

# Optimizing Palatability of Retail Beef and Determining the Value of Beef Tenderness

## *Two Field Studies*

**M.K. Patterson**

Center for Quality

National Cattlemen's Beef Association

Englewood, Colorado

### **Introduction**

Consumers consider three characteristics—flavor, juiciness and tenderness—as they evaluate “palatability” and(or) satisfaction received by eating beef. Of these three characteristics, the 1983 National Consumer Retail Beef Study identified tenderness as the most important factor in determining eating satisfaction of beef. The 1990 National Beef Market Basket Survey also identified tenderness as being the single most important factor determining consumers' perception of taste.

Tenderness of beef is determined by the genetics of the animal, the feeding regimen provided the animal, and the age of the animal when it is harvested. Postmortem carcass treatment also exerts a great effect on tenderness. Tenderness of beef can be enhanced by electrical stimulation of the carcass, aging of carcasses/cuts, mechanical (blade or needle) tenderization of cuts, injection of cuts with tropical plant enzymes (papain, bromelain or ficin) or chloride salts (especially  $\text{CaCl}_2$ ) and appropriate time, temperature and type of heat (moist versus dry) during cooking.

Of competitive meats, veal, chicken and turkey are almost never tough while pork and lamb are seldom tough. Such is not the case for beef. The 1990 National Beef Tenderness survey concluded that 20% of loin steaks, 20% of rib steaks, 40% of chuck steaks/roasts and 50% of round steaks/roasts were “slightly tough” or tougher. The 1992 National Beef Quality Audit concluded “one out of four beef steaks just doesn't eat right.”

The 1994 National Beef Tenderness Conference called for development of a total quality man-

agement model for decreasing beef tenderness problems. This model was developed by researchers at Colorado State University. The model, “Palatability Assurance Critical Control Points” (PACCP), establishes pre- and post-harvest practices for improving beef palatability. The premises outlined in the PACCP model were used to develop a list of production and processing practices for optimizing retail beef palatability. These practices are currently being field tested in an ongoing in-home and in-store test with a regional retailer.

In 1997, the number 1 priority of NCBA's product enhancement subcommittee was to determine the value of tender beef to consumers. A second field test is underway in the Denver market, working with a major retailer, to qualify and quantify the consumer's perception of “guaranteed” tender beef products. It is our goal to determine if consumers would embrace a consistently tender beef product that works to guarantee a satisfactory eating experience. The NCBA has committed tremendous resources to the topic of tenderness research. As we continue our work in this area, and encourage producers to help solve the tenderness puzzle—sometimes at expense to their operations—we need assurances that consumers will recognize a product superior in tenderness and alter their purchasing behavior to reflect that recognition.

### **Optimizing Palatability of Retail Beef**

#### ***Background***

This study was undertaken to assess consumer evaluations of beef strip steaks, top butt steaks, shoulder steaks and top round steaks. San Antonio area consumers were supplied with steaks from five

different treatments and asked to respond to overall desirability, tenderness, juiciness and flavor on a ten point scale. Treatments were Guaranteed Tender Choice, Guaranteed Tender Select, Source Verified, “Marinated,” or Control (a selection of retail steaks obtained from the case).

All Treatments, except Controls, were subject to high-voltage electrical stimulation. Guaranteed Tender product was USDA Choice or Select product from a major commercial packing plant that was subject to tenderness classification using USDA MARC’s automated tenderness selection method. Guaranteed Tender product was cut into retail steaks by personnel from the major commercial packing facility. The Marinated product was a pumped beef product—the formulation is proprietary to the retail partner. Source Verified product was generated from cattle managed under pre-harvest conditions outlined in the “Production and Processing for Optimizing Retail Beef Palatability” recommendations (see attached). The subsequent beef carcasses were high-voltage electrically stimulated and beef cuts were aged 14d post-mortem. Source Verified product was obtained from a major Texas Panhandle packing plant. This product was processed into retail cuts at Texas A&M University’s Rosenthal Meat Science and Technology Center. Control product was selected from a cross section of the retail partner’s stores in the San Antonio metropolitan area.

