Willingness to pay for locally produced foods: A customer intercept study of direct market and grocery store shoppers

Kim Darby, Marvin T. Batte, Stan Ernst and Brian Roe
Department of Agricultural, Environmental and Development Economics,
The Ohio State University

Corresponding Author:
Marvin T. Batte
Agricultural, Environmental, and Development Economics
The Ohio State University
2120 Fyffe Rd.
Columbus, OH 43210-1067
PH: 614-292-6406
Email: batte.1@osu.edu

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006

Locally-grown produce has an appeal that draws many to roadside stands each summer. Likewise, we are seeing more grocery stores that feature foods that are identified as locally grown or processed, suggesting that stores have assessed the market for these differentiated products to be sufficient to warrant increased shelf space. Freshness and taste are obvious reasons for consumer preference for these goods, but also important may be *home-bias*, which often is attributed to ethnocentrism, or less pejoratively, "hometown pride" (Scarpa 2005). Home-bias can refer to local consumption as a means to support local business. Alternatively, home-bias may be interpreted as an attempt to preserve a certain way of life, a countryside without large mono-crop cultivation and urban sprawl. Moreover, some consumers may associate local food systems with the concept of "sustainability," referring to a local food system which uses less energy in its supply chain, which supports a regional economy, and which is less dependent on trade. Whatever the motive, there is substantial evidence that some consumers are willing to pay premium prices for food characterized as locally produced.

Marketing differentiated food products locally provides an opportunity for farms to capture a greater share of consumers' food budgets, and for rural communities to generate greater incomes. Successful product differentiation and profitable product placement require more specialized knowledge of those food characteristics valued by consumers. As such, clarifying and quantifying the appeal of locally-grown produce provides valuable information to those interested in marketing. Where other studies have clarified the concept of local into levels of distance, this study additionally attempts to decompose the type of quality communicated by the "locally-grown" signal. Moreover, where other studies have used qualitative methods to assess preferences, the quantitative methods used in this study provide information useful for pricing decisions for both direct markets and retail grocery.

The objective of this study is to explore the potential for differentiation in fresh produce through estimation of willingness to pay (WTP) for selected characteristics. Specifically, this study relies on a customer-intercept survey and a choice experiment of food shoppers in a variety of direct markets and traditional grocery stores. Conjoint analysis is used to evaluate WTP for characteristics related to locally grown fresh strawberries.

Literature Review

In the past 15 years consumer demand for niche products (including organic, natural, and locally grown) has grown substantially (Dimitri and Greene). Consumers value locally produced foods or foods produced with a particular technology because they perceive the products to be healthier, to be more environmentally friendly, or to be more supportive of small scale agriculture and local rural communities. This preference may translate to a willingness to pay a premium price for that product.

Govindasamy and Italia (1999) showed that younger consumers, regardless of gender, paid higher premiums for organic produce, as did females with higher annual incomes. They also found that the probability of paying a premium goes down as the number of individuals in the household rises. Thompson and Kidwell (1998) found that families with children were more likely to buy organic produce than those without children, whereas Loureiro and Hine (2002) and Wang and Sun (2003) show the opposite. Moreover, Williams and Hammitt (2000, 2001) found few distinctions between organic and conventional fresh produce consumers. Batte et al., in a study of multi-ingredient organic foods, found that shoppers who were aware of the National Organic Program organic seal for food products were more likely to be willing to pay a premium price. Conditioned on a willingness to pay a premium, they found older consumers and those with higher income per household member were willing to pay higher premia. Females, consumers with children, and consumers who were intercepted in a whole foods health store were also willing to pay prices that were significantly larger than their counterparts.

Consumer acceptance and willingness to pay for genetically modified food has been studied with stated choice methods using contingent valuation (Ganiere 2004), experimental auctions (Huffman 2003) and observed choice (James 2005). Onyango (2004) used conjoint methods to show that WTP estimates for GM bananas were positive for "additional oxidants", followed in magnitude by "less pesticide-use" and "ripens longer." The study showed negative WTP for the actual use of GM technology, indicating that consumers would need to be compensated to purchase a GM product.

In addition to consumer willingness to pay for food attributes perceived to relate to food safety and nutrition, consumers have been shown to be willing to pay for ideological functions of food production systems. Williams and Hammitt (2000, 2001) and Underhill and Figueroa (1996) show that WTP to pay for organic foods is related to a perception of its being more environmentally friendly and supportive of small-scale agriculture and local rural communities. Choice experiments have been used to show positive WTP for eco-labels on seafood (indicating sustainable fishery management) certified by an independent third party (Wessells et al.1999, Johnston et al. 2001, and Teisl et al. 2002). Aquino and Falk (2001) and Hurley and Kliebenstein (1998) show that, respectively, 87.5% and 67% of respondents (self-selected environmentalists) agreed with the statement that they would pay a price premium for "wolf-friendly" beef or beef raised with production methods that improve water quality and animal welfare. Contingent valuation of eco-labels for fresh apples also showed a price premium of between \$0.10 and \$0.50 (Loureiro and McCluskey 2002).

Whether for safety, quality, or an origin-based ideology, country of origin (CoOL) and region of origin (ROO) labeling have been shown to garner price premiums. In an experimental auction, Umberger (2003) showed that the majority of consumers (69%) had positive WTP estimates for CoOL certified beef. However, in a related study, Louriero and Umberger (2004) use conjoint analysis to estimate WTP for CoOL vs. other safety labels on beef. They show that CoOL labeling does not have positive WTP estimates, while food safety certification and traceability certification do. They also show that age and gender are significant determinants of WTP for food safety, while income is a significant determinant of WTP for traceability. Mabiso (2005) used an auction experiment to show that the CoOL label garnered premiums for fresh produce. In the case of apples, 79% paid a premium, $0.48 on average, and in the case of tomatoes, the figures were 72% and $0.49, respectively.

