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Regional Differences in Consumer Demand for Beef Rib-Eye Steak Attributes

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Abstract

A choice experiment (conjoint analysis) was used to investigate consumer demand for several beef rib-eye steak attributes. Survey results indicated consumers in the Southeast are less concerned about the use of growth promotants and genetically modified feed in livestock production than are consumers in other areas of the United States. Consumers in the southeastern United States are less averse to abundantly marbled steaks, and they place a higher value on steak tenderness than do consumers in other regions of the country. Results indicate Southeast respondents prefer nonhormone-treated rib-eye steak priced up to $6.30 per pound more than rib-eye steak from beef treated with hormones. These consumers also identified tenderness as an important attribute, with a one-unit increase in the tenderness of a steak (on a scale of 1 to 10) associated with a $1.24 per pound premium.

Introduction

For decades, beef has been marketed as a homogeneous or generic product with little differentiation in quality identification. The U.S. Department of Agriculture (USDA) quality grading system, introduced in 1927, provided a measure for differentiation, but little else has changed in beef differentiation until recent years. The poultry and pork sectors have been more liberal with their differentiation strategies, introducing many branded products to the market. Consumers are often unable to purchase beef based on stated quality characteristics, functional attributes, or previous eating experiences because few identifiable-brand-named beef products exist.

Beef demand has been on the decline in recent years partially as a result of the homogeneous labeling and marketing of the product. USDA data indicate that per capita beef consumption dropped 20 percent from 1970 to 1998, whereas inflation-adjusted retail beef prices declined 25 percent over the same period (LMIC). Much of this demand decline may be attributed to the inability of the beef industry to stay abreast of changing consumer desires. New marketing strategies to increase consumer demand for beef will likely entail product differentiation. In this case, it is important to understand consumer demand for various beef attributes when devising marketing or branding strategies.

Animal and meat scientists have determined that meat tenderness is the single most important palatability attribute of beef (Dikeman 1987; Miller et al. 1995). However, it is unknown whether beef consumers are more concerned about the perceived safety of their food or about inherent palatability attributes, such as tenderness, that beef may possess. Marketers must determine if consumers are more concerned about price, fat, tenderness, safety, or production practices when making beef purchasing decisions. Further, it is important to identify those consumer segments that are more responsive to changes in a particular beef attribute. Understanding the relative importance of such

beef attributes is necessary in predicting the future success of beef products labeled Hormone Free, Guaranteed Tender, or other such differentiated brands.

The goal of this research was to examine the importance of price, marbling, tenderness, use of growth promotants, and use of genetically modified (GM) feed in U.S. consumers' beef steak purchasing decisions. The objectives of this study were to quantify the value consumers place on beef attributes and compare the valuations across regions to determine how alternative differentiation strategies are perceived in different sections of the country. Beef from cattle administered growth promotants or fed GM corn may not be well accepted in one region, yet in another region, these attributes may not be of concern. Consumers in some regions may be more concerned about beef tenderness or fat content when making purchasing decisions.

Research Methods

Because the designations Hormone Free, GM Free, and Guaranteed Tender are not now widely used, actual consumer purchases cannot be used to evaluate the relative importance of many beef steak attributes. Even in markets where All Natural beef is sold, other branded beef substitutes may be unavailable to examine the consumer trade-offs between price, tenderness, marbling, and safety.

To evaluate these attributes, a mail survey was developed. The first section of the survey polled consumers on their economic and demographic characteristics and on their consumption habits. The second section used consumers' stated preferences in a choice experiment (CE) to provide a valuation of steak attributes.

The CE is an extension of conjoint analysis, a technique widely used in marketing literature to predict consumer choice. The CE, like conjoint analysis, allows consumers to make decisions about products based on several product attributes. Underlying this methodology is the assumption that consumers find worth in the attributes embodied in a product (Lancaster 1966). Conjoint analysis often uses a ranking scheme, whereas a CE usually involves making one choice among several alternatives (Green and Srinivasan 1990; Louviere 1991). These methods are used to determine the relative importance of various attributes in purchasing decisions. They may also be used to predict the likely success of various products that have not previously been available in the marketplace. Jayne et al. (1996) used a CE to examine consumer choices for maize meal in Africa and found that stated preferences provided useful information in estimating responses to future structural changes in food markets. They also found that the CE model provided an accurate estimate of real preferences. Adamowicz et al. (1998), when examining passive-use values, found that the CE had several advantages over typical contingent valuation methods. Additionally, it has been shown that results from a CE are comparable to consumers' revealed preferences (Adamowicz et al. 1994; Adamowicz et al. 1997).

