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Customer Willingness to Pay for Multi-Ingredient, Processed Organic Food Products

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Abstract

This is a report of a customer intercept survey of customers in seven central Ohio grocery stores. Six were conventional stores of a national grocery chain (Traditional Grocery); of these, two were suburban, two were city central, and two were in predominately rural locations. The seventh store was a health/whole foods store (Specialty Grocery). The survey addressed customer willingness to pay for alternative levels of organic content in breakfast cereals, customer purchase patterns for organic foods, and customer opinions about the benefits of organic and other food characteristics. Forty-two percent of *traditional* grocery shoppers reported purchases of organic foods, the majority purchasing at least twice monthly. Shoppers in the *specialty* grocery were much more likely to purchase organic foods (92 percent). Consumers indicated a willingness to pay higher prices for processed foods with organic content. This willingness to pay varied with income and demographic characteristics of the households. *Specialty* grocery shoppers were more likely to purchase organic foods than their *traditional* grocery counterparts, and had a greater willingness to pay for these products.

Customer Willingness to Pay for Multi-Ingredient, Processed Organic Food Products

Currently the organic industry is booming with an annual increase in consumption of 20 percent per year (Dimitri and Greene); the U.S. market now accounts for \$12 billion in retail sales in 2003 (Kortbech-Olesen). The rapid industry growth has led to questions about the regulation of organic marketing. In 1999 more than 30 states had organic laws and more than 40 certification entities provided for third party certification using a variety of standards (Fetter). Consumers were confronted with a diverse array of organic standards at the state, retailer, or product level. In an effort to resolve this confusion, the National Organic Program (NOP), implemented October 21, 2002, formalized rules for organic certification and labeling.

There are four levels of the claim covered by the NOP: “100% organic”, “Organic” (at least 95% organic), “Made with Organic Ingredients” (at least 70%) and “Some Organic Ingredients” (less than 70%, the organic items can be listed individually in the ingredients on the side panel). The first two categories can use the NOP seal on the front of the food package. Clearly these categories are most relevant to processed foods, as opposed to the most commonly purchased organic category – produce.

Literature Review

In the past 15 years consumer demand for niche products (including organic, natural, and locally grown) has grown substantially (Dimitri and Greene). Organic foods are now available in 42 percent of mainstream grocery stores (Organic Trade Association, 2000A), 57 percent of restaurants with per-person dinners priced \$25 or more and 29 percent of restaurants with dinner costs in the \$15 to \$25 dollar range (Organic Trade Association, 2000B). While some studies

suggest that the motivation to purchase organic and natural products derives from environmental concerns, most conclude that the primary motive is health reasons (Huang).

There have been a number of studies of demand for organic characteristics and other attributes in produce. Loureiro and Hine suggest that commodities with "locally grown", GMO-free, and organic labels all can command premium prices. Using a contingent valuation survey, they found that Colorado consumers were willing to pay the largest premiums for "Colorado grown" potatoes, followed by organically grown and GMO-free. Suryanata also found that identification of local product (in this case Hawaii's foodstuffs) allowed capture of a premium price for pineapples and macadamia nuts. Wang and Sun found that Vermont consumers were willing to pay more for organic apples and milk produced locally and certified by NOFA (Northeast Organic Farming Association). They also concluded that consumers most likely to purchase these products were young, in households with few members, and with higher household income.

Govindasamy and Italia surveyed consumers at five grocery retail stores in New Jersey in March 1997 to obtain estimates of willingness to pay for organically-grown fresh produce. Their analysis showed that females with higher annual incomes, younger individuals, and those who usually or always purchase organic produce were more likely to pay a premium. They also conclude that the likelihood of paying a premium goes down as the number of individuals in the household rises. Thompson and Kidwell, in a 1998 study of conventional and organic produce purchases, concluded that families with children were more likely to buy organic produce than those without children. This result was opposite to that found by Loureiro and Hine and Wang and Sun who concluded that consumers with children were less likely to buy organic products.

Research Data and Methods

Although there have been a number of studies of demand for organic commodities, little has been done to understand the demand for multi-ingredient processed organic foods. These products may contain less than 100% organic ingredients. Hence, labeling and consumer interpretation and confidence in these labels are important. Our research also is timely in that it was conducted one year following the implementation of the NOP. Our research provides insight into consumer demand for multi-ingredient processed organic foods, and tests the impact of consumer awareness of the NOP on willingness to pay for these products.

