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Consumer Willingness to Pay for Cue Attribute: The Value Beyond Its Own

ZHIFENG GAO
University of Florida, Gainesville, Florida, USA

TED C. SCHROEDER
Kansas State University, Manhattan, Kansas, USA

XIAOHUA YU
The Pennsylvania State University, University Park, Pennsylvania, USA

Using Certified U.S. Product *as a product cue, we show that consumer willingness to pay for other identifiable search and experience attributes change.* Certified U.S. Product *serves as a substitute for* Guaranteed Tender *and a complement of* Guaranteed Lean. *Results have important implications for policymakers and food companies interested in food labeling programs in the presence of cue attributes such as* Certified U.S. Product. *The substitute effects of a cue attribute on other product attributes may contribute to deteriorating product quality and the complement effects of a cue attribute could improve product quality in the market.*

KEYWORDS country of origin, food label, label information, willingness to pay

Consumers are increasingly demanding foods that are assured to be healthier, safer, more palatable, and more environmentally or animal friendly (Brown, 2003; McCarty, 2006; Umberger, Feuz, Calkins, & Stiz, 2003). For food companies and policymakers, the major task is to create efficient

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Address correspondence to Zhifeng Gao, Food and Resource Economics Department, University of Florida, P.O. Box 110240 IFAS, Gainesville, FL 32611. E-mail: zfgao@ufl.edu

mechanisms or programs to provide food quality information demanded by consumers (Golan, Kuchler, & Mitchell, 2000). However, this task is difficult because of the complicated relationships among food quality attributes. On the one hand, food quality can be categorized into search, experience, and credence attributes. On the other hand, food attributes can also be classified into cue attributes and component/physical attributes (Connolly & Srivastava, 1995). Search attributes such as product color can be observed by consumers before purchase. Experience attributes, such as taste, can be judged after a product is purchased and consumed. Credence attributes such as production practices and product origin cannot be observed by consumers even after purchase (Nelson, 1970). Cue attributes are often used by consumers as a proxy for numerous quality attributes, and component/physical attributes are an integral and inseparable part of the physical products (Richardson, Dick, & Jain, 1994; Teas & Agarwal, 2000).

With the use of food labels, experience, and credence, attributes can be transformed into search attributes, alleviating information asymmetry and providing quality information demanded by consumers (Caswell & Mojduszka, 1996). The vintage of bottled wine and organic labels are two examples of using product labels to transfer credence attributes into search attributes to satisfy consumer demand for product information. However, despite evidence suggesting value, many labels that could convert credence to search attributes have not been adopted by the food industry. For example, a sizable body of literature reports consumers are willing to pay premiums for country-of-origin labeling (COOL; e.g., Loureiro & Umberger, 2003; Mabiso, Stern, House, & Wysocki, 2005; Umberger et al., 2003). However, few producers voluntarily provide a country-of-origin label for many meat products in the United States and labeling is mandated by recent federal law for numerous meat products.[1] Similarly, labels such as "locally produced" have been demonstrated to have value (e.g., Brown, 2003; Darby, Batte, Ernst, & Roe, 2008) but have not been widely adopted. Underlying reasons for nonadoption are unclear. Some suggest that market price premiums for COOL, for example, may not be high enough to cover the cost of adoption (Brester, Marsh, & Atwood, 2004; Loureiro & Umberger, 2005; Lusk & Hudson, 2004).

Consumers use cue attributes such as COOL, organic, and locally produced as a proxy for overall food quality and indicators of the existence of other food attributes such as safety, nutrition, freshness, and environmentally friendly production (Haucap, Wey, & Barmbold, 1997; Loureiro & Umberger, 2003; Naspetti & Bodini, 2008; Umberger et al. 2003). If new food labels are introduced into a market that transfer a cue credence attribute into a search attribute, consumers likely will connect the label with search and experience attributes that can be verified. This is because of the property of cue attributes and consumer perceptions between cue and other attributes. So an important question is whether presence of a cue attribute on the label affects

consumer willingness to pay for other search or experience quality assurances that can be verified in real world purchase. Dransfield, Zamora, and Bayle (1998) show that the experience of the eating quality of beefsteak is more important than quality labels in consumers' choice of steak. If consumers are not simply willing to pay for the labeled attribute and express higher expectations for other food product attributes, then labeling a food product with a cue credence attribute is not sufficient to differentiate the product from other products on the shelf. As a result, the cue credence attribute will not garner a premium in the long run if consumers discover there is no difference between products with and without labels.

