionado | 0.002 |
| | Farm Labor | 0.009 |
| | Farm Preservation | 0.005 |
| | Animal Welfare | 0.010 |

| | Distribution of Age Range Selected by Individual | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | **18-24** | **25-29** | **30-34** | **35-39** | **40-45** | **45-49** | **50-54** | **55-59** | **60-64** | **65-69** | **70 Plus** | 45.662 |
| | 11.4% | 9.2% | 8.6% | 6.7% | 8.4% | 11.4% | 13.8% | 10.5% | 8.2% | 6.0% | 5.9% | |

| | Distribution of Income Range Selected by Individual | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Income** | **<$19,999** | **$20-29,999** | **$30-59,999** | **$40-$49,999** | **$50-$59,999** | **$60-$79,999** | **$80-$99,999** | **>$100,000** |
| | 9.3% | 7.5% | 8.4% | 7.9% | 10.1% | 17.7% | 12.6% | 26.5% |

variables into a reduced set of representative variables, which are the component scores. For this study, a varimax rotation is used to create an orthogonal solution, which is the basis for the formation of the weights used. Examination of the rotated component matrix confirms whether the questions designed to measure a particular component contribute most highly to that expected component. Further, the component should be defined based on the commonality among those questions.

Principal component analyses are intended to evaluate related concepts. Consequently, the Likert-scale questions from this study are partitioned into three groups of related concepts (environmental/wildlife, health/food, and farming) before performing the principal components analysis. Since the main purpose of a factor analysis is data reduction, the number of components is initially determined by the number of consumer attitudes that the questions were designed to measure. The rotated component

**Table 2. Rotated Component Matrix (Environmental and Wildlife Factors)**

| Questions (All on 5 point Agreement Scale) | Type* | Component 1 | Component 2 | Factor |
|---|---|---|---|---|
| I buy environmentally friendly products even if they are more expensive. | | .797 | .195 | |
| I have switched products for environmental reasons. | A | .806 | .258 | |
| I have convinced family/friends not to buy environmentally harmful goods. | A | .783 | .184 | |
| I will not buy from a company if it is ecologically irresponsible. | A | .747 | .251 | Environmentalism |
| I have purchased products because they cause less pollution. | A | .809 | .222 | |
| I try to buy only products that can be recycled. | A | .673 | .222 | |
| I do not buy household products that harm the environment. | A | .688 | .212 | |
| Preserving all plant and animal species is important. | A | .235 | .856 | Wildlife |
| I would vote for referendums/initiatives to preserve wildlife habitat. | A | .255 | .845 | Preservation |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.
*T -type responses: Always True, Mostly True, Sometimes True, Rarely True, Never True.
A-type responses: Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree.

**Table 3. Rotated Component Matrix (Health and Food Factors)**

| Questions (All on 5 point Agreement Scale) | Type* | Component 1 | Component 2 | Factor |
|---|---|---|---|---|
| I worry that there are harmful chemicals in my food. | A | .777 | .164 | |
| I avoid foods containing nitrates and preservatives. | T | .742 | .143 | Health Concerns |
| I am interested in information about my health. | T | .701 | .167 | |
| I'm concerned about my drinking water quality. | A | .668 | .054 | |
| I look for new types of food to try. | T | .163 | .904 | |
| I go out of my way for new food experiences. | T | .188 | .879 | Food Aficionado |
| I enjoy magazines about food. | T | .092 | .660 | |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.
*T-type responses: Always True, Mostly True, Sometimes True, Rarely True, Never True.
A-type responses: Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree.

matrix is produced based on the number of factors selected for retention, and the process achieves a pattern of loadings on each factor that is as diverse as possible.

