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Eating and cooking loss characteristics of electrically stimulated and hot boned bull inside round muscle chilled at different rates (1983)

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Eating and Cooking Loss Characteristics of Electrically Stimulated and Hot Boned Bull Inside Round Muscle Chilled at Different Rates

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Summary

We found steaks cut from inside rounds (chilled fast or slow) of electrically stimulated and hot boned bull carcasses, to be similar to conventionally processed steaks in taste panel, shear force and cooking loss characteristics.

Introduction

Considerable energy is used for conventional chilling of beef carcasses. Boning beef while the muscle is still warm (hot boning) and chilling muscle only (not bone and excess fat) results in significant savings. However, meat boned before the onset of rigor mortis (postmortem muscle stiffening) can be tough, especially if subjected to low temperatures. Electrical stimulation of carcasses hastens the onset of rigor mortis, thus, allowing use of hot boning without decreasing tenderness. We examined the effects of fast and slow chilling on the eating and cooking loss characteristics of electrically stimulated and hot-boned inside round steaks and compared them to conventionally boned steaks, all of which were from young bulls.

Procedure

We used 30 bulls, ten of which had been implanted with Ralgro® from birth (Greathouse and others, Cattlemen's Day, 1982). At 45 minutes postmortem, one side of each carcass was electrically stimulated (ES) for 2 minutes with 420 volts, and 1 amp of pulsed (.68 seconds on, .32 seconds off) alternating current (60 cycles). The inside round muscles were hot boned (HB) at 2 hours postmortem and were either fast chilled in a tray (ESHB-Fast Chill) or slow chilled in a cardboard box (ESHB-Slow Chill) at 41 to 45°F until 48 hours postmortem. The inside round muscles were removed from the conventionally (Conv) chilled and cut carcasses at 48 hours postmortem. All inside round muscles were cut into steaks, vacuum packaged, aged at 35 to 39°F until 6 days postmortem and frozen. Eating qualities were evaluated by a trained taste panel. A Warner-Bratzler shear was also used to assess tenderness. Cooking loss was calculated as a percentage of pre-cooked steak weights.

Results and Discussion

Means for taste panel scores, shear force values and cooking losses are shown in Table 19.1. Both Fast and Slow Chill ESHB steaks had values similar to the Conv steaks. Only beef flavor intensity was scored as less intense ($P<.05$) for

the ESHB steaks when compared to the Conv steaks. Stimulating bull carcasses at 45 minutes postmortem, hot boning at 2 hours postmortem and aging until 6 days postmortem, produced steaks comparable in eating quality and similar in cooking losses to the Conv treatment.

Table 19.1. Taste Panel[a], Shear Force and Cooking Loss Means for Fast and Slow Chilled ESHB[b] and Conv[b] Processed Bull Inside Round Steaks

Variable	Conv	ESHB-Fast Chill	ESHB-Slow Chill
Flavor intensity	6.1[c]	5.9[d]	6.0[d]
Juiciness	5.5	5.3	5.3
Connective tissue amount	5.4	5.4	5.5
Myofibrillar tenderness	5.7	5.7	5.7
Overall tenderness	5.5	5.5	5.5
Warner-Bratzler shear force (lbs)	8.5	8.3	8.2
Cooking loss (%)	23.43	24.99	27.18

[a]Scores: 7=very intense flavor, very juicy, practically no connective tissue, or very tender; 6=moderately intense flavor, moderately juicy, trace amount of connective tissue, or moderately tender; 5=slightly intense flavor, slightly juicy, slight amount of connective tissue, or slightly tender.

[b]ESHB=Electrically stimulated and hot boned; Conv=Conventionally processed.

[c,d]Means within the same row with different superscripts are different ($P<.05$).

TASTE PANEL EVALUATION OF BEEF

Trained taste panels score much of the beef from our experiments for such factors as juiciness, beef flavor intensity, tenderness of the muscle proteins, tenderness of connective tissue, and overall tenderness. Panel members have been screened to exclude people who are not sensitive to taste factors. Then they are trained to accurately score the various flavor and tenderness factors. Beef for the taste panel is prepared carefully to remove any differences in cooking method or temperature. Then half-inch cores are removed for the individual panel members. A session starts with a "warm-up" sample so no sample has the advantage of being served first to a hungry taster. Then, the panel tastes and fills out evaluation forms on four to eight beef samples. The evaluations are done under red light so the panelists cannot visually estimate the degree of doneness. Trained taste panels enable us to measure the specific effects of breeding, feeding, pre-slaughter handling, post-slaughter chill rates, or such treatments as electrical stimulation and/or hot boning on the eating characteristics of beef.