Previous studies have employed a CE in understanding meat purchasing and consumption habits. For example, Unterschultz et al. (1998) examined Korean chefs' and purchasing managers' perceptions of Australian, Canadian, and U.S. beef. Quagrainie et al. (1998) examined attitudes among Canadian consumers toward attributes such as country of origin labeling, fat level, packaging, and price of ground beef. In this study's CE, consumers chose one of two steaks, each described with varying levels of price, marbling, and tenderness and each produced either with or without growth promotants and GM corn.

The factors or attributes considered in this analysis (price, marbling, tenderness, GM feed use, and hormone use) were chosen because of their hypothesized importance in consumer purchasing decisions. The various rib-eye steak attributes and levels are presented in Table 1 (page 3). The rib-eye cut was chosen because it is a high-value cut that is recognizable to most consumers. The levels of each attribute were chosen to represent realistic ranges that could be found in the retail market. Price was chosen as an attribute to provide a realistic comparison of steaks and to allow for a monetary valuation of the other steak attributes. The range of prices was from $5 per pound to $12 per pound because this range represents the realistic limits of rib-eye steak prices currently in the marketplace.

Table 1. Steak attributes and levels in the stated preference survey.

Steak Attribute	Factor Levels
Price	$5.00
	$8.50
	$12.00
Marbling	Slight
	Modest
	Abundant
Tenderness	2
	5
	8
Animal administered growth promotants	Yes
	No
Animal fed genetically modified corn	Yes
	No

Marbling refers to the intramuscular fat content of a steak. The USDA uses marbling as the key determinant of quality in the USDA beef quality grading system; thus, it is viewed as an important attribute in consumer purchasing decisions. Abundant, moderate, and slight marbling represent the three primary USDA beef quality grades found at the retail level: USDA Prime, Choice, and Select.

Tenderness, the third attribute used in the study, has been identified as the most important palatability attribute of beef (Dikeman 1987; Miller et al. 1995). Until recently, steak tenderness levels could not be predicted accurately because of the low correlation between marbling and tenderness. New technologies, which allow for accurate prediction of steak tenderness, give marketers the ability to label or brand steaks based on tenderness levels (Koohmaraie et al. 1996). Steak tenderness was described as a continuous variable ranging from 1 to 10, with 10 representing steaks with the highest tenderness level and 1 representing steaks with the lowest tenderness level.

Hormones and GM corn in livestock production were included as attributes because they are likely to be variables of interest in identifying a growing beef consumer segment that is concerned with livestock production practices.

Because the respondents may not have been familiar with some of the terminology used to describe the attributes, the survey included information about the attributes (marbling, tenderness, hormone use, and use of GM corn). Pictures of steaks that had slight, modest, and abundant marbling were obtained from the USDA and were used to explain the marbling attribute. The shear force test used to predict steak tenderness was described, and information was also included about hormones and GM plants.

The total number of discrete steak descriptions from the various attributes and attribute levels was $3^3 \times 2^2 = 108$. It would have been impossible for survey respondents to evaluate such a large number of choices. To simplify the experiment, a fractional factorial design was generated using SAS. The orthogonal factorial design was constructed so that all main effects could be estimated and not confounded with other extraneous effects. This design allowed for a smaller and more reasonable sample of survey questions (see Addelman 1962 or Louviere and Woodworth 1983 for a discussion of orthogonal designs). The final design consisted of 18 choice set questions and 36 discrete steak descriptions. According to research findings, up to 20 choice tasks may be used without degradation in data quality (Johnson and Orme 1996). Research has also shown that tasks answered later in a survey are as reliable as tasks answered earlier, and they are answered at a faster speed (Johnson and Orme 1996). Additionally, using more choice sets results in more observations and degrees of freedom per respondent. Figure 1 (page 4) shows a sample CE question. Responses to the survey questions were analyzed by using a conditional logit model described in the next section.