Phase I of this project involved in-home consumer evaluations of the various treatments and cuts of beef. Participants were recruited based on their beef eating habits—all participants consumed at least 4 beef meals, prepared at home, in a 2-week period. The 240 households participating were segmented *a posteriori* into the following groups:

- **Heavy Beef**—These consumers eat primarily beef and are extremely loyal to the product. Heavy Beef eaters are usually savvy about beef cut selection and preparation methods.

- **Light/Rotators**—For the purposes of this study, these consumers are still moderate-to-heavy meat eaters but consume predominantly chicken over beef, and consume less meat overall than the previous group. Of the last 10 “meat” meals consumed, more than 5 would be chicken for this group.

Further analysis of consumer responses by segmentation group is useful for determining how different groups of participants perceive the attributes of various beef products.

### ***Phase I Results***

The results of Phase I point to a number of different conclusions with respect to the cuts, treatments, doneness and cooking methods presented. There exists a strong, though not unexpected, preference for strip steaks over top butt steaks; top butt steaks over shoulder steaks; and shoulder steaks over top round steaks. As to the effects of treatments, there was a definite advantage for Guaranteed Tender Choice and Guaranteed Tender Select over Control steaks in all evaluated components for strip steaks. Marinated and Source Verified strip steaks were intermediate, though not statistically different, from Control and the Guaranteed Tender treatments in all evaluated characteristics. Furthermore, Guaranteed Tender Choice and Select top butt and top round steaks showed an advantage in several characteristics over Control top butt and top round steaks. Once again, Source Verified and Marinated top butt and top round steaks were intermediate to the Guaranteed Tender treatments and Controls for a variety of evaluated characteristics. Treatment did not appear to have an effect on shoulder steaks.

Consumers indicated a preference for lesser degrees of doneness over more advanced degrees of doneness. This was true for all cuts except the top butt which seemed to be unaffected by doneness. Furthermore, doneness had the greatest effect on evaluations of strip steaks while the line be-

tween doneness groups appeared to become less clear in the shoulder and top round steaks.

Cooking methods also showed a distinct effect on consumer evaluation of all cuts except the top butt. Specifically, oven broiling performed poorly in almost all consumer responses across cuts. On the other hand, indoor and outdoor grilling were preferred for strip steaks. As cut shifted toward the shoulder and particularly toward top round, cooking methods of preference shifted to braising and pan-frying or sautéing.

Lastly, it should not be underestimated that, due to the large number of confounding interactions between cooking method and treatments as well as doneness and treatment, all evaluated characteristics are interdependent on particular consumer's tastes with respect to doneness and cooking method. This was especially true for top butt steaks, which showed numerous interactions of both treatment and cooking method as well as degree of doneness and treatment.

These findings are consistent with those from Beef Customer Satisfaction I, where major influences on consumers' preference for beef products were cooking method, degree of doneness, and cut of beef. The highest satisfaction ratings were given to steaks cooked Medium Rare or less; however, over 80% of consumers in this study cooked steaks to a Medium degree of doneness or greater.

This study supports the utilization of either of the guaranteed tender (USDA Choice or Select) treatments to enhance consumers' satisfaction with beef from all cuts but the shoulder steaks. Overall satisfaction with guaranteed tender cuts would be closely related to individual cooking habits as well as preferences for degree of doneness of steaks.

