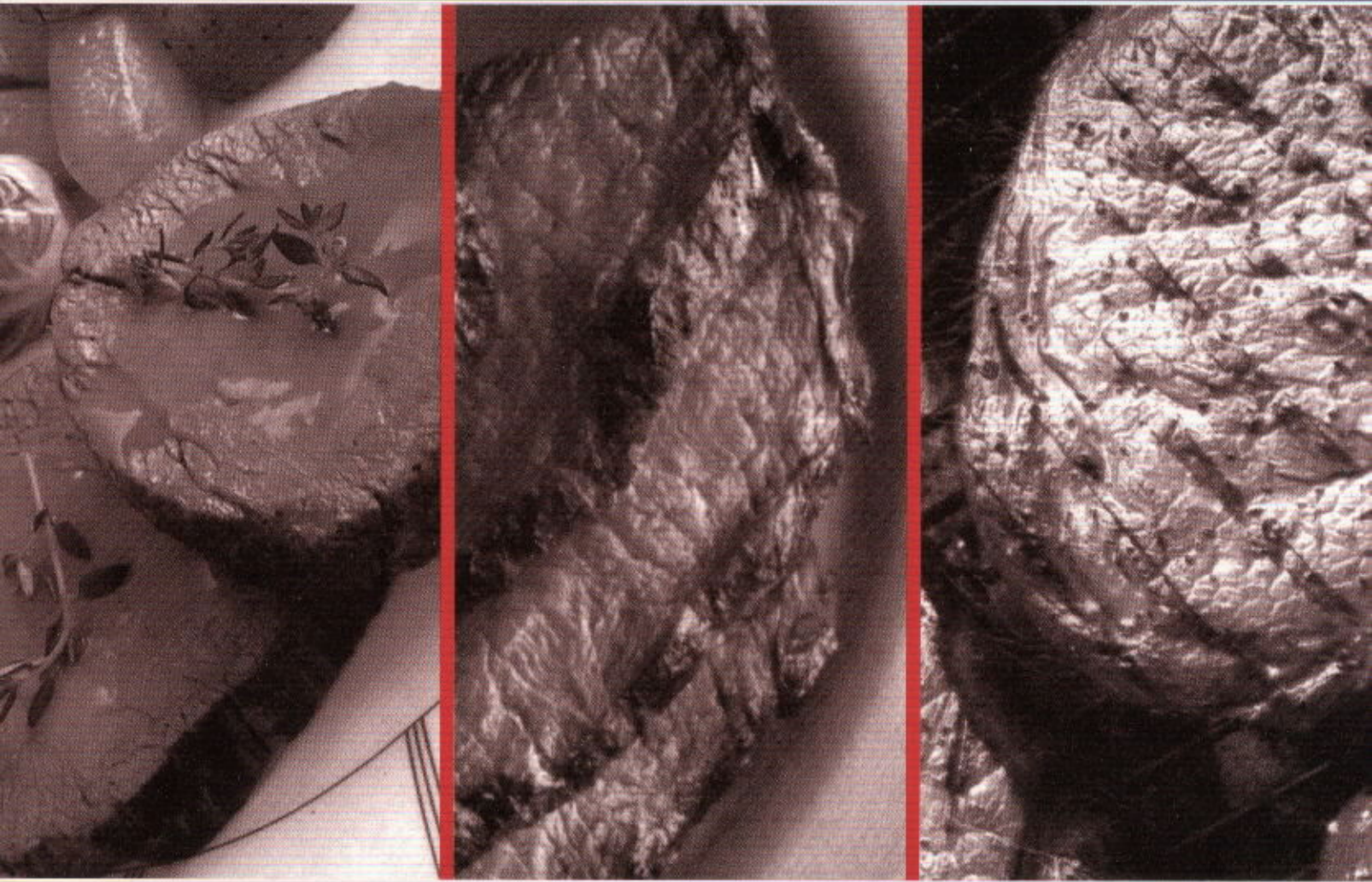


Beef Customer Satisfaction II: **THE MARKETPLACE AND BEYOND**

What factors drive customer satisfaction?



