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## Consumer Willingness-to-Pay for Fresh Pork Attributes

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A survey was used to gauge consumer preferences toward four fresh pork attributes: juiciness, tenderness, marbling, and leanness. The survey elicited consumer willingness-to-pay a premium for an improvement in these attributes. Approximately one-half of the respondents were willing to pay some premium for the attributes of juiciness, leanness, and tenderness. The average premium size ranged from \$0.20/lb. for marbling to \$0.37/lb. for tenderness. Neither the choice of a certifying agency nor the use of a cheap talk script influenced premium levels.

**Key Words:** pork attributes, pork markets, willingness to pay

Consumers increasingly demand specific attributes when purchasing food products. This trend is triggering major changes in agricultural production and in the food industry (Barkema, Drabenstott, and Novack, 2001). While a great deal of consumer research has focused on beef (Moschini and Meike, 1989; Anderson and Shugan, 1991; Unnevehr and Bard, 1993; Lusk and Schroeder, 2004), relatively little is known about attributes that are important in consumers' decisions to purchase pork products. The pork industry has used the slogan 'The Other White Meat' to capitalize on growing consumer awareness of diet-chronic disease linkages, but whether the campaign was successful in increasing pork consumption is not certain (Coulibaly and Brorsen, 1999). The pork industry must be knowledgeable about the characteristics consumers expect from fresh pork products in order to position and promote pork effectively in the competitive meat market. Indeed, some niche pork marketers such as Minnesota Certified Pork have tried and failed to anticipate consumer demand (Vansickle, 2003). Others, such as Meadowbrook Farms, are attempting to capitalize on specialty pork (Prairie Farmer, 2004). Often times, these ventures are viewed as a way to preserve "family" production units by providing them market access as well as ownership in processing facilities. Given the large investment required to construct slaughter facilities, agribusinesses need to understand the attributes for which consumers are willing to pay prior to undertaking the investment.

This research study originated with the Illinois Pork Producers Association's query about the feasibility of a value-added or premium Illinois pork product.

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Therefore, the overall objective of our study was to examine preferences of Illinois consumers for attributes associated with fresh (not further processed) pork products, specifically pork chops. We pursued this objective by analyzing whether and how much consumers would be willing to pay for a fresh pork product certified to be superior to regular pork products in terms of four taste-related attributes: tenderness, juiciness, leanness, and marbling. Although a range of visual attributes, such as color, could also be considered in studying consumer preferences for fresh pork products, Melton et al. (1996) showed that consumer evaluation of pork chops based on photographs were an unreliable source of predicting demand. Therefore, we focused on taste-related attributes. Specifically, contingent valuation methods were used to elicit consumers' willingness-to-pay for each of the selected fresh pork attributes.

In the following section, we describe the conceptual valuation method used to assess consumers' willingness-to-pay. Then the survey design is presented, followed by a presentation of the descriptive statistics. In the final part of the data analysis, the econometric methods are estimated and discussed. The paper concludes with a discussion of the results and ramifications for potential entrants into the premium pork market.

### Conceptual Model

Contingent valuation methods conceptually rest on equivalent or compensating variation (CV) to value welfare changes in the form of consumers' willingness-to-pay (WTP). CV represents the amount of income that should be taken away from a consumer to restore welfare back to the original indifference curve after a change (e.g., price decrease). CV can be interpreted as the maximum amount of money that consumers would be willing to pay to obtain the welfare gain associated with the price decrease. Using an indirect utility function ( $V$ ) with two goods ( $X_1$  and  $X_2$ ), the CV associated with a price decrease in  $X_1$  from  $P_1^1$  to  $P_1^2$  is the solution to the following equation (Freeman, 1993):

$$(1) \quad V(P_1^1, P_2, M) = V(P_1^2, P_2, M - CV) = U_0.$$

Equation (1) indicates the reduction in income ( $M$ ) needed to hold the consumer at the welfare level associated with the initial price,  $P_1^1$ .