Figure 1. Sample Choice Experiment Question.

Options A and B represent two different descriptions for a beef rib-eye steak. Please check (✔) the option (A, B, or C) that you would be most likely to purchase.

Product attribute	Option A	Option B	Option C
Steak price/lb	$12.00	$8.50	Neither A nor B is preferred
Marbling	Abundant	Modest	
Tenderness rating	5	8	
Animal produced with growth promotants	No	Yes	
Animal fed genetically modified corn	No	No	
I would choose	☐	☐	☐

Choice Experiment Model

The use of a CE is consistent with random utility theory. In the survey, the i^{th} consumer was faced with a discrete choice between steaks given a set of steak attributes. As shown by Adamowicz et al. (1998), a random utility function may be defined by a deterministic (V_{ij}) and a stochastic (ε_{ij}) component.

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

where U_{ij} is the i^{th} consumer's utility of choosing option j, V_{ij} is the systematic portion of the utility function determined by steak attribute values (Table 1) for alternative j for consumer i, and ε is the stochastic element. In this case, there were three alternatives (A, B, or C) as shown in Figure 1. The probability that a consumer will choose alternative j is given by (2).

$$\text{Prob}\{\text{j is chosen}\} = \text{prob}\{V_{ij} + \varepsilon_{ij} \geq V_{ik} + \varepsilon_{ik}; \text{ for all } k \in C_i\} \quad (2)$$

where C_i is choice set for respondent i.

If the random errors in Equation 1 are independently and identically distributed across the j alternatives and if N individuals with a type I extreme value distribution and scale parameter equal to 1, then the probability of consumer i choosing alternative j becomes

$$\text{Prob}\{\text{j is chosen}\} = \frac{e^{V_{ij}}}{\sum_{k \in C} e^{V_{ik}}} \quad (3)$$

If V_{ij} is assumed to be linear in parameters, then the functional form may be expressed as

$$V_{ij} = \beta_0 = \beta_1 x_{ij1} + \beta_2 x_{ij2} + \ldots + \beta_n x_{ijn} \quad (4)$$

where x_{ijn} is the n^{th} attribute value for alternative j for consumer i, and β_n represents the coefficients to be estimated. Equation 3 is a conditional logit model, which may be formulated using the attribute levels given in Table 1 and the responses to the CE survey questions.

For estimation, attribute levels are effects coded. Instead of the typical 0,1 dummy variables, one category is set as the base. Adamowicz et al. (1994) provided motivation and justification of the use of effects coding in a CE. Effects coding forces the parameter value for the base category equal to the negative sum of the parameter values for the other estimated categories. Thus, the "left out" category is not incorporated into the intercept as with traditional dummy variable estimation. For an example of effects coding, see Adamowicz et al. (1994).

RESULTS

Surveys were mailed to a random sample of 2,500 U.S. consumers in February 2000. The mailing list was obtained from a reputable private company to ensure the representativeness of the sample. As an incentive to increase the response rate, $1 was included with each survey mailed. Of the mailed surveys, 253 were returned by the Post Office because of undeliverable addresses. A total of 685 surveys were completed and returned, resulting in a 30.5 percent response rate. Of the 685 returned surveys, 50 were unusable, resulting in a usable response rate of 28 percent.

Respondents represented a wide range of demographics from all 48 continental states. Summary statistics of the participants are in Table 2. Fifty-two percent of the respondents were women. The average age was 52. Approximately 22 percent of the respondents had children under the age of 12. Education ranged from less than a high school diploma to a Ph.D.

Table 2. Summary Statistics of Survey Respondents.