CUSTOMER SATISFACTION II

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THE MARKETPLACE AND BEYOND

What factors drive customer satisfaction of beef?

While a strong understanding of the marketplace is of vital importance to the survival of any industry, relatively little has been done by the beef business to characterize and understand its customers.

In 1990, the National Beef Tenderness Survey underscored the importance of tenderness in delivering satisfactory products to consumers. That same year the Value Based Marketing Task Force declared a "War on Fat," demonstrating that the industry was falling short in delivering desirable products to the marketplace. Since then, the beef industry has conducted several beef quality audits, all aimed at identifying and reducing the frequency of quality defects.

While all of these studies have led to improvements in the quality of beef, surprisingly little was known about the people who were buying our product, preparing it and consuming it.

So in 1995, the National Live Stock and Meat Board (now the National Cattlemen's Beef Association) conducted an extensive in-home product test among frequent beef consumers. Called the "Beef Customer Satisfaction study," it had several significant findings:


- First, researchers found that beef cut played a very major role in customer satisfaction.
- Second, significant geographical differences in the level of customer satisfaction were evident.

- Third, the method of cooking affected how well consumers liked the finished product.
- Fourth, USDA quality grade had a cut-specific impact on customer satisfaction.
- Fifth, degree of doneness affected customer satisfaction.
- And sixth, production practices had little influence on customer satisfaction.

Although this report was an important first step in understanding beef consumers, many important questions remained unanswered. That is why the beef industry conducted a follow-up study, called Customer Satisfaction II Project. The results of this study are contained on the following pages.

The project had several goals, and hoped to answer important questions about the marketplace.

- First, beef quality was closely related to customer satisfaction in the higher-valued top loin (strip) steaks and in the lower valued top round steaks. Does the relationship of quality exist for other lower-valued cuts such as the clod?
- Second, the top sirloin steak remains a troublesome cut of beef as it becomes undesirably tough when overcooked. Could instructions given to consumers help with the proper preparation of steaks? Do new technologies, such as calcium chloride injection, improve the top sirloin's tenderness when prepared to higher degrees of doneness?
- Third, the Top round steak received lower ratings when compared with other cuts (top loin and top sirloin steaks). Could calcium chloride injection be used to enhance the acceptability of these lower-priced steaks?



**SPECIFIC CUTS
OF BEEF,
COOKING METHODS,
AND DEGREE
OF DONENESS
ARE KEY FACTORS
IN CUSTOMER
SATISFACTION
OF BEEF.**



METHODOLOGY

Carcass and Subprimal Selection

Researchers selected carcasses with the assistance of USDA-AMS from the Excel beef processing plant in Schuyler, Neb. They vacuum-packaged all subprimals and shipped them to Texas A&M University's Rosenthal Meat Science and Technology Center.

Product Processing

Researchers aged all of the subprimals for 14-21 days before fabricating them into retail cuts. They cut steaks from the clod and top sirloin to one-inch thickness and top round to 5/8-inch thickness.

They identified each steak individually, and selected one steak from each subprimal for Warner-Bratzler shear force testing.

Next, they vacuum-packaged and individually froze each steak and delivered them to consumer participants. Each household received bags with identified steaks and corresponding ballots, as well as instructions that gave the order in which the steaks were to be consumed.

Calcium Chloride Marinade

Designated subprimals used for the calcium chloride marinade were handled in the plant off-line by USDA-ARS personnel. The marinade consisted of 2.2% calcium chloride; the top round and top sirloin subprimals were marinated with a multiple needle injector to a target of 5% of cut weight. Earlier checkoff funded studies indicated that calcium chloride could be used to increase tenderness in some beef cuts.

Consumers

Researchers performed testing in Chicago and Philadelphia with consumers that were moderate to heavy consumers of beef. Each household consisted of two adult participants with a minimum household income of \$20,000. Researchers selected participants from a telephone screening interview and an introductory questionnaire.

