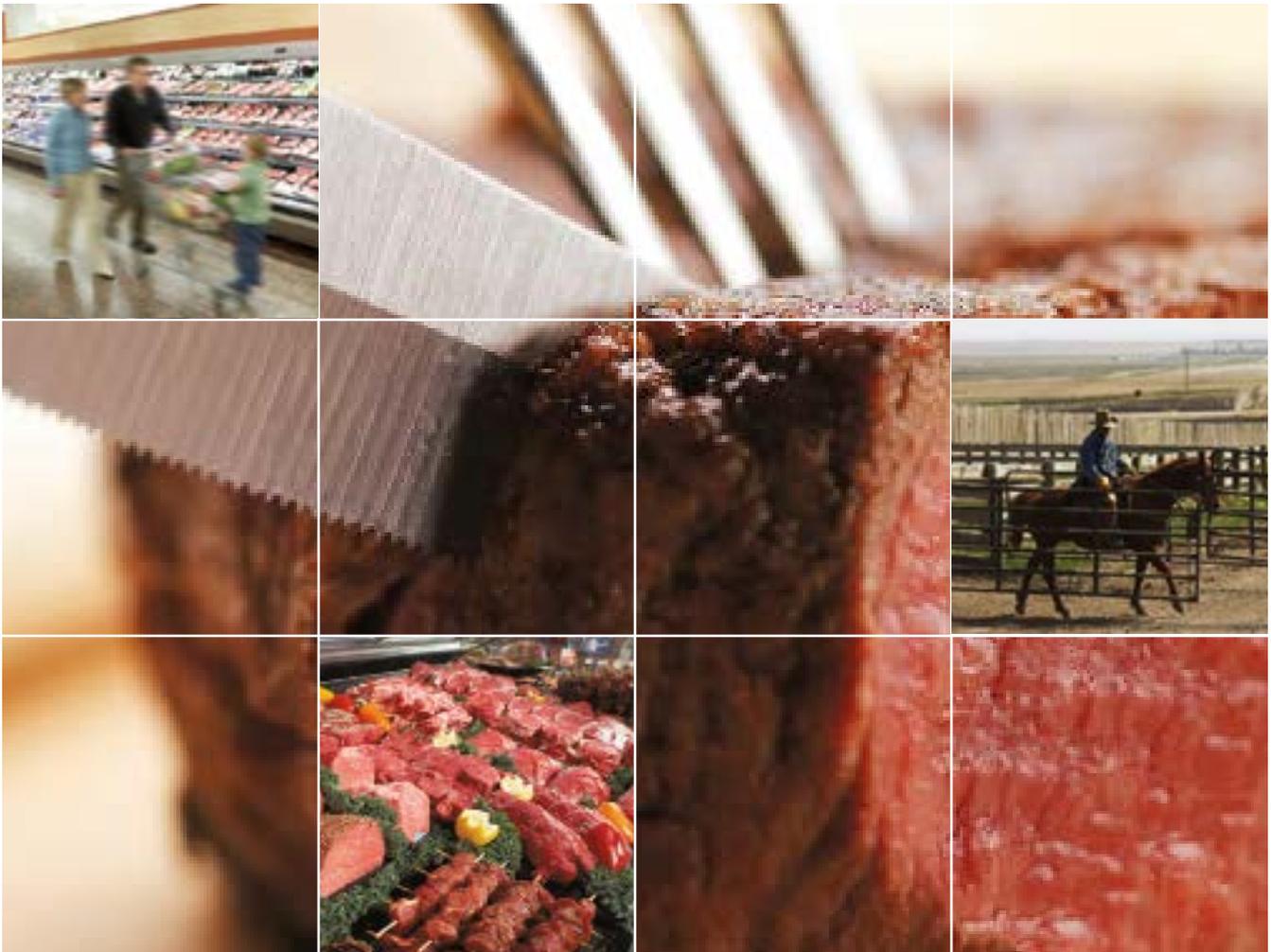


2014 -18 National Beef Quality Audit Retail Beef Satisfaction Benchmark



An Executive Summary for the Beef Industry





Benchmark Study Goals

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Consumer and Product Statistics



Satisfaction Driver Analysis and Levels



Beef Tenderness Assessment



Enhancement Beef Eating Quality

Study Methodology Overview



The study methodology used both consumer and laboratory testing to determine factors related to beef eating quality or palatability. In the consumer portion of the study, juiciness, flavour, and tenderness were examined separately to determine their contribution to overall satisfaction with beef products. A summary of the methods used are found in the table below.

