

# **PALATABILITY AND TENDERNESS EVALUATION OF BEEF TOP SIRLOIN STEAKS FROM SUBPRIMALS SUBJECTED TO BLADE TENDERIZATION, POSTMORTEM AGING OR FREEZING TREATMENTS**

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## **I. INTRODUCTION**

The beef top sirloin steak is a popular cut among cost-conscious consumers, yet often does not deliver a desirable eating experience when compared to other cuts from the rib and loin. Historically, the sirloin has had lower tenderness values, which is an important fact to consider since consumers view tenderness as the most important organoleptic characteristic of meat [1]. To combat shortcomings inherent to the sirloin, a variety of processes have traditionally been implemented to increase consumer acceptability. The benefits of using blade tenderization to enhance tenderness are known [2-4], yet other aging options are available that may minimize the food safety risks associated within. It is known that postmortem aging of beef increases tenderness due to endogenous enzymes in the muscle causing loss of structure and strength of the myofibril [5, 6]. However, Harris, Miller, Savell, Cross and Ringer [7] reported that the extensive length of time required for tenderness changes in sirloin steaks could lead to undesirable effects, such as off-flavor and soft texture. Furthermore, Grayson, King, Shackelford, Koohmaraie and Wheeler [8] reported that freezing and thawing of meat, or freezing and thawing combined with aging, reduced slice shear values and may be a method to improve meat tenderness. The objectives of this study were to 1) determine if consumer satisfaction improves by blade tenderizing today's more inherently tender beef, 2) assess whether extended aging periods for the top sirloin were necessary to improve tenderness, and 3) evaluate the impact of freezing top sirloin butts during subprimal storage to see if quality attributes of the resulting steaks would be enhanced.

## **II. MATERIALS AND METHODS**

Paired USDA Choice top sirloin butts ( $n = 60$ ) were collected from 30 carcasses and divided equally among three experiments: 1) blade tenderized (BT) versus non-blade tenderized (NBT), 2) 14- versus 35-day refrigerated aging (all subprimals stored at  $\sim -1$  °C for the assigned number of days), and 3) refrigerated aging (aged under refrigeration for 35 days before cutting into steaks) versus frozen aging (aged under refrigeration for 14 days, frozen for 14 days, and then placed back in refrigeration for 7 days before cutting into steaks). Consumer sensory and Warner-Bratzler Shear (WBS) force evaluations were performed. Experiment data were analyzed separately with paired t-tests, using the matched pairs function of JMP (Version 12, SAS Institute, Inc., Cary, NC), at an alpha of 5%.

## **III. RESULTS AND DISCUSSION**

Paired t-tests for sensory panel ratings and WBS force values for steaks from each experiment are reported in Table 1. Steaks that were BT had higher ( $P < 0.05$ ) overall liking, flavor liking, and tenderness liking ratings than did steaks from NBT subprimals. Interestingly, although tenderness liking differences occurred, WBS force values did not differ ( $P > 0.05$ ) between BT and NBT treatments. For experiments 2 (14 versus 35-day aging) and 3 (refrigerated versus frozen), no differences ( $P > 0.05$ ) between treatments were seen for consumer sensory panel ratings or WBS force values.

Table 1. Paired t-tests for sensory panel ratings and WBS force values for steaks from subprimals subjected to different aging treatments.

		Sensory panel ratings <sup>b</sup>				
	<i>n</i> <sup>a</sup>	Overall like/dislike	Tenderness like/dislike	Flavor like/dislike	Juiciness like/dislike	Warner-Bratzler shear force (N)
<i>Experiment 1<sup>c</sup></i>						
BT	10	6.7	6.7	6.7	6.4	26.4
NBT	10	6.3	6.0	6.5	6.1	28.2
SE		0.14	0.15	0.08	0.20	2.29
Prob > t		0.0293	0.0011	0.0198	0.1138	0.4395
<i>Experiment 2<sup>d</sup></i>						
14 d	10	6.0	5.6	6.3	5.6	30.7
35 d	10	6.1	6.0	6.1	5.9	27.5
SE		0.25	0.29	0.20	0.28	1.81
Prob > t		0.6321	0.1868	0.3795	0.2948	0.1215
<i>Experiment 3<sup>e</sup></i>						
Refrigerated	10	6.3	6.0	6.4	5.8	26.7
Frozen	10	6.1	5.8	6.2	6.1	30.7
SE		0.14	0.21	0.11	0.26	1.97
Prob > t		0.0946	0.3017	0.1005	0.2870	0.0733

<sup>a</sup> Number of subprimals per treatment.

<sup>b</sup> Sensory panel ratings: 9 = like extremely; 1 = dislike extremely.

<sup>c</sup> Experiment 1: BT = top sirloin butts were run once through a blade tenderizer before cutting into steaks; NBT = top sirloin butts were not blade tenderized before cutting into steaks.

<sup>d</sup> Experiment 2: 14 d = top sirloin butts were aged for 14 days under refrigeration before cutting into steaks; 35 d = top sirloin butts were aged for 35 days under refrigeration before cutting into steaks.

<sup>e</sup> Experiment 3: Refrigerated = top sirloin butts were aged under refrigeration for 35 days before cutting into steaks; Frozen = top sirloin butts were aged under refrigeration for 14 days, frozen for 14 days, and then placed back in refrigeration for 7 days before cutting into steaks.

#### IV. CONCLUSION

Overall, tenderness levels of top sirloin steaks were acceptable regardless of treatment, indicating that purveyors have options and flexibility in inventory control for top sirloin butts. Improvements in sensory panel ratings with blade tenderization show that this traditional method of enhancing tenderness is still beneficial for the top sirloin steak.

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