Consumer Segmentation

For the analyses, researchers segmented the participants on the basis of demographic characteristics and attitudes about beef and food. Consumers were included in one of three segments:

- **Beef Loyals**

This group consisted of heavy beef eaters. They are average in age, income, education and household size. Not particularly concerned with diet/health issues, their food preferences are not driven by budget concerns. They have positive attitudes about beef and considerably less positive attitudes about chicken.

- **Variety Rotators**

This group consisted of heavy meat eaters, but split their meat consumption among beef, poultry and other protein foods. Somewhat older than the other groups, they also have higher incomes and education levels. Their perceptions of beef and chicken are generally equally positive.

- **Budget Rotators**

This group splits its meat consumption among beef and chicken. Budget rotators typically have less education, larger households, and are somewhat more focused on budget concerns. Their attitudes toward chicken are somewhat more positive than their attitudes toward beef.

Warner-Bratzler Shear Force

One steak from each treatment from each carcass was used for shear force evaluation. Steaks were cooked to a medium degree of doneness. Researchers took shear force measurements from six, 1/2-inch cores from each steak. The lower the pounds of force required to cut the cores in beef, the more tender the steak. A typical threshold for steaks to be considered tender is 11 lbs. of force or less.

Consumer Evaluations

Participants evaluated each steak for the following traits using a 10 point scale with 10 being "like extremely" and 1 being "dislike extremely":

- **Overall Like**
- **Tenderness**
- **Juiciness**
- **Flavor Like**
- **Flavor Amount**

Project Design

The study was conducted in two parts, Module A and Module B.

MODULE A

CLOD STEAK

TOP CHOICE
LOW CHOICE
HIGH SELECT
LOW SELECT

TOP ROUND STEAK

TOP CHOICE, MARINADE
TOP CHOICE, NO MARINADE
HIGH SELECT, MARINADE
HIGH SELECT, NO MARINADE

200 HOUSEHOLDS:

100 IN CHICAGO AREA
100 IN PHILADELPHIA AREA

MODULE B

TOP SIRLOIN STEAKS (ALL HIGH SELECT)

INSTRUCTIONS PROVIDED, MARINADE
INSTRUCTIONS NOT PROVIDED, MARINADE
INSTRUCTIONS PROVIDED, NO MARINADE
INSTRUCTIONS NOT PROVIDED, NO MARINADE

300 HOUSEHOLDS (ALL IN CHICAGO AREA)

150 HAD INSTRUCTIONS PROVIDED (SEE APPENDIX FOR INSTRUCTIONS)
150 DID NOT HAVE INSTRUCTIONS PROVIDED



Each household received bags with identified steaks and corresponding ballots, as well as instructions that gave the order in which the steaks were to be consumed.



KEY FINDINGS



Clod Steak

- Consumers predominantly grilled this steak. Philadelphia consumers fried more than those in Chicago, while consumers in Chicago broiled and braised more often than consumers in Philadelphia.
- Chicago consumers cooked clod steaks less well done while Philadelphia consumers cooked them to a greater degree of doneness.
- Beef Loyals gave higher ratings to clod steaks than did other consumer segments.
- In-home factors such as cooking methods and degrees of doneness greatly influenced customer satisfaction more than did quality grade. For the clod steak, it is likely that preparation techniques that improve flavor without reducing tenderness positively impact customer satisfaction.



Top Round Steak

- Consumers predominantly grilled to prepare this steak with Philadelphia consumers grilling more frequently than consumers in Chicago. Chicago consumers braised more often than those in Philadelphia.
- No real differences appeared between cities for degree of doneness. Medium well and higher was the most dominant degree of doneness in both cities.
- For the top round, overall like was driven principally by flavor like followed by tenderness and flavor amount.
- In both cities, braising was a highly rated cooking method, but in Philadelphia, frying was also highly rated. When consumers in Chicago grilled, they rated the top round high, but Philadelphia consumers rated grilled top round low. This becomes an issue when more than 45% of the consumers in Philadelphia grilled their top round steaks. With respect to degree of doneness, it appears that cooking more well done results in a more highly rated top round steak.
- Marinade failed to improve customer satisfaction of this steak.



