

Project Summary

Effect of Quality Grade and Aging Time on Top Sirloin and Shoulder Clod Tenderness

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Background

The top sirloin is a cut that is widely featured on restaurant menus as a low cost alternative to other 'middle meat' steak entrees. However, it is also one of the most variable in tenderness and frequently fails to meet consumer expectations. There has been a substantial amount of research completed on the effect of postmortem aging time on tenderness of the top sirloin. However, study design often does not take into account previously unknown within- and among-steak effects on tenderness. Location effects may explain the mixed results seen for the effect of aging on top sirloin tenderness. It would be helpful to the restaurant industry to have an alternative or additional menu item that is more consistent in tenderness and lower in cost than the top sirloin. The *triceps brachii* (clod heart) has this potential.

The objectives of this project were:

1. To determine the effect of quality grade on the tenderness of top sirloin and shoulder clod steaks using slice shear force and trained sensory panel evaluation.
2. To determine the effect of postmortem aging time on the tenderness of top sirloin and shoulder clod steaks using slice shear force and trained sensory panel evaluation.
3. To compare the tenderness, and variation in tenderness, between top sirloin and shoulder clod steaks using trained sensory panel evaluation.

Methodology

USDA Choice (n = 300) and Select (n = 300) center-cut top sirloin butts and USDA Choice (n = 300) and Select (n = 300) clod hearts originating from the left side of beef carcasses were obtained from a large-scale, mid-western beef processing plant. Each muscle cut was assigned to one of six aging periods (7, 14, 21, 28, 35 or 48 days postmortem). After the completion of the respective aging period, a steak was obtained from each cut and slice shear force (SSF) was measured. The remainder of the cut was frozen and a steak was obtained from the frozen cut for sensory evaluation by a trained descriptive attribute sensory panel. The same location within each subprimal was used to compare aging times. All 14 and 42 day samples were also evaluated for sarcomere length and for the amount of desmin proteolysis via Western blotting.

Findings

Palatability

Regardless of quality grade, clod steaks were more tender than top sirloin steaks with the greatest difference seen after 21 or more days of aging. Additionally, clod steaks were juicier, had more intense beef flavor, and possessed less off-flavors than top sirloin steaks.

Aging

Regardless of quality grade, trained sensory panel tenderness ratings of clod steaks improved significantly from 7 to 14, 14 to 21, and 21 to 42 days postmortem. Slice shear force of clod steaks decreased (improved) from 7 to 14 and 14 to 28 days postmortem, but clod steak SSF did not improve after 28 days postmortem. Regardless of quality grade, sensory panel tenderness ratings of top sirloin steaks improved significantly from 7 to 14, 14 to 28, and 28 to 42 days

postmortem. Slice shear force of top sirloin steaks decreased (improved) from 7 to 14, 14 to 28, and 28 to 42 days postmortem. These results show a greater benefit for extended aging than most previous research.

Effect of Postmortem Aging on SSF of *Triceps brachii* (clod) and *Gluteus medius* (top sirloin) steaks

Length of postmortem aging, days	Triceps brachii	Gluteus medius
7	15.9 ^a	21.8 ^a
14	14.2 ^b	19.3 ^b
21	13.8 ^{b^c}	19.0 ^b
28	12.9 ^d	18.0 ^c
35	13.4 ^c	18.1 ^c
42	12.5 ^d	16.6 ^d

^{abcd}Means that do not share a common superscript letter differ ($P < 0.05$).

Quality Grade

Quality grade did not affect tenderness ratings of top sirloin steaks; however, Choice clod steaks received higher trained sensory panel tenderness ratings than Select clod steaks. Slice shear force values did not differ between quality grades for clod steaks, and Select top sirloin steaks had lower SSF than Choice top sirloin steaks. Therefore, researchers concluded that quality grade did not have meaningful effects on tenderness of clod and top sirloin steaks.

Tenderness Differences

Following measurement of SSF, the two halves of the sheared slices were frozen and later sampled for sarcomere length measurements and Western blotting of desmin, which is an indication of the level of Calpain-mediated postmortem proteolysis. At 14 days postmortem, desmin degradation in top sirloin steaks was similar between quality grades, but increased with postmortem storage and was greater in Select than in Choice top sirloin steaks after 42 days. Sarcomere length of top sirloin steak samples was not affected by quality grade or postmortem aging. At 14 days postmortem, Select clod steaks had less desmin degraded than steaks from Choice carcasses; however, after 42 days of postmortem aging, desmin degradation had increased in cuts from both quality grades. Sarcomere length was not affected by quality grade or postmortem aging in clod steaks. Differences in desmin degradation were consistent with tenderness differences among muscles, quality grades and aging times.

Implications

This study determined that clod steaks were more tender than top sirloin steaks for both USDA Choice and Select quality grades. Moreover, clod steaks delivered greater juiciness and flavor attributes. Because top sirloin steaks typically cost much less than other ‘middle meat’ cuts, restaurants routinely use this item as a low price menu alternative. Clod hearts, which are the source of one of the beef value cuts (Ranch Steaks or Shoulder Center Steaks), are typically marketed at 70% of the cost of top sirloins. Therefore, foodservice could feature clod steaks as a low cost menu alternative to top sirloins while simultaneously increasing customer satisfaction.

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