A customer intercept survey was conducted during October and November, 2003. Six stores of a national grocery chain (*traditional grocery*) were selected for the survey. Two stores were located in the inner city of Columbus, Ohio, two stores were in suburban areas of Columbus, and two in small towns in predominantly rural areas of central Ohio. Customers were identified at random as they entered the store. Customer interviews were conducted between the hours of 1:00 and 6:00 pm, Monday through Thursday. The interview included a contingent choice experiment featuring four hypothetical breakfast cereal products. Following the experiment, participants completed a short survey in the store that elicited information about organic purchase behavior, knowledge of organic food labels, attitudes toward health and nutrition issues, and household demographic information. One hundred ninety nine interviews were completed.

While the experimental design for the traditional grocery is designed to look at choices made by the general population, it is also of interest to identify the characteristics of shoppers that lead them to self-select into the organic market. To provide a comparison to the *traditional* grocery, in March 2004, a questionnaire was handed out to shoppers at a national whole

food/health/nutrition store (*specialty grocery*) located in a suburban area of Columbus, Ohio. Shoppers were asked to complete the questionnaire and return it in a postage-paid return envelope. The questionnaire included identical questions to those asked of the *traditional* grocery shoppers. Three hundred questionnaires were distributed and 102 were returned.

Table 1 includes descriptive statistics for the sampled consumers identified by *traditional* and *specialty* grocery. There were substantial differences in the characteristics of consumers in the two store formats. *Specialty* grocery shoppers were somewhat younger, less likely to have children in the household, had more formal education, and higher mean household incomes. It should be noted that the selection of *traditional* grocery stores was done in such a way to increase the variability of consumer characteristics. For instance, the inner city, rural, and suburban *traditional* groceries differed substantially by distribution of race, income, education level, and other demographic measures.

Table 2 summarizes the percentage of consumers who indicated that they previously have purchased organic food products. Just over 42 percent of *traditional* grocery shoppers had purchased organic foods, versus 92 percent of *specialty* grocery shoppers. Table 2 also provides organic purchase percentages for consumers grouped by age, race, education level and household income. For *specialty* grocery shoppers, organic purchase percentages were high for all subgroups. However, significant differences were observed among groups of *traditional* shoppers. Specifically, white consumers indicated lower percentages that had purchased organic products than nonwhites, and the percentage was lower for households with lower income levels.

Table 3 summarizes consumer motives for purchase of organic foods by *traditional* and *specialty* grocery shoppers. *Traditional* consumers cited nutrition as the most important motive, whereas specialty grocery organic consumers cited the pesticide free character of organic foods

as the most important reason for purchase. Both groups indicated that difference in food taste was the least important reason for organic purchases.

The primary reasons that consumers did not purchase organic foods are listed in Table 4. For both traditional and specialty grocery shoppers, price was listed as the most important reason, followed by too little variety of choice in the organic food category. Traditional shoppers also gave a relatively large importance score to *concern about food safety of organic products*.

Consumers were presented with a list of food characteristics and were asked to evaluate the importance of each when making purchase decisions for processed foods such as breakfast cereal. A four-level scale was used for each, ranging from not important (zero) to very important (3). Both groups indicated that the most important characteristic was food taste and quality based on previous consumption experience. Price was the second most important characteristic for both groups. Ease of preparation also was ranked near the top for both groups. However, products labeled as organic was the third most important characteristic for the *specialty* grocery shoppers, but was the lowest ranked characteristic for *traditional* shoppers. Both groups gave relatively low importance scores to product brand, and both list the five health-related measures in the middle of the food characteristics.

Willingness to pay for organic food content:

A primary focus of this study is to estimate consumers' willingness to pay for multi-ingredient processed foods, and investigate the willingness to trade-off multi-ingredient foods containing varying levels of organic ingredients. Although a number of studies have estimated willingness to pay for organic produce (Govindasamy and Italia, etc.), few studies have estimated willingness to pay for multi-ingredient processed organic foods. Furthermore, no

known studies have considered willingness to pay for multi-ingredient food products differentiated by the four levels of organic content that are allowed under the NOP guidelines.

The willingness to pay experiments were based on a hypothetical multi-ingredient processed food product; a breakfast cereal. Two approaches were used to elicit and measure willingness to pay. One method utilized a payment card approach to elicit willingness to pay not only for various levels of organic content, but also for other characteristics. In the second approach the consumer was presented with four products with different levels of organic content and asked to make a choice given a specific set of prices. The estimation of willingness to pay from each of these methods will be described in the following section.

