Consumer Willingness-To-Pay for Cue Attributes: the Value beyond its Own

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Consumer Willingness-To-Pay for Cue Attributes: the Value beyond its Own

Introduction

Consumers are increasing the demand for foods which are healthier, safer, more palatable, and more environmentally and animal friendly in an era of continuously declining proportion of food expenditure relative to household income, so that more knowledge about the health benefits of food, increasing awareness of food-born disease and more concerns about the environment are very important for consumer welfare. A major task for food producers and policy makers would be creating efficient mechanism or program to provide food quality information demanded by consumers, though it is not an easy one, due to the complicated relationship among food quality attributes.

On the one hand, food quality can be categorized into search, experience and credence attributes. The search attributes, such as colors, can be directly observed by consumers before purchasing; the experience attributes, such as tastes, can be judged after a product is purchased and consumed by consumers; and the credence attributes, such as production practice and product origin, cannot be observed by consumers either before or after purchase (Nelson 1970, 1974 and Darby and Karni, 1973). On the other hand, food attributes can also be classified into cue attributes and component/physical attributes. The cue attributes can be used as a proxy for overall or part quality attributes, and the component/physical attributes can only reflect the value of itself (Connolly and Srivastava 1995).

Through food labeling, the experience and credence attributes can be transformed into the search attributes, so that it can alleviate the information asymmetry and provide needed quality information for consumers. Year labeling for wine and organic labeling are two good examples of labeling to transfer the credence attribute into the search

attribute and satisfy consumers' demand for the quality information. However, some other labelings are not as successful as the above two examples. One case is the country-of-origin labeling (COOL) in the U.S. Although a large body of literature reports that consumers are willing to pay a higher premium to COOL (Loureiro and Umberger 2003; Umberger et al. 2003; Mabiso et al. 2005), few evidences support that producers are voluntary to provide the labelings. [1] The same situation also happens to other labelings such as the "locally produced" products. Some research demonstrates that consumers are willing to pay more for locally produced products (Brown 2003; Darby et. al. 2008), but it is not as popular as organic labeling. However the reason behind it is still unclear. Some studies for the welfare of COOL indicate that the premium might not be high enough to cover the cost (Lusk and Anderson 2004; Brester, Marsh and Atwood 2004; Lubben 2005), and others argue that only a small premium exists for COOL (Loureiro and Umberger 2005).

Current studies also show that consumers look the cue attributes such as COOL, organic, locally produced as a proxy of overall food quality or an index of other food attributes such as safety, nutrition, freshness, and/or environmental friendliness. In a market without labeling, consumers can observe the search attributes and perceive the experience attributes by post purchase experience. If the labeling is introduced into the market, and a cue credence attribute can be transferred into the search attribute, it is very likely that consumers would connect the labeling with the search and experience attributes that can be verified by consumers. However, is the labeling of the cue attributes such as COOL, organic and locally produced etc. enough to capture the premiums (willingness-to-pay) reported in the literature? Beyond the willingness-to-pay (WTP) for

the labeled credence attribute, do consumers change their valuations of the search or experience attributes that can be verified in real purchase? And how much do they really want to pay for the search or experience attributes with labeled cue attributes? If consumers do not only pay for the labeled attributes, but express higher valuations for other food product attributes, it may not be enough to differentiate the products and achieve the benefits in the long run with simply labeling the cue credence attributes, because consumers may find out that there is no difference between products with and without labeling.

In this paper, we are trying to capture the consumers' WTP for other product attributes when a cue attribute is presented. We use COOL as the cue attribute, because COOL will be mandatory for all covered commodities by September 30, 2008, and then estimate the changes in the WTP for other food attributes when COOL is presented. This may give an answer to the question that if food companies in the U.S. can achieve price premiums by simply labeling their products as "Produced in the U.S.". If not, they may need to take more actions to improve other food quality beyond the COOL.

The rest of the paper is organized as follows. The next section briefly reviews the literature on consumer preference for COOL. The followed section describes the experimental design, data collection, and econometric models. The next section reports the estimation results, followed by the discussions in the final section.

Consumer Preference for Country of Origin Label

Many studies on the relation between country-of-origin labeling and product evaluations show that country-of-origin could be a signal of product quality and thus

affect consumer choices (Strutton and Pelton, 1993; Maheswaran, 1994; Haucapet, Wey and Barmbold, 1997; Cai, Cude and Swagler, 2004). Two studies using meta-analysis to review the current literature on the effects of the country-of-origin labeling demonstrate that the perceived quality is largely affected by the country of origin rather than the attitudes towards the product and purchase intention (Verlegh, and Steenkamp 1999; Peterson and Jolibert 1995). The country-of-origin effect is closely related with a country's economic development and not significantly different between consumer and industrial purchase (Verlegh, and Steenkamp 1999). In addition, the methods used to test the county-of-origin effect have larger impacts on the purchase intention than on the perceived quality and reliability of products (Peterson and Jolibert 1995).

There are a few studies on the consumers' willingness to pay for foods with COOL in the United States. Schupp and Gillespie (1999) show that about 93% and 88% of the respondents in their Louisiana household survey prefer COOL on beef in grocery stores and restaurants, respectively. Consumers who prefer domestic durable products and those who believe U.S. beef is safer and has higher quality, are more interested in COOL. Income does not significantly affect households' choice on U.S. beef. Males and households with a single head or with children are less interested in COOL than others.

