

AGING, BLADE TENDERIZATION, AND INJECTION IMPACTS TENDERNESS OF MUSCLES FROM FED STEERS

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Introduction

Enhancement of steer and heifer meat has become a common practice, especially for some large retailers in the United States, because it increases the weight of salable product and decreases variability in tenderness and juiciness. Enhancement also may reduce the aging period for some muscles. Muscles for this research were identified by National Cattlemen's Beef Association (NCBA) as possible muscles in which value could be added with some type of postmortem tenderization treatment. If muscles are enhanced, aging may become less important, thus allowing more efficient and faster processing of those cuts. Therefore, the objective of this research was to determine the influence of aging period on tenderness of enhanced muscles from three intermediate-priced steaks.

Experimental Procedures

Muscles from 24 steers were used in this study. The round tip (knuckle), top sirloin (*gluteus medius*), and top blade (*infraspinatus*/flat iron) steaks from the right and left sides were removed and randomly assigned to seven or 28 days of vacuum aging. Following aging, the muscles were frozen for further processing. Muscles were subsequently thawed for 36 hours, and then all muscles were blade-tenderized and injection-pumped at 10% of their weight with a solution containing 0.35% phosphate and 0.5% salt. Freeze-thaw losses were calculated from the initial weights after seven and 28 days of aging. After pumping, muscles were allowed five minutes to drip

before they were repackaged and frozen to facilitate cutting (band saw) into three 1-inch thick steaks. One steak was randomly assigned to Warner Bratzler shear force (WBSF) testing; the other two steaks were used for further lab analysis. Steaks for WBSF were thawed at 36°F overnight. Steaks were then weighed in the package, removed from the package and re-weighed to determine package loss percentages. The 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 percentage of cooking loss. Cooked steaks were chilled at 32°F overnight and six 0.5-inch cores were removed parallel to the muscle fiber direction. Each core was sheared once perpendicular to the direction of the muscle fibers using the WBSF attachment to the Instron Universal Testing Machine with a 50-kg compression load cell and a cross head speed of 250 mm/min. Treatments were arranged as a split-plot with the whole plot a randomized complete-block design.

Results and Discussion

Freeze thaw loss after seven days of aging was 6.2%, 7.8%, and 5% for the round tip, top sirloin, and top blade, respectively. After 28 days of aging, freeze thaw loss for these same cuts was 6.8%, 8.2%, and 4.2%, respectively. Tenderness, cooking losses, and package losses of round tip steaks were not significantly different due to aging time. However, tenderness of the *rectus femoris* was more ($P<0.01$) tender than the *vastus lateralis*. The

rectus femoris portion of the knuckle could be cut into steaks and sold for a higher price. Aging of this muscle for 7 vs 28 d was not necessary to improve tenderness.

Table 1. Effects of Days of Aging and Muscle (*vastus lateralis*, *rectus femoris*) on Tenderness and Moisture Loss of Steaks From the Knuckle

Item:	Days of Aging	
	7	28
Vacuum Package Loss, %	2.3	2.3
Cook Loss, %	31.7	32.0
Warner Bratzler shear force, lb		
Round Tip	6.8	6.6
<i>Rectus femoris</i> ^a	5.9 ^b	6.3 ^b
<i>Vastus lateralis</i> ^a	7.7 ^c	6.9 ^c

^aDenotes both muscles sampled within the knuckle. Means for muscle with a different superscript letter are different (P<0.01).

^{b,c}Differing superscripts within a column are different (P<0.01).

Tenderness and package losses of top sirloin steaks were not affected by postmortem aging. Steaks that were aged for 28 days had greater (P<0.05) cooking losses than those that were only aged for seven days. The greater cooking losses could have been due to a reduction in water holding capacity of aged meat.

Top blade steaks that were aged for 28 days were more (P<0.05) tender than those

aged for seven days. Cooking and package losses were not different due to days of aging. These steaks have become very common in the marketplace. It may be important to see if an intermediate number of aging days would increase tenderness to the same extent as 28 days of aging.

Table 2. Effects of Days of Aging on Tenderness and Moisture Loss of Top Sirloin and Top Blade Steaks (*gluteus medius* and *infraspinatus* muscles, respectively)

Item:	Days of Aging	
	7	28
Top Sirloin		
Package Loss, %	2.6	2.5
Cook Loss, %	31.3 ^a	33.8 ^b
Warner Bratzler shear force, lb	6.3	5.7
Top blade		
Package Loss, %	3.9	3.9
Cook Loss, %	23.3	24.7
Warner Bratzler shear force, lb	4.6 ^a	4.1 ^b

^{a,b}Differing superscripts within a row are different (P<0.01).

Implications

Top blade steaks of steer carcasses will benefit from aging for 28 days, whereas seven days aging of round tip and top sirloin steaks were sufficient for tenderness.