Payment card approach

A payment card method was used to estimate consumers' willingness to pay for several food characteristics including level of organic content. Consumers were presented with the purchase of a hypothetical breakfast cereal product. Specifically, they were asked: *Assuming breakfast cereal is priced at \$3.00 per box at your local grocery store, how much more would you be willing to pay for each of the following characteristics?* The price premium indicated is interpreted as the willingness to pay for that characteristic. Eight characteristics were identified, and seven payment levels were offered, including an option to pay zero additional for the characteristic. The largest premium category was an open-ended range - more than \$1.00 premium per box. Because the customer was asked to identify a range of prices that he/she would be willing to pay, the minimum value of that range should be viewed as the minimum willingness to pay. A complete listing of the food characteristics, price ranges, and the distribution of consumer responses to this question are listed in Table 6.

Both *traditional* and *specialty* grocery shoppers indicated the highest willingness to pay for the same three characteristics -- although in a different order. *Traditional* grocery shoppers placed the highest willingness to pay on pesticide free ingredients, followed by 100% organic and locally grown characteristics. *Specialty* grocery shoppers placed the highest value on 100% organic ingredients, followed by pesticide free and locally grown characteristics. It is also instructive to note that *specialty* grocery shoppers were willing to pay substantially larger premiums for many food characteristics than were *traditional* shoppers. With one exception (less than 70% organic ingredients), the *specialty* grocery shoppers' mean willingness to pay measures were higher than those of *traditional* shoppers. *Specialty* shoppers indicated a mean WTP that was 100 percent larger for GMO-free foods, and more than 50 percent larger for 100% and 95% organic foods, locally grown foods and pesticide free foods. The results also clearly indicate a declining willingness to pay for lesser amounts of organic content for both groups of shoppers.

In order to understand consumer and household attributes that impact consumer willingness to pay premium prices for these food characteristics, multiple regression methods were used to explain WTP differences. Consumers who indicated a zero WTP for an attribute were excluded from that model. Results for these eight models are reported in Table 7. Explanatory variables included age, income per person in the household, presence of children aged 15 and under in the household, education level, a health index, consumer race, gender, and acknowledgement of having seen the new USDA organic seal. A binary variable also was included to identify shoppers of the *specialty* grocery.

Consumer age was a significant explanatory variable in four of the eight models. Increased consumer age was associated with increased WTP for 100% organic content, greater than 70%

organic content, pesticide free and enhanced flavor foods. Income per household member was significant and positively associated with WTP for two food characteristics: 100% and 95% organic content. The presence of children 15 and under in the household (a binary variable taking the value of 1 when children were present) was significant and positive for one food characteristic; 95% organic content.

A health index was constructed to quantify the consumer's level of concern with health-related issues. Specifically, customers were asked to indicate, using a four-level scale, the importance of a number of food characteristics when making purchase decisions. Health related characteristics were low calorie, low fat, low cholesterol, low sodium and foods labeled as Heart-Smart (e.g., see Table 5). The index is a continuous variable ranging from zero to 100, where higher values indicate greater importance of health issues when making food purchase decisions. This variable was significant in two models: 95% organic and pesticide free. Surprisingly, the health index displayed a negative sign in the pesticide free WTP model.

Shopper race was significant in three models. Non-white consumers were willing to pay more than white consumers for pesticide free, GMO free, and locally grown foods. Consumer gender was significant in all eight models, and indicates that female shoppers were willing to pay more for each food characteristic than were male consumers. *Specialty* grocery shoppers were willing to pay more for 100% and 95% organic food ingredients, pesticide and GMO free foods, and for locally grown foods. Customer awareness of the NOP organic seal was not statistically significant in any model.

Choice from among alternatives: the Random Utility Model:

The random utility model (RUM) is a leading approach to analyzing choice from among alternatives (Haab and McConnell). This approach will be used to value consumers' choice from

among four hypothetical multi-ingredient cereal products. Specifically, consumer choice is analyzed using a hybrid multinomial/conditional logit model. A random utility model is specified such that the consumer's utility from each alternative cereal is assumed to be a linear-in-parameters function of product attributes (price) and individual-specific demographic and attitudinal variables. A type-I generalized extreme value random variate enters the individual utility function as an additive error term. The error term is independently and identically distributed across individuals. The consumer is assumed to choose the alternative that yields the maximum utility among the available alternatives, conditional on the product attributes.

Given these assumptions, the expected maximum utility for individual i with all choice alternatives available can be represented as:

$$E\{\max U_i\} = \ln\left(\sum_{j=1}^J e^{X_i B_j}\right)$$

Expected maximum utility for individual i can also be evaluated for the situation where one of the choice alternatives is not available:

$$E\{\max U_i^{-J}\} = \ln\left(\sum_{j=1}^{J-1} e^{X_i B_j}\right)$$

Willingness to pay for each alternative is calculated by assessing the expected maximum utility the consumer can achieve with and without the product of interest:

$$E(WTP_i) = [E\{\max U_i\} - E\{\max U_i^{-J}\}] / (-B_p)$$

The expected willingness to pay of individual i is found by taking the difference between the expected maximum utility of individual i when all product choices are available less the expected maximum utility of individual i when one product is removed from the choice set. This difference is then converted to a money-metric by dividing by the estimated marginal utility of

income (i.e. the estimated price coefficient in the linear utility function). This value represents consumer i's willingness to pay for the excluded product. .

