EVALUATION OF BEEF CAMERA GRADING TECHNOLOGY TO ASSESS BISON CARCASS CHARACTERISTICS

J. K. Janssen[1*], K. M. Cammack[1], W. J. Horne[2], J. K. Grubbs[1], K. R. Underwood[1], J. Hansen[3], C. Kruse[3], and A. D. Blair[1],

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

[2]*Livestock and Poultry Program, USDA-AMS, Washington, DC, USA*,

[3]*Conservation, Science, and Research, Turner Enterprises, Inc., Bozeman, MT, USA*,

*jessica.janssen@sdstate.edu

I. OBJECTIVES

The objective of this study was to evaluate the effectiveness of beef camera grading technology on bison carcass characteristics.

II. MATERIALS AND METHODS

Bison heifers were randomly assigned to finishing treatments: grain-finished ($n = 108$; backgrounded on pasture and finished for 130 d with *ad libitum* access to grass hay, alfalfa, and a corn and dry distillers grain concentrate prior to slaughter) or grass-finished ($n = 93$; remained on pasture until slaughter). Heifers were transported (~720 km) to a commercial packing facility and slaughtered at 28 mo of age over a 2-d period. Carcass measurements and camera images were collected at ~20 h postmortem. Carcasses were ribbed between the 12th and 13th rib and allowed to bloom for approximately 30 min. An expert USDA grader evaluated ribeye area, backfat thickness, and marbling score of one side of each carcass. USDA personnel then captured images of the exposed ribeye from the same side evaluated by the grader using the hand-held camera portion of a VBG2000 image processing system. The system automatically determined carcass parameters from the images, including preliminary yield grade, yield grade, ribeye area, and marbling. To assess the ability of the beef grading camera to evaluate bison carcass characteristics, both camera and grader measurements were analyzed using the MIXED procedures of SAS (SAS Institute Inc., Cary, NC), while yield grade data were analyzed using the GLIMMIX procedures for the main effect of finishing treatment; slaughter date was included as a random effect. Separation of least-squares main effect means was performed using least significant difference with a Tukey adjustment, assuming $\alpha = 0.05$. Additionally, correlations between grader and camera measurements were analyzed using the CORR procedures of SAS.

III. RESULTS

Grain-finished bison heifers had increased ($P < 0.0001$) backfat thickness and marbling scores compared to grass-finished carcasses when evaluated by both the camera and expert grader. Across both finishing treatments, means for ribeye area and marbling were increased, while mean backfat thickness was decreased when evaluated by the camera in comparison to the expert grader. Regardless of evaluation by camera or grader, yield grade was not impacted ($P > 0.10$) by finishing system, with the exception of increased ($P < 0.0001$) proportion of yield grade 1 carcasses in the grass-finished treatment when evaluated by the camera, and a tendency for increased ($P = 0.0965$) proportion of yield grade 2 in the grass-finished treatment when evaluated by the expert grader. Correlations were positive ($P < 0.0001$) between expert grader and camera measurements for yield grade, backfat

thickness, and ribeye area. Correlations between the camera and grader were highest ($r = 0.978$, $P < 0.0001$) for yield grade, and lowest ($r = 0.451$, $P < 0.0001$) for marbling score measurements. Additional camera measurements identified as unknown pixels were found to be positively correlated ($r = 0.621$, $P < 0.0001$) with ribeye area but not correlated ($r = 0.002$, $P = 0.9807$) with marbling.

IV. CONCLUSION

Collectively, these data indicate that bison ribeye images collected with a beef grading camera were correlated with expert grader evaluations. However, accuracy of measurements and validation of a suitable camera grading system for bison will require additional investigation, including calibration and adjustments for bison carcass characteristics.

Keywords: bison, camera grading technology, carcass measurements, finishing systems