

## DEPARTMENT OF AGRICULTURAL ECONOMICS

# Valuing Beef Tenderness

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Beef tenderness is one of the highest ranked beef quality concerns among beef packers, purveyors, restaurateurs, and retailers according to recent surveys (Smith et al.). Tenderness has been demonstrated as beef's most important palatability attribute (Huffman et al.). Unfortunately, current USDA quality grading standards inadequately identify meat tenderness (Savell et al.). However, recent technological improvements have made it possible to effectively segregate carcasses into tenderness categories and to tenderize less tender meat (Shackelford et al.). Widespread adoption of these technologies would enable the beef industry to better provide consumers with the quality products they desire.

Prior to implementing an alternative grading (or tenderization) system, more information is needed regarding the value consumers place on tenderness. This study investigated consumer willingness to pay for a guaranteed tender steak and quantified the impact various economic and demographic factors have on consumer willingness to pay for steak with varying tenderness levels. Results demonstrate several points about consumer preferences for beef that should be considered prior to adoption of a beef production/marketing system based upon tenderness.

First, most consumers prefer tender steaks in a blind taste test. Second, providing consumers information regarding tenderness via labeling has value. Third, some consumers are willing to pay large premiums to obtain a "guaranteed tender" steak instead of a "prob-

ably tough" steak. Fourth, not all consumers who prefer a tender steak are willing to pay a premium

to obtain it. Overall, results indicate targeting tender beef products to consumers willing to pay more for higher tenderness levels is an opportunity for the beef industry to increase product value. The potential value increase needs to be considered relative to the cost of implementing a tenderness-based production/marketing strategy, prior to its adoption.

## About The Study

Data were collected from typical shoppers at three urban retail grocery stores in the Midwest during summer 1998. Shoppers approaching the meat counter were asked to participate in a short experiment for which they would receive a free 12-ounce ribeye steak. Participants completed a short written survey that required disclosure of basic demographic information including age, gender, household size, household income, education level, and preference for steak doneness and USDA quality grade.

Upon completion of the survey, participants sampled two different types of steaks labeled Red or Blue: Red was "guaranteed tender" (based on a Warner-Bratzler slice shear force test) and Blue was "probably tough." Participants responded to questions about which steak they preferred based upon the attributes of taste, tenderness, texture and juiciness. Respondents were then asked which steak they preferred overall.

Consumers participating in the study were given a free 12-ounce Blue (probably tough) ribeye steak. If they preferred the Blue (probably tough) steak, the experiment ended. If they indicated a preference for the Red (guaranteed tender) steak, they were asked to indicate the most they would be willing to pay to exchange their Blue (probably tough) steak for the 12-ounce Red (guaranteed tender) ribeye steak. Respondents were told that if their bid exceeded a predetermined price level (which was unknown to the participants), they would make the exchange at the predetermined price. If their bid was less than the predetermined price, then they kept their Blue (probably tough) steak.

A second experiment was also conducted, which was identical to the first except that the words Red and Blue were replaced with “guaranteed tender” and “probably tough,” respectively. In this experiment, consumers were effectively provided information about the steaks, similar to a product label, in addition to the information obtained from their own taste test.

### Consumer Characteristics

A total of 313 consumers participated in the study, 227 in the first experiment and 86 in the second. Sixty-nine and 58 percent of the participants in experiment one and two, respectively, were female reflecting the population of shoppers in the stores during the experiments. Participant ages ranged from 19 to 82 and the average age was 47. On average, participants had completed at least some college, although education level ranged from less than high school to Ph.D. Household income ranged from less than \$20,000 to more than \$120,000 per year and averaged between \$40,000 and \$50,000 in the first experiment and between \$50,000 and \$60,000 in the second experiment.