Consumers were interviewed before a 30 x 24 inch poster that displayed four cereal product box fronts.¹ The four cereals were identified to contain 1) *100% Organic Ingredients*, 2) *At least 95% of Ingredients are Organic* 3) *Contains at least 70% Organic Ingredients*, and 4) *Conventional cereal* with no claim of organic ingredients. Consumers were asked to consider the following situation: *Assume that you plan to purchase a breakfast cereal. The following four cereals are all the same size and made by the same company. They are all the same type of cereal, are identical in nutrition, and are all the same mix of ingredients. They differ only in the degree of organic content.* A set of prices was then placed in front of the four cereal products and the consumer was asked to identify which product they would consume given these prices. Four price regimes were used, with approximately 25 percent of the consumers facing each price regime. Consumers were asked to indicate why they selected a particular product. They were then presented with an alternative price structure, and again asked to indicate their product preference.²

The hybrid multinomial/conditional logit model allows estimation of the probability of consumer selection of 100% organic, 95% organic and at least 70% organic cereals relative to a conventional cereal (Table 8). The estimated coefficient for the product-specific attribute price is significant and negative in sign. As expected, this coefficient suggests that as price for the various organic products rise relative to the conventional cereal, consumers are less likely to choose the organic product. A number of individual-specific attributes also were included as explanatory variables. An increase in the income per household member was associated with an

¹ Customers were interviewed in the traditional store using the described method. For the specialty grocery customers, the same options and information were presented in a printed survey form.

² The specialty store customers were not presented with this second product choice.

increase in the likelihood of a consumer choosing the 70% product relative to the conventional product, but this attribute was not significant for the 95% and 100% organic products. Non-white consumers were more likely to choose the 70% and 100% organic products relative to the conventional product. The presence of children age 15 and younger in the household was a significant determinant for two product choices. Families with children were less likely to select the 70% and 100% organic products relative to the conventional product. Thus, our result is in agreement with the earlier work on willingness to pay for organic produce by Loureiro and Hine and Wang and Sun. The negative sign might be due to heightened budget pressure beyond that captured with the income measure, or it might be indicative of the role that children play in the selection of food products.

Health and safety indices also were included in the model. The health index is the same described in the payment card models. The food safety index is constructed in a similar manner, and is based on consumer willingness to pay for GMO free and pesticide free foods. This index also ranges from zero to 100, with higher values indicating greater willingness to pay to avoid GMOs and pesticides. The health index was significant and positive in sign for the 70% organic cereal. The safety index was significant and positive for all three organic content levels. Hence, concern to avoid pesticides and GMOs was associated with an increased likelihood of selecting organic cereal products relative to conventional ones.

Specialty grocery shoppers were identified by means of a binary variable (one indicates specialty shoppers). The estimated coefficients were significant at the 0.01 probability level for all three organic content levels. The positively signed coefficients indicate that the specialty grocery shoppers were more likely to purchase a cereal with organic content than a conventional cereal relative to traditional grocery shoppers.

As described above, the willingness to pay premium prices for each product alternative relative to the conventional product is calculated by assessing the difference in expected maximum utility the consumer can achieve 1) with all product options and 2) without the product of interest. The mean, median, minimum, and maximum values of willingness to pay estimates for 70, 95 and 100% organic cereal products relative to conventional, non-organic cereal appear in Table 9.

Clearly, consumer choices indicate a willingness to pay premium prices for products with organic content. Estimated willingness to pay premia for the 70% organic product ranged from 1.3 to 76.1 cents per box. Mean and median willingness to pay for the 70% product were 27.9 and 23.9 cents per box, respectively. The range of willingness to pay premia was smaller for the 95% product, resulting in mean and median WTP estimates that were smaller than for the 70% and 100% products. Although this result seems counterintuitive, one must recall that consumers who displayed differing personal and household characteristics selected different products, for reasons that made sense to that individual. Hence, it should not be surprising that transitivity of choice based solely on organic content does not hold in the aggregate. The mean and median WTP estimates for the 100% organic product were not significantly different from those of the 70% organic product.