Following Lancaster (1971), the value consumers place on attributes can be measured by comparing welfare levels before and after a change in an attribute. Van Ravenswaay and Hoehn (1991) adapted Lancaster's characteristics model to a single product case and derived a willingness-to-pay expression for an attribute change:

$$(2) \quad WTP = (P_1^1 - P_1^0) \times X_1^0,$$

where  $P_1^1$  is the price of  $X_1$  associated with the level of an attribute ( $C_1$ ), and  $P_1^0$  is the price of  $X_1$  associated with another level of the same attribute ( $C_0$ ). Consistent

with prior research, Van Ravenswaay and Hoehn assumed that the quantity of  $X_1$  remains constant. Willingness-to-pay for the attribute change from  $C_0$  to  $C_1$  is theoretically equivalent to the associated price change from  $P^0_1$  to  $P^1_1$ . Instead of a price difference, as in equation (2), willingness-to-pay for an attribute can be expressed as a difference in consumer surpluses associated with attribute levels before and after a change (Lee and Charles, 2001). Based on this theoretical construct, we elicited consumer willingness-to-pay through appropriately designed surveys.

In recent years, contingent valuation has emerged as a useful method for addressing consumer demand for a broad range of attributes associated with food products. For example, Loureiro, McCluskey and Mittelhammer (2002) demonstrated that consumers would be willing to pay a premium for locally or organically grown food products. Using cross-cultural contingent valuation survey, Moon and Balasubramanian (2003) revealed that consumers in the U.S. and U.K. would be willing to pay more for food products made of non-genetically modified ingredients. Recognizing the potential value of contingent valuation methods in agribusiness decision making, Lusk and Hudson (2004) assessed this method as particularly useful to pricing new products or products with novel attributes. In the current study, we followed Lusk and Hudson's recommendation and design a survey that allows us to use CV methods to assess consumers' willingness-to-pay for taste-related pork attributes.

### Survey Design

A survey instrument was designed to collect Illinois consumers' preferences about pork products and to assess the value of four salient taste-related attributes associated with pork products. The instrument includes questions that measure current consumption behavior for five fresh pork products: roasts, chops, steaks, ribs and loins. Additionally, they examine whether respondents are currently purchasing premium-priced pork or beef products, such as Certified Angus Beef. Other questions probe respondents' perceptions of the importance of selected attributes in purchase decisions, attitudes towards marbling, and concerns regarding health-related issues.

The survey consisted of contingent valuation questions designed to explore whether consumers valued hypothetical new pork chops. The pork products were certified to be superior to average USDA-inspected retail pork products in terms of four selected attributes: tenderness, juiciness, marbling and leanness. The CV questions attempted to assess the value that consumers placed on each of the four taste-related attributes. Specifically, two questions were posed for each of the four attributes: (a) a binary question probing whether consumers would be willing to pay a premium to purchase such a certified pork product, and (b) a question eliciting the amount of premium that consumers would be willing to pay to purchase the certified fresh pork product. The second question was posed only to those consumers who responded positively to the first question.

The binary response question for each of the four attributes was posed in the following way:

Suppose that grocery stores carry fresh pork chops that are certified by [*USDA, Illinois Pork Producers Association, or absence of certifying agency*] to be consistently [*juicier, leaner, more tender, more marbled*] than standard USDA inspected products. Would you be willing to pay a premium to purchase such a certified pork chop?

Subsequently, a scenario was presented to elicit the amount of premium that respondents would be willing to pay:

Suppose that a standard pork chop is \$3.00 per pound. What is the maximum amount of premium per pound that you would be willing to pay to purchase a pork chop that is certified by [*USDA, Illinois Pork Producers Association, or absence of certifying agency*] to be consistently [*juicier, leaner, more tender, more marbled*] than standard USDA inspected pork products?

A \$3.00 pork chop was used as a reference product because pork chops are the most familiar fresh pork product and \$3.00 was a representative market price at the time of the survey. Our study used the payment card method for the scenario above. Contingent valuation questions following this method contain an ordered set of threshold values. The payment card for our study included various sizes of premium ranging from \$0.00 to \$1.00 (or higher) for a pork chop with a base price of \$3.00. Consumers were asked to look over the range of values and to circle the highest premium they would be willing to pay.

The WTP questions were asked separately in order to value each of the four attributes by themselves. Then, the instrument attempted to value a fresh pork product that would be certified to be consistently more lean, juicy, tender, and marbled than standard USDA inspected products (i.e., all four attributes simultaneously). Importantly, because the USDA does not have established quality grades for pork, the referenced standard product implicitly reflects each respondent's average experience with fresh pork products.

Two experiments were incorporated into the survey. The first was to test whether the certifying agency (or lack thereof) in the CV questions impacted consumers' valuation of the premium pork products. Consumers might attach greater trust to food products that are certified by government or third-party agencies than to food with no certification. Three certification cases were considered in our survey design: (a) United States of Department of Agriculture (USDA), (b) Illinois Pork Producers Association (IPPA), and (c) the absence of any certifying agency description.

