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Aging improves tenderness of longissimus muscle steaks from fed mature cows (2009)

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Aging Improves Tenderness of Longissimus Muscle Steaks from Fed Mature Cows

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Introduction

Steaks from cows are tougher than those from young steers and heifers. This difference is often attributed to the increased cross-linkage of collagen in muscle of mature animals that is considered very stable and more resistant to postmortem degradation. Aging steaks from young steers and heifers is a common postmortem practice used to improve tenderness of steaks from the ribeye roll and strip loin. Improvement in tenderness because of aging has been attributed to enzymatic degradation of, primarily, the myofibrillar fraction of muscle and is most beneficial for low connective tissue muscles. Because muscles from mature cows have more collagen cross-linking, postmortem tenderization methods, such as blade tenderization and enzymatic tenderization, are often used to increase tenderness of steaks from mature cows. However, few studies have investigated the effect of aging on tenderness of longissimus muscle steaks from fed mature cows. Therefore, the objective of this study was to determine effects of aging on tenderness of longissimus steaks of fed mature cows from different management strategies.

Experimental Procedures

Longissimus muscle (LM) steaks from 53 cull cows from five different management treatments were used in this study. Live animal performance and carcass traits are reported in other articles in this publication. During fabrication at approximately 72 hours postmortem, LM from the 12th rib and strip loins were removed and vacuum packaged. At 7 days postmortem, 12th rib LM muscle samples were removed from their vacuum bags and faced on both ends before a 1-in. steak was cut for 7-day Warner-Bratzler shear force (WBSF) determination. At 14 days postmortem, strip loins were removed from their vacuum bags, faced on the anterior end, and three 1-in. LM steaks were cut from the anterior end. Steaks were randomly assigned to 14, 21, and 28 days of aging. Steaks for 21- and 28-day aging were vacuumed packaged and stored at approximately 32°F.

Steaks were removed from the vacuum package and weighed to determine initial weight. Steaks were cooked to an internal temperature of 104°F, turned, and cooked to a final internal temperature of 158°F. Following a 30-minute cooling period, steaks were reweighed to determine cooking loss percentages. Steaks were chilled at 36°F overnight, and eight 0.5-inch cores were removed parallel to the muscle fiber direction for WBSF determination using the Instron Universal Testing Machine with a 110-lb compression load cell and a crosshead speed of 9.84 in./minute.

Data were analyzed as a completely randomized design by using the MIXED procedure of SAS with a 5 × 4 factorial arrangement of treatments. The model statement contained the respective response variables, management treatment, days of aging, and the management treatment × days of aging interaction. Means were separated ($P<0.05$) by using the least significant difference procedure when the respective F-tests were significant ($P<0.05$).

Results and Discussion

No management treatment × days of aging interactions (P<0.05) were observed. Steaks aged for 28 days had the lowest (P<0.05, most tender) WBSF values compared with all other days of aging (Table 1). Steaks aged for 21 days had lower (P<0.05) WBSF values than steaks aged for 7 and 14 days. Steaks aged for 7 days had the highest (P<0.05, toughest) WBSF values among aging treatments. Cooking loss percentages for all days of aging were not different.

Results indicate that increased postmortem aging continues to improve tenderness of LM steaks from fed mature cows in a near linear manner. These WBSF values suggest that shorter aging periods (7 and 14 days) would result in steaks that are considered "slightly tough" and continuing the aging period to 28 days would result in steaks that would be considered "slightly tender." Therefore, other postmortem tenderization techniques such as blade tenderization and enzymatic tenderization might also be used in combination with aging to assure LM tenderness.

Implications

Aging LM steaks from mature cows to 28 days improves tenderness, but other postmortem mechanical or enhancement strategies may provide additional assurance of improved tenderness.

Table 1. Day of aging means for Warner-Bratzler shear force (WBSF) and cooking loss for longissimus muscle steaks

	Aging (days)					
Trait	7	14	21	28	SE	P-value
WBSF, lb	11.9[a]	11.1[b]	10.0[c]	9.3[d]	0.27	<0.01
Cooking loss, %	25.0	25.3	25.1	25.1	0.56	0.99

[abcd] Within a row, means without a common superscript letter differ (P<0.05).