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Effects of quality grade, aging period, blade tenderization, and degree of doneness on tenderness of top sirloin butt steaks

Abstract

We used 162 top sirloin butts to determine the influence of different quality grades, postmortem aging periods, blade tenderization passes, and degree of doneness on thawing and cooking losses and Warner-Bratzler shear force (WBS, tenderness). Select (SEL), Choice (CHO), and Certified Angus Beef™ (CAB) top sirloin butts (n=54 for each) were aged for 7, 14, or 21 days and not tenderized (OX) or blade tenderized one (1X) or two (2X) times. Steaks from each top sirloin butt were assigned randomly to final endpoint cooking temperatures of 150, 160, and 170°F. Each longer aging period resulted in lower ($P < .05$, more tender) WBS. In addition, steaks blade tenderized 2X had lower ($P < .05$) WBS than steaks not tenderized or blade tenderized 1X. Within each quality grade, WBS increased ($P < .05$) as endpoint cooking temperature increased. When cooked to 160 or 170°F, CHO and CAB steaks had lower ($P < .05$) WBS than SEL steaks. Increased aging periods and blade tenderization passes of top sirloin butt steaks improved tenderness. When cooking to higher endpoint temperatures, using higher quality grades will minimize toughness caused by cooking.

Keywords

Cattlemen's Day, 2000; Kansas Agricultural Experiment Station contribution; no. 00-287-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 850; Beef; Tenderness; Blade tenderization; Aging; Quality grade

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EFFECTS OF QUALITY GRADE, AGING PERIOD, BLADE TENDERIZATION, AND DEGREE OF DONENESS ON TENDERNESS OF TOP SIRLOIN BUTT STEAKS

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J. L. Marsden, and C. L. Kastner*

Summary

We used 162 top sirloin butts to determine the influence of different quality grades, post-mortem aging periods, blade tenderization passes, and degree of doneness on thawing and cooking losses and Warner-Bratzler shear force (WBS, tenderness). Select (SEL), Choice (CHO), and Certified Angus Beef™ (CAB) top sirloin butts (n=54 for each) were aged for 7, 14, or 21 days and not tenderized (OX) or blade tenderized one (1X) or two (2X) times. Steaks from each top sirloin butt were assigned randomly to final endpoint cooking temperatures of 150, 160, and 170°F. Each longer aging period resulted in lower ($P<.05$, more tender) WBS. In addition, steaks blade tenderized 2X had lower ($P<.05$) WBS than steaks not tenderized or blade tenderized 1X. Within each quality grade, WBS increased ($P<.05$) as endpoint cooking temperature increased. When cooked to 160 or 170°F, CHO and CAB steaks had lower ($P<.05$) WBS than SEL steaks. Increased aging periods and blade tenderization passes of top sirloin butt steaks improved tenderness. When cooking to higher endpoint temperatures, using higher quality grades will minimize toughness caused by cooking.

(Key Words: Beef, Tenderness, Blade Tenderization, Aging, Quality Grade.)

Introduction

Of beef steaks regularly offered on restaurant menus, the top sirloin steak is less tender and more variable in tenderness and generally has the lowest price. Different quality grades, aging periods, blade tenderization passes, and endpoint cooking temperatures can contribute to tenderness. Our objective was to determine

the influence of these variables on tenderness of top sirloin butt steaks.

Experimental Procedures

The procedures for this study followed those described in the previous paper (strip loin, pg. 127), except we used 162 top sirloin butts (IMPS 184A) to obtain top butt (gluteus medius) steaks.

Results and Discussion

Thawing and cooking losses were similar ($P>.05$) for all quality grade and blade tenderization treatments (Table 1). However, steaks aged 7 days had greater ($P<.05$) thawing loss than steaks aged 21 days. Steaks aged 14 and 21 days had more ($P<.05$) cooking loss than those aged 7 days. In addition, for each increase in endpoint cooking temperature (150, 160 and 170°F), cooking losses increased ($P<.05$; 26.3, 31.0 and 35.1%, respectively). Steaks aged 21 days had lower (more tender, $P<.05$) WBS values than those aged 14 and 7 days (Table 1). Furthermore, steaks aged 14 days had lower ($P<.05$) WBS values than steaks aged 7 days. Steaks blade tenderized 2X had lower ($P<.05$) WBS values than steaks not tenderized or blade tenderized 1X. These results show that blade tenderization and aging can lower WBS. Our results suggest that for maximum tenderness, top sirloin butt steaks should be aged at least 21 days and blade tenderized 2X.