On the regional level, both generic ROO labels and protected designation of origin (PDO) or protected geographical identification (PGI) labels garner premiums. Scarpa, et. al. (2005) used conjoint analysis to estimate WTP for the PDO label on olive oil as well as a CoOL label on oranges and table grapes. In the case of table grapes, they found WTP for these attributes to have about the same impact on preferences as more common characteristics such as color and ripeness. The CoOL label on oranges had nearly four times the impact than that of firmness and absence of imperfections. Loureiro and McCluskey (2000) cite cultural identification as well as perceived quality to account for premiums found using a hedonic model on PGI Galecian veal. Van der Lans et. al. (2001) isolates two reasons for WTP for ROO on olive oil: the direct effect (i.e. cultural identification) and its indirect effect through perceived quality. Using conjoint techniques, the study shows that, while PDO labels only have the indirect effect, ROO labels have the additional direct effect, especially for consumers from the same region.

Buchardi et al (2005) used contingent valuation to estimate WTP for milk from the consumer's own region. They found that "consumers perceive fresh milk from local farmers as a trustful, high quality product, and that consumers are interested in supporting local producers." (pg. 2). However, in two separate experiments, one that is incentive compatible and the other purely hypothetical, WTP estimates are significantly different, indicating a hypothetical bias.

Campbell et al. (2004) used conjoint analysis to estimate part worth values for Satsuma Mandarins, including physical attributes (skin color, size, blemishes, and seeds), an own-region cue (in-state vs. US) and an organic cue. Their results suggested the location attribute was the least important product attribute, and the physical attribute "seedless" had the greatest impact on likelihood of purchase, even greater than price.

Brown (2003) found that in response to the question, "Would you pay a price that was lower, the same, or higher for products labeled 'locally grown' versus unlabeled products of the same quality?," 58% of food consumers were unwilling to pay a premium for food products labeled as "locally grown" provided that the unlabeled products were of the same quality, whereas 16%, 5% and 1% said they would pay more than a five, ten or 25 percent premia, respectively. Socioeconomic characteristics that significantly influenced WTP were gender (females were more likely to pay a higher price). Survey respondents with annual household income of $50,000 or more or with a graduate or professional degree were more likely to pay a higher price for local food.

Data and Methods

During the period August 2005 - January 2006, researchers interviewed shoppers at 17 locations. These included six farm markets, four farmers' markets, and seven retail grocery stores.[1] Two of the grocery stores were located in small towns. Two were in urban locations within Columbus Ohio, and three were in suburban locations surrounding Columbus. Interviewers randomly selected consumers, asked for their participation, and verified that each participant was at least 18 years of age. After completing a series of eight choice experiments, the customers completed a survey that included attitudinal questions and elicited economic and demographic information for the respondent. Table 1 depicts the makeup of the sample by market type and location.

Table 1. Number of Respondents and Choice Experiment Observations by Intercept Location

Market Type[a]	Respondents	Choice Experiment Observations
Direct Markets		
Farmer's Markets		
Metro	32	256
Rural	96	768
Farm Markets		
Metro	105	840
Rural	34	272
Direct Market Sub-Total	267	2136
Grocery Stores		
Rural	80	640
City Center	78	624
Suburban	105	840
Grocery Store Sub-Total	263	2104
Total	530	4240

a Rural refers to areas that are outside a commuting distance of a major urban center. Metropolitan area refers to locations that are just beyond the suburban rim of an urban center, but still within commuting distance. City center refers to locations in the inner city of the Columbus metropolitan area, and suburban refers to location in bedroom communities surrounding Columbus.

Choice Analysis and Willingness to Pay Measures

Willingness-to-pay measurements are grounded in utility theory. Hanemann (1991) outlines the theoretical underpinnings as a utility maximization problem subject to a budget

[1] Farmers' markets refer to open-air markets with multiple stalls representing a variety of farm and/or marketing operations. Farm markets refer to either indoor or outdoor venues where a single farm operation is selling goods.

constraint. The consumer chooses the level of the good *X* that maximizes utility, producing the traditional Marshallian demand curve $X(p, y, q)$, where p is market price, y is income and q, is the quality of the good, fixed exogenously. The resulting indirect utility function is $V(p, y, q)$. Identifying a change in a good's quality from q_0 to q_1, the measurement of value is

$$V(p, y\text{-WTP}, q_1) = V(p, y, q_0). \quad (1)$$

where WTP is the amount the consumer would be willing to pay for the improved quality, maintaining constant utility.

The estimate is shown more directly using the dual problem: expenditure minimization constrained by a given utility level (Lusk 2004). The dual produces the Hicksian demand curve $X(p, U, q)$ and indirect expenditure function $M(p, U, q)$ so that

$$\text{WTP} = M(p, U, q_0) - M(p, U, q_1). \quad (2)$$

where U is a constant utility level.

The random utility model (RUM) is used to analyze choices and estimate WTP. When respondents are asked to make a choice of whether or not to pay a given dollar amount, a positive response is interpreted as their WTP. In order to find the central tendency of WTP from a sample, the positive responses are fitted to a probability function. This is modeled as the probability that the utility derived from the good associated with that choice is greater than the alternative,

$$P[(V_1 + \varepsilon_1) > (V_0 + \varepsilon_0)] \quad (3)$$

or $$P[(\varepsilon_1 - \varepsilon_0) < (V_1 - V_0)] \quad (4)$$

where V is the indirect utility and ε is the error term.

Estimates of WTP are based on the mid-point of this function, i.e. the point at which the probability of a positive response is .5. The most basic version of this model includes only the socioeconomic attributes of respondents as variables.

$$P[\{\varepsilon_1(s) - \varepsilon_2(s)\} < (V_1(s) - V_2(s)\}] \quad (5)$$

This is the model used in contingent valuation choice analysis. Conjoint analysis offers a more sophisticated alternative that allows the quality of a good to be decomposed and their contribution to total WTP estimated.