The rotated component matrix and set of statements used to generate the environmental and wildlife factor scores are presented in Table 2. The first factor is *Environmentalism*. Responses to the statements, "I have switched products for environmental reasons," "I have convinced members of my family or friends not to buy some products that are harmful to the environment," and "I will not buy from a company if it is ecologically irresponsible" contribute highly to the first of the environmentally oriented factors. The second factor is *Wildlife Preservation*. Responses to the statements "Preserving all plant and animal species is important," and "I would vote for referendums/initiatives to preserve wildlife habitat" contribute highly to this factor.

The health and food rotated factor matrix and the set of statements are presented in Table 3. For these statements, the evaluation of the rotated matrix for three components indicated that the expected health ingredient and health environment measures had not been satisfactorily delineated by the state-

**Table 4. Rotated Component Matrix (Farming)**

| Questions (All on 5 point Scale) | Type* | Component 1 | Component 2 | Factor |
|---|---|---|---|---|
| I'm concerned about wages received by farm laborers in other countries. | A | .891 | .264 | Farm Labor |
| I'm concerned about working conditions for farm laborers in the U.S. | A | .871 | .305 | |
| I would vote for referendums/initiatives to preserve farmland | A | .236 | .852 | Farm Preservation |
| I'm concerned about the survival of family farms in the U.S. | A | .303 | .801 | |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.
*A-type responses: Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree.

ments included in the survey, so the number of factors selected for retention was reduced to two, producing one Health Concerns component and one *Food Aficionado* component.

The rotated component matrix and set of statements used to generate farming factor scores are presented in Table 4. This grouping produced two factors: *Farm Preservation* and *Farm Labor*. The statements, "I'm concerned about wages received by farm laborers in other countries," and "I'm concerned about working conditions for farm laborers in the U.S.," create a factor representing concerns about *Farm Labor.* The factor for *Farm Preservation* is based on the responses to the statements, "I would vote for referendums/initiatives to preserve farmland," and "I'm concerned about the survival of family farms in the U.S." The final motivation variable is based on a single statement that did not align with any expected factor when tested with subgroups in a useful way. The decision was made to create a standardized variable from the responses to the statement, "I'm concerned about the welfare of domestic farm animals," and use it as the factor, *Animal Welfare*, to represent this motivation.

Thus, the factor scores produced and utilized in the analysis are *Environmentalism, Wildlife Preservation, Health Concerns, Food Aficionado, Farm Preservation, Farm Labor,* and *Animal Welfare.* Given the construction of the statements for the factor analysis, the individual placement along the scale for each factor score produced is expected to have either a neutral or positive effect on willingness to pay for the socially responsible food products. For example, if the consumer usually makes product choices for environmental reasons, he or she might be motivated to buy an ecolabeled food product rather than a conventionally produced one.

## Contingent Valuation Methodology

Contingent valuation (CV) method is a technique that is used to estimate willingness to pay.[1] An objective of this study is to analyze and estimate willingness to pay for the socially responsible production attributes and consider the characteristics that affect willingness to pay. In pursuit of this objective, a double-bounded model question series (Hanemann, Loomis, and Kanninen 1991) was incorporated in the survey.[2] In the double-bounded model, each participant is presented with two bids. The level of the second bid is contingent upon the response to the first bid. If the individual responds "yes," meaning that he or she is willing to pay the amount of the first bid ($B_i$), then the individual is presented with a second higher bid ($B_H$). On the other hand, if the individual responds "no," meaning that he or she is not willing to pay the amount of the first bid, then he or she is presented with a second discounted bid ($B_L$). The four possible responses to the bid scenarios are: (a) "no" to both bids; (b) a "no" followed by a "yes"; (c) a "yes" followed by a "no"; and (d) "yes" to both bids.

The sequence of questions isolates the range in which the respondent's true willingness to pay lies,

[1] For further information, including recent reviews and comparison across models estimable from CV data with reiteration see, for example, Flachaire and Hollard (2006).