A quality grade \times endpoint cooking temperature interaction ($P=.05$) was detected for WBS (Table 2). Within each quality

grade, as endpoint temperature increased, WBS values increased ($P<.05$). For steaks cooked to 150°F, WBS values were similar ($P>.05$) for all quality grades. For those cooked to 160 and 170°F, CHO and CAB steaks had lower ($P<.05$) WBS values than SEL steaks. Higher quality grades (CHO and CAB) provided some protection against toughening at higher degrees of doneness.

For foodservice, a WBS of 8.6 lbs (3.9 kg) has been used as a threshold to predict a rating of at least “slightly tender”. Select steaks aged 14 or 21 days, blade tenderized 2X, and cooked to 150°F had no tough steaks with WBS values above 8.6 lbs (Table 2). Choice steaks aged 14 or 21 days, blade

tenderized 2X, and cooked to either 150 or 160°F and CAB steaks aged 21 days and blade tenderized 1X or 2X, regardless of degree of doneness, had no steaks above 8.6 lbs WBS.

Top sirloin butt steaks cooked to lower endpoint temperatures (150°F) were more tender than those cooked to higher temperatures (160 and 170°F). Higher quality grades (CHO and CAB) minimized the toughening by higher endpoint cooking temperatures and provided tenderness "insurance". Longer aging and more blade tenderization passes improved tenderness and consistency of top sirloin butt steaks.

Table 1. Thawing Loss, Cooking Loss, and Warner-Bratzler Shear (WBS) Force Means of Top Sirloin Steaks for Different Quality Grades, Postmortem Aging Periods, and Blade Tenderization Passes^a

Item	USDA Quality Grade			Aging, Days			Blade Tenderization			SE
	SEL	CHO	CAB	7	14	21	0X	1X	2X	
Thawing loss, %	1.96	1.84	1.70	2.17 ^f	1.82 ^{fg}	1.52 ^g	2.01	1.90	1.59	.13
Cooking loss, %	30.8	30.4	30.8	29.8 ^f	31.3 ^g	30.9 ^g	30.5	30.7	30.8	.30
WBS, kg ^b	*	*	*	3.96 ^f	3.64 ^g	3.47 ^h	3.87 ⁱ	3.76 ⁱ	3.43 ^j	.05

^aQuality Grades (SEL=Select, CHO=Choice, CAB=Certified Angus Beef™); Blade Tenderization (0X=not blade tenderized, 1X=blade tenderized one time, 2X=blade tenderized two times).

^bQuality Grade*Endpoint Cooking Temperature interaction.

^{f,g,h}Means within a row and postmortem age with different superscripts differ ($P<.05$).

^{i,j}Means within a row and blade tenderization with different superscripts differ ($P<.05$).

Table 2. Warner-Bratzler Shear (WBS) Force Means of Top Sirloin Butts as Affected by Interaction of Different USDA Quality Grades and Endpoint Cooking Temperatures

Grade ^a	150°F	160°F	170°F	SE
SEL	3.29 ^b	4.12 ^{ce}	4.31 ^{de}	.07
CHO	3.25 ^b	3.69 ^{cf}	3.96 ^{df}	.07
CAB	3.14 ^b	3.56 ^{cf}	3.90 ^{df}	.07

^aSEL=Select, CHO=Choice, CAB=Certified Angus Beef™.

^{b,c,d}Means within a row with different superscripts differ (P<.05).

^{e,f}Means within a column with different superscript differ (P<.05).

Table 3. Number of Top Sirloin Butt Steaks with Warner-Bratzler Shear Force Values Greater than 8.6 lbs (3.9 kg)

BT Treatment ^b	Cooked Temp., °F	SEL ^a			CHO			CAB			Total
		7 ^c	14	21	7	14	21	7	14	21	
0X	150	3 ^d	1	1	1	1	1	0	0	1	9
	160	6	5	5	3	0	2	3	0	1	25
	170	6	6	3	5	5	2	5	1	4	37
1X	150	0	1	1	1	1	0	1	1	0	6
	160	5	4	3	4	2	1	3	1	0	23
	170	4	5	3	4	2	3	1	2	0	24
2X	150	1	0	0	1	0	0	1	0	0	3
	160	4	3	1	1	0	0	2	1	0	12
	170	4	4	1	1	3	1	4	3	0	21
Total		33	29	18	21	14	10	20	9	6	160

^aSEL=Select, CHO=Choice, CAB=Certified Angus Beef™.

^b0X=Not blade tenderized, 1X=blade tenderized one time, 2X=blade tenderized two times.

^cDay of postmortem aging.

^dn=6 for each cell; a total of 486 steaks is represented in this table.