Project Summary

Retail beef tenderness surveillance

Principal Investigator: J. W. Savell
Texas A&M University

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Background

Tenderness, juiciness and flavor are the primary traits that encompass meat palatability. Palatability can be affected by live management practices, and post-harvest practices. Surveillance of these practices and their effect on meat quality is critical to beef demand and the sustainability of the beef industry. Beef tenderness is commonly regarded as the most critical attribute and is the reason why a vast amount of research has been conducted to better understand tenderness mechanisms and their effect in order to enhance beef palatability. This study has allowed for a comparison of beef tenderness to the National Tenderness Beef Surveys previously conducted, specifically the 2010 survey. Each survey has allowed the industry to make advancements in beef products at the retail and food service levels. The objectives of this project were to establish a benchmark for tenderness of beef top loin steaks in the United States; and to draw comparisons to previous National Beef Tenderness Surveys.

Methodology

Steaks were selected (n = 1,613) by four universities which comprised of California Polytechnic State University, Colorado State University, University of Missouri and Texas A&M University. The collaborators sampled four metropolitan areas chosen to represent a broad geographical range and to maintain some historical linkage with cities that have been used in the National Beef Tenderness Survey. Metropolitan areas included Los Angeles, CA; Denver, CO; Kansas City, MO; and Houston, TX. Over a 12-month time period, each city was sampled four times from July 2012 to May 2013, to account for potential seasonality variation. In each metropolitan area, approximately 20 supermarket stores or wholesale club stores per metropolitan area were sampled. Steak packages were selected from various locations within the case and represented the various programs and brands offered by the retailer. Information gathered upon collection were store name and store number, location (city), grade, enhanced/non-enhanced, brand name, package weight, price/ lb, steaks per package, package date, sell by date, and packaging material. Steak packages were then placed in Ziploc® bags and placed in insulated coolers with cooling material to ensure product remained under refrigerated temperatures until further processing of steaks could occur. Steaks were taken to the respective universities, were removed from the original store package, and steak thickness (cm), average fat thickness (cm), and steak weight (g) were measured and recorded (Figure 1). Steaks then were frozen and shipped overnight in insulated containers with sufficient refrigerant to ensure that products are shipped and received frozen. Steaks were assigned randomly to be used for Warner-Bratzler shear force (Figure 2), Slice shear force (Figure 3), and consumer sensory panels. All steaks were cooked to an internal temperature of 70˚C. Consumer panels rated samples for overall like, tenderness, juiciness, and flavor as well as the level of tenderness, juiciness and flavor.

Findings

Top loin and top loin, bone-in steaks had comparable WBS values, which were similar numerically to the values reported in the 2010 survey, lower numerically than the 1991 and 2000 surveys, but slightly higher numerically than the 2006 survey (Table 1). Approximately 85% of the steaks evaluated with the SSF objective tenderness measurement met the criteria, SSF $\leq$ 20 kg or 196.1 N, to be considered Certified Tender. Further, 81% of top loin and 76% top loin,

bone-in steaks were categorized as “very tender” based on their WBS measurements (Table 2). The top loin received the highest ($P < 0.05$) ratings by consumers across all categories, whereas top loin, bone-in steaks received the lowest ($P < 0.05$) ratings by all consumers. Furthermore, enhanced/blade tenderized top loin steaks had the lowest ($P < 0.05$) WBS and SSF values and consumers rated enhanced/blade tenderized steaks the highest ($P < 0.05$) in tenderness level and flavor level.

Implications

This research allows all sectors of the beef industry to track advancements made in beef tenderness and consumer preferences since the last survey was conducted. The beef industry has to be diligent to ensure that beef remains the leading protein that provides the greatest joy and pleasure to its consumers, and with on-going surveillance, at least at the retail counter, it provides some of the information necessary to be confident that beef continues to perform to its best ability.

Tables:

Figure 1. Measuring steak parameters upon arrival to the respective laboratories.