[2] There is a literature on the appropriate number of iterations to include in the bidding procedures used in the CV method (e.g., single versus double-bounded). Cameron and Quiggin (1994) evidenced the problem of anchoring/starting point bias with iterations of bids. There is some bias with the double-bounded model, primarily due to inconsistencies that may be present between the consumers' first and subsequent bids (Hanemann and Kanninen 1999). Since we use a double bounded-model, our results may be biased toward the initial bid. The advantage to using the double-bounded model is the additional information obtained from the follow-up question.

placing it into one of the following four intervals: $(-\infty, B_L)$, $[B_L, B_I)$, $[B_I, B_H)$, or $[B_H, +\infty)$. The second bid, in conjunction with the response to the initial preference decision, allows both an upper and a lower bound to be placed on the respondent's unobservable true willingness to pay. The willingness to pay function is represented as:

$$WTP = \alpha + \rho B + \lambda' z + \varepsilon \tag{1}$$

where *WTP* is willingness to pay, *B* is the ultimate bid amount each consumer faces, *z* is a column vector of observable characteristics of the individual, $\varepsilon$ is a random variable accounting for unobservable characteristics, and $\alpha$, $\rho$, and $\lambda$ are unknown parameters to be estimated. Assuming linearity in *z* and letting $\varepsilon \sim G(0,\sigma^2)$, where $G(0,\sigma^2)$ denotes a distribution function with mean zero and variance $\sigma^2$, the log likelihood function can be characterized as:

$$L = \sum_i \left\{ \begin{array}{l} I_{D_i=1} \ln G(\tilde{\alpha} + \tilde{\rho} B_{Li} + \tilde{\lambda}' z_i) \\ + I_{D_i=2} \ln[G(\tilde{\alpha} + \tilde{\rho} B_{Ii} + \tilde{\lambda}' z_i) \\ - G(\tilde{\alpha} + \tilde{\rho} B_{Li} + \tilde{\lambda}' z_i)] \\ + I_{D_i=3} \ln[G(\tilde{\alpha} + \tilde{\rho} B_{Hi} + \tilde{\lambda}' z_i) \\ - G(\alpha + \tilde{\rho} B_{Ii} + \lambda' z_i)] \\ + I_{D_i=4} \ln[1 - G(\tilde{\alpha} + \tilde{\rho} \mathrm{B}_{Hi} + \tilde{\lambda}' z_i)] \end{array} \right\} \tag{2}$$

where $I_K$ is an indicator function for the event *K*, $D_i = j$ denotes that the $j^{th}$ alternative occurred, and *i* denotes individual *i*. In the empirical implementation of the model, we define $G(.)$ to be the standard logistic distribution with mean zero and standard deviation $\sigma = \pi/\sqrt{3}$.

## Empirical Implementation

The demographic factors included in the models include gender, income, the presence of children in the household, educational level, and a variable for whether the respondent was the primary household shopper. When appropriate, these are entered as simple binary explanatory variables. Based on preliminary analysis, education is coded with an indicator variable for the highest two educational levels, bachelor's and advanced/professional degrees. Income is treated as a linear variable with midpoints of the income range (in thousands of dollars) entered for each of the eight income categories of the multiple choice question.[3] The models include variables for the location where the survey was conducted. Location is included in the model to ensure that non-random consumer differences associated with location are addressed.

Finally, the factor scores *(Environmentalism, Wildlife Preservation, Health Concerns, Farm Preservation, Farm Labor, Food Aficionado,* and *Animal Welfare)* are included in the second model as explanatory variables. Certain factors are only expected to affect products with specific attributes. Nevertheless, all of the factors of interest are included in the analysis to test the possibility and to help evaluate the reliability and reasonableness of the factor scores. However, each score is produced in a standardized form with mean zero and a standard deviation of one, which makes it easier to compare each factor's marginal effect. The empirical representation of equation (1) for the models *without factors* is defined as:

$$W_m = \alpha_m + \rho_m B_m + \sum_{n=1}^{5} \gamma_{mn} * location_n + \sum_{n=6}^{14} \gamma_{mn} * Demographics_n + \varepsilon_{mn}. \tag{3}$$