Lancaster (1966) builds the conceptual framework for conjoint analysis by clarifying that utility is gained from the characteristics of a good rather than the good itself. Characteristics are objective qualities of a good while attributes, on the other hand, are what the characteristics represent, and are the real source of an individual's utility. For example, characteristics of fresh strawberries may include color, size, absence of blemishes and type of packaging. These characteristics represent attributes, such as taste, convenience, and nutrition. Lancaster maintained that utility should be a function of characteristics rather than attributes as the former are measurable, so that,

$$u = U(t_1, t_2, t_3) \quad (6)$$

$$t = \mathbf{B}X \quad (7)$$

where t represents the characteristics of a good X, based on the consumption technology matrix **B** (i.e. the amounts of each characteristic which are predetermined in each good).

Louviere, Hensher and Swait (2000) further refine these distinctions, making utility a function of consumption services. Each characteristic of a good is associated with a consumption service which it provides. Moreover, they suggest that utility maximization is based on *expected services* of a good because consumers do not have complete information. In practice, the model forces a one-to-one correlation between services and characteristics. However, these theoretical distinctions are helpful in conceptualizing characteristics as signals that communicate value. Analysts can then examine which signals most effectively communicate the service that ultimately provides utility.

Conjoint analysis proceeds with a good that is decomposed according to the Lancastrian model and measures its part-worth values. It uses a more sophisticated RUM to estimate the probability that utility of the i^{th} individual derived from the j^{th} alternative is greater than other alternatives in the set,

$$\text{Prob}_{ij} = P[(V_{ij} + \varepsilon_{ij}) > (V_{ia} + \varepsilon_{ia}; a = 1,2,\ldots J, a \neq j)] \quad (8)$$

or $$P[(\varepsilon_{ij} - \varepsilon_{ia}) < (V_{ij} - V_{ia})] \quad (9)$$

where V_{ij} denotes the individual's indirect utility from choosing product j and ε_{ij} is an error term.

Results

Descriptive statistics for the sample are reported in Table 2. Mean age of consumers interviewed was 49.5 years. Seventy-two percent were female. The average household size was 2.6 people, and just over 33 percent of households had children aged 19 or younger. Our respondents were more highly educated than average Ohioans – 78 percent had some education post high school. Mean annual household income was $81,891, and was about $12,000 more for consumers intercepted in grocery stores than for those contacted at direct markets.

Table 2 Consumer sample demographic and economic variables

Variable	Mean or Percent Full Sample	Direct	Grocery	
Number of respondents	530	267	263	
Mean Household Income ($)	81,891	75,768	87,963	***
Household weekly expenditure for food ($)	101	96	106	***
Household weekly expenditure for produce ($)	28	28	28	
Mean age of respondent (years)	49.5	49.2	49.8	
Gender (Percent female)	72.0	69.4	74.7	***
Number in household:	2.6	2.6	2.7	**
Percent households with children	33.4	34.2	32.5	
Percent with post-high school education	78.1	78.9	77.3	
Percent white	92.1	89.8	94.5	***
Percent metropolitan[a]	61.1	55.1	67.1	***
Percent U.S. citizens	95.3	94.9	95.7	

* One, two and three asterisks indicates a difference of the means for the direct and grocery shopper groups that was significant at the 0.10, 0.05 or 0.01 probability levels, respectively.
a Percent of respondents who indicated that they lived in a city or surburb of a city.

Respondents were asked to identify their reasons for purchasing locally grown foods from a list of options. The list included freshness, taste, nutrition, safety, to support the regional economy, to support local businesses, and to maintain a direct connection with the source of food. They were also asked to rank their top three choices from among this list. Table 3 reports the overall percentage of respondents who identified a reason as one of their top three choices. Freshness was the most frequently cited among both consumer groups, although more so for the grocery store customers. Supporting local businesses was the next most frequently cited reason for both groups, although this reason was cited about 20% less often than freshness. Taste also ranked high at 63% of all consumers, but was higher still (69.5%) for direct market customers.

Table 3 Primary reasons to purchase locally grown foods

	Percent Citing as Most Important[a]		
	Full	Direct	Grocery
Freshness	91.3	89.0	93.8
Support local businesses	71.0	70.4	71.6
Taste	62.7	69.5	55.5
For direct connection with source of food	20.7	22.8	18.6
Nutrition	21.5	21.7	21.4
Support regional economy	20.8	16.6	25.2
Safety	11.9	10.0	14.0

a Percent of respondents citing this reason as one of the three most important motives for purchasing local foods.

Respondents were also asked about their reasons for selecting one food product relative to others when shopping at a grocery store. The list of selection reasons and mean evaluation scores for each are presented in Table 4. The top ranked reason was taste/quality (3.54), which was not based on labels but on past experience. Price was also an important factor (2.9), followed by ease of preparation (2.62). Following this were several health-related food characteristics, including low in transfat, fat, cholesterol, and sodium. Product brand ranked in the lower half of the list of reasons to purchase.

The rankings were similar across the sub-sample groups based on store type, but there differences between these groups. Customers intercepted at direct markets gave higher importance scores to food taste/quality and foods labeled as natural or organic. Grocery store shoppers gave higher mean importance scores to health related measures, ease of preparation, convenience of packaging, and product brand. Interestingly, there was no significant difference in the importance given to product price for the two groups.

Table 4. Characteristics rated as important in food purchase decisions.[a]

	Total	Store Type	
	Means	Direct	Grocery
Taste/quality (from past experience)	3.54	**3.57**	**3.52**
Price	2.90	2.91	2.88
Ease of preparation	2.62	**2.50**	**2.74**
Low trans-fats	2.52	**2.48**	**2.57**
Low-cholesterol	2.35	**2.27**	**2.44**
Low-fat	2.23	**2.12**	**2.34**
Low-sodium	2.22	**2.11**	**2.34**
Labeled as natural	2.18	**2.23**	**2.13**
Brand	2.18	**2.14**	**2.22**
Convenience of packaging	2.10	**2.04**	**2.18**
Low calorie	2.08	**1.96**	**2.20**
Labeled as organic	2.02	**2.14**	**1.90**
Labeled as *Heart-Smart*	1.96	**1.92**	**2.00**

a The question read "In general, when you purchase food of any type at the grocery store, how would you rate the importance of the following characteristics in your decision? ". Responses are coded: Not important=1, Somewhat Important=2, Important=3, very important=4.
Bold indicates significant at least at the .05 level

Conjoint Study

The design used in this study includes four variables: price, location of production, size/type of producing firm, and whether or not there is a product freshness guarantee. All other characteristics are assumed equal.