Top Sirloin Steak

- Consumers predominantly grilled this steak. Broiling was second and used more often than fried.
- For degree of doneness, medium and lower was the category used most often for top sirloin steaks, followed by the combined category of well done and higher.
- Based on Warner-Bratzler shear force values and tenderness ratings, the top sirloin steak was generally tender. Overall like was driven principally by flavor like, followed by tenderness and juiciness.
- Cooking method had a profound influence on the palatability ratings for the top sirloin steak. This was especially evident for juiciness, which may have been the result of the high frequency of dry heat cooking methods (such as grilled and broiled) used by the consumers in this study.
- Degree of doneness impacted all of the palatability ratings. The top sirloin steak is a cut that is more influenced by degree of doneness than most cuts.
- Marinade had no effect on tenderness or customer satisfaction for this steak.

CONSUMER EVALUATION OF CLOD STEAKS

Overall Like

- Consumers in the Beef Loyals segment rated clod steaks higher in overall like than other consumers did.
- Braised clod steaks received the highest tenderness ratings in both cities.

Tenderness

- Among cooking methods, fried clod steaks received among the lowest tenderness ratings in Chicago; clod steaks prepared similarly received among the highest tenderness ratings in Philadelphia.
- The only clear difference between the two categories of degree of doneness within cooking method was for grilled and broiled; clod steaks cooked to medium and lower were rated higher for tenderness than those cooked to medium well and higher.
- Greater differences in tenderness ratings were found among cooking methods within the medium well and higher category than the medium and lower category.

Juiciness

- As expected, clod steaks cooked to medium and lower were juicier than those cooked to medium well and higher.
- In Chicago, consumers who braised clod steaks gave the highest juiciness ratings compared to the other cooking methods.
- In Philadelphia, consumers who braised or fried clod steaks gave the highest juiciness ratings compared to the other cooking methods.
- Clod steaks cooked with dry heat (grilled and broiled) generally received among the lowest juiciness ratings.

Flavor Like

- Beef loyals gave clod steaks some of the highest flavor like ratings while variety rotators gave this cut some of the the lowest flavor like ratings.
- When cooked to medium or lower, clod steaks that were broiled received significantly higher flavor like ratings than when cooked to a higher degree of doneness.

Flavor Amount

- Greater differences in flavor amount ratings occurred among the different cooking methods in Philadelphia than in Chicago.
- Fried clod steaks received among the highest flavor amount ratings in Philadelphia compared to the remaining methods.
- Fried clod steaks in Philadelphia received higher flavor amount ratings than in Chicago.

CLOD STEAKS: WARNER-BRATZLER SHEAR VALUES

For clod steaks, no significant differences in Warner-Bratzler shear force were found between the four different grades.

GRADE	MEAN (LBS)	N	MINIMUM	MAXIMUM
Top Choice	4.82	50	3.33	7.42
Low Choice	4.97	50	3.18	7.32
High Select	5.16	50	3.32	9.13
Low Select	5.31	50	2.48	10.25

CONSUMER EVALUATION OF TOP ROUND STEAKS

Overall Like

- Top Choice top round steaks received higher overall like ratings than did High Select top round steaks.
- In Chicago, top round steaks cooked to medium and lower received the lowest overall like ratings compared to the other groups.
- In Philadelphia, braised top round steaks received among the highest ratings for overall like and were rated significantly higher than braised steaks in Chicago.
- Grilled top round steaks were rated lower in Philadelphia than in Chicago.
- Fried top round steaks were rated lower in Chicago than in Philadelphia.
- Top Round steaks with marinade received the lowest ratings compared to the other groups when cooked to a medium and lower degree of doneness.
- Top round steaks that were fried to medium well or higher received higher ratings than a medium or lower degree of doneness.
- When cooked to medium well and higher, top round steaks received higher ratings when fried or braised as compared to the other Cooking Methods.
- Beef Loyals rated grilled top round steaks significantly higher than did the Budget Rotators and Variety Rotators.
- Budget Rotators rated dry methods of cooking (grilled and broiled) significantly lower than the other Cooking Methods.