The second experiment addressed potential bias that might stem from the hypothetical nature of contingent valuation methods. Hypothetical bias refers to the tendency that respondents have to overstate the amount they are willing to pay for public or private goods of research interest. A number of studies have presented evidence showing that hypothetical transactions are not incentive compatible (e.g.,

Loomis, Gonzalez-Caban, and Gregory, 1994). To test for potential hypothetical bias, our survey design integrated a shortened version of a cheap talk script, which explained the nature of hypothetical bias prior to administration of CV questions (Cummings and Taylor, 1999). Following Lusk (2003), one-half of the respondents received a questionnaire with the shortened cheap talk script, while the other half received a questionnaire without the script. In sum, there were six versions of our survey stemming from the possible combinations of one of three certifying agencies and the presence or absence of the cheap talk script.

The survey instrument was administered in the first quarter of 2004 by mail using household panels maintained by Ipsos-Insight, a private marketing firm specializing in survey research for consumer behavior. A representative sample of 2,500 males and females older than 18 who lived in Illinois and participated in Ipsos-Insight mail panel was recruited. Of those sampled, 1,163 participants responded with completed surveys in a two-week period, yielding a response rate of 47%.

Table 1 presents the socio-demographic composition of our sample and compares it to the U.S. and Illinois year 2000 census. The percentage of female respondents (78.4 %) was much higher in our data than the general population of Illinois (51%) and the U.S. (51%), reflecting that women “do most of the grocery shopping.” The percentage of minorities (Black, 9.2%, Hispanic, 2.1%, and Asian 0.9%) was noticeably lower than the general population of Illinois and U.S. as a whole. Over 78% of respondents were high school graduates, and 26.6% had bachelor’s degree, comparable to the state and U.S. census numbers. The average household size was 2.50, comparable to 2.63 in Illinois and 2.59 in the U.S. The average income of respondents was \$42,500, which was very close to the \$41,994 of the U.S. Census but noticeably lower than \$46,590 reported by the Illinois census. Overall, except for ethnic composition, the respondents’ demographics were not markedly different from the U.S. and Illinois census numbers, suggesting a fairly representative sample.

## **Data Analysis**

### *Descriptive Statistics*

To provide preliminary insights into the survey data, we conducted descriptive data analyses for some of the key variables of interest. First, the current consumption habits of respondents were solicited as the frequency and type of pork products consumed. Of those surveyed, 88% had eaten fresh pork products in their home or at a restaurant in the preceding four months. Monthly consumption of fresh pork products was highest for pork chops at 2.19 occurrences per month. Pork roasts (1.12), ribs (1.11), steaks (0.94), and loins (0.98) were eaten roughly once per month. In total, fresh pork products were consumed five times per month, or slightly more than once per week.

Focusing on the WTP questions for taste-related attributes, 57% of respondents were willing to pay for tenderness as indicated in their binary response; 50% were willing to pay for juiciness, and 57% were willing to pay for leanness. A minority

of the consumers (26%) were willing to pay a premium for marbling. As one might expect, a product containing all of the attributes was most appealing with 64% of the respondents willing to pay a premium for such a product. Interestingly, 355 (31%) respondents were not willing to pay a premium for any single attribute, whereas 236 (20%) respondents indicated that they were willing to pay for all four attributes.

**Table 1. Survey Sample versus Illinois and U.S. Census**

Demographic Characteristics	Respondents	Illinois	United States
<b>Gender (%)</b>			
Female	78.4	51.0	50.9
<b>Ethnicity (%)</b>			
White	88.7	73.5	75.1
Black	9.2	15.1	12.3
Asian	0.9	3.4	3.6
Hispanic	2.1	12.3	12.5
<b>Education (%)</b>			
High school graduate (FHH <sup>a</sup> )	78.4	81.4	80.4
High school graduate (MHH <sup>b</sup> )	90.8		
Bachelor's degree (FHH)	26.6	26.1	24.4
Bachelor's degree (MHH)	33.6		
<b>Household size</b> (members)	2.5	2.63	2.59
<b>Household income</b> (\$)	42,500	46,590	41,994

*Note:* Illinois and United States demographics are obtained from 2000 U.S. Census and are available online at <http://quickfacts.census.gov>.

<sup>a</sup>FHH, female head of household.

<sup>b</sup>MHH, male head of household.