The location-of-production cues provide the most general information on the value of origin and degree of localness. The options for location are “grown on a nearby farm,” “grown in Ohio,” “grown in the U.S.,” and unidentified, which is displayed as a blank. The size of the producing firm cue is intended to capture the element of “local” that implies a social ideology around small-scale agriculture and supporting locally owned businesses. The name of producer is displayed as either “Fred’s Berry Farm” or “Berries Inc.,” implying small family farm versus a large corporate farm, although these cues will not be interpreted in the same way by each respondent. To capture the element of local that is exclusively related to its perceived freshness, we included a freshness guarantee cue. The label either indicates “harvested yesterday” or was left blank. Respondents are not given any information regarding the type of certification process involved with the guarantee. Lastly, the price variable included five levels, ranging from $2.00 to $4.00 in $.50 increments.

We implemented our study using a full factorial experimental design. There are 2*2*4*5=80 possible product profiles. We implemented this design by randomly sampling from these profiles for each product. Thus, each respondent viewed different product comparisons based entirely on chance. In the event that two identical products were randomly selected for comparison, a new drawing was made automatically. Also, we were willing to assume that all consumers preferred a product with a freshness guarantee to none, if all other attributes were identical, and prefer less costly products to more costly ones, again assuming all other product attributes are identical. When two products were randomly selected and one product dominated the other as described in the previous sentence, the computer automatically drew another product pair.

The conjoint experiment was administered in face-to-face interviews. Customers were approached randomly and told that the interviewer was a student in the College of Agriculture at The Ohio State University working on a research project. They were also told that the survey, which regarded their preferences for fresh produce, would take approximately 7-8 minutes to complete. After ascertaining the respondents were over the age of 18, they sat at a table in the produce section and looked at the screen of a laptop computer. They were then given the following scenario:

We will begin by asking you to compare several hypothetical fresh strawberry products. Imagine that you are out for a drive in the country and decide to stop at a roadside produce market. There you see two fresh strawberry displays. The strawberries are being sold in one-quart containers. In the following slides you will see the product information presented in these displays. Other than the information that is provided, assume that the berries are identical in terms of size, color, ripeness, etc. Of course, any purchase that you make will reduce the funds that you and your family have available for other purchases.

The final comment is intended as a budget-constraint reminder to reduce hypothetical bias (Loomis 1997). Next, the interviewer generated the first paired comparison and gave a brief overview of the options to help the respondent process the information. The following is an example:

Figure 1 Display used for conjoint experiment

	Product 1:	**Product 2:**
Where Produced:	**Grown in the U.S.**	**Grown nearby**
Producer:	**Berries, Inc.**	**Fred's Berry Farm**
Freshness guarantee?	**Harvested Yesterday**	
Price:	**$ 2.00**	**$ 3.00**

The respondent was given the choice to indicate a preference for either product or to indicate no preference. This process was repeated eight times for each respondent.

In our study, the levels of locality were not conducive to a metric scale, so we chose to use of the part worth utility model. In addition, the other two attributes (farm size and freshness) were originally conceptualized as dummy variables. Only with the price variable, which lends itself readily to a metric scale, do we assume a continuous negative relationship, so that

$$V_{ij} = x_j\beta + p_j\pi + \varepsilon_{ij} \tag{10}$$

where V_{ij} denotes the individual's indirect utility from choosing product j; x_j is a vector of product attribute level j's; p_j is price for product j; β is a conformable vector of coefficients and π is a conformable coefficient to be estimated; and ε_{ij} is an error term.

This simple additive linear function produces the main effects of our model. These effects indicate how utility is affected by the level of the attribute when it is isolated from all other attributes. Higher order effects indicate whether utility is also affected when two attributes are presented in tandem (Louviere, et al 2000). We incorporate combinations of attributes by interacting product attribute levels, so that,

$$V_{ij} = x_j\beta + p_j\pi + c_{ij}\chi + \varepsilon_{ij} \tag{11}$$

Where c_{ij} is a vector of combination effects from product attribute level i's interacted with product attribute level j's; and χ is a conformable vector of coefficients to be estimated.

The final dimension to our model is that of preference variation among the population. In order to account for different preferences among various sub-populations we incorporate socioeconomic characteristics through interaction terms with the attribute level variables, so that,

$$V_{ij} = s_{ij}\alpha + x_j\beta + p_j\pi + c_{ij}\chi + \varepsilon_{ij}\,, \tag{12}$$

where s_{ij} is a vector of socioeconomic variables i's interacted with product attribute level j's; and α is a conformable vector of coefficients to be estimated.

Now that we have the utility function defined, we can model the choice as the relative differences in utility. The difference between product A and product B for individual i is,

$$dV_{AB}^{i} = \Delta s\alpha + \Delta x\beta + \Delta p\pi + \Delta c\chi + \varepsilon_{AB} \qquad (13)$$

where dV^i_{AB} = the utility difference between product A product B; $\Delta s = s^i * (x^j_A - x^j_B)$; $\Delta x = (x^j_A - x^j_B)$; $\Delta p = (p^j_A - p^i_B)$; $\Delta c = (x^j_A - x^i_A)*(x^j_B - x^i_B)$; and $\varepsilon^i_{AB} = (e^i_A - e^i_B)$ a normally distributed error term.

The location attribute included four levels. We represented this as four binary variables: Δ Unidentified = location (loc) 1 – loc 2, where loc is 1 if blank and 0 otherwise; Δ Local = loc 1- loc 2, where loc is 1 if "grown on a nearby farm," 0 otherwise; Δ Ohio = loc 1 – loc 2, where loc is 1 if "grown in Ohio," or 0 otherwise; and Δ National = loc 1- loc 2, where loc is 1 if "grown in U.S.," 0 otherwise. Three of these binary variables were to be included in the model, with the fourth excluded to prevent collinearity. However, statistical tests for the two groups indicated that for both groups there was no significant difference in their evaluation of "grown on a nearby farm" and "grown in Ohio". Hence, these two locations were collapsed into a single binary variable to indicate local production.