Product Choice Change Model

The interview format used in the traditional grocery survey incorporated two rounds of the willingness to pay experiment. Following the first experiment, the consumer was given a new set of prices and asked to make a second product choice decision. For customers who selected the 100% organic product in the first experiment, the prices given in the second experiment

featured increased price premia for the organic products relative to the conventional product.³ For those who selected a product with less than 100% organic content, the price regime faced in the second experiment featured a lower price premia for the organic products relative to the conventional product. A binary dependent variable (SWITCH) was created by comparing the results of these two experiments. SWITCH takes on the value of one if the customer selected a different product in the second experiment, and is zero if their product choice was unchanged. A binomial probit model was formulated to explain the probability of making a product choice change. Model results are presented in Table 10. The model correctly predicted 75 percent of the dependent variable values.

Own price change is the change in price between experiments for the product selected by the consumer in the first experiment. *Substitute price change* is the change in price between experiments for the next closest substitute product, assuming the products are normal goods. For consumers who purchased the 100% organic product in the first experiment, the substitute is the 95% product. For those who selected any of the other products in the first experiment, they faced lower prices in the second experiment, and thus the substitute would be the product with the next higher organic content level. ORG100, ORG95 and ORG70 were three binary variables that take on the value of one if the named product was selected in the first experiment. The remaining variables are as described previously.

Neither *own price change* nor *substitute price change* were statistically significant in the explanation of product switching behavior. Interaction variables also were included to test if these price changes were significant only for people who selected 95% or 70% organic content products in the first experiment. These interaction variables were not significant and are

³ In all price regimes, the conventional product price was \$3.00. All price regimes used a positive premium for increased organic content.

excluded from the final model reported. All consumers, both those who changed products and those who did not, faced relative price changes for the own and substitute products between experiments. The lack of significance of these two price variables suggests that it is not the magnitude of price changes that impacted this decision, but rather other covariates. That is, different groups of consumers exhibit differing levels of cross-price elasticity of demand for these substitute products.

Of the three binary variables indicating organic cereal preference in the first experiment, two were significant. ORG95 and ORG70 both were significant and positive in sign, indicating that those who selected these two products in the first experiment were more likely to change products when confronted with a change in relative prices. This suggests that consumers who selected either conventional products or those who demanded 100% organic content were less sensitive to product price changes. Two other covariates were statistically significant at the 0.10 probability level. White consumers were more likely to make a product choice change following the change in product prices, and those consumers who indicated an awareness of the NOP organic seal were less likely to change products in response to price changes.

Summary and Implications

This study represents the first research of consumer choice from among multi-ingredient processed food with varying organic content. It includes data for both *traditional* grocery shoppers, with consumers from city-center, suburban, and rural stores, and shoppers of a *specialty* whole foods/natural foods grocery. This is also the first research of its kind following the implementation of the National Organic Program in October 2002.

Of the sampled consumers, 59 percent had previously purchased organic foods – 42 percent for *traditional* shoppers and 92 percent for *specialty* grocery shoppers. Nutrition and a desire to

avoid pesticide residue were the primary motives for purchasing organic foods. High price and a perceived lack of variety of organic foods were the most important reasons that consumers did not purchase organic foods. However, the results of our contingent valuation experiment suggest that price changes do not significantly affect the probability of product choice.

Estimates of willingness to pay for organic foods suggest that consumers are willing to pay premium prices for organic foods, even those with less than 100 percent organic ingredients. The magnitudes of the WTP premia varied significantly among consumer groups. Generally, specialty grocery consumers were willing to pay substantially more than traditional grocery shoppers. Health and food safety concerns were significant explanatory variables product choice model. Families with children aged 15 and younger were significantly less likely to select organic food products.

A binomial probit model of those consumers who changed product selections when presented with alternative prices suggests that consumers vary significantly in their price elasticities of demand for the various products. Of particular importance is the conclusion that those who selected conventional or 100% organic products were not as likely to switch in response to price changes as were consumers who initially selected partial organic content. This suggests that, in order for retailers to expand the number of consumers who purchase organic products (e.g., to win over conventional product consumers), organic price premia may need to decrease dramatically. Another option is that retailers may undertake advertising campaigns that focus on organic food characteristics other than price. However, it is also interesting that neither the health or safety index, two motives often thought to be important to organic food consumers, was significant in the product change model.