Where *m* indicates the $m^{th}$ product in *M*, and $M \equiv$ {reduced-pesticide strawberries, milk from pasture-fed cows, and fair-trade bananas}. Subscripts for individuals are omitted for simplicity. Similarly, the empirical representation of equation (1) for the models *with factors* is defined as:

$$W_m = \alpha_m + \rho_m B_m + \sum_{n=1}^{5} \gamma_{mn} * location_n + \sum_{n=6}^{14} \gamma_{mn} * Demographics_n + \sum_{n=15}^{21} \gamma_{mn} * Factor_n + \varepsilon_{mn}. \tag{4}$$

[3] Alternative forms were examined for income and the utilized linear variables appear to represent the relationship between the dependent variable and this explanatory factor reasonably well, with no evident improvement in significance or explanatory power from more complicated utilization of the information.

Estimation results are obtained by maximizing the log-likelihood function represented in (2) using LIMDEP Statistical and Mathematical Programming software.

## Contingent Valuation Results

The parameter estimation results for the models are reported in Table 5 and their marginal effects are reported in Table 6. We first discuss the results of the models *without factors.* As expected, the coefficients associated with the bids are negative and significant for all products. When a higher bid is presented to the consumer, one expects the likelihood that the consumer will agree to pay it to decrease. Age has a statistically significant and negative effect only for the fair-trade product. Consistent with many previous studies, race and ethnicity variables, whether the respondent holds a bachelors degree, and the presence of children in the household do not make a significant contribution to explaining preferences for any of the three products. Having an advanced degree has a positive effect on willingness to pay for the three products, although not statistically significant for milk from pasture-fed cows. Income and being female have positive effects for all three products, although they are statistically insignificant for fair-trade bananas.

The estimation results from the models *with factors* are somewhat different. The most consistently influential factor score in the models is the

**Table 5. Parameter Estimates**

| | Minimal-pesticide Strawberries | Minimal-pesticide Strawberries | Milk from Pasture-fed Cows | Milk from Pasture-fed Cows | Fair-trade Bananas | Fair-trade Bananas |
|---|---|---|---|---|---|---|
| | *Without Factors* | *With Factors* | *Without Factors* | *With Factors* | *Without Factors* | *With Factors* |
| **Intercept** | 6.211*** | 6.893*** | 8.719*** | 10.128*** | 4.630*** | 5.896*** |
| **Bid** | -2.275*** | -2.388*** | -2.729*** | -2.986*** | -3.626*** | -4.134*** |
| **Farmers Market** | 0.318*** | 0.139 | 0.278** | 0.067 | 0.476*** | 0.293** |
| **Food-coop** | 0.507** | -0.134 | 1.468*** | 0.656*** | 1.450*** | 0.470* |
| **Natural Food** | 0.255 | 0.099 | 0.351* | 0.114 | 0.707*** | 0.600*** |
| **Minnesota** | 0.302** | 0.224 | 0.307** | 0.220 | 0.322** | 0.172 |
| **Pacific Northwest** | -0.470*** | -0.418*** | -0.489*** | -0.453*** | 0.029 | 0.096 |
| **Age** | -0.002 | -0.004 | 0.001 | -0.005 | -0.014*** | -0.020*** |
| **Black** | -0.394 | -0.319 | 0.225 | 0.292 | 0.014 | -0.003 |
| **Asian** | 0.361 | 0.298 | 0.451 | 0.409 | 0.008 | -0.074 |
| **Hispanic** | 0.167 | 0.107 | 0.272 | 0.183 | 0.215 | -0.168 |
| **Bachelors Degree** | 0.193 | 0.192 | 0.032 | -0.020 | 0.074 | -0.008 |
| **Advanced Degree** | 0.407*** | 0.308** | 0.213 | 0.043 | 0.437*** | 0.178 |
| **Children** | -0.114 | -0.060 | 0.025 | 0.125 | -0.088 | 0.002 |
| **Female** | 0.378*** | 0.194* | 0.413*** | 0.173 | 0.170 | -0.146 |
| **Income** | 0.058*** | 0.065*** | 0.030** | 0.050*** | 0.019 | 0.040** |
| **Environmentalism** | -- | 0.333*** | -- | 0.443*** | -- | 0.538*** |
| **Wildlife Preserv.** | -- | 0.136* | -- | 0.020 | -- | 0.107 |
| **Health Concerns** | -- | 0.136* | -- | 0.096 | -- | -0.068 |
| **Food Aficionado** | -- | 0.089 | -- | 0.023 | -- | -0.065 |
| **Farm Labor** | -- | -0.026 | -- | 0.043 | -- | 0.478*** |
| **Farm Preservation** | -- | 0.045 | -- | 0.268*** | -- | 0.147** |
| **Animal Welfare** | -- | 0.046 | -- | 0.144* | -- | 0.087 |
| **% Cor. Predictions**† | 50.87% | 53.02% | 45.38% | 50.6 6% | 48.51% | 51.08% |

