2019 Reciprocal Meat Conference – Meat and Poultry Quality

Meat and Muscle Biology™

Aging Influences Shear Force of Beef in a Muscle-Specific Manner

M. N. Nair[1], S. P. Suman[2]*, A. C. V. C. S. Canto[2], and G. Rentfrow[2]

[1]Animal Sciences, Colorado State University, Fort Collins, CO, USA
[2]Animal and Food Sciences, University of Kentucky, Lexington, KY, USA
*Corresponding author. Email: spsuma2@uky.edu (S. P. Suman)

Keywords: aging, beef tenderness, muscle-specificity
Meat and Muscle Biology 3(2):59

Objectives

Tenderness is an important sensory attribute that influences consumers' overall eating satisfaction and repurchase decisions of beef. However, beef tenderness is a muscle-specific and highly variable trait, with different muscles from the same carcass exhibiting considerable variations. Retailing single-muscle beef cuts, based on quality and palatability traits, can improve value of carcasses. Postmortem wet aging of beef subprimals under vacuum packaging is a widely used industry practice in the U.S. to improve beef tenderness. Although beef muscles differ in their biochemical attributes, different muscles undergo similar aging procedure because wet aging is generally preformed on the subprimals. While beef muscles may respond differentially to wet aging, the effects of aging time on tenderness of three economically important beef hindquarter muscles, i.e., longissimus lumborum (LL), psoas major (PM), and semitendinosus (ST), are yet to be examined. Therefore, the objective of the current study was to examine the effect of aging on tenderness of beef LL, PM, and ST muscles.

Materials and Methods

The LL, PM, and ST muscles were excised (24 h postmortem) from both sides of eight (n = 8) beef carcasses (USDA Choice; A maturity) and was further separated into two equal-length sections, resulting in four muscle sections per carcass. The muscle sections were vacuum packaged and randomly assigned to aging at 2°C for either 0, 7, 14, or 21 d. At the end of each aging period, 2.5-cm steaks were fabricated. The steaks were cooked to an internal temperature of 71°C and chilled to 4°C overnight. Six cylindrical cores (1.27-cm of diameter) parallel to the muscle fiber orientation were obtained from each steak with a hand-held coring device. Shear force was determined by shearing each core with V-shaped blade of Warner-Bratzler shear device, and the values were recorded as the peak force (N). The main effects of muscle source and aging days, and their interactions were analyzed using the Mixed Procedure of SAS. The least square means for protected F-tests ($P < 0.05$) were separated by using least significant differences and were considered significant at $P < 0.05$.

Results

Muscle source and aging days influenced ($P < 0.05$) the tenderness, with an improvement ($P < 0.05$) in tenderness observed with aging. Moreover, a muscle × aging day interaction ($P < 0.05$) was observed for tenderness. Shear force of LL decreased ($P < 0.05$) with aging, although there was no difference ($P > 0.05$) in tenderness between 7 and 14-d aged LL. However, aging beyond 7 d did not improve ($P > 0.05$) the tenderness of already tender PM steaks. On the other hand, improvement ($P < 0.05$) in tenderness was observed in ST until 14 d. After 21 d of aging, LL was the most tender, while ST remained the toughest ($P < 0.05$).

Conclusion

The results indicated that different muscles in beef hindquarters responded differentially to postmortem aging, and the processors could optimize aging time depending on the muscles to improve beef tenderness.