Not surprisingly, the results indicate that a significant portion of consumers were willing to pay a premium price for a superior product. However, our goal was to gauge the magnitude of the premium they would be willing to pay for the attributes. Accordingly, the survey instrument posed a payment card ranging from \$0.00 to \$1.00 (or more) to respondents. Consumers expressed a willingness to pay \$0.37/lb., on average, for guaranteed juiciness and tenderness. Leanness was a bit lower, at \$0.33/lb. However, multiple attributes command a higher \$0.39/lb. premium.

Consumers expressed a statistically smaller premium for guaranteed marbling at \$0.20/lb. (two-tailed t-test, 1% level), even though marbling is strongly linked to the desirable characteristics of juiciness and tenderness. Other researchers have shown that consumers are confused about the desirability of marbling and its association with other meat characteristics (Brendahl, Grunert, and Fertin, 1998) or that they do not understand the linkages between appearance and taste (Melton, Huffman, and Shogren, 1996). Consistent with these findings, only 6% of our respondents agreed

with the following statement: “Marbling is a desirable characteristic of fresh pork products.” This result indicates that consumer education efforts might be needed to advance the marketing of value-added premium pork products. Alternatively, consumers might believe that standard pork products are sufficiently marbled; therefore, they would place little emphasis on improving that attribute.

Collectively, these results suggest that there is a reasonably high willingness to pay for guaranteed quality attributes. However, for each attribute (and multiple attributes), the most frequent payment category indicated was a zero premium. This finding suggests a degree of segmentation in the marketplace, where some consumers simply will not participate in a premium pork market, possibly because they are already satisfied with current purchases.

*Econometric Models*

Estimation Methods

Given that the survey asked consumers both binary and payment card willingness-to-pay questions, we developed regression models to probe two decisions separately: (a) whether or not to pay a premium and (b) how much to pay. We estimated the first decision using the Probit procedure and the second decision using a payment card interval data model. Because the CV questions generated value responses in the form of intervals rather than point estimates, midpoints of the intervals could be used as approximations of the true unobserved values and as the dependent variable in an ordinary least square (OLS) regression. Given that the expected values within intervals are not necessarily equal to interval midpoints, Cameron and Huppert (1989) proposed the maximum likelihood (ML) estimation procedure, where the model underlying the ML estimator is given by following system (Stewart, 1983):

$$(3) \quad W_i^* = \mathbf{X}\boldsymbol{\beta} + \varepsilon_i,$$

and where,

$$W_i = P_{j-1}, \text{ if } P_{j-1} \leq W_i^* < P_j, \quad i = 1, 2, 3, \dots, n; \quad j = 1, 2, 3, \dots, m.$$

$W_i^*$  is the unobserved true WTP;  $\mathbf{X}$  is a vector of variables explaining the decision of how much more to pay for value-added pork chops;  $W_i$  is grouped-observed WTP; and  $P_j$  represents observed threshold values for each WTP category. The likelihood function depicting the above model is given by

$$(4) \quad L = [\Phi(P_j - \mathbf{X}\boldsymbol{\beta})/\sigma - \Phi(P_{j-1} - \mathbf{X}\boldsymbol{\beta})/\sigma]^{D_{ij}},$$

where,  $D_{ij}$  is one if  $W_i^*$  falls in the  $j$ th category and zero otherwise. The likelihood function is maximized with respect to the vector of parameters ( $\boldsymbol{\beta}$ ) using nonlinear

optimization algorithms. Given the presence of threshold values ( $P_j$ ) in the likelihood function,  $\beta$  represents a vector of marginal changes.

### Model Specification

We used WTP values ( $W_i$ ) as dependent variables in our regression models. Basic model specification in this study (i.e., identifying the components of the vector  $\mathbf{X}$ ) was guided by Fishbein's (1967) multiattribute model in which attitude/behavior toward an object is determined by how consumers perceive the attributes associated with the object (Azjen and Fishbein, 1980). We adapted Fishbein's (1967) model to link behavioral intentions (as measured with willingness-to-pay) to pork chops' salient attributes such as leanness, tenderness, juiciness, marbling, and price. Equation (5) presents the empirical model specification:

$$(5) \quad WTP_{ij} = f(\text{Price, Juiciness, Tenderness, Marbling, Leanness, PorkPremium, BeefPremium, Cheaptalk, NoAgency, IPPA, Knowledge of Marbling, Health Concerns, demographic profile}),$$

where, subscript  $i$  denotes respondents and  $j$  represents the type of attributes being valued. Table 2 presents a detailed description of explanatory variables and question items that were used to construct indices of health concern and perceived marbling.