Participants in the study consumed ground beef an average of 2.2 times per week at home and slightly over 1 time per week away from home. Similarly, participants also indicated they consumed steak an average of 1.1 times per week at home and 0.6 times per week away from home. Total beef consumption ranged from 0 to more than 16 times per week. Eighteen consumers indicated they did not typically purchase beef and 60 consumers indicated they did not typically purchase beef steak. Thirty-eight percent of participants generally purchased USDA Choice beef, 19 percent usually purchased USDA Select beef, 19

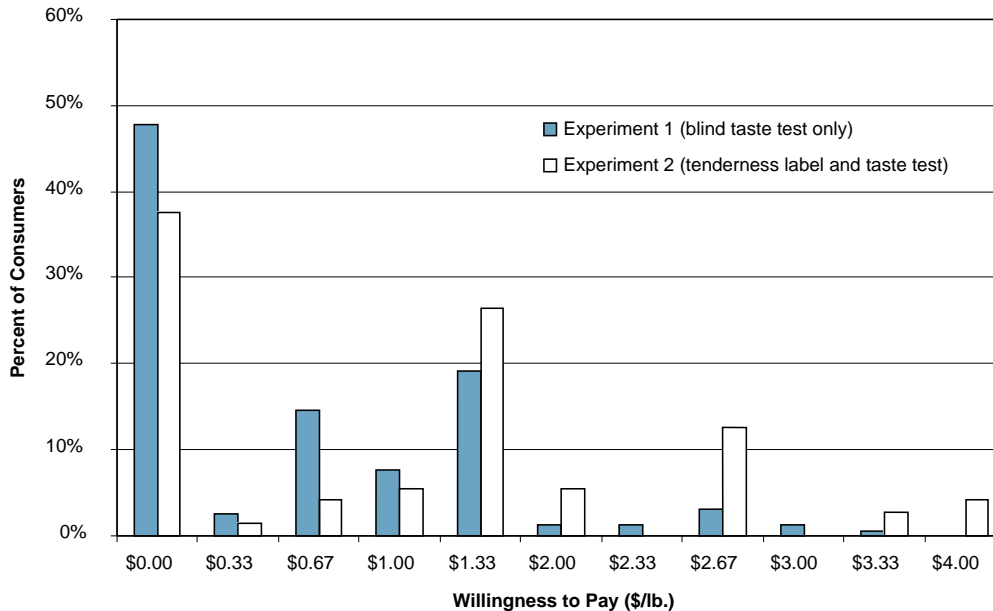
percent generally purchased store-brand beef and 22 percent indicated they did not know the grade of beef they generally purchased.

### Consumer Preferences for Tenderness

Consumers generally preferred the “guaranteed tender” steaks. In the first experiment, where consumers had only their own taste tests to rely on when deciding which steak they preferred, 69 percent of the participants preferred the “guaranteed tender” steak. When consumers were informed that one steak was “guaranteed tender” and the other steak was “probably tough,” 84 percent of the participants preferred the “guaranteed tender” steak. These results indicate consumers were able to detect differences in tenderness between the “guaranteed tender” and “probably tough” classifications and, furthermore, that providing consumers information via labeling affected their preferences.

Most consumers preferred the “guaranteed tender” steak, but many of these same consumers were not willing to pay a premium to obtain a “guaranteed tender” instead of a “probably tough” steak. For example, in the first experiment, 69 percent of the consumers preferred, but only 36 percent of the consumers were willing to pay extra to obtain a “guaranteed tender” steak. When tenderness was revealed in the second experiment, 84 percent of consumers preferred, but only 51 percent of consumers were willing to pay for the “guaranteed tender” steak. Among the consumers willing to pay a premium to obtain a “guaranteed tender” steak in the first experiment, the average premium was \$1.23 per pound. When the steaks were labeled “guaranteed tender” and “probably tough” in the second experiment, the average premium consumers were willing to pay to obtain the “guaranteed tender” over the “probably tough” steak increased to \$1.84 per pound, \$0.61 per pound above the premium identified in experiment one. However, when differences in population characteristics across the two experiments were accounted for, the value of providing consumers tenderness information via labeling was even larger than a comparison of the two sample means indicated, at \$0.82 per pound. The distribution of willingness to pay premiums for consumers who preferred tender steak is presented in Figure 1.