In addition to production location as a product attribute, the experiment included the size/type of farm and a guarantee of freshness. Both of these attributes included only two levels. Based on these attributes, two more binary variables are constructed: Δ Farm Size = size 1 – size 2, where size is 1 if "Fred's Berry Farm," 0 if "Berries Inc; Δ Fresh = fresh 1 – fresh 2, where fresh is 1 if "Harvested Yesterday," 0 if blank. Thus we have four *x* variables associated with the vector in the first term: Local, Unidentified, Farm Size and Fresh. The price variable will be included as ΔPrice = price 1 – price 2, where the difference in price will range from $0.00 to $2.00

Higher-order effects

Next we consider if there are any combinations of attributes that may produce significant marginal effects. In the case of an unidentified product location, it is possible that another attribute may negate the cue, as the signals may be substitutes. That is, if the strawberries have a freshness guarantee, even though the location is unidentified, the consumer may be just as likely to choose that product as if it had a local cue. The combination of a guarantee and unidentified label, therefore, may have predictive value in the consumer choice beyond what each could predict independently. The same might be true for the farm size, assuming that if it is produced on a smaller scale, the consumer may assume that it will have a shorter supply chain. Likewise, these cues may compensate for a national label as well. Preliminary models included several interaction effects (Table 5).

Table 5 Higher order interaction effects for grocery sub-sample

	Δ National	Δ Freshness	Δ Unidentified	Δ Farm Size
Δ National	--			
Δ Freshness	--	--		
Δ Unidentified	--	*	--	
Δ Farm Size	*	n/s	n/s	--

– indicates not tested, “n/s” if found not significant, and * if found significant at the 0.1 probability level

Interestingly, this same model showed no significant combination effects for the direct market sub-sample. However, based on the significance of the coefficients for the grocery model, we will include a combination of freshness with unidentified as well as farm size with national: Δ Unidentified* Δ Freshness and Δ National* Δ Farm Size

Socioeconomic variables

Finally, we consider which socioeconomic variables will play a role in preference variability. The socioeconomic variables must be interacted with each of the product variables individually. Even if we only chose four of the most common demographic variables, we would have 16 interaction terms (4 attribute variables * 4 socioeconomic variables). Thus, careful selection of the appropriate interaction terms is required so that the model does not become too large and lose too many degrees of freedom.

Table 6 shows the results from preliminary regressions for the direct market sub-sample. Four interaction terms were found significant in this process, indicated by asterisks, two for significance at 10% and three for significance at the 5% probability levels.

Table 6. Parameter estimates for demographic variables for direct market sub-sample

	Interaction Variable				
	Price	Local	Unidentified	Size	Fresh
Age	--	n/s	--	n/s	**
Income	n/s	--	--	--	--
Education	--	--	--	--	--
Gender	--	**	--	--	n/s
Metropolitan resident	--	n/s	--	*	--
Local-support index	--	n/s	--	*	--
Health index	--	n/s	--	--	--
Safety index	--	n/s	--	--	--

– indicates not tested, “n/s” if found not significant, and * (**) if found significant at the 0.1 (0.05) probability levels

The same process was completed for the grocery sub-sample, and interestingly, none of the interaction terms were significant. For the sake of consistency, the same model will be used for each of the sub-samples. Thus the socioeconomic variables included are, Gender* Δ Local: where male =1, female = 0; Metro* Δ Farm Size: where city and suburban residents =1, rural =0; Local Support* Δ Farm Size: where “main reason for buying local” is to support local business or the regional economy =1, 0 otherwise; Age* Δ Freshness: where age is a continuous variable.

The model in equation 13 is estimated as:

$$\mathbf{Y = \beta_1 - \beta_2 \Delta\ Price - \beta_3 \Delta\ Unidentified + \beta_4 \Delta\ Local + \beta_5 \Delta\ Fresh + \beta_6 \Delta\ Farm\ Size}$$
$$\mathbf{+/- \beta_7 \Delta\ Unidentified^* \Delta\ Freshness +/- \beta_8 \Delta\ National^* \Delta\ Farm\ Size - \beta_9\ Gender^* \Delta\ Local}$$
$$\mathbf{+/- \beta_{10}\ Metro^* \Delta\ Farm\ Size + \beta_{11}\ Local\ Support^* \Delta\ Farm\ Size +/- \beta_{12}\ Age^* \Delta\ Freshness} \qquad (14)$$

where the signs on parameters indicates the hypothesized relationship. The parameters are estimated with the maximum likelihood procedure for a binary probit model with the Limdep statistical package in NLOGIT version 3.0.

Before the model can be estimated, it is necessary to test the regularity of preferences within the population, as well as within a group of experiments completed by one respondent. Price sensitivity and attribute preferences will inevitably vary for each consumer; this variance will be captured by the random error term. Because the model relies on a distribution of random components which are independent and identically distributed, it is essential to extract any systematic variance within the sample. A log-likelihood ratio test was used to test for differences based on where the respondent was surveyed – direct market versus grocery store. Our results suggested a systematic difference in response between these two groups, and thus we will estimate separate models for these two groups. Similar tests were conducted for groups based on household income, education and other socio-economic measures, but the log-likelihood test statistic was not statistically different than zero at a 0.05 probability level.

In the same way that we tested for systematic variance in sub-populations, we also tested for learning that occurs within the experiment. Because each respondent made eight consecutive choices, it is possible that the observations are not independent of one another. If there is systematic variance between the early and late experimental results, we can infer that learning occurred during the experiments. We tested for this using a log-likelihood test for each of the three sub-groups, a pool of the first three choices for each respondent, a pool of the last three and a pool of the two in between. Again, the chi-square statistic was not sufficiently large to reject the null hypothesis that learning occurred.