In this article, we determine how consumer willingness to pay (WTP) for specific food product attributes changes when a cue attribute is present on the label. We investigate the impact of cue attribute on consumer WTP rather than on product evaluation. This is because high evaluation does not necessarily result in real purchase because of the trade-off between price and quality. Therefore, estimating the change in consumer WTP with the presence of cue attributes has more real world implication. We use COOL as the cue attribute and select other important attributes reflecting tenderness, leanness, and freshness of a beef. Those attributes have been documented to be important factors affecting consumer beef steak preferences. Estimating changes in WTP for other food attributes when COOL is present in the market is important because it reveals whether food companies are likely to be able to secure price premiums by labeling their product with a cue such as *Produced in the U.S.* If not, food companies may need to pursue improvements in other food quality beyond what a COOL label might imply to consumers.

Three alternatives exist each with quite different implications from mandating a cue attribute like COOL: (a) COOL could have no impact on premiums consumers are willing to pay for other product attributes, suggesting COOL is simply an additional independent product attribute consumers may consider when they purchase the product; (b) COOL could have a positive impact on premiums consumers are willing to pay for other labeled attributes, suggesting COOL is a complement to other product characteristics, increasing values of other label attributes when origin information is present; or (c) COOL could have a negative impact on premiums consumers are willing to pay for other product quality attributes. This last possibility is important because it suggests that in the presence of a mandated COOL, product quality could actually deteriorate in the marketplace because premiums for quality attributes would decline in the presence of COOL.

This article is organized as follows: The next section briefly reviews literature on consumer preferences for COOL. That section is followed by a description of the experimental design used in this study, data collection, and econometric methods. The next section reports the estimation results followed by discussions in the final section.

Many studies on country-of-origin labeling related to product evaluations show that country of origin could be a signal of product qualities and thus affect consumer choice (Haucap et al., 1997; Maheswaran, 1994; Strutton & Pelton, 1993). Two review articles synthesized previous research on country-of-origin effects using meta-analysis. Results demonstrate that country of origin has larger impacts on the perceived quality than on the attitude toward products and purchase intention (Peterson & Jolibert, 1995; Verlegh & Steenkamp, 1999). The country-of-origin effect is closely related to a country's economic development and does not differ between consumer and industrial purchases (Verlegh & Steenkamp, 1999). In addition, methods used to test the county-of-origin effect have larger impact on the purchase intention than on perceived quality and reliability of a product (Peterson & Jolibert, 1995).

Studies on U.S. consumer WTP for foods with COOL are limited relative to those completed with consumers in other countries. Schupp and Gillespie (1999) showed that about 93% and 88% of respondents in their Louisiana household survey preferred COOL on beef in grocery stores and restaurants, respectively. Consumers who preferred domestic durable products and those who thought U.S. beef was safer and higher quality were more interested in COOL. Income did not significantly affect consumer preference for U.S. origin-labeled beef. Males and households with a single head or with children were less interested in COOL than others.

Loureiro and Umberger (2003) showed that surveyed consumers in Denver were willing to pay an average premium of 38% and 58% for *Certified U.S.* steak and hamburger, respectively. In addition, respondents were willing to spend about $184 per household annually to support a mandatory COOL program. Similar to Schupp and Gillespie's (1999) results, consumers with higher income and those who had children were less likely to pay a premium for COOL. Their explanation for the negative marginal effects of income was that wealthier consumers could afford more expensive foods that were considered safer and had higher quality. As a result, high income consumers did not need more labeling, such as COOL, to indicate the quality of food they purchased.