Loureiro and Umberger (2003) shows that the surveyed consumers in Denver are willing to pay an average premium of 38% and 58% for the "Certified U.S." steak and hamburger, respectively. In addition, the respondents are willing to spend about $184 per household annually to support mandatory COOL program. Contrast to Schupp and Gillespie(1999), the consumers with higher income and those who have children are less likely to pay a premium for COOL. Their explanation to the negative marginal effect of

income is that wealthier consumers can afford more expensive foods which are considered to be safer and have higher quality. As a result, they don't need additional labeling, such as COOL, to indicate the quality of foods.

Umberger et al. (2003) demonstrate that Chicago consumers are willing to pay a premium of 23% for the U.S. labeled steak, which is higher than 14% in Denver. About 7% of the consumers do not prefer the U.S. labeled steak, and 24% of the consumers show indifference between the labeled and unlabeled steaks. The major reasons that the consumers prefer COOL are: "food safety concerns about imported beef, a preference for labeling source and origin information, a strong desire to support U.S. products, and the beliefs that U.S. beef is of higher quality." Consumers that are more concerned about freshness, source assurance, locally raised cattle and those who prefer not to purchase beef in supermarkets are more likely to pay a premium for COOL. Consumers with higher income and with higher preference for organic or natural products are less interested in COOL.

Contrast to the high premium for COOL in the aforementioned studies, a national survey conducted by Loureiro and Umberger (2005) shows that only 30% of consumers are willing to pay a 5% premium for COOL meat products. The average premiums are about 2.5% for labeled chicken and pork and about 2.9% for labeled beef. Income has a significant positive marginal effect on consumer WTP for COOL of beef and pork. Older, higher educated and male consumers have less desire to pay for COOL. Food safety and freshness of meat are the two most important reasons that the consumers choose "Certified U.S." meats products. In addition, nearly 39% of respondents prefer

government to pay the COOL-related certification costs and 36.2% agree to pay the costs through higher meat price.

Mabiso et al. (2005) in a survey for three cities find that approximately 79% of the respondents are willing to pay a premium for "Grown in the U.S." labeled apples and 72% for labeled tomatoes. The premiums are $0.49 for labeled apples and $0.48 for labeled tomatoes. In addition, older and wealthier people have less WTP and consumers in different cities have different WTP. The perception of food quality and consumers' trust in government agencies significantly influence consumers' intention for COOL. The food safety concern is the most important factor affecting consumers' WTP.

The current literature demonstrates that the U.S. consumers are likely to pay a premium for COOL, lower or higher. It also explores some major reasons determining consumer preferences for and attitudes toward COOL are revealed to be food safety, quality, and freshness. However, none of those studies explore the changes in consumer valuations for safety, quality and other product attributes when COOL is presented. Specifically, how much are consumers willing to pay for the other product attributes with the provision of COOL? Will COOL increase consumers' valuations of other attributes or substitute other attributes so that consumers concern less about other product attributes? If the answer to the second questions is "yes", then producers in the U.S have more advantages for selling their products just by labeling their products with COOL, and don't need to worry much about improving other product attributes. The same logic may also be applied to other cue attributes, which, similar with COOL, can be used as a quality indicator.

Survey Design and Data Collection

When eliciting consumers' willingness-to-pay (WTP) for food quality attributes, the attributes of interest are isolated or partially isolated from other attributes out of interest. As a result, the survey regarding consumer preferences for food attributes creates an information environment in which that full information of the product are assumed to be available in the market. We designed two sets of surveys to elicit consumers' WTP for 12-ounce beef strip lion steak (also known as KC strip) attributes. In the one set of the survey, there is no COOL information, and in the other set COOL information of the product is provided. The surveys also contain other product attribute information regarding tenderness, leanness and freshness of the beef steak. The survey without COOL information simulates a market in which consumers can not observe the origin of products while they can get information of other product attributes by observing or experiencing the products. The survey with COOL information simulates a market in which consumers can observe the origin of product through the label. In both cases, consumers can express their preferences for the attributes such as tenderness, leanness etc.. Then, the effects of COOL on consumer preferences for other product attributes can be investigated.

We used the conjoint analysis in our survey because this method is consistent with the Lancaster's theory of utility maximization (1972), in which consumer utility can be expressed as a function of product attributes. In the conjoint analysis each product is described with a bundle of attributes and consumers are asked to pick one product from a choice set consisting of two or more products (choice). Some research shows that the design complexity, such as the number of attributes included in the experiment of conjoint analysis, can affect consumer behavior (Hensher 2006; Islam,Louviere and

Burke. 2007). We design four experiments with different COOL information and different numbers of product attributes, so that we can separate the effects of COOL from the effects of attributes by the changes in consumer presences for other product attributes. Table 1 shows the attributes used in experiments C4, C5, W3 and W4, in which the experiments C4 and C5 include COOL information and the experiments W3 and W4 do not. The numerical index indicates the number of attributes in a choice experiment, varying from 3 to 5.