Table 7 shows the results of the final models. Note that each of the product attribute parameter estimates were significant with the hypothesized signs except the "unidentified" variable in the direct market model which was not significant. Comparison of the parameter estimates across the models allows us to draw conclusions about the relative importance of these cues for the two groups. For both groups, consumers value a freshness guarantee more than the local cue. The grocery model shows a marginal effect of 0.31 for *freshness* compared to 0.23 for *local*. In the direct market model, the marginal effect of *freshness* is 0.36 compared to 0.30 for *local*. Likewise, both of these cues were valued more highly than the farm size cue and the unidentified production location. For the grocery model, unidentified production location (-0.116) had a larger effect than *farm size* (0.086), whereas the direct market model had a marginal effect of 0.207 for farm size while *unidentified* was not significantly different than zero.

Table 7. Parameter estimates and marginal effects for the conjoint model.

	Grocery		Direct Market	
Product Specific Attribute	Coefficient*	Marginal effects	Coefficient*	Marginal effects
Intercept	0.053	0.021	**0.067**	**0.027**
Δ Price	**-0.901**	**-0.359**	**-0.646**	**-0.257**
Δ Local	**0.579**	**0.231**	**0.755**	**0.301**
Δ Unidentified	**-0.292**	**-0.116**	0.053	0.021
Δ Farm Size	**0.217**	**0.086**	**0.520**	**0.207**
Δ Freshness	**0.785**	**0.313**	**0.893**	**0.356**
Gender* Δ Local	-0.072	-0.029	**0.288**	**0.115**
Metro* Δ Farm Size	0.006	0.002	-0.138	-0.055
Local Support* Δ Farm Size	0.056	0.022	-0.182	-0.073
Age* Δ Freshness	-0.003	-0.001	**-0.006**	**-0.002**
Δ Unidentified* Δ Freshness	**-0.126**	**-0.050**	0.045	0.018
Δ National* Δ Farm Size	**0.187**	**0.074**	**0.139**	**0.055**

* Estimates in bold refer to significance level of at least 0.10

We can also draw tentative conclusions about the underlying consumption services associated with the cues. Assuming that the "harvested yesterday" guarantee is an effective way of communicating freshness, we can factor out the freshness appeal from the local cue. The marginal effects of *local* are significant holding freshness constant. That is, comparing two products that are both harvested yesterday, consumers will still choose the local product more often. Thus, we can view the effects as exclusive to the social component of the cue. If this logic holds, both the grocery and the direct market models show substantial marginal effects for the social component. In terms of the direct market model, the results suggest that freshness and social ideology are both primary motivations to visit direct markets. Grocery store shoppers are relatively more biased toward freshness as an attribute, but the social component is still strong.

The farm size cue "Fred's Berry Farm" versus "Berries, Inc." also shows a significant coefficient, despite its potential for a wide range of interpretation. Our intended interpretation was a "small-scale" versus "large-scale" production method. Other potential interpretations include "corporate" versus "family-owned" operations, "national" production versus "local", or others. However, in general, we assumed that the cue, regardless of the exact interpretation, would signal some form of social ideology revolving around supporting smaller, family-owned business that runs parallel to the ideological component of the local cue. In the grocery model, the marginal effect of the farm size cue is only 0.086, little more than a third as influential as *local*. In the direct model, the farm size cue has an effect of 0.207, which more closely approximates that of *local*. The large disparity in marginal effects for the local and farm size cues for *grocery* could indicate two phenomenons. One explanation assumes that consumers interpret the cues as communicating entirely different services. The result would suggest that the service communicated by *farm size* is not as highly valued as that communicated by *local*. An alternate explanation uses the same logic that assumes that freshness is factored out of the local cue. If the two cues share some services in common but also have some exclusive to themselves, we assume that those that overlap are factored out. Inferences about which services are shared as opposed to distinct overextend the bounds of this analysis because more information is needed to determine what exactly each cue communicates and how substitutable they are. We conclude that *farm size* is not as strong a cue as *local*, whether it does not communicate as well, it communicates a less valued service, or covers a narrower range of services.

The price variable in the grocery model shows a negative coefficient that is larger in magnitude than any other product attributes. This indicates that grocery store customers are more sensitive to changes in price than any other factor. The price impact is 38% greater than the local impact and 14% more than freshness. In contrast, direct market consumers' price sensitivity has the third highest impact, less than both local and freshness. High price sensitivity is an indication that the consumer is highly aware of the budget constraint and the nature of utility gains as trade-offs. There are two plausible explanations for the discrepancy between these two groups. A less favorable explanation in terms of the validity of our model is that people in the direct market group are less aware of their budget constraints, so their responses may have a higher degree of hypothetical bias. However, there is not a solid rationale for why direct market consumers would be less aware of the trade-offs. More plausible is that direct market customers are more willing to trade-off for the utility gains offered by the product attributes. Assume that shopping at a direct market has additional opportunity costs, because it is in essence an extra trip, since not all groceries can be purchased there. Those consumers who are willing to spend the extra time are already demonstrating that they are willing to pay some premium for the products and, thus, are willing trade off other utility gains for locally grown. Price sensitivity plays and important factor in overall willingness to pay as will be reflected in our later calculations.

The expected sign for the "unidentified" production location variable shows up in the grocery model, although it is not significant in the direct market. Assuming that the standard strawberry that consumer's purchase is identified as having been grown in the U.S., grocery store consumers are almost 30% less likely to choose that product than one that does not identify where it was produced. However, direct market consumers are no less likely to choose an unidentified product than a national product. This result indicates that the uncertainty associated with an unidentified product is not a major factor in their decision. Perhaps this stems from the fact that direct market consumers are more trusting of products without information, since typically, local produce is not packaged in this way. Alternately, this result could indicate that "national" poses as much uncertainty in production methods as unidentified. Whatever the reason, direct market consumers are more accepting of unidentified products than those at grocery stores.

