

INFLUENCE OF FEEDING A COVER CROP MIXTURE INCLUDING BRASSICAS DURING BACKGROUNDING ON CARCASS CHARACTERISTICS AND BEEF TENDERNESS

C. E. Bakker^{1*}, L. M. Hite¹, A. D. Blair¹, J. K. Grubbs¹, C. L. Wright¹, D. W. Brake², A. J. Smart³, and K. R. Underwood¹,

¹*Animal Science, South Dakota State University, Brookings, SD, USA,*

²*Animal Sciences, University of Missouri, Columbia, MO, USA,*

³*Natural Resource Management, South Dakota State University, Brookings, SD, USA,*

*christina.bakker@sdsstate.edu

I. OBJECTIVES

Brassica cover crops are an option for producers to plant to improve soil health and utilize as a feedstuff for cattle. While brassica cover crops have been widely used for grazing cows, their use as a backgrounding feedstuff is relatively unknown. The objective of this study was to determine the impact of feeding a brassica cover crop mixture during backgrounding on carcass characteristics and beef tenderness.

II. MATERIALS AND METHODS

Thirty Angus-based steers were assigned to one of 2 dietary treatments during backgrounding: (1) *ad libitum* access to freshly cut brassica cover crop forage containing radish, turnip, rapeseed, rye grass, and liquid supplement or (2) common midwestern dry lot backgrounding diet containing silage, soybean meal, grass hay, and liquid supplement (Control). Steers were assigned to electronic feed bunks (Insentec, Hokofarm Group, the Netherlands) for collection of individual feed intake. Diets were formulated to be nutritionally similar on a dry matter basis. Steers were paired by weight across treatments and pair fed. Dry matter intake was calculated daily for steers in the Cover Crop treatment, and the following day Control steers were allowed access to an equal amount of dry matter. Steers were weighed weekly and backgrounded for 44 d before transitioning to a common finishing diet and weighed every 28 d. Steers were harvested at an estimated average backfat thickness of 1.02 cm. Standard carcass data were measured, striploins were collected, and steaks were aged 3, 7, 14, or 21 d for analysis of Warner-Bratzler shear force (WBSF), autolysis of calpain-1, proteolysis of desmin and troponin-T, and subjective tenderness of 14-d aged steaks evaluated by a trained sensory panel. Data were analyzed using PROC Mixed of SAS (SAS Institute Inc., Cary, NC) with fixed effect of treatment, aging day, and their interaction where appropriate. Proteolysis, calpain-1 autolysis, and shear force data were deemed repeated measures. Significance was considered at $P < 0.05$.

III. RESULTS

Treatment did not influence live animal growth or carcass characteristics ($P > 0.05$). A treatment by day interaction was observed for WBSF values ($P = 0.02$). Control steaks were less tender than Cover Crop steaks at day 3 and 7 but did not differ on day 14 and 21. Also, WBSF values were increased for Control steaks at day 3 compared to day 7. Steaks from Cover Crop steers had increased WBSF values at day 3 compared to day 7, 14, and 21. No treatment differences were detected for calpain-1 autolysis, degradation of desmin and troponin-T, or subjective tenderness ($P > 0.05$). An increased abundance of autolyzed

calpain-1 (76 kDa subunit) and decreased abundance of the active (78 kDa) and inactive (80 kDa) subunits was detected with increasing aging day ($P < 0.001$). The abundance of intact desmin and troponin-T decreased with aging day ($P < 0.0001$).

IV. CONCLUSION

Feeding a brassica mixture cover crop during the backgrounding phase of production did not impact live growth, carcass characteristics, subjective tenderness, autolysis of calpain-1, or proteolysis of desmin and troponin-T. However, steaks from the Cover Crop treatment reached their ultimate tenderness earlier postmortem than the Control treatment. Further investigation into the mechanisms regulating these differences in tenderness is warranted. However, producers can use cover crops to improve soil quality and be assured that feeding them in backgrounding diets of beef steers will not negatively impact tenderness.

Keywords: backgrounding, beef, brassica, cover crops, tenderness