The price of the steak has 4 levels, varying from 4.64/lb to $11.50/lb. Other attributes have two levels, with or without a specified attribute, except for "Days before Sell-by Date" who has two level "2 days before Sell-by Date" and "8 days before Sell-by Date". The choices in the experiments use orthogonal fraction design with 100% D-efficiency. The choices are then randomly paired to create choice sets with dominant choice being removed (Louviere, Hensher and Swait 2000). In addition, a "None" choice is added to each choice set to make the scenario more realistic. A sample choice set is shown in Figure 1. The numbers of choice sets in each choice experiment are equal to control the difference in other dimensionality of choice design (Hensher 2006).

The choice experiment C4 and C5 consists of survey C, and the choice experiment W3 and W4 consists of survey W. Then we can send out two sets of surveys to two samples of respondents rather than send out four sets of surveys in which each survey only consists of one choice experiment. As a result, the cost of survey can be reduced.

In November, 2006, e-Rewards, Inc. an online-survey company, sent out surveys to 1100 Chicago residents, each survey went to 550 online panel members. Our budget constraints necessitated the discontinuity of the survey when we achieved approximately

75 respondents for each survey. Finally, we got 76 and 78 respondents in survey C and survey W, respectively. Table 2 reports the summary statistics of the demographical characteristics for the two surveys in Chicago.

Random Parameters Logit Models

Consumer utility function is specified as

(1) $U_{ij} = \alpha \cdot p_{ij} + \delta_{ij}^{'} \cdot X_{ij} + \varepsilon_{ij}$

for the experiments of survey C; and

(2) $U_{ij} = \alpha^{*} \cdot p_{ij} + \beta_1 \cdot COOL_{ij} + \delta_{ij}^{*'} \cdot X_{ij} + \varepsilon_{ij}$

for the experiments of survey W. Where p is the price, *COOL* is a dummy indicate if the product has origin label, and *X* are other product attributes. The change of the parameters from α to α^{*} for price and from δ_{ij} to δ_{ij}^{*} for other attributes is a results of the proxy effect of cue attributes or the effects of the increasing number of product attributes. The studies find that the increase in the number of attributes may decrease the marginal utility of attributes due to the increasing efforts for consumer to process more attribute information (Swait and Adamowicz 2001; Lusk 2003). The coefficient for price in the utility function can be estimated as a nonrandom parameter and the parameters for other attributes are estimated as random parameters with normal distribution. Specifically, $\delta_{ij} = \bar{\delta}_j + \Gamma \nu_{ij} = \bar{\delta}_j + \mu_{ij}$, where $\bar{\delta}$ is the mean valuation of attributes for all consumers Γ is a Cholesky matrix and μ_{ij} is the random variable capture the variation in consumer preferences. The covariance of random parameters can be calculated as $\sum = \Gamma\Gamma^{'}$ (Hensher, Rose and Greene 2005). Not allowing price being random with normal distribution ensures that no positive estimate for the price coefficient occur, consistent with the

negative price-demand relationship. Allowing the parameters of other beef attributes being random helps to capture the heterogeneous preferences among consumers and the correlation among attributes or alternatives. In addition, it avoids the limitation of independence from irrelevant alternative of the traditional multinomial logit model (Hensher, Rose and Greene 2005).

Results

Table 3 reports the estimates of the parameters for the logit models in different experiments. Our results show that all the coefficient estimates have the expected signs with the price coefficients being negative and other attribute coefficients being nonnegative. The estimates also indicate that statistically significant heterogeneous preferences exist for all beef steak attributes across the surveyed consumers. In addition, the correlations between the coefficients of beef steak attributes are rejected at 5% significant level for all choice experiments except for the choice experiments C4 and W4.

With the estimates of the coefficients and the standard deviation, 1000 coefficients of those random parameters are simulated. And consumer WTP for a beef steak attribute is calculated as $WTP_k = \frac{\delta_k}{\alpha}$, where δ_k is the coefficient of kth attribute and α is the price coefficient. Consumer total WTP is calculated as the sum of the WTP for all individual attributes. Because the price coefficient is not random, the simulated WTP is normally distributed. Table 4 reports the means and standard deviations for the simulated WTP. All the means of WTP are significantly different from zero at 5% significance level. Consumers are most willing to pay for "Certified U.S. Product" with "Guaranteed Tender" followed, and are willing to pay most for the beef steak in the choice experiment C5, which has the most attributes and COOL information. The highest WTP might be

driven by the high WTP for "Certified U.S. Product," and the high WTP for "Guaranteed Tender" and "Guaranteed Lean" in this choice experiment. The extremely high WTP for "Certified U.S Product" in the choice experiment C5 may result from the fact that our choice experiments are hypothetical, commonly with higher WTP. Another explanation could be that the choice experiment C5 has more attribute information than the choice experiment C4, and it may also change consumers' evaluation of product attributes. Hensher (2006) shows that with an increase in the number of attributes, consumers' valuation of "Stop-start" time increases while the valuation of "Free flow time" and "Slowed down time" decreases. Gao and Schroeder (2006) demonstrates that the number of attributes in a choice experiment has a quadratic relationships with consumer WTP for some of the product attributes.