Significant variation in preferences was found in the direct market model among groups based on gender and age. In contrast, none of these variables were significant in the grocery model. When interacted with the local variable in the direct market model, the coefficient on the gender variable indicates that males have stronger preferences for local than females. When age is interacted with freshness, the coefficient indicates that older consumers value freshness less. The original coefficient of .006 was evaluated at the mean age of 49 to produce the marginal effect displayed in the table. All other demographic variables were insignificant, indicating a high degree of preference regularity among consumers.

In contrast with the demographic variables, more combination effects were found significant in the grocery model than in the direct market. For the interaction term between unidentified and freshness, the marginal effect is negative. That is, there is less probability of choosing a product whose label says nothing about location but has a freshness guarantee, *ceteris paribus*. Also, the national cue combined with farm size shows a significant and positive coefficient in both models. So, a label that says Grown in the U.S. on Fred's Berry farm is more frequently chosen.

By factoring out a consumer's marginal utility of money, the coefficients in Table 7 can be translated into willingness to pay in currency units. Each variable has a part-worth associated with it, such that the attribute can be priced. Table 8 shows the estimates. When translated into WTP measures, the disparity in consumer preferences among the models is even greater. This is a result of the substantial difference in price sensitivity. The marginal utility of money is literally the negative of the price coefficient. Notice that grocery consumers' marginal utility of money is over 25 percent higher than of direct consumers.

Recall that the national variable is the referent for the production location variable. These WTP measures then, are calculated as part-worth values above a product that is grown in the U.S. The average grocery store customer will be willing to pay an average of 64 cents extra for a carton of strawberries if they are labeled "Grown in Ohio." The estimate rises to $1.17 for the average direct-market shopper.

Table 8 Comparison of grocery and direct WTP estimates

	Grocery	Direct
Marginal utility of money	$0.90	$0.65
Local	$0.64	$1.17
Unidentified	-$0.32	$0.00*
Family farm	$0.24	$0.80
Freshness guarantee	$0.87	$1.38

* This coefficient was not statistically different from zero

For the production location variables then, our results show that consumers are willing to pay a substantial premium for local strawberries. But the even larger premium is found for the freshness guarantee cue. If the strawberries show a label that say harvested yesterday, consumers will pay an average premium of between $0.87 and $1.38 for grocery store and direct market customers, respectively. These premiums are considerable considering that the prompt indicated that the typical market price for a carton of strawberries is only $3.00.

Farm size did not garner as substantial a premium as freshness or local. If the label on the strawberries said Fred's Berry Farm rather than Berries, Inc., consumers were willing to pay an average premium of 24 cents for grocery store customers and 80 cents for direct market.

Conclusions

Our results suggest that consumers are willing to pay more for locally produced foods. In the case of fresh strawberries, customers intercepted in grocery stores would pay an average of 64 cents more per quart, while those intercepted at direct markets would pay nearly $1.17 more per carton of strawberries that was grown locally rather than berries identified simply as "produced in the U.S." Our results also showed no significant difference in WTP for berries "Grown nearby" relative to berries "Grown in Ohio." This would suggest that to the median consumer in both shopping venues, grown in Ohio is equivalent to local production.

These conclusions provide a solid rationale for the existence of niche market potential for Ohio berry producers. Clear identification of Ohio-grown produce can distinguish a carton of strawberries from another whose appearance is exactly the same. If local production is valued in and of itself, consumers will realize higher utility if these products are available in the market place at a comparable price. Likewise, producers and marketers who can document their produce to be local can capture a portion of the consumer surplus as firm profit.

Another objective was to determine the extent to which the magnitudes of premiums vary based on socioeconomic factors. Such knowledge would allow merchants to identify various segments within the market and to advertise to or price for those segments strategically. For instance, targeted discounting of prices based on the socio-economic characteristics allows various local premia to exist simultaneously.

This study also proposed to determine the relative effectiveness of cues that communicate the underlying consumption service of *local*. Freshness communicated through a guarantee garners a higher premium, suggesting that it is more effective than local. The implication is that labels that communicate the time of harvest are more relevant to a consumer's decision than the distance traveled from production location. Both types of information favor local producers, since time is a function of distance in most cases. A local producer should decide which signal to use, depending on the degree to which the distance factors into the time-frame from harvest to retail. Direct markets have a definite advantage in this area. However, with advanced coordination, retail outlets could garner premiums from the time-based freshness cue.

One further objective of this study was to decompose the appeal of locally-grown into its freshness and home-bias consumption service. The conjoint analysis suggests that consumers are primarily paying for the freshness of locally-grown produce. However, it does not explain all of the appeal of locally-grown since nearly equivalent premiums still exist for local cues after the freshness guarantee is controlled for. What we've variously called home-bias, social functions and ideological components are legitimate utility-producing consumption services that come close to rivaling that of freshness. The premiums associated with the family farm/farm size cues suggest the viability of family farms or small-scale agriculture is another social function. While we cannot specify the social function, in general we can assert that people are willing to use consumption as a means to realize their social ideology. Thus, communicating a local region-of-origin or small-scale production method is an important marketing strategy.

References

Aquino, Helen L.; Falk, Constance L. (2001), A Case Study in the Marketing of "Wolf Friendly" Beef, *Review of Agricultural Economics*: **23**, 524-37

Batte, Marvin T., Neal H. Hooker, Timothy C. Haab, and Jeremy Beaverson. " Putting Their Money Where Their Mouths Are: Consumer Willingness to Pay for Multi-Ingredient, Processed Organic Food Products." *Food Policy*. Forthcoming, 2006

Brown, Cheryl (2003), Consumers' preferences for locally produced food: A study in southeast Missouri, *American Journal of Alternative Agriculture*: **18**, 213-224.

Buchardi, Henrike, Carsten Schröder, and Holger D. Thiele (2005) Willingness-To-Pay for Food of the Own Region: Empirical Estimates from Hypothetical and Incentive Compatible Settings, *Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting*, Providence, Rhode Island, July 24-27.

Campbell, Robert, G. Nelson, Benjamin L., Ebel, Robert C., Dozier, William A., Adrian, John L and Hockema, Brandon R. (2004), Fruit Quality Characteristics that affect Consumer Preferences for Satsuma Mandarins, *HortScience:* **39(7),** 1664-1669.