The model includes consumer perceptions about pork attributes including price, juiciness, tenderness, marbling, and leanness. In addition, the equation encompasses a number of other variables. First, consumers' willingness-to-pay is hypothesized to be determined by their current meat consumption behavior, including whether they have purchased branded or premium-priced fresh pork or beef in the past four months. *PorkPremium* is defined as a binary variable indicating whether respondents have purchased branded or premium-priced fresh pork for use at home in the past four months. Similarly, *BeefPremium* is a binary variable representing respondents' participation in premium beef market such as Certified Angus Beef.

Furthermore, the premium pork WTP models include some experimental binary variables and socio-demographic characteristics. *Cheaptalk* is a dummy variable denoting whether the cheap talk script was present in the questionnaire; *NoAgency* and *IPPA* represent binary variables indicating the absence of a certification agency and Illinois Pork Producers Association as the certification agency, respectively. The USDA was used as a reference base and dropped from the model. *Socio-demographic profile* include Age, Gender, Income, Education, Household Size, and Racial Background.

**Table 2. Definitions of Variables in Statistical Models**

Variable	Description	Mean	Std. Dev.
CheapTalk	= 1 if exposed to the script; = 0 otherwise	49%	
NoAgency	= 1 if no description of agency is provided; = 0 otherwise	34%	
IPPA	= 1 if IPPA is the certifying agency; = 0 otherwise	32%	
PorkPremium	= 1 if purchased premium-priced pork before; = 0 otherwise	64%	
BeefPremium	= 1 if purchased premium-priced beef before; = 0 otherwise	59%	
Perceived attributes <sup>a</sup>	(1 = strongly disagree, 6 = strongly agree)		
Juiciness	Juiciness is an important consideration when I buy pork	4.58	1.07
Tenderness	Tenderness is an important consideration when I buy pork	4.96	1.45
Marbling	Marbling is an important consideration when I buy pork	4.07	1.89
Leanness	Leanness is an important consideration when I buy pork	4.77	0.97
Price	Price is an important consideration when I buy pork	4.94	1.12
TasteMost	Taste is more important than any other attribute when I buy pork	4.58	1.32
HealthConcern <sup>b</sup>	Composite index constructed of the following questions (1 = not at all, 5 = extremely well)	3.33	1.12
Salt	I am concerned about the amount of salt in my diet	3.27	0.91
Fruit	I eat a lot of fresh fruit	3.45	1.03
Vegetables	I eat a lot of fresh vegetables	3.55	1.21
Fat	I am trying to consume less fat in my diet	3.53	0.76
Cholesterol	I am trying to consume less cholesterol in my diet	3.36	0.85
Diet & Diseases	I am concerned about diet-diseases linkages	3.47	1.09
MarblingKnow <sup>a</sup>	Composite index constructed of the following questions (1 = strongly disagree, 6 = strongly agree)	3.45	1.27
Desirable	Marbling is a desirable characteristics of fresh pork products	3.22	1.49

(continued . . .)

**Table 2. Continued**

Variable	Description	Mean	Std. Dev.
Juicy	Marbling makes fresh pork products more juicy and tender	3.72	1.36
Quality	The more marbling, the higher the product quality	3.06	1.12
Socio-demographics			
Age	Age (years)	50.4	15.5
Gender	= 1 if male; = 0 otherwise	0.78	
Income	1 = under \$7,500; 2 = \$7,500–9,999; 3 = \$10,000–12,499; 4 = \$12,500–14,999; 5 = \$15,000–19,999; 6 = \$20,000–24,999; 7 = \$25,000–29,999; 8 = \$30,000–34,999; 9 = \$35,000–39,999; 10 = \$40,000–44,999; 11 = \$45,000–49,999; 12 = \$50,000–54,999; 13 = \$55,000–59,999; 14 = \$60,000–64,999; 15 = \$65,000–74,999; 16 = \$75,000–99,999; 17 = \$100,000–149,999; 18 = \$150,000–199,999; 19 = \$200,000 or more	10.34	3.85
Education	1 = grade school; 2 = some high school; 3 = high school graduates; 4 = some college; 5 = college graduates; 6 = post college education	4.3	1.95
Race	RaceBlack = 1, otherwise = 0	9.43%	
	RaceAsian = 1; otherwise = 0	0.88%	

<sup>a</sup> Perceived attributes and MarblingKnow are measured with a six-point scale ranging from “Strongly Disagree = 1” to “Strongly Agree = 6.”