In order to study the impacts of COOL information on consumer WTP for other beef steak attributes, we compare the differences between WTP's elicited from different choice experiments. However, almost all attributes are the same through comparisons, and the only difference between two choice experiments is the information availability of COOL, or the presence of "Certified U.S. Product" labeling. With the presence of "Certified U.S. Product", the mean of the total WTP (Figure 4 and Figure 5) and the WTP for other beef steak attributes such as "Guaranteed Lean", "Guaranteed Tender" (Figure 2 and Figure 3) and "Days before Sell-by-Date" (Figure 6) increase (WTP from W3 vs C4, and W4 vs C5). One exception is the WTP for "Guaranteed Tender" from the choice experiment W3 to C4, in which the WTP decreases after the presence of "Certified U.S Product" attribute (Figure 2). Because the simulated WTP are independent normally distributed, the mean of WTP from different choice experiment can

be compared using t-test. The null hypothesis that the sample means are the same for the WTP from choice experiments with and without COOL information is rejected for all comparisons at 5 percent significance level. In addition, we test the hypothesis that the variances of the WTP from different choice experiments are the same. In seven comparisons, the hypothesis of equal variance of WTP between choice experiments is rejected for four times (for total WTP: W3 vs. C4 and W4 vs. C5; for "Guaranteed Tender": W4 vs. C5; for "Guaranteed Lean": W3 vs. C4) at 5 % significant level. In the four comparisons, the variances of WTP increase after consumers have more COOL information in the choice experiments. This implies that the COOL information not only increases consumer average valuation of other attributes, and also results in more heterogeneous preferences among consumers. This is consistent with Swait and Adamowicz's (2001) who find that the preference variance of consumers can be affected by the complexity of decision environment.

The presence of COOL information in a choice experiment accompanied by the increase number of product attributes, could increase the complexity of consumer decision context. We run a simple regression with the consumer WTP as the dependent variable and use the presence of COOL information and the number of product attributes in the choice experiment as independent variables to separate the effect of COOL information from other factors. In addition, because consumer preference variance has a concave relationship with the complexity of choice context (Swait and Adamowicz 2001), we specify the WTP as a quadratic function of the number of beef steak attributes in the choice experiment. Specifically, the model we will estimate is:

(3) $$WTP = \alpha + \beta \cdot X_1 + \theta \cdot X_2 + \lambda \cdot X_3 + \kappa \cdot X_4 + \varepsilon$$

where β, θ, λ and κ are row vectors of coefficients to be estimated. *WTP* is the simulated *WTP*, and

$X_1 = \left[Tender \quad Lean \quad Total \right]'$,

$X_2 = \left[CO \cdot Tender \quad CO \cdot Lean \quad CO \cdot Sell \quad CO \cdot Total \right]'$,

$X_3 = \left[Att \cdot Tender \quad Att \cdot Lean \quad Att \cdot Total \right]'$, and

$X_4 = \left[Att^2 \cdot Tender \quad Att^2 \cdot Lean \quad Att^2 \cdot Total \right]'$,

where "Tender", "Lean" , "Sell" and "Total" are dummy variables, respectively denoting "Guaranteed Tender", "Guaranteed Lean", "Days before Sell-by Date" and total WTP [2]; "CO" is a dummy variable indicates if the WTP is estimated from a choice experiment with "Certified U.S. Product" , "Att" is the number of beef steak attributes in the choice experiment, and $\varepsilon = \mu_n + \xi_{ni}$ is a random error with normal distribution. The random effects model is proposed to capture unobservable factors in each choice experiment that may affect consumer preferences. The Breusch and Pagan LM test is used, and the null hypothesis that the variance of μ_n equals zero cannot be rejected.

The marginal effect of COOL information on WTP is β, and the marginal effect of the number of attribute is $\lambda + 2\kappa \cdot X_4$. Table 5 reports the estimation results in which column one is the estimate of α and β, column two is the estimate of θ, column three is the estimate of λ and column four is the estimate of κ. The results shows that the COOL information significantly increases consumer total WTP and their WTP for "Guaranteed Lean" at 1 percent significance level, but does not have a significant impact on consumer WTP for "Guaranteed Tender ". Though the marginal effect of the number of attributes

may depend on the attribute levels, table 6 reports the *p* value of the null hypothesis that the number of attributes has no impact on consumer WTP at different attribute levels. The results indicate that the number of product attributes have significant impacts on consumer total WTP and WTP for "Guaranteed Tender" at 1 percent significant level, and have significant impacts on consumer WTP for "Guaranteed Lean" at 5 percent significant level when the number of steak attributes is five. Combined with the impact of COOL information on consumer WTP, the results implies that the number of beef steak attributes is more important than the availability of COOL information for "Guaranteed Tender",, while the COOL information have more impacts on consumer WTP for "Guaranteed Lean". We also test the impact of COOL information on consumer WTP for different beef steak attributes. Our tests show that the impact of COOL information on the consumer WTP for "Guaranteed Lean" and "Days before Sell-by Date" are not statistically significant at 5% significant level, while all other comparisons are.

Conclusions and Discussions

The complicated relationship between food product attributes makes the study of consumer preference for food a complex process. This is especially true when one food attribute is a cue of other attributes, and the cue attribute may be a proxy of overall or part product quality. By investigating consumer WTP for the beef steak attributes with the presence or absence of COOL information, we show that consumer preference for some of steak attributes changes significantly. COOL information significantly affect consumer total WTP and it implies that the cue attributes have large impacts on the evaluation of the overall food quality. However, the presence of cue information not necessarily implies better food quality, and an example in our case could be the

"Guaranteed Tender". So that producers could just label their products as "Certified U.S. Product", and don't make the quality improvement of tenderness. However, consumer expects more quality improvement of leanness of the beef steak with "Certified U.S. Product" labeling,, and they are willing to pay more for this attribute.