Finally, we were interested in the impact of the NOP on consumer choice. One aspect of the NOP is the new organic seal that can appear on foods with 95 percent or greater organic content. Only 45 percent of consumers (38% of *traditional* and 60% of *specialty* shoppers) recalled having seen the NOP organic seal on food products in the past. Awareness of the NOP seal was not a significant explanatory variable of willingness to pay using either the payment card or contingent choice approaches. However, it was a significant (and negative) correlate in the product choice change model, indicating that those who were aware of the NOP seal were less likely to change their selection in response to product price changes. A second aspect of the NOP is the provision for labels recognizing organic foods with various levels of organic content. Our results suggest that this differentiation is valued by consumers –many consumers selected products with less than 100% organic content, apparently due to price differences among the various organic products.

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Table 1. Characteristics of sampled customer households.

Characteristic	Traditional Grocery	Specialty Grocery
Sample Size	199	102
Age (years)	43.0	39.8
Percent female	69.7	79.0
Percent primary food shopper	79.8	83.8
Percent vegetarian or vegan	4.1	26.0
Number in household	3.1	2.7
Percent of households with children:	59.5	32.7
1-5 years old	23.7	13.3
6-10 years old	20.0	13.3
11-15 years old	23.7	10.2
16-18 years old	22.6	6.1
Education	Percent	
Less than high school graduate	7.2	1.0
High school graduate (or equivalency)	27.3	6.0
Some college, no degree	27.3	17.0
Associate degree	8.3	5.0
Bachelor's degree	18.0	36.0
Graduate or Professional degree	11.9	35.0
Race/Ethnicity	Percent	
Black or African American	31.1	1.0
American Indian or Alaska native	1.5	1.0
Native Hawaiian or other Pacific Islander	0.5	0.0
Hispanic / Latino	0.0	2.0
White	66.8	96.0
Marital Status:	Percent	
Now married	59.8	52.0
Living together	6.7	14.0
Never married	18.6	26.0
Divorced/Separated	10.3	6.0
Widowed	4.6	2.0
Total Household Income:	Percent	
Less than \$10,000	10.1	5.2
\$10,000-\$14,999	5.9	0.0
\$15,000-\$24,999	8.0	11.3
\$25,000-\$34,999	11.2	6.2
\$35,000-\$49,999	16.5	14.4
\$50,000-\$74,999	14.9	21.7
\$75,000-\$99,999	12.2	20.6
\$100,000-\$124,999	9.6	5.2
\$125,000-\$149,999	3.7	6.2
\$150,000-\$174,999	3.2	6.2
\$175,000-\$199,999	2.1	0.0
\$200,000-\$224,999	0.5	1.0
\$225,000-\$249,999	0.0	0.0
\$250,000 and over	2.1	2.1
Mean Household Income	\$65,253	\$74,304
Median Household Income	\$42,500	\$62,500

Table 2. Percent of consumers who buy organic foods by shopper and household characteristics

	Traditional Grocery	Specialty Grocery
Full sample	42.2	92.2
Age:		
45 or younger	40.9	94.3
Older than 45	44.3	91.1
Race:		
Non-white	47.7	100.0
White	39.7	91.7
Education level		
High school or less	40.3	85.7
Post high school education	44.1	93.5
Household income		
\$64,000 or less	37.6	94.7
More than \$64,000	52.4	90.0

Table 3. Motivation for purchasing organic foods.

	Mean Importance Rank *	
	Traditional Grocery	Specialty Grocery
Nutrition	3.2	2.8
Environmentally Friendly	2.1	2.3
Pesticide Free	2.5	3.1
Taste	1.9	1.8

* Responses are weighted as 1=least important through 4=most important.

Table 4. Primary reasons shoppers do not purchase organic foods.

	Mean Importance Rank*	
Reason	Traditional Grocery	Specialty Grocery
Price is too high	5.6	6.0
Taste is inferior	3.2	3.2
Poor appearance	3.0	3.2
Low nutrition	2.3	2.6
Concern about food safety of organic products	3.2	1.6
Too little variety of choice in organic foods	4.0	4.4

* Responses are weighted as 1=least important through 6=most important

Table 5. Importance of selected processed food characteristics for purchase decisions.

	Mean Importance Score*	
	Traditional Grocery	Specialty Grocery
Price	2.16	1.88
Brand	1.39	0.90
Labeled as organic	1.14	1.88
Labeled as natural	1.27	1.35
Low calorie	1.45	1.14
Low-fat	1.59	1.24
Low cholesterol	1.63	1.42
Low sodium	1.54	1.32
Labeled as <i>Heart-Smart</i>	1.55	1.02
Taste/quality (from past experience)	2.24	2.57
Ease of preparation	1.75	1.62
Convenience of packaging	1.47	0.86

* Mean was calculated using values of 0 = not important, 1 = somewhat important, 2 = important, and 3 = very important.

Table 6. Willingness to pay for selected breakfast cereal characteristics.