Umberger et al. (2003) demonstrated that Chicago consumers had stronger preferences for COOL than Denver consumers. Chicago consumers revealed a premium of 23% for a U.S. origin-labeled steak compared with a 14% premium from Denver consumers. About 7% of the consumers indicated they did not prefer, and 24% were indifferent, between U.S. labeled and unlabeled steaks. The major reasons that consumers preferred COOL were "food safety concerns about imported beef, a preference for labeling source and origin information, a strong desire to support U.S. products, and

beliefs that U.S. beef was of higher quality" (p. 113). Consumers who were more concerned about freshness, source assurance, locally raised cattle, and those who preferred not to purchase beef in supermarkets were more likely to pay a premium for COOL. Consumers with higher income and with higher preference for organic or natural product were less interested in COOL.

A national survey conducted by Loureiro and Umberger (2005) showed that 30% of consumers were willing to pay a 5% premium for COOL meat products. Average premiums were about 2.5% for labeled chicken and pork and about 2.9% for labeled beef. Income had significant positive marginal effects on consumer WTP for COOL of beef and pork. Older, higher educated, and male consumers had less WTP for COOL. Food safety and freshness of meat were the two most important reasons that consumers chose "Certified U.S." meat products. In addition, nearly 39% of respondents preferred government to pay COOL-related certification costs and 36.2% agreed to pay the costs through higher meat prices.

Mabiso et al. (2005) studied consumers in three cities (Gainesville, FL; Atlanta, GA; and Lansing, MI) and demonstrated that approximately 79% of respondents were willing to pay a premium for *Grown in the U.S.* labeled apples and 72% of the respondents were willing to pay a premium for U.S. origin-labeled tomatoes. Average WTP premiums for labeled products were $0.49 for apples and $0.48 for tomatoes. Older and wealthier people had lower WTP for COOL and WTP varied by locations. Quality perception of food as well as consumer trust in government agencies significantly influenced consumer preferences for COOL. Food safety concerns were the most important factor affecting consumer WTP for COOL.

Previous studies demonstrated that many U.S. consumers are willing to pay a premium for COOL food products. Major factors related to consumer preferences and attitudes toward COOL include perceptions that domestic food products are safer, higher quality, and fresher. However, no previous study has explored changes in consumer valuation for safety, quality, and other product attribute assurances in the presence of a country-of-origin label. Specifically, how much more or less money a consumer is willing to pay for other product quality attributes in the presence of a cue label of COOL has not been explored. Will COOL enhance consumer valuation of other product attributes or substitute for other attributes, making them lower valued? If consumers lower their valuation of product quality attributes with COOL present on the label, producers have less incentive to strive to improve other attribute qualities in the presence of COOL. However, if COOL results in other quality attributes having greater premiums, then producers will have greater incentive to add value to products through higher quality control.

SURVEY DESIGN AND DATA COLLECTION

Typically when eliciting consumer WTP for food quality attributes, the attributes of interest are isolated or partially isolated from other attributes that are not of interest. As a result, the survey regarding consumer preferences for food attributes creates an information environment, which assumes that full information about the product available in the market is included in the survey. However, this assumption, if incorrect, could affect revealed WTP. To test this hypothesis in the presence of COOL we designed two sets of surveys to elicit consumer WTP for 12-oz beef strip loin steak (also known as KC strip) attributes. In one set of the surveys, there is no COOL information; in the other set of surveys, COOL information of the product is provided. The surveys also contain other product attribute information regarding tenderness, leanness, and freshness of the beefsteak. The surveys without COOL information simulate a market in which consumers cannot observe the origin of products whereas they can get information of other product attributes by observing or experiencing the products. The surveys with COOL information simulate a market in which consumers observe the origin of product through the label. In both cases, consumers can express their preferences for the attributes such as tenderness, leanness, and freshness. Therefore, the effects of the COOL information on consumer preferences for other product attributes can be investigated.

We used choice experiment in our study because this method is consistent with Lancaster's (1972) theory of utility maximization, in which consumer utility is expressed as a function of product attributes. In choice experiment, each product is described as a bundle of attributes and consumers are asked to choose one product from a choice set consisting of two or more products (choice). Table 1 shows the attributes used in designing the experiments C4, C5, W3, and W4. The experiments C4 and C5 include the COOL information and the experiments W3 and W4 do not. The numerical index indicates the number of attributes included in each choice experiment, varying from 3 to 5. The particular attributes used in this study were selected because they describe substantial aspects of beefsteak characteristics and reflect concerns of consumers when they make beefsteak purchases.