Tenderness

- Top Choice top round steaks received higher tenderness ratings than did High Select top round steaks.
- Variety Rotators in Philadelphia rated top round steaks more tender than did those in Chicago.
- In Chicago, Beef Loyals gave significantly higher tenderness ratings than did Budget Rotators and Variety Rotators.
- In Chicago, top round steaks cooked to medium and lower received significantly lower ratings than did the same degree of doneness in Philadelphia.
- Braised top round steaks were rated among the highest for tenderness in both Chicago and Philadelphia when compared to other cooking methods. Consumers in Philadelphia also rated braised top round steaks significantly higher than consumers in Chicago.
- Grilled top round steaks in Philadelphia rated among the lowest for tenderness, and were significantly lower than in Chicago.
- Braised top round steaks cooked to medium and lower rated higher for tenderness than when prepared by other cooking methods.
- Fried top round steaks received significantly higher ratings when cooked to a medium well and higher degree of doneness.
- No marination effects were found.

Juiciness

- Top Choice top round steaks received higher juiciness ratings than did High Select top round steaks.
- In Philadelphia, top round steaks cooked to medium and lower received the highest Juiciness ratings compared to the other City X degree of doneness combinations.
- Top round steaks that were grilled, fried and braised received significantly lower Juiciness ratings in Chicago than in Philadelphia.
- In Philadelphia, top round steaks that were fried and braised rated higher than other cooking methods; in Chicago, grilled steaks rated higher than steaks that were fried.
- Beef Loyals rated braised top round steaks higher in juiciness when compared to the other cooking methods.
- Budget Rotators rated fried and braised steaks higher than broiled steaks.
- Grilled and broiled top round steaks received lower ratings from Budget Rotators and Variety Rotators when compared to the other cooking methods.
- When consumers used dry heat cooking methods (such as grilled and broiled) and steaks were prepared to medium well and higher, juiciness ratings were significantly reduced when compared to steaks prepared with similar cooking methods or within the same degree of doneness.
- When consumers used moist heat cooking methods (such as fried or braised), the effect of degree of doneness was minimized.

- Braised top round steaks received higher juiciness ratings than the other cooking methods when cooked to medium and lower.
- For Beef Loyals, braised top round steaks received the highest Juiciness ratings.
- Budget Rotators rated fried and braised top round steaks higher than broiled. Variety Rotators rated fried and braised steaks higher than grilled steaks.

Flavor Like

- Top Choice top round steaks received higher flavor like ratings than did High Select top round steaks.
- In Chicago, top round steaks cooked to medium and lower received the lowest flavor like ratings compared to the other City X degree of doneness combinations.
- In Philadelphia, fried and braised top round steaks received significantly higher flavor like ratings than those grilled or broiled.
- Fried top round steaks were significantly different between cities, with consumers

in Philadelphia giving higher flavor like ratings than those in Chicago.

- Budget Rotators that fried top round steaks gave them among the highest Flavor Like ratings, while Beef Loyals gave steaks prepared the same way among the lowest flavor like ratings.
- Braised top round steaks received among the highest flavor like ratings across all customer segments.
- For top round steaks cooked to medium well and higher, fried and braised received higher Flavor Like ratings than all other degree of doneness X cooking method combinations.

Flavor Amount

- In Chicago, top round steaks cooked to medium and lower received the lowest flavor amount ratings compared to the other City X degree of doneness combinations.
- Grilled top round steaks were rated significantly higher for flavor amount in Chicago than in Philadelphia.

- Fried and braised top round steaks were rated significantly higher for flavor amount in Philadelphia than in Chicago.
- When cooked medium and lower, marinated top round steaks received significantly lower flavor amount ratings when compared to those cooked to a higher degree of doneness.
- Of top round steaks cooked to medium well and higher, those with marination rated significantly higher in flavor amount ratings than steaks without marination.
- Grilled top round steaks received significantly higher flavor amount ratings from Beef Loyals than the other segments.
- Beef Loyals generally gave fried steaks among the lowest flavor amount ratings when compared to the other cooking methods, while Budget Rotators generally gave fried steaks among the highest flavor amount ratings when compared to other cooking methods.
- Fried top round steaks rated higher for flavor amount when cooked to medium well and higher.

