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Influence of Postmortem Aging and Storage Conditions on Tenderness of Grain and Grass Finished Bison Striploin Steaks

J. K. Janssen[1]*, K. M. Cammack[1], J. K. Grubbs[1], K. R. Underwood[1], J. Hansen[2], C. Kruse[2], and A. D. Blair[1]

[1]Animal Science, South Dakota State University, Brookings, SD, USA
[2]Turner Enterprises, Inc, Turner Enterprises, Inc, Bozeman, MT, USA
*Corresponding author. Email: jessica.janssen@sdstate.edu (J. K. Janssen)

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Objectives

The objectives of this study were to: 1) compare the influence of postmortem aging on tenderness of striploin steaks from grain- and grass-finished bison, and 2) compare the influence of freezing on tenderness of striploin steaks from grain- and grass-finished bison.

Materials and Methods

Bison heifers were randomly assigned to finishing treatments: Grain-finished (n = 30, backgrounded on pasture and finished for 130 d with ad libitum access to grass hay, alfalfa and a corn and dry distiller's grain concentrate prior to slaughter) or Grass-finished (n = 30, remained on pasture until slaughter). Heifers were slaughtered at approximately 28 mo of age, and striploins were removed from both sides of the carcass posterior to the 12th rib separation and fabricated into 2.54-cm steaks. One steak was removed from each striploin (n = 60), vacuum packaged and stored fresh for 14 d at 4°C. Four additional steaks were fabricated from each striploin, aged for 4,7,14, or 21 d, vacuum packaged, and frozen for approximately 3 mo. Warner-Bratzler Shear Force (WBSF) was utilized to determine objective tenderness. Frozen steaks were thawed at 4°C for 24 h before cooking. All steaks were weighed prior to cooking to an internal temperature of 71°C. Internal temperature was monitored using a digital thermometer placed near the geometric center of each steak. After cooking, all steaks were reweighed to determine cook loss and cooled to room temperature (20°C). Five to six 1.27-cm cores were removed from each steak and sheared once perpendicular to the muscle fiber orientation and peak force was recorded. A texture analyzer with a Warner-Bratzler attachment was used to assess instrumental tenderness. An average shear force value was then calculated for each steak. For Objective 1, cook loss and shear force data were analyzed as repeated measures using the ante-dependence covariance structure in the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) for effects of finishing treatment, aging, and their interaction; peak temperature was included as a covariate. For Objective 2, shear force data were analyzed for the effects of finishing treatment, storage treatment and their interaction using the GLM procedure of SAS. For both objectives, the interaction was not significant and omitted from the final model. Separation of least-squares main effect means was performed using LSD with a Tukey's adjustment and assuming a level of 0.05.

Results

Steaks from grain finished bison heifers had tendency to be more tender (P = 0.0552) and had less cook loss (P < 0.0001) than steaks from grass finished heifers. Tenderness of all steaks improved (P < 0.0001) with postmortem aging. Aging time also influenced cook loss (P = 0.0199). Cook loss was greater (P = 0.0133) at Day 4 than Day 7 and tended to be greater (P = 0.0561) at Day 4 than Day 21. Frozen storage improved tenderness (P < 0.0001) and increased cook loss (P < 0.0001) of bison steaks compared to fresh storage.

Conclusion

Collectively this data indicates postmortem aging, storage conditions, and finishing systems influence meat tenderness of bison striploin steaks. Grain-finishing resulted in reduced cook loss and tended to improved tenderness of bison steaks compared to grass-finishing. Additionally, holding bison steaks in frozen storage improved tenderness, but also increased cook loss.