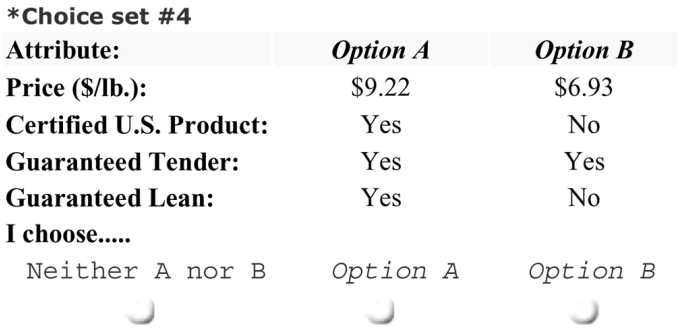
TABLE 1 Attributes Used in Choice Experiments and Surveys

	Survey C		Survey W	
Attribute choice experiment	C4	C5	W3	W4
Certified U.S. product	X	X		
Price	X	X	X	X
Guaranteed tender	X	X	X	X
Guaranteed lean	X	X	X	X
Days before sell-by date		X		X

Tenderness is a key determinant of consumer satisfaction of beef (Dransfield et al., 1998; Sivertsen, KubberØd, & Hildrum, 2002). *Days before Sell-by Date* (normally used as "Sell by dd-mm-yyyy" on most meat products) is a widely used label on food products that indicate product freshness, which affects consumer preferences for steak. Schroeder, Tonsor, Mintert, and Pennings (2006) found that freshness was the most often cited in the five most important product characteristics by U.S. consumers when making beef purchase decisions. Leanness relates to consumer health concerns and is rated as one of the most important attributes of beef products (McCarty, 2006).

In choice experiments, steak price has four levels, varying from \$4.64/lb to \$11.50/lb. Other attributes (U.S. origin, tenderness, and leanness) have two levels each, with or without a specified attribute, and *Days before Sell-by Date* has two levels: *2 days before Sell-by Date* and *8 days before Sell-by Date*. The profiles in the choice experiments are generated using orthogonal fraction design with 100% D-efficiency. Those profiles are randomly paired to create choice sets with dominant choice being removed (Louviere, Hensher, & Swait, 2000, p. 132). To make the choice scenario more realistic, a *None* choice is added to each choice set. Altogether, there are four choice experiments, in each choice experiment there are eight choice sets, in each choice set there are three choices (Figure 1). Respondents taking the choice experiments were asked to choose one choice from each choice set (more details of the design of choice experiment can be obtained from Gao & Schroeder, 2009). Consumer preferences for steak attributes can be indentified from their consecutive choices in a choice experiment.

Using four choice experiments, two surveys were designed, each including two choice experiments. The choice experiment C4 and C5 consists of survey C and choice experiment W3 and W4 consists of survey W. As a result, we could send out two sets of surveys to two samples of respondents rather than send out four sets of surveys in which each survey only consisted of one choice experiment. Therefore, the cost of conducting surveys could be reduced. The respondents in each sample completed two choice experiments (C4 and C5 in survey C or W3 and W4 in survey W),


*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 set used in choice experiment of choice experiment.

in which the number of attributes changed. The availability of COOL information remained unchanged within C or W but changed across C and W.

The surveys were sent out by e-Rewards, Inc., an online survey company, to 1,100 Chicago residents in November 2006. Each survey went to 550 online panel members. We discontinued the survey after we received approximately 75 completes for each survey because of our budget

TABLE 2 Means and Standard Deviations of Respondent Demographics by Survey[a,b]

Demographic	Survey C	Survey W
Age (years)	45.46	44.33
	(11.91)	(12.30)
Income[c]	6.30	6.35
	(2.12)	(2.36)
# of adults[d]	2.00	1.94
	(0.79)	(0.72)
# of children[e]	0.30	0.47
	(0.69)	(0.83)
Gender[f]		
Male	36%	59%
Female	64%	41%
Education[g]		
1	0%	0%
2	5%	1%
3	29%	24%
4	33%	41%
5	33%	33%
Marital status		
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

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[a]Reported statistics of Age, Income, # of adults, and # of children are mean values.