However, in our study, we are unable to separate the symbolic and emotional aspects of country-of-origin from its role of product cues (Verlegh and Steenkamp 1999). It is very difficult for producers' decision on the overall quality improvement when they label their products with country of origin. If consumer WTP for COOL are mainly from the symbolic and emotional effect of country-of-origin, food producers can label their products with COOL without worrying too much about the improvement of overall product quality. The same logic may also be applied to other cue attributes such as "Organic" and "Local" products. Consumers buy those products simply because they "feel good" of protection of environment and want to help local farmers, or due to other reason not related to component attributes.

Future research may focus on the impacts of cue attributes on consumer preference or the WTP for more component attributes, and also try to separate the emotional aspect of the cue attributes from their impacts on evaluation of overall product quality and other component attributes.

Notes

1. Country of Origin Label was mandatory for fish and shellfish in 2004, and will be required for other covered commodity such as beef, lamb, chicken etc. by September 30, 2008.

2. The dummy variable indicates if the WTP is for "Days before Sell-by Date" is removed from the regression to avoid dummy trap. And, there are no interaction terms between "Days before Sell-by Date" and the number of attributes because in our survey design, the number of attributes in a choice experiment is determined by the presence of COOL information. Five attributes corresponding to presents of COOL information, and four attributes corresponding to absence of COOL information.

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Table 1. Attributes Used in the Choice Experiments

Choice Experiment	C4	C5	W3	W4
Attributes	Certified U.S. Product Price Guaranteed Tender Guaranteed Lean	Certified U.S. Product Price Guaranteed Tender Guaranteed Lean Days before Sell-by Date	Price Guaranteed Tender Guaranteed Lean	Price Guaranteed Tender Guaranteed Lean Days before Sell-by Date

Table 2. Means and Standard Deviations of the Demographical Characteristics by Location and Survey

	Survey C	Survey W
Age [c]	45.46	44.33
	(11.91)	(12.30)
Income [d]	6.30	6.35
	(2.12)	(2.36)
# of Adults [e]	2.00	1.94
	(0.79)	(0.72)
# of Children [f]	0.30	0.47
	(0.69)	(0.83)
Gender [g]		
Male	36%	59%
Female	64%	41%
Education [h]		
1	0%	0%
2	5%	1%
3	29%	24%
4	33%	41%
5	33%	33%
Marriage		
Single	28%	24%
Married	57%	63%
Other	16%	13%
Employment		
Full Time	78%	69%
Part Time	4%	17%
Unemployed	1%	3%
Student	0%	3%
Retired	4%	9%
# of respondents	76	78

[a] Reported statistics of Age, Income, # of Adults and # of Children are mean values.
[b] The numbers in parentheses are standard deviations.
[c] Age: Age in years
[d] Income: Household annual income level.
1=Under $10,000; 2=$10,000 to $24,999 …13=$300,000 to $399,999; 14=$400,000 and more
[e] # of Adults: Number of people 18 years old and older within household
[f] # of Children: Number of children less than 18 years old within household
[g] Reported statistics of Gender, Education, Marriage, and Employment are frequency of the variable levels among respondents.
[h] Education: 1=1st through 8th grade; 2=Some high School or high school graduate; 3=Some college/2 year associate degree; 4=Four year college degree; 5=Master or Ph.D. degree

Table 3 Estimation Results of Random Parameters Logit Models in Choice Experiments

Choice Experiment	C4	C5	W3	W4
Independent Variable	Coefficient			
Certified U.S. Product	2.20	2.58		
	(0.00)	(0.00)		
Guaranteed Tender	1.65	1.65	2.17	2.35
	(0.00)	(0.00)	(0.00)	(0.00)
Guaranteed Lean	1.09	0.87	0.98	1.21
	(0.01)	(0.00)	(0.00)	(0.00)
Days before Sell-by Date		0.138		-0.03
		(0.003)		(0.71)
Price	-0.41	-0.30	-0.46	-0.57
	(0.00)	(0.00)	(0.00)	(0.00)
Constant for the None Option	-0.32	1.76	-1.83	-2.44
	(0.23)	(0.00)	(0.00)	(0.00)
	Diagonal values in Cholesky matrix, L			
Ns Guaranteed U.S. Product	1.47	1.79		
	(0.00)	(0.00)		
Ns Guaranteed Tender	1.36	0.02	1.63	1.07
	(0.00)	(0.75)	(0.00)	(0.00)
Ns Guaranteed Lean	1.44	0.44	1.27	0.84
	(0.00)	(0.30)	(0.00)	(0.00)
Ns Days before Sell-by Date		0.02		0.23
		(0.95)		(0.00)
	Below diagonal values in L matrix. V = L*Lt			
Tender : U.S. Product	0.54	0.27		
	(0.16)	(0.40)		
Lean : U.S. Product	0.62	0.04		
	(0.14)	(0.91)		
Lean : Tender	0.23	-0.08	0.70	-0.13
	(0.53)	(0.85)	(0.00)	(0.65)
Sell-by : U.S. Product		0.10		
		(0.09)		
Sell-by : Tender		-0.10		0.14
		(0.06)		(0.08)
Sell-by : Lean		-0.01		-0.11
		(0.90)		(0.18)
	Standard deviations of parameter distributions			
Std Guaranteed U.S. Product	1.47	1.79		
	(0.00)	(0.00)		
Std Guaranteed Tender	1.46	0.27	1.63	1.07
	(0.00)	(0.03)	(0.00)	(0.00)
Std Guaranteed Lean	1.58	0.45	1.45	0.85
	(0.01)	(0.35)	(0.00)	(0.00)
Std Days before Sell-by Date		0.14		0.29
		(0.10)		(0.00)
Log Likelihood	-458.0	-499.1	-506.8	-446.0
# of Obs	76	76	78	78

[a] The number in parentheses are p-values.