Based on consumption habits, participants in this study were segmented into one of two groups: Heavy Beef (eaters) or Light (eaters)/Rotators. In

Customer Satisfaction II, strong preferences were shown for a marinated beef product—but only by consumers meeting the profile of Light (eaters)/Rotators. Heavy Beef eaters rated the marinated product significantly lower in overall satisfaction than traditional beef offerings. This learning was significant for the Customer Satisfaction II study, but also has an impact on future consumer studies...including this one. When these data were analyzed based on consumer segmentation group several differences came to light. The strongest preference differences existed in the strip steaks, with Light/Rotators preferring all treatments to the control with especially strong preference for the Source Verified beef, closely followed by both Guaranteed Tender treatments. Heavy Beef consumers preferred the Source Verified least and showed strongest overall like ratings for the Marinated beef product.

### ***Next Steps***

Phase II of this project will further explore the differences between heavy versus light beef eaters in terms of product preferences in an in-home and in-store evaluation. It is essential to appropriately market palatability-enhanced beef products to not only ensure success, but to efficiently allocate marketing dollars as well. Consumer studies such as these will enable retailers to define product specifications based on consumer wants and potential market applications.

## **Determining Value of Tenderness at the Retail Level**

### ***Background***

NCBA has committed tremendous resources to unlocking the tenderness puzzle related to fresh beef products. Technologies are available to cattle producers as well as beef marketers to improve beef's palatability profile. Often these technologies add cost or time to the beef marketing system. NCBA's product enhancement subcommittee felt cattle/beef marketers would be more encouraged to

adhere to palatability-enhancing practices if a known value were associated with the resulting product. This project proposes to determine (through in-home consumer testing and analysis of purchase behavior in-store) consumers' perception of the value of tender beef. Value may be defined as (1) willingness to pay a premium for guaranteed tender product; (2) greater loyalty to beef as a protein choice versus poultry or pork offerings; and (3) greater initial and repeat purchases of beef from grocery outlets.

Thus far, consumer focus groups have been conducted to probe issues surrounding consumers' perception of beef tenderness. In addition, labeling, cut selection, nomenclature and other issues were probed.

### ***Front-End Focus Groups***

Two focus groups were conducted in Denver, Colorado to obtain qualitative consumer feedback on the concept of a "tender beef" product. Participants were women who were primary meal preparers for families consuming beef 4+ times at home in an average 2 week period. The first group was made up largely of beef dominants with a minority of budget driven (significant portion of beef usage was hamburger). The second group was made up largely of respondents who fit the rotator definition, using beef regularly as well as other proteins. Participants were asked their opinions on beef, package labels, benefits, sources of product, and the "Beef Mark" for the Brand Like Initiative.

### ***Focus Group Results***

- Overall there was a strong interest in a tender beef product. Heavy beef users were less interested in a "guaranteed tender" product because they are generally savvy about buying and preparing beef.
- Variety rotators have less time and knowledge to choose beef cuts in which they feel confidence. They want guarantees that the beef they

buy will be tender and flavorful and were more willing to pay extra for this assurance.

- 60% of participants liked a name for the tender beef associated with current quality grades such as "Tender Select/Tender Choice/Tender Prime."
- 65% of participants felt that cattle producers or producer organizations were the most credible sources for a tender beef product. A retailer-sponsored program was not credible to the consumers because of the belief that retailers have less "ownership" in the production of a consistent, high lower quality branded product.
- The Beef Mark as a potential logo was very well received. Consumers felt it indicated the product had been "checked" for quality.
- Consumers agreed that a guaranteed product would be worth paying more for, but were unable to quantify the amount of premium. Variety rotators were more accepting of a 10 to 25% price premium per pound.
- Participants generally felt that a tender beef option would work best for the higher priced middle meats: steaks and prime rib were examples provided. Many said that tenderness was a more important purchasing criterion than flavor, especially to their husbands and kids. Consumers feel they have a stronger ability to impact flavor through seasonings and preparation techniques. Lack of tenderness is harder to remedy, especially for the cut that will be cooked "as-is"...steaks on the grill, etc.