[b]The numbers in parentheses are standard deviations.

[c]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.

[d]# of adults: Number of people 18 years old and older living in household.

[e]# of children: Number of children less than 18 years old living in household.

[f]Reported statistics of Gender, Education, Marriage, and Employment are frequency of the variable levels among respondents.

[g]Education: 1 = First through eighth grade; 2 = Some high school or high school graduate; 3 = Some college/2-year associate degree; 4 = 4-year college degree; 5 = Master's or doctoral degree.

constraint. We have 76 and 78 respondents in survey C and survey W, respectively. Table 2 reports summary statistics of demographics for the two completed surveys. There is no statistical significant difference between the two consumer groups for all demographic variables at 5% significance level.

RANDOM PARAMETERS LOGIT MODELS

To complete the objectives of this project, we use standard random parameters logit models as follows. Consumer utility function is specified as

$$U_{ij} = \alpha \cdot p_{ij} + \delta'_{ij} \cdot X_{ij} + \varepsilon_{ij}. \quad (1)$$

For the choice experiments including the cue attribute, the utility function is

$$U_{ij} = \alpha^* \cdot p_{ij} + \beta_1 \cdot COOL_{ij} + \delta^{*\prime}_{ij} \cdot X_{ij} + \varepsilon_{ij}, \quad (2)$$

where i indicates consumer i, j indicates product j, p is price, $COOL$ is a binary variable indicating if the product has an origin label ($COOL = 1$ for survey C and $COOL = 0$ for survey W), and X are other product attributes. The changes in the parameters from α to α^* for price and from δ_{ij} to α^*_{ij} for other attributes is a result of the proxy effects of cue attribute or the effects of increasing the number of product attributes revealed. An increase in the number of product attributes present may decrease the marginal utility of attributes or increase the efforts of consumer to process more attribute information (Lusk, 2003; Swait & Adamowicz, 2001). The coefficient of price in the utility function is estimated as a nonrandom parameter and the coefficients of other attributes are estimated as random parameters with normal distribution. Specifically, $\delta_{ij} = \overline{\delta}_j + \Gamma\nu_{ij} = \overline{\delta}_j + \mu_{ij}$, where $\overline{\delta}$ is the mean valuation of attributes of all consumers, Γ is a Cholesky matrix, and μ_{ij} is the random variable capture the variation in consumer preferences (Hensher, Rose, & Greene, 2005). Not allowing price to be random with normal distribution ensures that no positive estimates of the price coefficients occur, which is consistent with the negative price-demand relationship. Allowing parameters of other beef attributes to be random helps capture heterogeneous preferences among consumers and correlation among attributes or alternatives. In addition, random parameters models avoid the limitation of independence from irrelevant alternatives of traditional multinomial logit models (Hensher et al., 2005).

RESULTS

Estimation of the Models and WTP

Table 3 reports estimates of the parameters for the random parameters logit models in the different experiments. All estimated coefficients have the

TABLE 3 Estimate of Random Parameters Logit Models in Choice Experiments

Choice experiment	Coefficient			
Independent variable	C4	C5	W3	W4
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

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[a]The numbers in parentheses are *p* values.

expected signs with the price coefficients negative and other attribute coefficients nonnegative. The estimates also indicate presence of statistically significant heterogeneous preferences for all beefsteak attributes across surveyed consumers. In addition, correlations between the coefficients of beefsteak attributes are rejected for choice experiments C5 and W3 but not for choice experiments C4 and W4 at the 5% significance level.