Variable	Definition	Mean[1]	Std. Dev.
Gender	1 if female; 0 if male	0.525	0.500
Age	age of respondent in years	51.585	15.175
Children	1 if children in household; 0 otherwise	0.222	0.416
Education	education level of repondent 0 = less than 12th grade; 1 = high school diploma; 2 = some college; 3 = technical school; 4 = associate's degree; 5 = bachelor's degree; 6 = master's degree; 7 = juris doctorate; 8 = doctorate	3.308	2.091
Income	household income level 1 = less than $10,000; 2 = $10,000 to $19,999... 19 = $180,000 to $189,999; 20 = more than $190,000	6.451	3.715
Ground beef	number of times per month respondent consumes ground beef	6.333	5.038
Beef steak	number of times per month respondent consumes beef steak	3.000	2.758
Poultry	number of times per month respondent consumes poultry	7.716	5.813
Pork	number of times per month respondent consumes pork	3.336	3.692
Lamb	number of times per month respondent consumes lamb	0.307	1.104
Fish	number of times per month respondent consumes fish	3.356	3.516

[1] Number of respondents = 631

In addition, consumer income ranged from under $10,000 per year to more than $190,000 per year, with the mean income between $50,000 and $60,000 per year.

Meat consumption also varied. The most frequently consumed meat was poultry, with consumers indicating they ate poultry 7.7 times per month, on average. Consumption of ground beef was also relatively high at 6.3 times per month; beef steak, pork, and fish were all consumed on average about 3 times per month.

Responses to the CE can be used to examine the trade-offs that consumers must make in the marketplace. For example, consumers may place high value on tenderness or fat content, but at what point would they be willing to trade more fat for a cheaper price?

Table 3 shows the estimates of Equation 3 for two different consumer segments: consumers in the Southeast and all other U.S. consumers. Consumers in the following states comprised the southeastern U.S. sample: Alabama, Arkansas, Georgia, Louisiana, Florida, Mississippi, North Carolina, South Carolina,

Table 3. Estimates of Conditional Logit Model – All Steak Consumers.

Attribute	Variable	Parameter[1]	Standard Error
Consumers in Southeast U.S.[2]			
Price	Rib-eye price/lb	-0.162	0.010
Marbling[3]	Slight	0.210	0.059
	Modest	0.230	0.056
	Abundant	-0.440	0.057
Tenderness	Tenderness scale	0.200	0.015
Animal produced with growth promotants[3]	Yes	-0.510	0.042
	No	0.510	0.042
Animal fed genetically modified corn[3]	Yes	-0.175	0.040
	No	0.175	0.040
Consumers in Other U.S. Regions			
Price	Rib-eye price/lb	-0.164	0.005
Marbling[3]	Slight	0.319	0.028
	Modest	0.249	0.027
	Abundant	-0.568	0.027
Tenderness	Tenderness scale	0.175	0.007
Animal produced with growth promotants[3]	Yes	-0.587	0.021
	No	0.587	0.021
Animal fed genetically modified corn[3]	Yes	-0.286	0.020
	No	0.286	0.020

[1]Statistically significant at the 0.01 level
[2]Consumers in Southeast U.S. include those consumers residing in the following states: Alabama, Arkansas, Georgia, Louisiana, Florida, Mississippi, North Carolina, South Carolina, Tennessee.
[3]Attributes are effects coded.
Number of observations = 570 (104 in Southeast U.S.; 466 in other U.S. regions)
Model Chi-Square = 3990.5 (significant at the 0.01 level)
Log Likelihood = -11271
Pseudo R^2 = 0.18

and Tennessee. The sample was limited to 570 respondents because not all consumers indicated the state in which they lived.

All parameter estimates exhibited expected signs and were statistically different from zero at the 0.01 level. In addition, the pseudo R^2 of 0.18 and the Chi-Square statistic indicated that a reasonably good fit of the model. As expected, estimates for both consumer segments indicated an increase in price is associated with a decrease in consumer use, resulting in a reduction in the probability that consumers would purchase the steak. Slight marbling was the most preferred marbling level, with a significant amount of disuse associated with abundant marbling.

This result contradicted the current USDA quality grading system. Prime, the highest quality grade, often sells at large premiums over Choice or Select. However, Prime steaks have abundant marbling, whereas Choice steaks have modest marbling and Select steaks have slight marbling. This result indicated that most consumers do not understand the information being transmitted through the current USDA quality grading system. It is likely that consumers do not know that steaks graded Prime or Choice have more intramuscular fat than steaks graded Select. The divergence between visual evaluation (leanness) and taste evaluation (tenderness) was also found in Melton et al (1996). Consumers do not seem to understand the relationship between taste and intramuscular fat content, suggesting that the decline in beef demand over the past decade may be partially attributed to miscommunication of quality from the farm to the consumer.