Study Stage	Methodology
Sample Collection	1,200 samples were purchased from 60 stores in Calgary, Montreal, Toronto, and London in the summer of 2015. Additionally, 1,200 extra samples were saved for evaluation at the AAFC Lacombe Research Centre.
Consumer Recruitment	1,200 consumers were randomly selected from shopping malls to try steaks at home. Consumers were screened to ensure they had some experience in preparing beef products and had consumed beef in the past year.
Consumer Evaluation of Beef Products	Consumers prepared one of four types of steak at home and recorded their impressions during consumption. Steaks tested were boneless cross rib, top sirloin, inside round and strip loin.
Follow-up Interview	<p>A professional interviewer then contacted each consumer by telephone and obtained detailed information on product perceptions as well as supporting data on cooking methods, historical beef satisfaction, and demographic information. Consumers were asked to evaluate the following factors on a numerical scale of 1 to 10.</p> <ul style="list-style-type: none"> ■ Tenderness – Amount and Satisfaction ■ Juiciness – Amount and Satisfaction ■ Flavour – Amount and Satisfaction ■ Overall Rating
Scientific Analysis	An additional 1,200 samples were frozen for laboratory testing including tenderness evaluation using Warner-Bratzler analysis. Measurements for maximum, minimum and average fat and lean depth were also recorded.



Consumer and Product Statistics

Table 1: **Summary Statistics for Retail Product Evaluated by Consumers**

Cut	#	Unit Price	\$/kg	Average Weight (g)	Lean Thickness (mm)	Branded %
Top Sirloin	300	\$10.41	\$26.69	434	16.8	35
Strip Loin	300	\$9.38	\$33.04	315	18.6	41
Boneless Cross Rib	300	\$7.74	\$17.89	424	16.2	36
Inside Round	300	\$7.79	\$19.73	412	15.8	39

Product Sampled

Table 1 summarizes product parameters for the steaks purchased for consumer evaluation. The number of steaks purchased from the retail chains represented in the study was proportional to their market share for the given beef steak category.

The four types of steaks selected for the study were chosen for their ability to represent different cooking categories, price ranges, and portions of the carcass.



Table 2:
Steaks the Study Consumers Say They Buy Most Often



Cut	%
<i>Top Sirloin</i>	16.0%
T-bone	30.0%
<i>Strip Loin</i>	14.0%
Tenderloin	19.0%
Rib Eye	16.0%
<i>Inside Round</i>	3.0%
Sirloin Tip	15.0%
<i>Boneless Cross Rib</i>	2.0%
Rib Steak	12.0%
Eye of Round	6.0%
Blade	5.0%
Bottom Sirloin	5.0%
Outside Round	5.0%

Consumers were not prompted and accordingly results may have been influenced by their ability to remember cut names. Steaks in italics were of the types utilized in the benchmark study.

Consumers Sampled

The 1,200 consumers sampled were selected from four Canadian cities (Toronto, Calgary, London and Montreal). The number of consumers selected from each region was based on regional beef consumption volumes.

When asked what type of steaks they buy most often, study consumers identified two of the study cuts (top sirloin, strip loin) among their most frequent choices (see table 2).

As table 3 shows, the randomly selected consumer sample consumed beef at approximately 41% of evening meals. Females comprised approximately 75% of the sample.

Table 3:
Consumer Statistics

Gender	305 male /895 female
Average Household Income	\$53,900
Beef Consumption (% evening meal)	41%
Average Age	50 years
Average Household Size	2.6



Satisfaction Driver Analysis

As described in the methods section, consumers were asked to rate tenderness, juiciness, flavour and overall impression for the four types of steaks. The first goal of the benchmark study was to determine the relative importance of tenderness, juiciness, and flavour as drivers or predictors of overall satisfaction. In order to determine this, a statistical value known as a correlation coefficient was calculated using survey responses. (In this case, the higher the value of the correlation coefficient the more important the strength of the attribute as a driver of overall satisfaction with eating quality.)