**Figure 1. Distribution of Willingness to Pay Premiums for Tender Steak**



pound to \$4.00 per pound. To learn more about the factors that affected the tenderness premiums consumers were willing to pay, a model was estimated to explain the premium differences among consumers that expressed a willingness to pay a premium to obtain the tender steak.

Results indicated that information had the largest impact on consumer bids for the tender steak. Consumers in the second experiment, where the tenderness levels were revealed, were willing to pay significantly more for

### Factors That Influenced Consumer Steak Choices

Providing consumers with information about steak tenderness level in the form of a label had the largest effect on their decision to choose tender steak over tough steak. Participants in the second experiment, where steaks were identified as “guaranteed tender” or “probably tough,” were 18 percent more likely to prefer the tender steak than participants in the first experiment where tenderness levels were not identified.

Age and education also had a positive affect on the probability that a consumer preferred a tender steak. For every one-year increase in age, a participant was 0.4 percent more likely to prefer tender steak. Thus, a 45 year-old would be expected to be 8 percent more likely to prefer tender steak than would a 25 year old. Similarly, given a one “unit” increase in the respondents education level (e.g. from “some college” to “B.S., B.A. complete”), consumers in the study were 4 percent more likely to prefer tender steak. Finally, respondents who prefer steaks cooked “well-done” were less likely to prefer tender steak than consumers who prefer steak cooked to a lower level of doneness.

### Factors Affecting Tender Steak Premiums

Willingness to pay for “guaranteed tender” steak differed greatly among those consumers willing to pay a premium for tenderness, ranging from \$0.33 per

tender steak (about \$0.82 per pound, when all other factors were accounted for) than consumers in the first experiment, who had to rely on their own taste test alone to determine which steak was more palatable.

Consumer age and gender also had a significant impact on willingness to pay for tender steak. Females and younger consumers were willing to pay more for the upgrade to tender steak. Surprisingly, consumer income level did not significantly affect the amount they were willing to pay to obtain the tender steak.

### Conclusions

Beef’s most important palatability attribute is tenderness. Despite this, current USDA quality grading standards do not provide consumers with a direct measurement of tenderness. Instead, USDA quality grading standards are based primarily upon intramuscular fat levels that explain a small percentage of the variation in beef tenderness. As a result, consumers are uncertain when they purchase a steak (or other beef cut) whether it will be tender.

Recent technological improvements have made possible alternative beef grading systems based upon beef tenderness. Furthermore, new technology also makes it possible to tenderize beef identified as less tender. This study allowed typical meat consumers to sample beef steaks graded by one alternative tenderness-based grading system to provide preliminary estimates of the system’s potential benefits.

Results from this study provide a wealth of information about consumer preferences for beef. Providing consumers tenderness information via labeling has value. When participants were told which steaks were tender and tough, more participants preferred the “guaranteed tender” steak. Additionally, participants who were told which steaks were “guaranteed tender” and “probably tough” bid a premium for the tender ribeye steak that was about \$0.82 per pound greater than participants who relied only on their own taste test to differentiate steaks.

Some consumers are willing to pay large premiums to obtain a “guaranteed tender” instead of a “probably tough” steak. For example, 20 percent of the participants in the experiment where steak tenderness was labeled were willing to pay a premium of \$2.67 per pound or more for a tender vs. a tough steak.

Among consumers that were willing to pay a premium, younger consumers and women were willing to pay more to upgrade to a tender steak than other consumers. Finally, not all consumers who prefer a tender steak were willing to pay to obtain it. A large proportion of the consumers who preferred the “guaranteed tender” steak were not willing to pay a premium to upgrade from tough steak. More knowledgeable consumers (i.e. consumers who knew which quality grade of beef they typically purchased) were more likely to pay to upgrade to a tender steak but, surprisingly, consumer income did not affect the probability the participant would pay for a “guaranteed tender” steak.

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