<sup>b</sup> HealthConcern is measured with a five-point scale measuring how well the statement describes the consumer, ranging from “Not at all = 1” to “Extremely Well = 5.”

We also hypothesized that respondents’ level of health conscientiousness might be pertinent in explaining willingness-to-pay for premium pork products, particularly for the leanness attribute. We constructed an index of health concern based on six question items measuring respondents’ degree of concern about the linkages between diet and chronic diseases. Finally, marbling perceptions (*MarblingKnow*) was included in the WTP model for the attribute of marbling. *MarblingKnow* measures consumers’ perceptions of the role of marbling in determining the quality of fresh pork products.

### Estimation Results

Table 3 presents the results of Probit models estimating the binary willingness-to-pay, and table 4 displays the payment card regression results indicating the amount

of premium for each attribute. The collective results show that cheap talk script parameters were not statistically significant, suggesting that the valuation of premium pork products did not suffer from a measurable bias due to the hypothetical nature of the contingent valuation study. Alternatively, the length of the script that was used in our survey might not have been effective (Cummings and Taylor, 1999). Similarly, the dummy variables (*NoAgency* and *IPPA*) for certification agencies were not statistically significant, indicating that certification, or lack thereof, did not shape consumers' willingness-to-pay for premium pork. This result might stem from a lack of well-defined quality grades in the pork market and is in contrast to previous research showing the value of USDA labeling (Hui, McLean-Meyinsse, and Jones, 1995).

**Table 3. Willingness-to-Pay: Probit Models**

Variables	Estimated Parameter ( <i>t</i> -ratio)			
	Juiciness	Tenderness	Marbling	Leanness
Constant	-0.776* (-1.95)	-0.880** (-2.16)	-2.365** (-5.38)	-1.67** (-4.02)
CheapTalk	0.053 (0.63)	0.089 (1.04)	0.058 (0.601)	0.055 (0.65)
NoAgency	0.059 (0.57)	0.064 (0.611)	0.132 (1.13)	-0.064 (-0.62)
IPPA	0.137 (1.31)	0.166 (1.58)	0.042 (0.35)	0.070 (0.67)
PorkPremium	0.414** (4.30)	0.407** (4.21)	0.282** (2.43)	0.282** (2.93)
BeefPremium	0.297** (3.18)	0.289** (3.07)	0.386** (3.51)	0.327** (3.50)
Juiciness	0.252** (6.64)	--	--	--
Tenderness	--	0.310** (6.89)	--	--
Marbling	--	--	0.211** (5.38)	--
Leanness	--	--	--	0.306** (7.07)
Price	-0.301** (-8.11)	-0.287** (-7.14)	-0.156** (-4.09)	-0.176** (-4.54)
TasteMost	--	--	--	-0.037 (-1.05)
AverageHealth	0.046 (0.84)	0.045 (0.82)	0.000 (0.03)	0.225** (4.00)
MarblingKnow	--	--	0.367** (8.63)	--

(continued . . .)

**Table 3. Continued**

Variables	Estimated Parameter ( <i>t</i> -ratio)			
	Juiciness	Tenderness	Marbling	Leanness
Age	0.004 (1.29)	-0.001 (-0.27)	-0.004 (-1.08)	-0.007** (-2.05)
Sex	-0.088 (-0.63)	0.070 (0.50)	-0.142 (-0.82)	0.037 (0.25)
Income	0.009 (1.41)	0.013* (1.96)	-0.009 (-1.20)	0.009 (1.48)
Education	0.016 (0.57)	0.000 (0.02)	0.032 (0.92)	0.026 (0.89)
HouseHoldSize	0.025 (0.69)	-0.018 (-0.48)	0.017 (0.41)	-0.012 (-0.32)
RaceBlack	0.230 (1.50)	0.569** (3.36)	0.476** (2.90)	0.371** (2.30)
RaceAsian	-0.142 (-0.31)	-0.190 (-0.43)	-0.784 (-1.20)	-0.474 (-0.99)
RaceOther	0.129 (0.29)	-0.315 (-0.72)	-0.150 (-0.33)	-0.138 (-0.31)
Log likelihood	-601.4	-588.8	-451.8	-596.4
LR (zero slopes)	163.0**	160.9**	210.1**	149.1**

Note: Single and double asterisks (\*) denote statistical significance at the .10 and .05 levels, respectively.