*** indicates significance at the .01 level, ** indicates significance at the .05 level, * indicates significance at the .10 level

† For percentage of correct predictions, one should compare to pure chance, which results in 25% correct predictions, since there are four categories.

**Table 6. Marginal Effects**

| | Minimal-pesticide Strawberries | Minimal-pesticide Strawberries | Milk from Pasture-fed Cows | Milk from Pasture-fed Cows | Fair-trade Bananas | Fair-trade Bananas |
|---|---|---|---|---|---|---|
| | *Without Factors* | *With Factors* | *Without Factors* | *With Factors* | *Without Factors* | *With Factors* |
| **Farmers Market** | 0.140*** | 0.058 | 0.102** | 0.022 | 0.131*** | 0.071** |
| **Food Co-op** | 0.223** | -0.056 | 0.538*** | 0.220*** | 0.400*** | 0.114* |
| **Natural Food** | 0.112 | 0.041 | 0.129* | 0.038 | 0.195*** | 0.145*** |
| **Minnesota** | 0.133** | 0.094 | 0.113** | 0.074 | 0.089** | 0.042 |
| **Pacific Northwest** | -0.206*** | -0.175*** | -0.179*** | -0.152*** | 0.008 | 0.023 |
| **Age** | -0.001 | -0.002 | 0.000 | -0.002 | -0.004*** | -0.005*** |
| **Black** | -0.173 | -0.134 | 0.083 | 0.098 | 0.004 | -0.001 |
| **Asian** | 0.159 | 0.125 | 0.165 | 0.137 | 0.002 | -0.018 |
| **Hispanic** | 0.073 | 0.045 | 0.100 | 0.061 | 0.059 | -0.041 |
| **Bachelors Degree** | 0.085 | 0.080 | 0.012 | -0.007 | 0.021 | -0.002 |
| **Advanced Degree** | 0.179*** | 0.129** | 0.078 | 0.014 | 0.121*** | 0.043 |
| **Children** | -0.050 | -0.025 | 0.009 | 0.042 | -0.024 | 0.000 |
| **Female** | 0.166*** | 0.081* | 0.151*** | 0.058 | 0.047 | -0.035 |
| **Income** | 0.025*** | 0.027*** | 0.011** | 0.017*** | 0.005 | 0.010** |
| **Environmentalism** | -- | 0.140*** | -- | 0.148*** | -- | 0.130*** |
| **Wildlife Preserv.** | -- | 0.057* | -- | 0.007 | -- | 0.026 |
| **Health Concerns** | -- | 0.057* | -- | 0.032 | -- | -0.017 |
| **Food Aficionado** | -- | 0.037 | -- | 0.008 | -- | -0.016 |
| **Farm Labor** | -- | -0.011 | -- | 0.014 | -- | 0.116*** |
| **Farm Preservation** | -- | 0.019 | -- | 0.090*** | -- | 0.036** |
| **Animal Welfare** | -- | 0.019 | -- | 0.048* | -- | 0.021 |

*** indicates significance at the .01 level, ** indicates significance at the .05 level, * indicates significance at the .10 level

one representing *Environmentalism*. The remaining factors are generally significant for the specific product related to the factor in question. The results for each product are discussed below.