Table 4 Mean and Variance of WTP in Choice Experiments

Choice Experiments	C4	C5	W3	W4
WTP for…[a]				
Certified U.S. Product	5.26*	9.14*		
	(3.56)	(5.87)		
Guaranteed Tender	3.97*	5.44*	4.61*	4.06*
	(3.49)	(2.68)	(3.61)[f]	(1.86)
Guaranteed Lean	2.55*	2.98*	2.13*	2.10*
	(3.80)	(4.84)	(3.17)	(1.47)
Days before Sell-by Date		0.51*		-0.03*
		(0.47)		(0.49)
Total WTP	11.78*	18.07*	6.74*	6.12*
	(8.22)	(7.48)	(5.90)	(2.29)

[a] WTP values are derived from models in Table 3. WTP values are dollars for a 12 oz beef steak.
[b] Total WTP are the sum of WTP for all individual attributes in each choice experiment.
[c] Reported statistics are mean of 1000 simulated WTP estimations.
[*] indicates statistically significantly different from zero at 5% significant level.
[e] Values in parenthesis are the standard deviation of WTP.

Table 5. Estimation Results of WTP as a Function of Multiple Factors

WRT for	Coefficient	COOL	# of Attribute	# of Attribute Squared
Tender	18.48	-0.08	-7.65	1.01
	(0.00)	(0.65)	(0.00)	(0.00)
Lean	5.01	0.45	-1.64	0.23
	(0.01)	(0.01)	(0.11)	(0.07)
Sell-by	N/A	0.55	N/A	N/A
		(0.00)		
Total	50.12	5.66	-24.82	3.46
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	-0.03			
	(0.79)			
# of Observation		14000		
R squares		0.56		

[a] Values in parenthesis are the *p* values.

Table 6 Test of the Null Hypothesis that the Marginal Effects of the Number of Attributes on Consumer WTP are Zero

# of Attribute	Guaranteed Tender	Guaranteed Lean	Total WTP
3	0.00	0.36	0.00
4	0.00	0.11	0.00
5	0.00	0.02	0.00

[a] Reported statistics are *p* value of the null hypothesis

***Choice set #4**

Attribute:	***Option A***	***Option B***
Price ($/lb.):	$9.22	$6.93
Certified U.S. Product:	Yes	No
Guaranteed Tender:	Yes	Yes
Guaranteed Lean:	Yes	No
I choose.....		
Neither A nor B	*Option A*	*Option B*

Figure 1 Choice Sets Used in the Choice Experiments

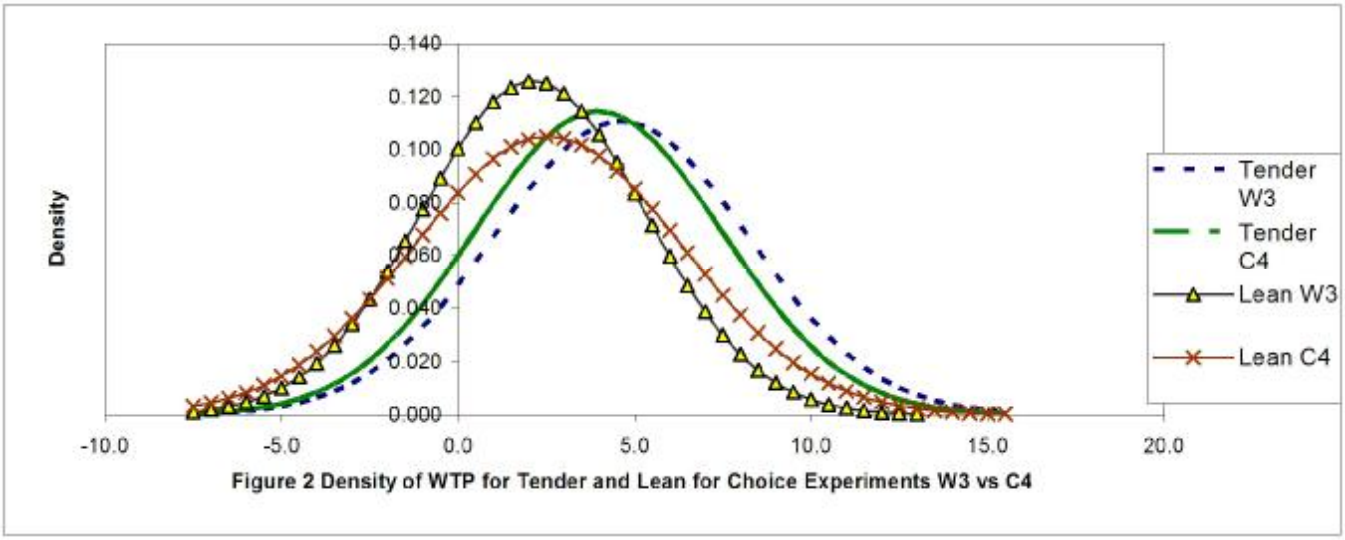

Figure 2 Density of WTP for Tender and Lean for Choice Experiments W3 vs C4

[a.] Distributions are plotted with estimated means and standard deviations of WTP.