Characteristic	Cents per box							Mean Premium*	Median Premium*
	None	1-9	10- 24	25- 49	50- 74	75- 99	> 100		
Traditional Grocery									
	Percent								
Pesticide Free	18.3	14.2	18.9	15.4	8.9	7.1	17.2	32.8	10.0
Enhanced Flavor	32.3	11.8	19.3	14.3	8.1	8.7	5.6	21.8	10.0
Genetically Modified Free	42.9	16.8	11.8	9.9	5.0	6.2	7.5	18.4	1.0
100% Organic Ingredients	28.4	16.0	11.8	13.0	10.7	9.5	10.7	27.7	10.0
At Least 95% Organic Ingredients	32.1	19.1	10.5	14.2	9.9	9.3	4.9	21.6	1.0
70-94.9% Organic Ingredients	39.6	17.0	10.7	14.5	8.2	6.9	3.1	17.3	1.0
Less than 70% Organic Ingredients	46.0	18.6	13.7	9.3	4.4	5.6	2.5	12.7	1.0
Locally Grown	23.8	17.7	18.3	11.6	11.0	9.2	8.5	25.8	10.0
Specialty Grocery									
	Percent								
Pesticide Free	5.1	10.2	12.2	14.3	19.4	15.3	23.5	49.5	50.0
Enhanced Flavor	40.6	11.5	10.4	15.6	6.3	4.2	11.5	22.8	1.0
Genetically Modified Free	28.3	12.0	8.7	12.0	7.6	8.7	22.8	37.1	25.0
100% Organic Ingredients	9.3	6.2	11.3	16.5	10.3	19.6	26.8	52.0	50.0
At Least 95% Organic Ingredients	17.7	9.4	11.5	22.9	14.6	17.7	6.3	33.8	25.0
70-94.9% Organic Ingredients	26.0	13.5	20.8	19.8	14.6	4.2	1.0	18.6	10.0
Less than 70% Organic Ingredients	41.9	25.8	18.3	5.4	8.6	0	0	7.7	1.0
Locally Grown	14.4	13.4	11.3	12.4	16.5	9.3	22.7	42.2	25.0

* Each premium category is valued at its lower bound and is measured in cents per box above \$3.00 for a conventional product. These are minimum willingness to pay measures.

Table 7. Regression of WTP for Various Food Characteristics on Consumer and Household Characteristics.*

	100% organic		>95% organic		>70% organic		<70% organic	
	Coefficient	P(Z >z)	Coefficient	P(Z >z)	Coefficient	P(Z >z)	Coefficient	P(Z >z)
Constant	-0.019	0.88	0.101	0.40	0.058	0.60	0.010	0.92
Age (yrs)	0.003	0.13	0.001	0.57	0.003	0.06	0.002	0.25
Income per household member (x\$1,000)	0.003	0.05	0.002	0.10	0.001	0.25	0.000	0.94
Children present (=1)	0.033	0.56	0.098	0.06	0.051	0.29	0.043	0.38
Post High School Education (=1)	0.053	0.45	-0.038	0.55	-0.070	0.22	-0.030	0.58
Health Index	0.001	0.35	0.001	0.08	0.001	0.41	0.001	0.31
Race (white=1)	-0.037	0.62	-0.108	0.13	-0.079	0.22	-0.034	0.59
Gender (female=1)	0.152	0.01	0.127	0.02	0.108	0.03	0.111	0.03
Specialty Store (=1)	0.237	0.01	0.146	0.01	0.039	0.42	-0.045	0.37
NOP awareness (=1)	-0.007	0.89	0.027	0.60	0.031	0.49	0.049	0.28
N	186		172		153		128	
R-Square	0.18		0.12		0.10		0.11	
Adjusted R-Square	0.13		0.07		0.05		0.05	
F-Value	4.22	0.00	2.51	0.01	1.81	0.07	1.69	0.10

* WTP is estimated using a payment card approach. This is minimum WTP and is measured as dollars per box above a \$3.00 conventional product price.