Overall satisfaction continues to be driven by tenderness, then flavour and juiciness. While as in previous benchmarks the value for tenderness was numerically higher, this difference was not statistically significant in 2015. This is likely due to an improvement in the tenderness of retail beef.

Similar values were seen for all three satisfaction drivers for male and females participants in the study. The correlation between palatability attributes can be influenced by the so called "halo" effect where enhanced tenderness leads to greater satisfaction with other aspects of eating quality.



Table 4:
Satisfaction Driver Analysis

Satisfaction Driver	Males	Females	Total Sample
Tenderness Satisfaction	0.85	0.88	0.87
Juiciness Satisfaction	0.80	0.82	0.82
Flavour Satisfaction	0.83	0.83	0.83

Values shown are correlation coefficients, the closer the value to 1 the stronger the driver. * Significance testing at the 90% confidence level.

Satisfaction Levels

Table 5: **Percentage of Satisfied Customers***

Steak Type	Tenderness	Juiciness	Flavour	Overall
Top Sirloin	80%	80%	83%	83%
Strip Loin	85%	81%	86%	88%
Boneless Cross Rib	68%	74%	81%	75%
Inside Round	60%	60%	71%	68%

The second goal of the study was to determine consumer satisfaction levels. In our analysis, a consumer was considered to be satisfied if they gave a score of 7 out of 10 or higher for the attribute being evaluated. In terms of overall satisfaction levels, top sirloin and strip loin were significantly higher than cross rib and inside round. Reduced consumer satisfaction with all three palatability or eating quality attributes was shown to contribute to this difference for inside round (see table 5). While tenderness and juiciness were reduced for boneless cross rib, flavour was not significantly diminished.

Table 6 shows the percentage of consumers satisfied with the different attributes of eating quality. For steaks, flavour had the highest levels of consumer satisfaction followed by juiciness and tenderness. This trend was generally observed in all four of the steaks tested in the study.

Table 6: **Attribute Satisfaction**

Attribute	% Satisfied Consumer*
Tenderness	73%
Juiciness	74%
Flavour	80%

*A satisfied consumer in this study is defined as one who gave a rating of 7/10 or higher for the attribute being evaluated.



Beef Tenderness Assessment

The third goal of the consumer satisfaction benchmark was to determine in a laboratory, using a procedure known as the Warner-Bratzler method, the tenderness of beef steaks. By comparing the laboratory measurements of beef tenderness with consumer ratings, we can better determine the extent that perceptions of eating quality are influenced the inherent tenderness of the beef versus consumer taste preferences or preparation methods.

The results in table 7 show that all four cuts had similar average measurements in terms of the force required to shear a core. This finding was in contrast to consumer ratings which indicated that the tenderness of top sirloin and strip loin was greater than the other two cuts. The reason for this unexpected finding may relate to challenges measuring tenderness in inside round steaks that were cut very thinly. The average thickness of inside round steaks used for tenderness evaluation was only 13.5mm versus 19.9mm for strip loin.

How Warner-Bratzler Tenderness Analysis is Performed

The laboratory tenderness assessment used the Warner-Bratzler method. This involves taking core samples from beef cooked to the same degree of doneness and measuring the force needed to cut through the meat using a standardized blade shown at the lower right.

The lower the shear force value the more tender the meat sample.

Table 7:
Warner-Bratzler Shear Results

Steak Type	Shear Values in kgs
Top Sirloin	3.0 kg
Strip Loin	3.2 kg
Boneless Cross Rib	3.3 kg
Inside Round	3.0 kg