With the estimates of the mean and standard deviation of coefficients, 1,000 coefficients of those random parameters were simulated. Consumer WTP for a beefsteak attribute is calculated as $WTP_k = \delta_k/\alpha$, 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 nonrandom, the simulated WTP is normally distributed. Table 4 reports the means and standard deviations for the simulated WTP estimates for each steak attribute by survey. All mean WTP estimates are statistically significantly different from zero at the 5% significance level. Consumers reveal the largest WTP for *Certified U.S. Product* in the survey C and most prefer *Guaranteed Tender* in survey W. WTP ranked order is *Certified U.S. Product, Guaranteed Tender*, and *Guaranteed Lean* with near zero value for *Days before Sell-by Date*. The large WTP for *Certified U.S Product* in the choice experiment C5 is a curious result given that all that changed between C4 and C5 was adding the *Days before Sell-by Date* in C5. The magnitudes of all WTP estimates are subject to well-known potential bias in hypothetical surveys such as ours. However, it could be that more attribute information in choice experiment C5 contributed to changing consumer evaluation of product attributes. Hensher (2006) showed that with an

TABLE 4 Mean and Variance of WTP in Choice Experiments

Choice experiment	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)

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[a]WTP values are derived from models in Table 3. WTP values are dollars for a 12-oz beefsteak.

[b]Total WTP are the sum of WTP for all individual attributes in each choice experiment.

[c]Reported statistics are mean of 1,000 simulated WTP estimations.

Q7 [e]Values in parenthesis are the standard deviation of WTP.

*Indicates statistically significantly different from zero at 5% significance level.

increase in the number of attributes in a choice experiment, consumer valuation of some attributes increased whereas the valuation of others decreased. Gao and Schroeder (2009) demonstrated that the number of attributes in a choice experiment had quadratic relationships with consumer WTP for some product attributes.

Changes in the WTP With the Presence of the COOL Information

In order to study the impacts of COOL information on consumer WTP for other beefsteak attributes, we compared differences between WTP elicited from the different choice experiments. In the comparisons, all other attributes are held constant, with the only difference between the two choice experiments being the availability of COOL information (i.e., *Certified U.S. Product* or not). With the presence of *Certified U.S. Product* labeling, the mean of total WTP (WTP from W3 vs. C4 and W4 vs. C5) and the WTP for other beefsteak attributes such as *Guaranteed Lean, Guaranteed Tender,* and *Days before Sell-by Date* increase (Table 4). 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. Because simulated WTP estimates are independently normally distributed, mean WTP from different choice experiments can be compared using a t test. The null hypothesis that the sample means are the same for the WTP estimated from the choice experiments with and without COOL information is rejected for all comparisons at the 5% 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 null hypothesis of equal variance of WTP between choice experiments is rejected 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% significance level. In the four comparisons that reject the null hypothesis, the variances of WTP increase after consumers have COOL information in the choice experiments. This implies that COOL information not only increases consumer average valuation of some of other attributes, it also results in more heterogeneous preferences among consumers. This is consistent with Swait and Adamowicz (2001), who demonstrated that the preference variance of consumers can be affected by the complexity of decision environment.

The presence of the COOL information in a choice experiment could increase the complexity of consumer decision context by the increase in the number of product attributes. We ran a stacked regression with consumer WTP for each noncue attribute as the dependent variable and the presence of COOL information and the number of product attributes in each choice experiment as independent variables to separate the effects of COOL information from other factors. Because consumer preference variance has a concave relationship with the complexity of choice context (Swait & Adamowicz,

2001), we specified the WTP as a quadratic function of the number of beefsteak attributes in each choice experiment. Specifically, the model we estimated is as follows:

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

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

$$X_1 = [Tender \quad Lean \quad Total],$$
$$X_2 = [CO \cdot Tender \quad CO \cdot Lean \quad CO \cdot Sell \quad CO \cdot Total],$$
$$X_3 = [Att \cdot Tender \quad Att \cdot Lean \quad Att \cdot Total], and$$
$$X_4 = [Att^2 \cdot Tender \quad Att^2 \cdot Lean \quad Att^2 \cdot Total]$$

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 that indicates if the WTP is estimated from a choice experiment with *Certified U.S. Product, Att* is the number of beefsteak attributes in the choice experiment, and $\varepsilon = \mu_n + \xi_{ni}$ is a random error with normal distribution. The random effects model was estimated to capture unobservable factors in each choice experiment that may affect consumer preferences. The Breusch and Pagan LM test was used to test null hypothesis that the variance of μ_n equals zero. Our results cannot reject the null hypothesis at the 5% significance level.