For the minimal-pesticide strawberries, the location variables, with the exception of the *Pacific Northwest*, are statistically insignificant. The variables representing advanced degree and being female are positive and significant, as they are in the model without factors. At the same time, the factors *Environmentalism, Wildlife Preservation*, and *Health Concerns* are statistically significant. This suggests that these factors better capture the attitudes and characteristics that the location variables were explaining in the model without factors.

For milk from pasture-fed cows, two location variables (*Food Co-op* and *Pacific Northwest*) remain the same sign and statistically significant. *Income* is also positive and significant. Beyond that, the factors *Farm Preservation* and *Animal Welfare* are positive and significant. These are the factors that one would expect to be significant for pasture-fed cows. One might interpret that consumers believe that farms with pasture-fed cattle are more likely to be on family farms, which is an aspect of the farm preservation factor. It is interesting and convincing that the other less related factors, except *Environmentalism*, are not significant.

For fair-trade bananas, the location variables with the exception of *Minnesota* and *Pacific Northwest* are statistically significant. For this product, the location variable *Pacific Northwest* was also not significant in the model without factors. *Age* has a negative and statistically significant effect, as it does in the corresponding model without factors. The presence of *children* is not statistically signifi-

cant. The *Farm Labor* and *Farm Preservation* factors are positive and significant for the fair-trade bananas.

Examining the marginal effects (Table 6), it is also noticeable that Minnesotans had a higher average willingness to pay than those in Rhode Island and those in the Pacific Northwest. However, these differences decline and become less significant in the model that includes the factor-score explanatory variables. The negative effect for *Pacific Northwest* for willingness to pay for minimal-pesticide strawberries and pasture-fed milk is interesting. The Pacific Northwest is a significant local producer of strawberries, and the lower willingness to pay for minimal-pesticides may relate to local consumers' trust in local production. Similarly a large dairy industry with pasture-fed cows as the norm in the region may reduce willingness to pay for pasture feeding. The general decline in the importance of survey venue in the models with factors suggests that consumers who have these beliefs choose their shopping locations to meet some of these goals, and that these beliefs are thus a better explanation than venue. It should also be noted that the impact of gender declines in the factor model.

Measures of goodness of fit for the models are compared using the fully correctly classified cases (FCCC) method as suggested by Kanninen and Khawaja (1995). This method calculates the percentages of respondents that the models correctly classified into the appropriate group (yes/yes, yes/no, no/yes, and no/no). A higher value of percentage of correct prediction indicates better model fit. The results of this test are presented in Table 5. Note that pure chance results in 25 percent correct predictions, since there are four categories. Our percentages of correct predictions range from approximately 45 percent to 53 percent, which compares favorably to other studies. For example, Kanninen and Khawaja (1995), in studying willingness to pay for water supply reliability, correctly predicted willingness to pay categories 35 percent of the time. We find that the factors increase the percentage of correct predictions for all three products, with the effect being most pronounced for milk from pasture-fed cows.

*Mean Willingness to Pay*

Mean willingness to pay can be estimated by restricting the $\lambda$'s in the likelihood function (3) equal to zero, leaving only the constant term and the bid term in the model. Then the parameters of the restricted model are estimated via maximum likelihood, and the mean willingness to pay is calculated as $-\widetilde{\alpha}/\widetilde{\rho}$ (Hanemann, Loomis, and Kanninen 1991). This formula allows for the mean willingness to pay to be negative. Our mean willingness to pay estimates and confidence intervals are presented in Table 7. The point estimates of mean willingness to pay are presented for the entire sample and for the four survey venues: conventional supermarkets, natural food supermarkets, farmers markets, and a food cooperative. The fair-trade bananas have the highest percentage premium at 70 percent for the full sample. The highest premium in terms of dollars is the minimal-pesticide strawberries with a premium of 82 cents per pound.