TOP ROUND STEAKS: WARNER-BRATZLER SHEAR VALUES

For top round steaks, researchers found no significant differences in Warner-Bratzler shear force between quality grades or marination treatment. For palatability ratings, researchers found some significant quality grade effects, but discovered no significant marination effects or interactions.

Means for Grade x Marination treatment on Warner-Bratzler shear force on top round steaks.

	MEAN (LBS)	N	MINIMUM	MAXIMUM
Top Choice, Marination	8.62	100	4.90	13.83
Top Choice, No Marination	8.99	100	3.77	14.23
High Select, Marination	9.13	99	4.84	18.27
High Select, No Marination	9.11	100	4.62	14.97

CONSUMER EVALUATION OF TOP SIRLOIN STEAKS

Overall Like

- Beef Loyals who received cooking instructions rated top sirloin steaks significantly higher for overall like than those who did not receive instructions.
- Beef Loyals who did not receive instructions rated top sirloin steaks significantly lower than did Budget Rotators and Variety Rotators.
- With instructions, fried top sirloin steaks received significantly higher overall like ratings compared to other cooking methods, while broiled steaks received significantly lower overall like ratings than grilled and fried steaks when instructions were not provided.
- Grilled top sirloin steaks rated significantly higher when instructions were not provided than when instructions were provided.
- Budget Rotators and Variety Rotators gave higher overall like ratings to top sirloin steaks cooked to medium and lower compared to steaks cooked to well done and more.
- Degree of doneness did not affect how Beef Loyals rated top sirloin steaks for overall like.

- Variety Rotators who broiled top sirloin steaks rated them among the lowest for overall like.
- Budget Rotators and Variety Rotators who fried top sirloin steaks rated them among the highest of all other combinations and significantly higher than grilled and broiled steaks.

Tenderness

- With instructions, fried top sirloin steaks had significantly higher tenderness ratings compared to the other cooking methods, while broiled steaks had among the lowest ratings of the cooking methods when instructions were not provided.
- Tenderness ratings for grilled top sirloin steaks were significantly lower with instructions compared to when instructions were not provided.
- Degree of Doneness did not impact tenderness ratings among Beef Loyals.
- For Budget Rotators, top sirloin steaks cooked to medium and lower rated significantly higher than those cooked to well done and higher.
- Variety Rotators gave significantly higher tenderness ratings for top sir-

loin steaks cooked to medium and lower and medium well compared to well done and higher.

- Budget Rotators and Variety Rotators rated broiled top sirloin steaks among the lowest in tenderness ratings compared to the other combinations of segment X cooking method.
- Beef Loyals gave fried top sirloin steaks significantly lower tenderness ratings than the other segments that used this method of preparation.
- Among the cooking methods, Budget Rotators and Variety Rotators gave higher tenderness ratings to fried steaks and gave the lowest tenderness ratings to broiled steaks. Cooking method did not affect tenderness ratings from Beef Loyals.
- No marination effects were found.

Juiciness

- With instructions, Beef Loyals rated top sirloin steaks significantly higher in juiciness.
- Fried top sirloin steaks received higher juiciness ratings than steaks

TOP SIRLOIN STEAKS: WARNER-BRATZLER SHEAR VALUES

For top sirloin steaks, no significant differences in Warner-Bratzler shear force were found between the marination treatments. Mean values generally were very tender and above-average for this cut. Means (lbs) for Marinade on Warner-Bratzler shear force of top sirloin steaks.

TREATMENT	MEAN (LBS)	N	MINIMUM	MAXIMUM
No marinade	6.39	57	4.05	9.87
Marinade	5.99	55	3.63	10.80

prepared using other cooking methods, regardless of whether instructions were provided.