**Table 4. Willingness-to-Pay: Payment Card Regression Models**

Variables	Estimated Parameter ( <i>t</i> -ratio)			
	Juiciness	Tenderness	Marbling	Leanness
Constant	0.085 (0.82)	0.154 (1.43)	-0.128* (-1.67)	0.007 (0.062)
CheapTalk	0.013 (0.63)	0.013 (0.55)	0.015 (0.87)	-0.004 (-0.181)
NoAgency	0.007 (0.28)	0.007 (0.27)	0.037* (1.77)	0.012 (0.428)
IPPA	-0.011 (-0.41)	-0.029 (-1.03)	-0.011 (-0.52)	-0.019 (-0.696)
PurchasedPork	0.091** (3.26)	0.086** (3.27)	0.034* (1.72)	0.051** (1.99)
PurchasedBeef	0.063** (2.56)	0.062** (2.43)	0.051** (2.67)	0.066** (2.64)
Juiciness	0.045** (4.74)	--	--	--

(continued . . .)

**Table 4. Continued**

Variables	Estimated Parameter ( <i>t</i> -ratio)			
	Juiciness	Tenderness	Marbling	Leanness
Tenderness	--	0.052** (4.50)	--	--
Marbling	--	--	0.024** (3.67)	--
Leanness	--	--	--	0.062** (5.87)
Price	-0.061** (-6.81)	-0.064** (-6.65)	-0.018** (-2.65)	-0.036** (-3.73)
TasteMost	--	--	--	0.10 (-1.16)
AverageHealth	0.023 (1.62)	0.024* (1.67)	0.000 (0.21)	0.048** (3.29)
MarblingKnow	--	--	0.054** (7.41)	--
Age	0.001* (1.71)	0.000 (0.46)	0.000 (0.16)	-0.001 (-0.92)
Sex	-0.022 (-0.59)	-0.008 (-0.21)	-0.003 (-0.12)	-0.023 (-0.62)
Income	0.002 (0.91)	0.001 (0.75)	-0.000 (-0.16)	-0.000 (-0.21)
Education	0.004 (0.53)	-0.001 (-0.12)	0.001 (0.17)	0.001 (0.17)
HouseHoldSize	0.014 (1.51)	0.009 (0.93)	0.003 (0.38)	0.006 (0.63)
RaceBlack	0.116** (2.93)	0.182** (4.41)	0.161** (5.18)	0.163** (4.03)
RaceAsian	-0.092 (-0.80)	-0.139 (-1.15)	-0.109 (-1.23)	-0.092 (-0.78)
RaceOther	-0.081 (-0.74)	-0.182 (-1.60)	-0.094 (-1.12)	-0.199* (-1.79)
Log likelihood	-2,445	-2,380	-1,843	-2,331
Log-L ( $\beta = 0$ )	-2,495	-2,443	-1,899	-2,403
$\chi^2$ Value	100**	126**	112**	144**

Note: Single and double asterisks (\*) denote statistical significance at the .10 and .05 levels, respectively.

Past purchasing behavior (as represented by *PorkPremium* and *BeefPremium*) had a statistically significant effect both on the probability of willingness-to-pay and the size of premium. Consumers who had past experience with purchasing premium

meat were more likely to pay a premium for quality-enhanced fresh pork products, and the size of their premium was greater than those with no experience with purchasing premium meat products.

Perceived importance of the quality attributes in purchasing decisions exerted a highly significant impact on shaping consumers' willingness-to-pay. For example, if consumers highly regarded juiciness as a factor in their pork purchase decisions, they had a greater likelihood of participating in premium pork market; moreover, they were also likely to pay larger amounts of premium compared to consumers who gave relatively low weight to the attribute of juiciness. Furthermore, as hypothesized, perceived importance of price was negatively associated with the decision to participate in premium pork market and the amount of premium to pay.

Health concern had the expected impact: health concern was positively and significantly linked to consumers' willingness-to-pay only for the attribute of leanness, while not generally significant in equations representing other attributes. This result indicates that consumers with high health concern would be more willing to pay a premium for fresh pork products guaranteed to be lean than those with lower health concerns. Marbling perceptions were highly significant and positively associated with the willingness-to-pay for fresh pork products guaranteed to have consistently more marbling; those consumers who understood marbling's impact on quality were willing to pay for that attribute. These results are suggestive of niche markets for leaner products for consumers who are health-conscious and for products with more marbling for consumers who value marbling in fresh pork products.