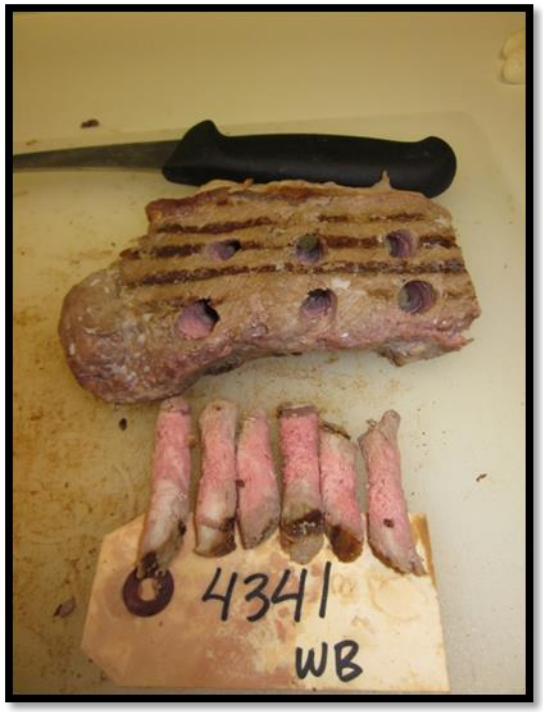

Figure 2. Core removal for Warner-Bratzler shear force analysis.

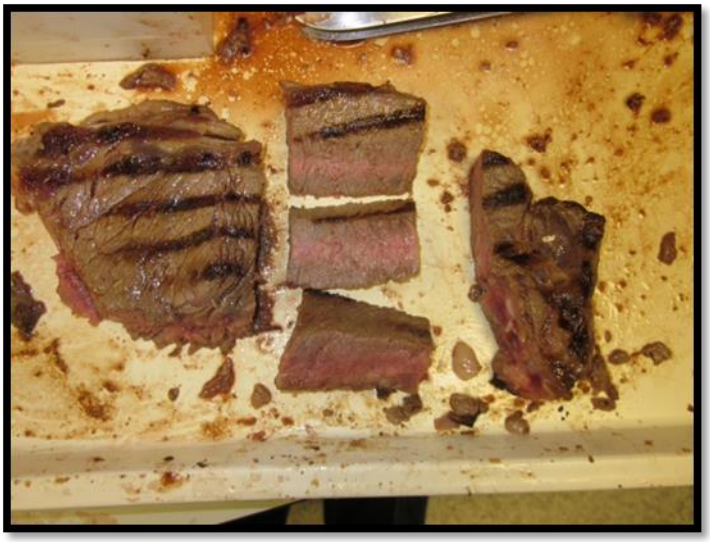

Figure 3. Slice cuts for slice shear force analysis.

Table 1. Comparison of mean Warner-Bratzler shear force (kg) values across all National Beef Tenderness studies

	1991	2000	2006	2010	2013
Top Loin	3.31	2.68	2.13	2.36	2.50
Bone-In Top Loin[A]	-	-	2.13	2.50	2.78

[A] Bone-in, Top Loin steaks were not evaluated in the 1991 and 2000 National Beef Tenderness Surveys.

Table 2. Percentage (%) distribution of retail steaks stratified into tenderness categories[A]

Steak	Very Tender	Tender	Intermediate	Tough
Top loin	80.98	10.78	5.07	3.20
Top loin, bone-in	76.27	12.71	6.78	4.24

[A] Very Tender=WBS < 7.05 lbs(3.2 kg; 31.4 N); Tender= 7.05 lbs(3.2 kg; 31.4 N) < WBS < 8.6 lbs (3.9 kg; 38.3 N); Intermediate=8.6 lbs (3.9kg; 38.3 N) < WBS < 10.14 lbs (4.6 kg; 45.1 N); Tough= WBS > 10.14 lbs (4.6 kg; 45.1 N).

For more information contact:
National Cattlemen's Beef Association
A Contractor to the Beef Checkoff
9110 East Nichols Avenue
Centennial, Colorado 80112-3450
(303) 694-0305