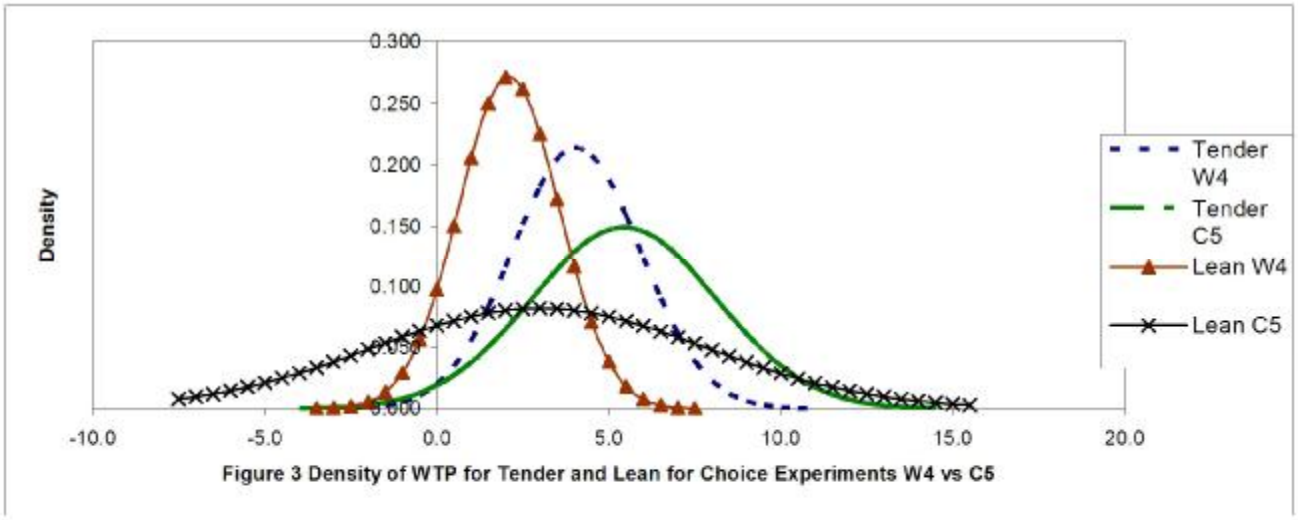

Figure 3 Density of WTP for Tender and Lean for Choice Experiments W4 vs C5

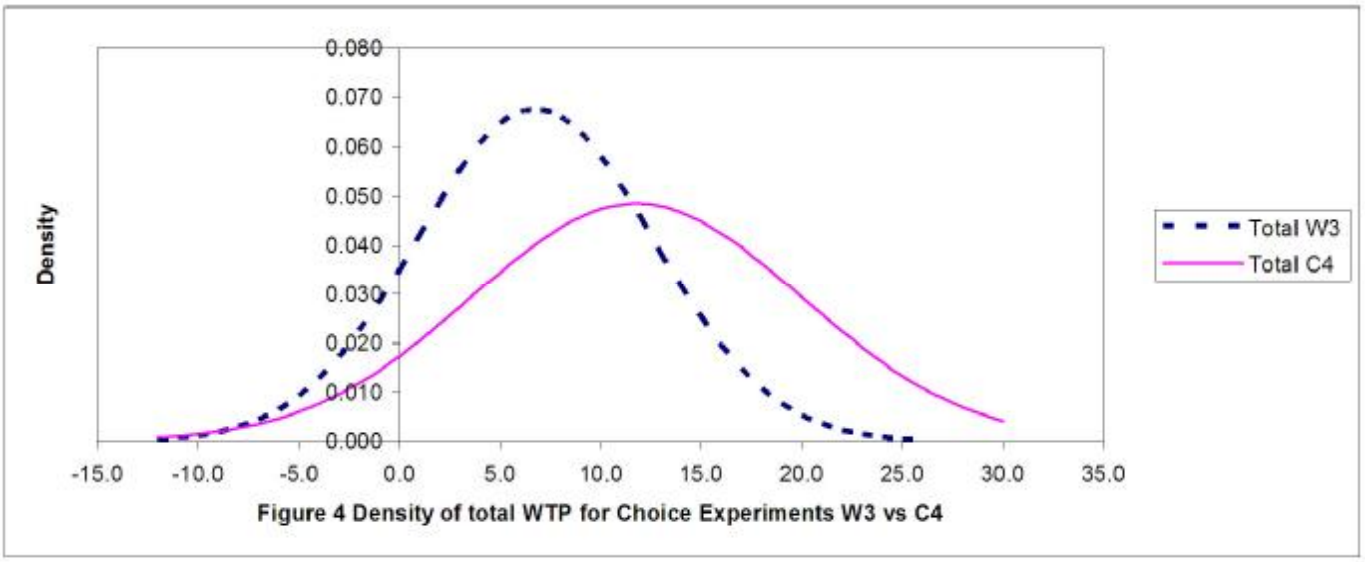

Figure 4 Density of total WTP for Choice Experiments W3 vs C4