Some socio-demographic characteristics were important in determining willingness-to-pay for premium pork products. For example, when compared to other races, African Americans were generally more willing to participate in the premium pork market and were predisposed to pay greater amounts of premium for such products. Yet other characteristics, including age, gender, income and education, did not make a significant difference in respondents' willingness-to-pay.

Collectively, the empirical results point to a few key findings. First, those consumers who already participated in value-added or premium markets were most likely to pay for improved pork attributes. Second, consumers' willingness-to-pay for taste-related attributes was strongly related to their perceptions (right or wrong) of that attribute. Those consumers who thought marbling was important were willing to pay for it. Third, those consumers who were highly price sensitive were not likely consumers of premium-priced pork. Fourth, in this sample, consumers did not place a premium on USDA or third party certification. This finding might stem from a lack of guarantees underlying third party certification. Different results might be obtained from private company branding and an associated "money back" guarantee. In a related vein, the lack of certification premiums suggests that state branding (Illinois Pork) might not be particularly meaningful to consumers. Finally, and most importantly, the premium for enhanced quality pork at the retail level could range as high as \$0.39/lb. for multiple quality attributes. This amount represents a premium of 13% on the \$3.00 pork chop used as a reference in the survey

instrument. These results have some important ramifications for agribusinesses considering entry into premium meat markets.

### **Summary and Implications**

Our research analyzed consumer preferences for four taste-related attributes of fresh pork chops: juiciness, tenderness, marbling, and leanness. A survey was used to elicit consumers' WTP premium for an increase or improvement in these attributes. Importantly, this survey assumed that the improvements in these attributes were large enough for consumer recognition. The analysis shows that the percentage of respondents who were willing to pay a premium for fresh pork products guaranteed to be superior to standard products ranged from a low of 26% for marbling to a high of 64% for multiple attributes. Approximately one-half of the respondents were willing to pay premiums for the attributes of juiciness, leanness, and tenderness. The average premium size ranged from \$0.20 for marbling to \$0.37 for tenderness to \$0.39 for multiple attributes of fresh pork products with a base price of \$3.00. The econometric analysis suggests that WTP among consumers was driven by past purchasing behavior, perceived importance of the taste-related attributes, and the level of price sensitivity. Health conscientious consumers expressed a willingness to pay for leanness, while African Americans were the only demographic group to offer a consistently larger premium than the population as a whole. Marbling continues to be a confusing issue for consumers; 74% of those sampled indicated that they would not pay a premium for a better marbled pork chop. This result, along with the willingness-to-pay characteristics, has some straightforward ramifications for producers of value-added or premium pork.

The Minnesota Certified Pork program faltered partially due to a failure to respond to consumer demand and a shortage of capital to fund an effective promotional campaign (Vansickle, 2003). The present study highlights those potential shortfalls. First, the WTP data clearly indicates that the characteristics consumers demand are leanness, juiciness, and tenderness. Indeed, a group of consumers were willing to pay a premium for these attributes. However, they did not necessarily value the marbling associated with these taste-related characteristics. Moreover, the largest single group was unwilling to pay a premium of any size. These results suggest that a large dose of consumer education via a marketing campaign is needed to build a customer base. Our survey indicated that 62% of the respondents were already purchasing what they considered to be a branded or premium pork product. At worst, the market is already satiated. At a minimum, it is highly competitive, and entrants will have to entice new consumers to buy premium products or take market share from existing players. In either case, an effective and prolonged marketing campaign must be financed.

The magnitude of the retail premium is estimated to be \$0.39/lb. or 13% for pork chops with multiple premium-quality attributes. The lowest estimated premium was on marbling (\$0.20) while the highest was on tenderness and juiciness (\$0.37). While these premiums appear substantial, it is not clear whether they are sufficient

to cover incremental production costs. First, even if all fresh pork products garnered a 13% premium, a majority of the carcass would be made into further processed products such as ham, bacon, and sausage, which might not generate any price premium for value-added products. Therefore, it is not clear how much premium is available on a whole-animal basis. Second, the cost of producing the animal might include large incremental costs in terms of rations, genetics, handling, and processing. So while a retail premium might be available, the economic incentives might not be sufficient to justify production. Tackling these difficult questions is one of the important next steps in this line of research.

Overall, the results indicate that there could be a niche market for premium pork products. Potential opportunities are likely to hinge on technical feasibility and the size of additional production costs associated with producing pork products with improved quality in terms of juiciness, tenderness, marbling, and leanness. The results indicate that consumers do value taste-related attributes in pork. However, the market is segmented, and the required investment to meet consumers' preferences must be made with caution.

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