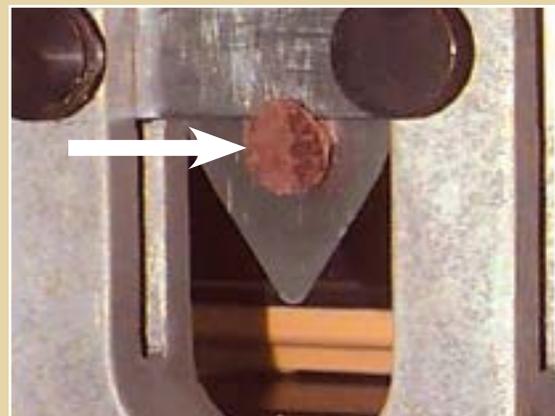


Table 8:
Percentage of Steaks Requiring Tenderness Enhancement Strategies

Steak Type	NEED FOR TENDERNESS ENHANCEMENT		
	None (<3.9 kg)	Slight to Moderate (3.9 to 4.6 kg)	Significant (>4.6 kg)
Top Sirloin	84.3%	9.3%	6.4%
Strip Loin	84.8%	7.0%	8.2%
Boneless Cross Rib	82.7%	13.1%	4.2%
Inside Round	87.0%	10.6%	2.3%

Previous Canadian research has shown that for retail beef steaks a shear force value of higher than 4.6 kg often corresponds to meat which will be judged by consumers as “tough.”¹ In our study an estimated 5.3% of cuts were found to be in this range. Values for the four types of steaks are shown above in table 8.

Inside round results showed that only 2% of steaks were found to require significant tenderness enhancement using Warner-Bratzler testing results in 2015. This finding contrasts with the figure of 27% reported in 2001.

In contrast, the 8.2 percentage of strip loins classified as requiring significant enhancement is greater than the corresponding 0% value found for the 2009 study. Certainly the boneless cross rib and inside round have improved since 2001 and some differences for strip loin may be due to stick thickness or sampling issues.

1. J. Aalhus et.al, Canadian Beef Tenderness Strategy



Enhancing Beef Eating Quality

Table 9 outlines the percentage of packages which contained detailed instructions or a cooking method e.g. *grilling or marinating steak*. While almost half of packages had some type of guidance, less than 10% of study consumers recalled noticing them.

Table 9: Presence of Cooking Guidance on Package

Instruction Type	%
Simple Cooking Method	43%
Cooking Instructions / Recipe	5%

An estimated 44% of study steaks were grilled or barbecued while 43% were fried and 8% baked or microwaved.

Study consumers added a variety of ingredients to steaks prior, during and after cooking as shown in table 10. Most added ingredients before cooking, on average 1.5 ingredients. The vast majority of respondents (86%) ate their steak for the evening meal. Just under half of study steaks were consumed on the weekend (42%).

Table 10: Added Ingredients

Before Cooking Steaks	%
Marinating products	20%
Salt and Pepper	57%
Spice, Sauce and Rubs	57%
Nothing	12%
During Cooking	%
Seasonings	20%
Spices	11%
Fats	10%
Sauces	8%
Other Ingredients / Vegetables	11%
Nothing	55%
After Cooking	%
Seasonings	6%
Sauces	5%
Other Ingredients/Vegetables	10%
Nothing	69%

Table 11: **Steak Doneness Levels**

Instruction Type	%
Well done / medium well	49%
Medium	25%
Medium rare / rare / blue	26%

Just under half of steaks were cooked to medium well or higher (see table 11). However, only 5% of study consumers used a thermometer to verify the doneness level. Those that did use a thermometer were significantly more likely to rate the quality of the steaks they cooked at home at 7/10 or higher.

In the study 288 of the 1,200 consumers gave their steak a perfect rating (10/10). When the remainder were asked, "Why wasn't it perfect?", approximately 12% of study consumers felt their preparation methods were solely or partially responsible (see table 12).

Although it could be argued that consumers underestimate the importance of their own cooking practices on steak eating quality, it does not change the fact that in their view, the vast majority of concerns are due to the product they purchased. Accordingly the largest share of the responsibility for enhancing eating quality is assigned to the beef industry.

Table 12:
Consumer Concerns with Study Steaks

Concern	%
Texture (tenderness and juiciness) Not tender enough, tough, hard, chewy/hard to chew, not juicy/dry	46%
Butchering Too many nerves/strands, too much gristle, cut too thin/thick	16%
Quality/Cut Type Do not like this cut, not a good cut, not good quality beef	14%
Cooking Not cooked right, not a good cook, seasoned incorrectly	12%
Flavour/taste Not enough flavour, did not like the taste	9%
Fat Content Too much fat, not enough fat	6%
Other	3%



Comparisons to the 2009 Benchmark

Product Characteristics

The tables below compare the results of the 2009 benchmark to the 2015 study findings. Both studies utilized the same methodology which makes comparisons meaningful.