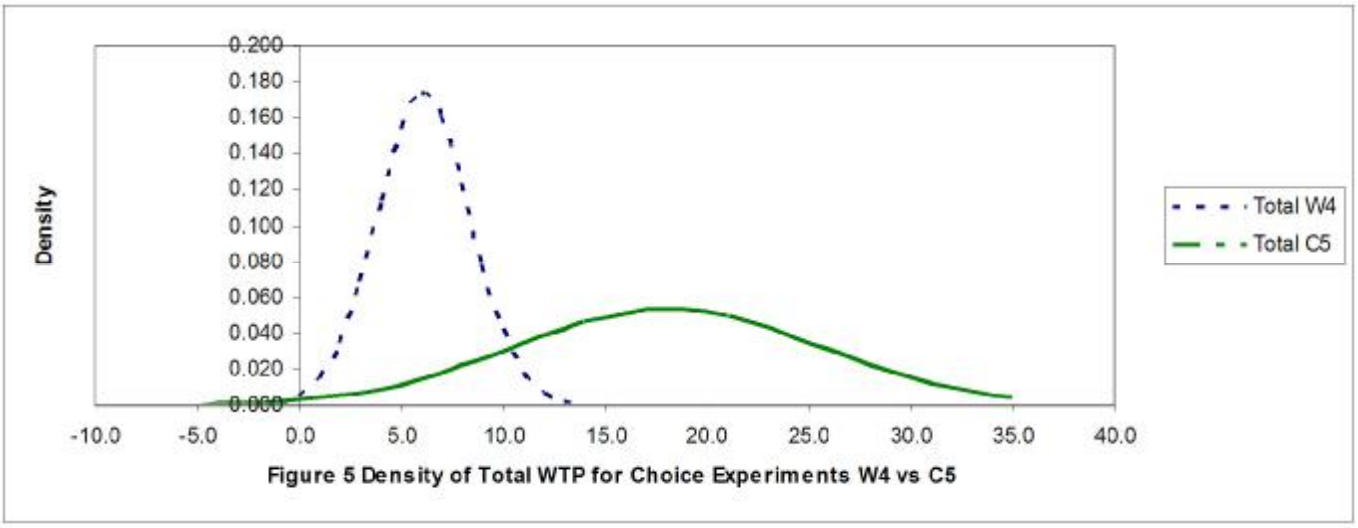

Figure 5 Density of Total WTP for Choice Experiments W4 vs C5

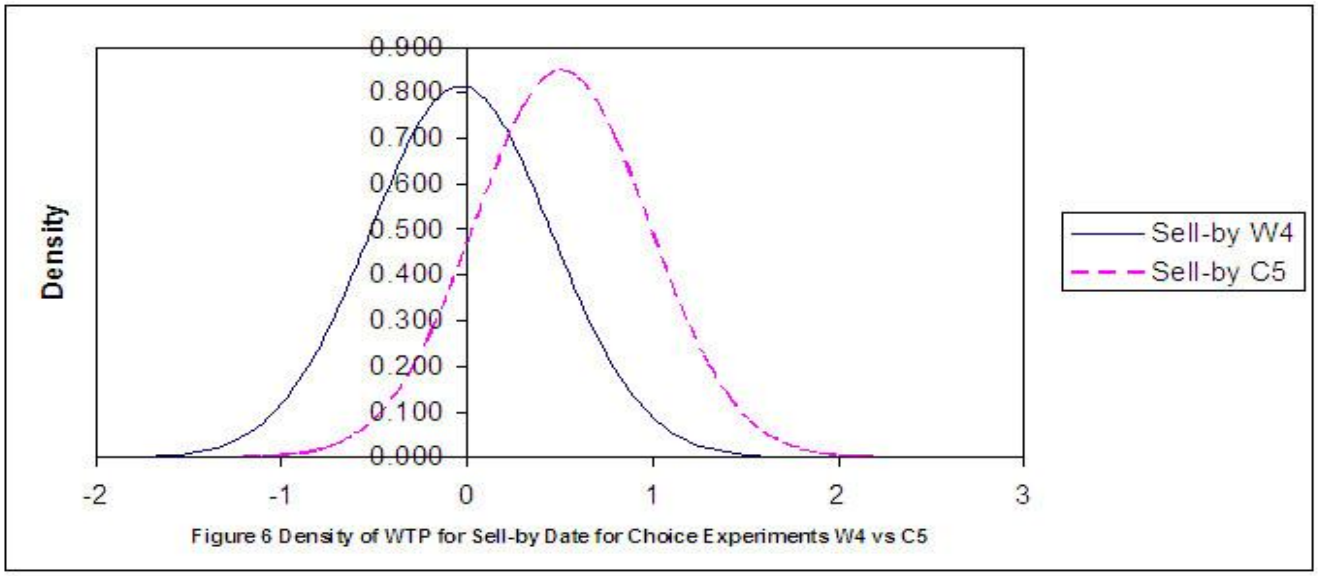

Figure 6 Density of WTP for Sell-by Date for Choice Experiments W4 vs C5