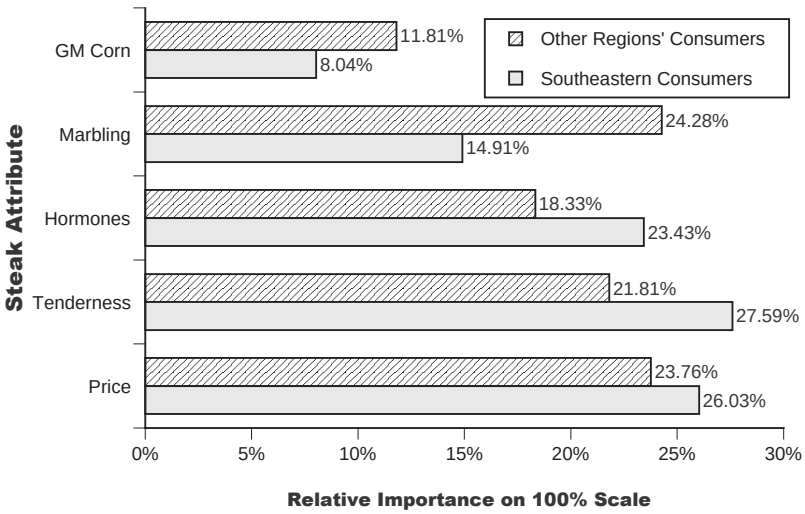
The tenderness coefficient for both consumer segments indicated that steaks with higher levels of tenderness are preferred to steaks with lower tenderness levels, other things being equal. Because price and tenderness were both measured on a continuous scale, the parameter estimates can be directly compared. The tenderness coefficient was larger in absolute value than the price coefficient, suggesting that a marginal change in tenderness would have a larger impact on the consumer's purchasing decision than an identical change in price. Although price and tenderness are important to consumers, cattle production practices are also of some concern. A steak from an animal fed GM corn or administered growth promotants was less preferred relative to the same level of price, tenderness, and marbling. Use of growth promotants was much more objectionable to consumers than use of GM feed. However, consumers were told in an information sheet provided with the survey that producers might be able to reduce pesticide use by planting a particular variety of GM corn; this suggestion may have biased some consumers about the use of GM corn as a livestock feed.

As indicated in Table 3 (page 6), results were separated into two groups: consumers in the southeastern United States and consumers outside this region. Hypothesis tests were conducted to determine if the coefficients from the two groups were statistically different from each other. At the 10 percent significance level, it was concluded that consumers in the southeastern United States are less concerned about marbling, hormone use, and use of GM feed in livestock production. Consumers in the Southeast place a higher value on tenderness than consumers in other regions. There was no statistical difference between the price attribute coefficients of the two groups, indicating that steak price influenced both consumer segments similarly.

Figure 2 illustrates the relative importance of the five beef steak attributes. Attribute importance was determined by moving the level of each attribute from one extreme to the other and by recording the probability of choice at each level (probability of choice was calculated by substituting the coefficient values in Table 3 with associated attribute levels into Equation 3). The ratio of the maximum to minimum probability of choice for each attribute, holding all others constant, was calculated. The logarithms of these ratios were summed across all five attributes. The logarithm of each ratio was then divided by the sum and multiplied by 100 to produce percentages. Essentially, the change in use associated with a change in the level of a particular attribute was measured. Those attributes that cause larger changes in use as its level moves from one extreme to another were deemed more important. For example, does raising a steak price from $5 per pound to $12 per pound cause a larger change in probability of purchase than raising a steak's tenderness score from 2 to 8?

Figure 2 (page 8) indicates that steak tenderness and price were the most important attributes to consumers in the Southeast. Alternatively, marbling and price were the most important attributes to consumers outside the Southeast. In this setting, price was calculated as being more important than tenderness for consumers outside the Southeast because the range of

Figure 2. Relative Importance of Rib-Eye Steak Attributes.