Table 7. Regression of WTP for Various Food Characteristics on Consumer and Household Characteristics.* -- Continued

	Pesticide Free		Enhanced Flavor		GMO Free		Locally Grown	
	Coefficient	P(Z >z)	Coefficient	P(Z >z)	Coefficient	P(Z >z)	Coefficient	P(Z >z)
Constant	0.260	0.04	0.012	0.93	0.011	0.95	0.231	0.07
Age (yrs)	0.004	0.04	0.004	0.04	0.004	0.14	0.002	0.23
Income per household member (x\$1,000)	0.001	0.32	0.000	0.78	0.001	0.46	0.000	0.74
Children present (=1)	0.019	0.74	0.036	0.54	-0.086	0.21	-0.023	0.69
Post High School Education (=1)	0.030	0.67	0.041	0.56	0.067	0.41	0.065	0.34
Health Index	-0.002	0.05	-0.001	0.48	0.001	0.49	0.000	0.62
Race (white=1)	-0.168	0.03	-0.028	0.71	-0.171	0.07	-0.229	0.01
Gender (female=1)	0.135	0.02	0.185	0.00	0.231	0.00	0.101	0.09
Specialty Store (=1)	0.145	0.01	0.061	0.32	0.210	0.00	0.171	0.00
NOP awareness (=1)	0.025	0.64	0.027	0.63	0.060	0.35	0.072	0.18
N	205		154		143		189	
R-Square	0.12		0.11		0.19		0.13	
Adjusted R-Square	0.08		0.05		0.14		0.08	
F-Value	2.85	0.00	1.93	0.05	3.51	0.00	2.94	0.00

* WTP is estimated using a payment card approach. This is minimum WTP and is measured as dollars per box above a \$3.00 conventional product price..

Table 8. Parameter Estimates from the Hybrid Conditional Logit Model of Cereal Product Choice

	Estimate	Prob $ Z > z$
Product-Specific attributes		
Price	-1.854	0.00
Individual-Specific Attributes		
Income per person (x \$1,000)		
70% Organic Cereal	0.019	0.06
95% Organic Cereal	-0.003	0.85
100% Organic Cereal	0.011	0.36
Race (1 if white, 0 if non white)		
70% Organic Cereal	-0.855	0.10
95% Organic Cereal	-0.815	0.18
100% Organic Cereal	-1.747	0.00
Education (1 if post High School, 0 otherwise)		
70% Organic Cereal	-0.690	0.15
95% Organic Cereal	-0.484	0.40
100% Organic Cereal	-0.472	0.41
Children (1 if children, 0 if no children)		
70% Organic Cereal	-0.721	0.09
95% Organic Cereal	-0.379	0.42
100% Organic Cereal	-0.855	0.06
Health Index		
70% Organic Cereal	0.017	0.01
95% Organic Cereal	0.012	0.13
100% Organic Cereal	0.010	0.19
Safety Index		
70% Organic Cereal	0.013	0.09
95% Organic Cereal	0.035	0.00
100% Organic Cereal	0.053	0.00
NOP (1 if aware of USDA Seal, 0 otherwise)		
70% Organic Cereal	-0.202	0.62
95% Organic Cereal	-0.312	0.51
100% Organic Cereal	-0.221	0.62
Specialty (1 if Specialty Grocery, 0 otherwise)		
70% Organic Cereal	1.512	0.00
95% Organic Cereal	1.957	0.00
100% Organic Cereal	3.091	0.00
Number of observations:	239	

Table 9. Willingness to pay estimates for three organic cereal products relative to a conventional, non-organic cereal.

	Willingness to Pay Estimates*					
	Minimum	Maximum	Median	Mean	95% Confidence Interval on Mean WTP	
					Lower	Upper
Organic 70%	0.013	0.761	0.239	0.279	0.254	0.304
Organic 95%	0.025	0.394	0.168	0.177	0.168	0.185
Organic 100%	0.038	0.956	0.202	0.276	0.250	0.303

* Additional amount the consumer would pay for this cereal product relative to the conventional cereal. Measured as dollars per box above a \$3.00 conventional product price.

Table 10. Binomial probit model of likelihood of switching organic products between WTP experiments.

	Estimate	Prob Z >z	Marginal effects
Constant	-0.9934	0.07	-0.3361
Own Price Change	-0.0688	0.97	-0.0233
Substitute Price Change	0.8841	0.51	0.2991
ORG100	0.8865	0.27	0.3343
ORG95	1.0888	0.08	0.4109
ORG70	1.1758	0.00	0.4362
Income per household member (x \$1,000)	-0.0085	0.16	-0.0029
Age of Shopper	-0.0091	0.36	-0.0031
Children present (=1)	-0.2650	0.31	-0.0890
Race (white=1)	1.0127	0.00	0.2841
Safety Index	0.0011	0.83	0.0004
Health Index	-0.0007	0.89	-0.0002
NOP awareness (=1)	-0.4847	0.07	-0.1575
N	149		
Log likelihood function	-75.664		
Restricted Log likelihood	-93.643		
Chi Squared	35.958	0.00	

Frequencies of actual and predicted values

	Predicted		Total
Actual	0	1	
0	90	11	101
1	26	22	48
Total	116	33	149