Relative to the 2009 benchmark the price per unit increased by 39% (see table 13). The reasons for this increase was due to a higher price per kilogram. The average thickness of the lean tissue and the weight of steaks was slightly lower in 2015. A long term trend towards increasing carcass weights (an average increase of 7 pounds per year since 1975) requires that steaks be cut thinner to maintain a consistent weight. The total number of steaks evaluated by consumers was 1,200 in 2015 versus 1,152 in the 2009 benchmark.

Table 13: Summary Statistics for Retail Product Evaluated by Consumers

Parameter*	2015	2009	Difference
Total Steaks Sampled	1,200	1,152	+4%
Unit Price (\$/unit)	\$8.74	\$6.30	+39%
Price per Kilogram (\$/kg)	\$24.20	\$16.60	+46%
Weight (grams)	396	407	-3%
Lean Thickness (mm)	16.1	16.8	-4%

* Simple average all 4 steak types

Consumer Characteristics

The percentage of consumer participants that were female increased in the 2015 study by 14% (see table 14). The average age of the respondents as well as household income also increased. The average number of people in participant households and the percentage of evening meals that contained beef both declined slightly.

Table 14: Summary Statistics for Consumer Study Participants (Averages)

Parameter	2015	2009	Difference
% Females	75%	66%	+14%
Age	50	46	+9%
Beef Consumption (% evening meals)	41%	43%	-5%
Household Income	\$53,900	\$48,000	+12%
Household Size	2.6	2.7	-4%

Cooked Methods and Doneness Levels

The percentage of study consumers that cooked their steaks to a well done or medium well level was identical to the previous 2009 study (see table 15). This doneness level was preferred by women more often than men. As in 2001, the most popular cooking methods for steaks continue to be grilling/BBQ and frying. As in 2009, respondents of French descent continue to be much more likely to fry steaks.

Table 15: **Level of Doneness**

Parameter	2015	2009	Difference
Well/Medium Well	49%	49%	+0%
Medium	25%	27%	-7%
Med. Rare/Rare/Blue	26%	24%	+8%

Use of Marinades

In 2015, 32% of study participants reported they marinated their steak versus 35% in 2009. Only 29% of those that marinated utilized a tenderizing agent or ingredient in the marinade in the current study. This was identical to the 29% figure from the 2001 benchmark. Accordingly, marination as performed will principally influence flavour versus tenderness. The use of a tenderizing agent or ingredient was greater for inside round steak (see table 16).

Table 16: **Use of a Tenderizer in the Marinade**

Steak Type	2015	2009	Difference
Strip Loin	28%	24%	+16.7%
Top Sirloin	31%	28%	+10.7%
Inside Round	38%	35%	+8.6%
Boneless Cross Rib	30%	29%	+3.5%

Concerns with Eating Quality

In both study years, a similar percentage of individuals gave their steaks a 10/10 rating, (24% and 23% in 2015 and 2009 respectively). When the remainder were asked “why was your steak not perfect?”, 19% of consumers in 2009 indicated their preparation methods were solely or partly responsible versus 12% in 2015. The remaining consumers reported that eating quality concerns were due primarily to quality of the product they had been provided.

As shown in table 17, Warner Bratzler testing indicated that the average value of shear force for all 4 type of steaks combined was very similar for 2015 and for tenderness testing performed in 2011.

Table 17: **Warner Bratzler Tenderness Testing Results**

Average for Study Steaks	2015	2009	Difference
Shear Force (kg)	3.1 kg	3.2 kg	-.1 kg

Consumer Satisfaction

Relative to the 2009 benchmark, consumers in the 2015 study typically assigned similar ratings for tenderness, juiciness, flavour and overall satisfaction for the steak sampled (see table 18). Ratings for juiciness of top sirloin and inside round as well as flavour of top sirloin did appear to decline.