Southeastern consumers include those consumers in the following states: Alabama, Arkansas, Georgia, Louisiana, Florida, Mississippi, North Carolina, South Carolina, Tennessee.

prices ($5 per pound to $12 per pound) used in the study was greater than the range of tenderness values (2 to 8). On the margin, tenderness was more important. However, because price can have a virtually limitless range, it may be more important as a whole. Use of GM corn was of relatively little concern to both consumer groups.

The power of a CE rests with its ability to provide monetary valuations for product attributes. Consumer trade-offs between each attribute and steak price can be calculated. Table 4 illustrates the results of four different rib-eye steak purchasing scenarios for the two consumer segments. Two hypothetical steaks were formulated in each scenario. Four attributes were held constant across the two steaks, whereas one was allowed to vary. After the probability of purchase was calculated for each steak option, the price change required to equate the probability of purchase was then calculated. When the two steaks were priced with this difference, it was assumed that consumers' preferences would be indifferent between the two options.

For example, the first row of Table 4 indicates the estimated price premium for "no hormones." To estimate the premium, two steak options were simulated: one steak produced with hormones and one steak produced without hormones. Then, using Equation 3 (page 4) and the coefficient estimates in Table 3 (page 6), the probability of purchase for each steak option was calculated. There was a greater probability of purchase for hormone-free steaks compared to steaks with hormones, when all other attributes were constant. Because consumers are less likely to purchase a steak when the price increases, the trade-off between hormone use and steak price can be examined. The esti-

Table 4. Estimated Premiums for Ribeye Steak Attributes for Two Regional Consumer Segments.

Estimated price premium for	Consumers in Southeast U.S.[1]	Consumers outside Southeast U.S.
No Hormones	$6.30/lb.	$7.15/lb.
No Genetically Modified Feed	$2.16/lb.	$3.48/lb.
One Unit Increase In Tenderness	$1.24/lb.	$1.07/lb.
Slight vs. Modest Marbled Steak	$0.12/lb.	$0.42/lb.

[1]Consumers in southeast US reside in the following states: Alabama, Arkansas, Georgia, Louisiana, Florida, Mississippi, North Carolina, South Carolina, Tennessee.

mate of how high the price of the hormone-free steak must be to make the probability of purchase identical between the two steaks is called the "value" of the hormone-free steak. At any price below this value, estimates indicated consumers would prefer hormone-free steaks, whereas at prices above this value, estimates indicated consumers would prefer steaks with hormones.

Table 4 (page 8) indicates consumers in the Southeast would be indifferent in preference for hormone-free steak priced $6.30 per pound more than steak with hormones. Consumers outside the Southeast would pay $7.15 per pound more for hormone-free steak. Thus, southeastern consumers placed a lower value on use of growth promotants in livestock production compared to other U.S. consumers. Although these estimated values appear to be rather large, they were fairly consistent with observed pricing practices. On April 1, 2000, prices at several Kansas City grocery stores were compared. The price for an organic or hormone-free beef rib-eye steak was $24.95 per pound, $11.99 per pound, and $9.99 per pound at three retail grocery stores. Prices for typical steaks were recorded on the same date in the Kansas City area. Prices ranged from $6.88 per pound for an ungraded rib-eye steak to $7.49 per pound for a Select rib eye and $8.49 per pound for a Choice rib eye. Based on these findings, the estimated premiums for hormone-free rib-eye steaks do not seem unreasonable, especially since food prices in Kansas City are likely lower than in other urban U.S. locations. The observed retail prices for hormone-free beef may represent only a small, atypical market segment.

The second row in Table 4 indicates that Southeast consumers are indifferent in preference to a non-GM steak priced $2.16 per pound more than a GM steak. Although this premium is more than half the value for a hormone-free steak, it is not a trivial amount. This study indicates that beef labeled both Hormone Free and GM Free would be preferred to steaks from beef without hormones or genetic modification as long as the hormone- and GM-free steaks were priced no more than $8.46 per pound above the steaks with hormones and GM. Consumers outside the Southeast would be willing to pay $1.32 per pound more than Southeast consumers for GM-free steaks. Currently, much of the product differentiation in the beef industry has focused on the use of growth promotants. By adding the GM Free designation to a steak, this study indicates an additional premium may be obtained.