The marginal effect of the COOL information on the WTP is θ, and the marginal effect of the number of attributes is $\lambda + 2\kappa \cdot X_4$. Table 5 reports the estimation results in which Column 1 contains estimates of α and β, Column 2 the estimate of θ, Column 3 the estimate of λ, and Column 4 the estimate of κ.

TABLE 5 Regression Model Estimates of WTP as a Function of Multiple Factors

WTP 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 parentheses are the *p* values.

Results show that COOL information significantly increases consumer total WTP and WTP for *Guaranteed Lean*[3] at the 5% significance level but does not have significant impacts on consumer WTP for *Guaranteed Tender*. The number of product attributes has significant impacts on consumer total WTP and WTP for *Guaranteed Tender* at the 5% significance level (Table 5). Number of attributes only has statistically significant impacts on consumer WTP for *Guaranteed Lean* at 5% significance level when the number of steak attributes is five. Combined with the impacts of COOL information on consumer WTP, results imply that the number of beefsteak attributes has larger impacts on *Guaranteed Tender*, whereas COOL information has larger positive impacts on consumer WTP for *Guaranteed Lean*. We also test the equality of the impacts of COOL information on consumer WTP for different beefsteak attributes. Our tests shows that the impact of COOL information on consumer WTP for *Guaranteed Lean* and *Days before Sell-by Date* are not statistically significant at the 5% significance level, whereas all other comparisons are statistically significant at the 5% significance level.

CONCLUSION

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, in which case the cue attribute may be a proxy for overall or part of product quality. By investigating changes in consumer WTP for beefsteak attributes in the presence or absence of COOL information, we show that consumer preferences for some steak attributes change significantly. COOL information significantly affects consumer total WTP, implying that this attribute impacts the evaluation of beefsteak products and consumers are willing to pay more for products with a COOL label. However, the presence of cue information does not necessarily imply higher food quality, and an example in our case is *Guaranteed Tender*. Consumers are willing to pay \$4 to \$5 for *Guaranteed Tender*; this attribute is one of the most important factors affecting consumer beef preference regardless of origin label presence. Therefore, by labeling their product as *Certified U.S. Product*, food companies do not need to worry that they will deteriorate added value associated with beefsteak tenderness. However, consumers are willing to pay more for product leanness of the beefsteaks in the presence of *Certified U.S. Product* labels. This suggests that beefsteak leanness is a complement of COOL.

In our study, we are unable to separate the symbolic and emotional aspects of country of origin from its role as a product cue (Verlegh & Steenkamp, 1999). This makes it difficult for producer decisions on overall quality improvement when they label their products with country of origin.

If consumer WTP for COOL are mainly from symbolic and emotional effects of country of origin, food producers can label their products with COOL without concern about whether it improves overall product quality. The same logic may also be applied to other cue attributes such as "Organic" and "Local" products. If consumers buy those products simply because they "feel good" about protecting the environment or want to subsidize organic farmers (Chang & Lusk, 2008) or due to other reasons not related to component attributes of product, then producers can gain comparative advantages by labeling their products as it is.

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. COOL was mandatory for fish and shellfish in 2004 and is required for other covered commodity such as beef, lamb, chicken, and so on, 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. There are no interaction terms between *Days before Sell-by Date* and the number of attributes because in our design of survey, the number of attributes in a choice experiment is determined by the presence of COOL information. Five attributes corresponding to presence of COOL information, and four attributes corresponding to absence of COOL information.

3. For *Days before Sell-by Date*, the effects of COOL information and number of beefsteak attributes are compounded. Due to our design of the survey, we cannot separate those two effects.

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CONTRIBUTORS

Zhifeng Gao is Assistant Research Scientist, Food and Resource Economics Department, University of Florida.

Ted C. Schroeder is Professor, Department of Agricultural Economics, Kansas State University.

Xiaohua Yu is Doctoral Candidate, Agricultural, Environmental & Regional Economics and Demography, The Pennsylvania State University.