- Beef Loyals and Budget Rotators rated top sirloin steaks cooked to medium and lower significantly higher in juiciness when compared to other degrees of doneness.
- Among all segments, top sirloin steaks cooked to medium and lower received higher juiciness ratings than those cooked to well done and higher.
- Fried top sirloin steaks generally received among the highest juiciness ratings from all three segments.
- Broiled top sirloin steaks received among the lowest juiciness ratings from Budget Rotators and Variety Rotators.

Flavor Like

- Fried top sirloin steaks received the highest flavor like ratings, while broiled steaks received the lowest flavor like ratings.
- Beef Loyals gave significantly higher flavor like ratings for top sirloin steaks when instructions were provided compared to when instructions were not provided.

Flavor Amount

- Beef Loyals gave significantly higher flavor amount ratings to top sirloin broiled steaks than did Budget Rotators and Variety Rotators.
- Budget Rotators gave fried top sirloin steaks significantly higher flavor amount ratings than other cooking methods.
- Broiled top sirloin steaks received the lowest flavor amount ratings from Budget Rotators and Variety Rotators.
- Cooking method did not impact flavor amount ratings among Beef Loyals.

CONCLUSIONS: WHAT FACTORS DRIVE CUSTOMER SATISFACTION?

A popular belief among the beef industry is that tenderness is the main factor driving customer satisfaction.

While tenderness is paramount to ensuring the eating quality of beef, results of this study show that flavor is the single-most important factor.

Among clod steaks, desirable flavor is the sensory trait that was most highly correlated to overall like. Flavor was followed by tenderness, flavor amount and juiciness.

It also appears that for Beef Loyals, both flavor like and flavor amount were more highly correlated to eating satisfaction than was tenderness.

For Budget Rotators, flavor like and tenderness were equally important when it came to determining overall like.

For top round steaks, flavor like was also the leading determinant of customer satisfaction, followed by tenderness, flavor amount, and juiciness.

Among Beef Loyals, flavor like was more highly correlated to overall like than was tenderness. Budget Rotators also rated flavor like as the most important factor in determining overall like, followed by tenderness and flavor amount receiving equal ratings.

For top round steaks, consumers also said flavor like is the sensory trait that is the most highly correlated to overall like followed by tenderness, flavor amount and juiciness.

The primary difference between Variety Rotators and Beef Loyals is that Beef Loyals gave higher correlations between flavor amount and juiciness with overall like than did Variety Rotators.

To further predict satisfaction drivers, researchers used a statistical method known as regression analysis. For this analysis, flavor like was the strongest variable for predicting overall like, accounting for 74% of the variation in consumer overall like. The second-most important variable was tenderness, followed by flavor amount. Juiciness was not significant in predicting overall like.

Regression analysis also showed that flavor like was the most important variable for predicting overall like among top round steaks. The second-most important variable was tenderness followed by flavor amount. Juiciness had little impact on overall like predictability.

And, flavor like was the single most important variable for predicting overall like among top sirloin. Next in importance was tenderness, followed by juiciness. Flavor amount added little to the prediction of overall like.

Clearly, flavor like is the key factor driving customer satisfaction for all three categories of beef cuts analyzed in this study.

How can we enhance Customer Satisfaction Ratings?

TOP ROUND:

- Choose Top Choice top round cuts
- Top rounds are best either braised or fried.
- Cook to medium well or higher degree of doneness (DOD).
- Flavor is the most important factor driving Customer Satisfaction.

TOP SIRLOIN:

- Either Choice or Select cuts eat extremely well.
- Top sirloins are best either grilled or fried.
- Lighter beef eaters (variety and budget rotators) preferred a medium or lower degree of doneness. Heavy beef eaters liked the top sirloin at all DOD's.
- Flavor is the most important factor driving Customer Satisfaction.

CLOD:

- Grade did not consistently influence Customer Satisfaction.
- Grilling is the preferred cooking method.
- DOD significantly influences the Customer Satisfaction rating.
- Medium well and higher is the preferred DOD for clod cuts.
- Flavor is the most important factor driving Customer Satisfaction.

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