### ***Next Steps— Project Design***

#### ***Phase I***

- 1,000 consumers in Denver metro area (Moderate Beef Eaters, Variety Rotators, Light Beef Eaters)
- \$25 incentive to shop the meat case in four King Soopers stores

- ▶ a branded, fresh “guaranteed tender” beef product, labeled with the “Beef Mark” will be available for purchase
- ▶ consumers may spend the incentive however they wish
- Record consumers’ meat purchases as they leave the store
- Probe for consumers’ perceptions of the meat offerings in retail case
- Give consumers paired steaks (guaranteed tender vs commodity beef) to evaluate at home in a blind tasting
- Follow-up phone call/in-depth interview to determine differences in beef tried at home

#### **Phase II**

- 200 consumers asked back for repeat shopping opportunity
- Repeat \$25 incentive to shop the meat case with branded, fresh guaranteed tender product
- Record consumers’ meat purchases as they leave the store
- Further probe these consumers for opinions on value of guaranteed tender beef product

### **Summary**

The beef industry has been diligent in its pursuit of knowledge concerning beef products. Numerous studies evaluate sensory attributes of beef produced under various pre- and post-harvest management and processing conditions. Fewer studies evaluate consumer acceptance of various beef products. Consumer studies, though time intensive, yield critical insight into the mind of the marketplace. Expanding niche markets through offering unique or enhanced beef products offers the beef industry opportunity for growth while maintaining its core market of moderate to heavy beef eaters. Through identification of consumer preferences for beef products in commercial settings, NCBA can catalyze retail requests for identified product—initially from the packer and ultimately from the producer.

### **References**

- Savell, J.W., R.E. Branson, H.R. Cross, D.M. Stiffler, J.W. Wise, D.B. Griffen, and G.C. Smith. 1987. National consumer retail beef study: Palatability evaluations of beef loin steaks that differed in marbling. *J. Food Sci.* 52:517–519.
- Morgan, J.B., J.W. Savell, D.S. Hale, R.K. Miller, D.B. Griffen, H.R. Cross, and S.D. Shackelford. 1991. National Beef Tenderness Survey. *J. Anim. Sci.* 69:3274.
- NCA. 1992. Executive Summary of the National Beef Quality Audit. National Cattlemen’s Association. Englewood, CO.
- NCA. 1994. National Beef Tenderness Conference Executive Summary. National Cattlemen’s Association. Englewood, CO.

# Production & Processing Practices for Optimizing Retail Beef Palatability

Developed at NCBA's  
Optimizing Retail Beef Palatability Symposium  
December, 1996

## Pre-Harvest Recommendations:

- ▶ Discourage the *excessive* use of biological types of cattle that have been shown *scientifically* to vary widely in tenderness:
  - a. Target biological types of cattle for specific markets.
  - b. Encourage seedstock producers to establish palatability data for their herds to foster the elimination of genetic strains that vary widely in palatability traits.
- ▶ Castrate bull calves as early as possible—prior to 7 months of age.
- ▶ Eliminate the aggressive<sup>1</sup> use of anabolic implants for large-framed No. 1 muscled cattle (i.e., late-maturing).
- ▶ Eliminate intra-muscular injections.
- ▶ Do not use short feeding programs, especially for large biological types of cattle.
- ▶ Harvest all cattle prior to 30 months of age.

## Post-Harvest Recommendations:

- ▶ Utilize Animal ID Systems to communicate carcass trait information back to the producer.
- ▶ Employ appropriate high voltage stimulation systems for all carcasses as specified by chilling conditions.
- ▶ Segment carcasses into tenderness groups via “sorting technologies.”
- ▶ Age all middle meats a minimum of 14 days postmortem.
- ▶ Carcasses/primals/subprimals identified as being tough should be
  - a. used in non-retail markets, and
  - b. subjected to additional tenderization technologies (i.e., calcium chloride, needle tenderizing, marination, etc.).
- ▶ Preparation/cooking recommendations should be provided for the consumer.

---

<sup>1</sup>As defined by the supplying pharmaceutical companies.

**NOTES:**