Dimitri, Carolyn and Catherine Greene. 2002. “Recent Growth Patterns in the U.S. Organic Foods Industry.” U.S. Department of Agriculture, Economic Research Service. Agriculture Information Bulletin Number 777. 2002.

Ganiere, Pierre, (2004) Impact of consumer behavior on the willingness to pay for genetically modified foods, M.S. Thesis, The Ohio State University.

Govindasamy, R., J. Italia. 1999. “Predicting Willingness-to-Pay a Premium for Organically Grown Fresh Produce.” *Journal of Food Distribution Research* July (1999): pp. 44-53.

Hanemann, Michael, and John Loomis (1991), Statistical Efficiency of Double-bounded dichotomous choice contingent valuation, *American Journal of Agricultural Economics*:**73,** 1255-63

Huffman, Wallace E. (2003), "Consumers' Acceptance of (and Resistance to) Genetically Modified Foods in High-Income Countries: Effects of Labels and Information in an Uncertain Environment." *American Journal of Agricultural Economics*, **85:** 1112.

Hurley, S.P., and J.B. Kliebenstein (1998) "Market potential for environmental improvements in livestock production – who will pay?" *Presented at the International Conference on Animal Production Systems and the Environment*, Des Moines, Iowa, July 21.

James, Jennifer S. James, Fleischer, Shelby, Johnson, David H., Schwab, Bradley D. and Lord, John (2005), Consumer Purchases of Biotech Sweet Corn: Results from a Market Experiment, *Selected paper prepared for presentation at the American Agricultural Economics Association Annual Meeting,* Providence, Rhode Island, July 24-27, 2005.

Johnston, R.J., C.R. Wessells, H. Donath and F. Asche. 2001. "A Contingent Choice Analysis of Ecolabeled Seafood: Comparing Consumer Preferences in the United States and Norway," *Journal of Agricultural and Resource Economics*, 26(1):20-39.

Lancaster, K. (1966), A New Approach to Consumer Theory, *Journal of Political Economy*, **74:**132-157.

Loomis, John, Brown, Thomas, Lucero, Beatrice, Peterson, George (1997), Evaluating the Validity of the Dichotomous Choice Question Format in Contingent Valuation, *Environmental and Resource Economics:* **10(2):** 109-123.

Loureiro, Maria L. and Susan Hine. 2002 A Comparison of Consumer Willingness to Pay for A Local (Colorado-Grown), Organic, and GMO-free Product. *Journal of Agricultural & Applied Economics,* vol. 34 iss. 3: pp. 477-487.

Loureiro, Maria Luz; McCluskey, Jill J. (2000), Assessing Consumer Response to Protected Geographical Identification Labeling, *Agribusiness:* **16**, 309-20.

Loureiro, Maria L., Jill J. McCluskey and Ron C. Mittelhammer, (2002) Will consumers pay a premium for eco-labeled apples? *Journal of Consumer Affairs*: **36**, 203-17.

Loureiro M.L. and W.J. Umberger (2004), A Choice Experiment Model For Beef Attributes: What Consumer Preferences Tell Us." *Selected Paper Presented at the American Agricultural Economics Association Annual Meetings*, Denver, Colorado, August 1-4.

Louviere, J.J., D.A. Hensher, and J.D. Swait (2000), Stated Choice Methods: Analysis and Application. Cambridge: Cambridge University Press.

Lusk, Jayson L.; Hudson, Darren (2004), Willingness-to-Pay Estimates and Their Relevance to Agribusiness Decision Making, *Review of Agricultural Economics*: **26,** 152-69.

Mabiso, Arthur, James Sterns, Lisa House and Allen Wysocki (2005), Consumers' Willingness-To-Pay for Country-Of-Origin Labels in Fresh Apples and Tomatoes: A Double-Hurdle Probit Analysis of American Data Using Factor Scores, *Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting*, Providence, Rhode Island, July 24-27.

Onyango, Benjamin (2004), An Application of Choice modeling To Measure U.S. Consumer Preferences for Genetically Modified Foods. *Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting*, Denver, Colorado, August 1-4. (Scarpa 2005).

Teisl, M.F., B. Roe and R.L. Hicks. 2002. "Can Eco-labels Tune a Market? Evidence from Dolphin-Safe Labeling," *Journal of Environmental Economics and Management* 43(3): 339-359

Thompson, G.D. and J. Kidwell. 1998. "Explaining the Choice of Organic Produce: Cosmetic Defects, Prices, and Consumer Preferences." *American Journal of Agriculture Economics* vol. 80, iss. 2 (May 1998): pp. 277-87.

Umberger, Wendy J.; et al. (2002), U.S. Consumer Preference and Willingness-to-Pay for Domestic Corn-Fed Beef versus International Grass-Fed Beef Measured through an Experimental Auction, *Agribusiness:* **18,** 491-504.Underhill, Sheila E., and Enrique E. Figueroa. 1996. Consumer Preferences for Non-Conventionally Grown Produce. *Journal of Food Distribution Research* vol. 27: pp. 56-66.

van der Lans, Ivo A. (2001), The Role of the Region of Origin and EU Certificates of Origin in Comsumer Evaluation of Food Products. *European Review of Agricultural Economics*, **28:** 451.

Wang, Q. and Sun, J. 2003. "Consumer preference and demand for organic food: Evidence from a Vermont survey." Paper prepared for American Agricultural Economics Association Annual Meeting July (2003): pp. 1-12Wessells et al.1999

Williams, Pamela R. D., and James K. Hammit. 2000. A Comparison of Organic and Conventional Fresh Produce Buyers in the Boston Area. *Risk Analysis* vol. 20 iss. 5: pp. 735-746

Williams, Pamela R. D., and James K. Hammit. 2001. Perceived Risks of Conventional and Organic Produce: Pesticides, Pathogens, and Natural Toxins. *Risk Analysis* vol. 21, iss. 2: pp. 319-330