Row three in Table 4 shows the value of tenderness. A one-unit increase in tenderness was associated with a $1.24 per pound price premium for Southeast consumers. Recall that the tenderness attribute was described on a tenderness scale ranging from 1 (least tender) to 10 (most tender). Thus, consumers would be indifferent in preference between a steak with a tenderness score of 8 priced at $10 per pound and a steak with a tenderness score of 5 priced at $6.28 per pound. Consumers in other regions of the United States placed a lower value on steak tenderness than southeastern consumers did.

The last row in Table 4 shows the value of marbling in a beef rib-eye steak. Slight marbling was a little more preferred than modest marbling. Results indicate that a steak with modest marbling must be priced at least 12 cents per pound less than a steak with slight marbling for southeastern consumers to be indifferent in preference between the two. However, a steak with modest marbling must be priced at least 42 cents per pound less than a steak with slight marbling for consumers in other regions to be indifferent in preference between the two.

Conclusions and Implications

Consumer demand for beef has been on the decline for the past two decades, with many possible reasons for the demand decline. One contributing factor to the demand decline has been the inability of the beef industry to stay abreast of changing consumer desires. As indicated by other retail food items, consumers are increasingly demanding products with specific quality or functional attributes. Because beef quality identification has remained virtually unchanged until recently, consumers may have shifted consumption to other foods because of better information and the perception of a wider range of choices with these foods.

New marketing approaches aimed at increasing consumer demand for beef will likely focus on product differentiation. However, there is currently little information available to decide how to differentiate beef. Would branding strategies that are focused on the current USDA quality grade, beef tenderness, and live-

stock production practices be more beneficial? This study's goal was to provide information to answer this question.

Results of this study indicate that differentiation strategies focused on the current USDA quality grading system will continue to be unsuccessful in the long run. Results of the choice experiment suggest that consumers do not understand the information being transmitted through the current grading system. These consumers indicated a preference for steaks with slight or modest marbling. However, the USDA grading system categorizes steaks with abundant marbling as Prime, the highest quality grade. Consumers given a taste test would likely prefer abundantly marbled steaks to those that are slightly marbled. Such miscommunication may have contributed to the decline in beef prices and sales. Thus, beef consumers are in need of better information on the relationship between marbling and taste. Although marbling and tenderness are positively correlated, perhaps the beef industry could better fulfill consumer desires by providing low-fat, tender steaks.

Both meat tenderness and use of growth promotants in beef production were identified as important attributes in rib-eye steak purchases. A one-unit increase in the tenderness of a steak (on a scale of 1 to 10) was associated with a $1.24 per pound premium for Southeast consumers. In addition, results show consumers in the southeastern United States would prefer a hormone-free steak priced up to $6.30 per pound more than a steak with hormones. Regional comparisons indicate that beef marketers would capture larger premiums for hormone-free, free of genetically modified corn, and low-fat steaks in regions outside the southeastern United States. However, steaks labeled Guaranteed Tender may command larger premiums in the Southeast than in other U.S. regions.

This study indicates there may be a large market for quality differentiated beef. Several issues still require attention. First, the costs of cattle and beef segregation and labeling need to be calculated. In addition, costs of producing cattle with higher tenderness levels and without hormones or genetically modified feed need to be assessed. These costs can then be compared to the estimated premiums. In addition, more research is needed to examine consumer demand for beef labeled under the current USDA quality grading system. In this study, consumers indicated increased demand for steaks with slight and modest marbling compared to abundantly marbled steaks.

Why then do large price premiums persist for abundantly marbled steaks in the marketplace? Some of this persistence likely rests with consumers who misunderstand the correlation between high intramuscular fat content and beef steak taste. Some of these premiums may be an artifact of grid and formula pricing used by beef packers. Further, estimated premiums need to be calculated in an environment that is real, not hypothetical.

Research indicates that consumers often overstate their preferences for products when they are not held accountable for their choices (such is the case with survey responses). Thus, the estimated premiums provided by this study are likely larger than those that may be achieved in the marketplace. Without further research, it is uncertain to what extent the estimated premiums may be overstated.

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