Table 18: **Percentage of Satisfied Customers***

Steak Type	Tenderness		Juiciness		Flavour		Overall	
	2015	2009	2015	2009	2015	2009	2015	2009
Strip Loin	85%	84%	81%	87%	86%	86%	88%	87%
Top Sirloin	80%	83%	80%	88%	83%	90%	83%	86%
Boneless Cross Rib	68%	71%	74%	72%	81%	79%	75%	75%
Inside Round	60%	63%	60%	65%	71%	70%	68%	69%

When comparing ratings for palatability attributes across all steak types, the ranking of attributes was similar to the 2009 benchmark, with higher satisfaction levels being associated with flavour versus tenderness (see table 19). In 2015 there was trend towards reduced satisfaction with tenderness, juiciness and flavour compared to 2009 when the ratings for all steak types studied were combined although only the decline in juiciness was statistically significant.

Table 19: **Attribute Satisfaction across all Study Steaks***

Attribute	2015	2009	Difference
Tenderness	73%	76%	-4%
Juiciness	74%	78%	-5%
Flavour	80%	82%	-2%

Most importantly, as shown in table 20, consumer ratings for overall satisfaction with study steaks remained essentially unchanged in the 2015 benchmark study. As in 2009 there was higher reported values for overall satisfaction with the steaks respondents usually purchased.

Table 20: **Overall Satisfaction with Steaks***

Steak Type	2015	2009	Difference
Steaks Usually Purchased	86%	88%	-2%
Study Steaks	79%	80%	-1%

*A satisfied consumer in this study is defined as one who gave a rating of **7/10 or higher** for the attribute being evaluated.



Conclusions and Next Steps

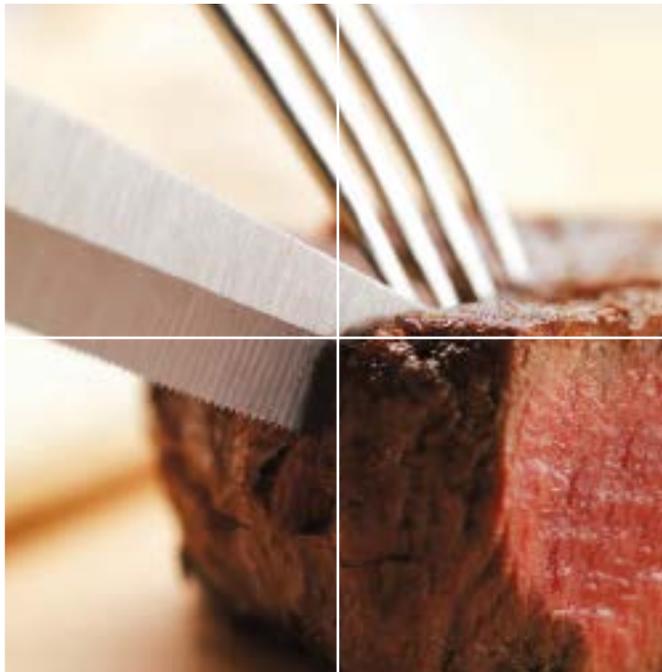
It is the ultimate goal of the Canadian beef industry to achieve 100% consumer satisfaction with beef products. As part of our survey we asked consumers participating in the study how satisfied they were with the steaks they usually prepare at home. As table 21 shows, 86% of consumers gave beef steaks an overall rating of 7/10 or better. When we average the results from the four steaks in this study, we obtain a result of 79%. Given that consumers were not permitted to select which of the four study steaks to sample, they did not always receive their first choice and this may explain why ratings for this measure are lower. Most likely, the best estimate of consumer satisfaction with steaks lies somewhere between the two measurements.

Table 21:
Consumer Satisfaction with Steaks

Measurement	% Satisfied Consumers
Steaks usually prepared	86%
Steak sampled in study	79%

The response for “Steaks usually prepared” was for any type of steak usually prepared by the consumer.





A Beef Research Cluster Initiative



The Beef Research Cluster is funded by the Canadian Cattlemen's Association and Agriculture and Agri-Food Canada to advance research and technology transfer supporting the Canadian beef industry's vision to be recognized as a preferred supplier of healthy, high quality beef, cattle and genetics.