**Table 7. Mean Willingness to Pay Estimates**

| | WTP Point Est. | Conventional Price | Estimated Mean Premium | Estimated Premium Confidence Interval | Point Estimate of Mean WTP by Survey Venue | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Conventional | Farmers Market | Natural Foods | Food Co-op |
| **Minimal-pesticide Strawberries** | \$3.11 | \$2.29 | \$0.82 | \$0.77, \$0.86 | \$2.98 | \$3.16 | \$3.24 | \$3.15 |
| **Milk from Pasture-fed Cows** | \$3.49 | \$2.79 | \$0.70 | \$0.67, \$0.74 | \$3.41 | \$3.51 | \$3.63 | \$3.86 |
| **Fair-Trade Bananas** | \$1.34 | \$0.79 | \$0.55 | \$0.52, \$0.58 | \$1.17 | \$1.38 | \$1.43 | \$1.70 |

For the current analysis, which utilizes a stratified rather than random sample, it is informative to examine the mean willingness to pay results for the conventional supermarket survey sub-sample in order to make comparisons to other studies that use a random sample. The mean willingness to pay values are greater than most previous findings, though this diminishes when comparing the conventional supermarket sub-sample. It may also be the case that consumers are becoming increasingly aware and concerned about food production issues due to exposure in the media and thus older studies may show a lower willingness to pay. However, Eom (1994) found a willingness to pay of over 80 percent for pesticide residue screened produce when the pesticide reduction was associated with a reduction of cancer risk. Govindasamy, Italia, and Adelaja (2001) found that 37.8 percent of consumers were willing to pay at least a 10 percent premium for fresh fruits and vegetables produced under integrated pest management. Loureiro and Lotade (2005) estimated that, on average, consumers in their sample were willing to pay a 22 cent premium for fair-trade coffee over the $6.50 per pound for conventional coffee, which is a 3.4 percent premium. The difference between this rather small premium and the conventional shopper premium for fair-trade bananas in the current survey may derive from at least two sources. One is that consumers were more familiar with fair-trade products by 2006 as compared to 2002. However, perhaps a more likely explanation is that the low base price for bananas makes individuals willing to pay a higher percentage of the price as a premium. Giraud, Bond, and Bond (2005) found that 59.4 percent of Maine respondents were willing to pay a $1 (20 percent) premium on a $5 product compared to only 18.2 percent willing to pay a $4 (20 percent) premium on a $20 product for local alternatives.

## Conclusions

Consumer expectations for firms' ethical conduct, food quality, and anxieties over food risk are all increasing. At the same time, consumers want to make a difference with their purchases. This has resulted in an abundance of food standards, certifications, and labels with claims concerning socially responsible production characteristics, geographic origin, organic status, and other attributes, as firms try to position their products in the market for high-value foods. Understanding consumer preferences behavior for characteristics such as reduced pesticides, fair-trade, and ethical treatment of animals is difficult because different ethical characteristics will appeal to different individuals, depending on their personal attitudes and values.

In this study, we examine three food products with different socially responsible production attributes: minimal-pesticide strawberries, fair-trade bananas, and milk from pasture-fed cows. Survey data were collected for the purpose of this study in grocery stores and farmers markets in Minnesota, Oregon, Rhode Island, and Washington. A double-bounded logit model was estimated to assess consumers' preferences and willingness to pay for these products. In addition, factors were developed to better understand the underlying motivations for consumers to purchase these products. The environmental factor is the most important in explaining willingness to pay across these three products.

To the extent that these findings apply more generally, producers who are considering entering socially responsible niche markets would be wise to carefully examine the production costs of these different food products. This study underscores the importance and complexity of the attitudes and values and location.

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