2016 Reciprocal Meat Conference – Meat and Poultry Quality

Meat and Muscle Biology™

Carcass Chilling Method Effects on Instrumental Color and Tenderness in Bison

M. A. Mickelson* and J. R. Claus

Meat Science and Muscle Biology, Animal Sciences, University of Wisconsin-Madison, Madison, WI, USA

Keywords: bison, carcass chilling method, color and tenderness, ground meat, steak
Meat and Muscle Biology 1(2):76 **doi:10.221751/rmc2016.072**

Objectives

To determine the effect of early postmortem carcass vascular rinsing and chilling on color and tenderness of bison meat in comparison to conventional carcass chilling.

Materials and Methods

Two chilling methods were implemented on carcasses (average hot carcass weight 231.9 kg) from 28 mo old bison. Nine carcasses were conventionally chilled (C) and nine were chilled with MPSC Inc. Rinse and Chill technology (RC). The RC process involves vascular rinsing of residual blood early postmortem using a chilled (3°C) isotonic substrate solution (98.5% water; balance: glucose, polyphosphates, glycerine, and maltose). At 24 h postmortem, the *M. Longissimus et lumborum* (LL) and *M. Triceps brachii* (TB) muscles were excised, vacuum packaged, and shipped overnight to UW-Madison. Internal meat temperature on delivery averaged 4.4°C. On d 2 postmortem, each individual TB was ground and a sample was packaged (polyvinyl chloride overwrapped, PVC; vacuum packaged, VAC). LL muscles were cut into steaks (25.4 mm thick) and packaged (PVC; VAC). PVC wrapped samples were continuously displayed (1 to 3°C, cool white deluxe lighting, 1615 lux) while VAC samples were stored in the dark (1 to 3°C). Color measurements (CIE L*a*b*; reflectance estimators of chemical states of myoglobin) were obtained on 1, 4, and 7 d except for PVC ground TB which excluded d 7. Scanning reflectance spectrophotometry was used to estimate oxymyoglobin (OMb, %R610 nm/%R525 nm), deoxymyoglobin (DMb, %R474nm/%R525nm) and metmyoglobin (MMb, %R572nm/525nm). Other dependent variables included purge (2 d postmortem), pH, sarcomere length, Warner-Bratzler shear (WBS; 1-cm wide strips), and cooking loss. Animal served as the experimental unit (replications = 9). Data were analyzed with PROC MIXED model (factorial 2 × 2, chill methods by packaging, with a storage day split plot factor).

Results

Chilling method did not influence ($P > 0.05$) pH or sarcomere length in either muscle. RC resulted in greater ($P < 0.05$) purge than C with a difference of 0.38% (LL) and 0.51% (TB). Although RC increased cooking loss by 1.7% ($P < 0.05$), this process decreased WBS by 24% (C, 4.33; RC, 3.28 kgf; S.E. = 0.29, $P < 0.05$) in aged steaks (10 d postmortem). RC PVC wrapped steaks were less red on Day 7 (CIE a*; 11.39; $P < 0.05$, S.E. = 0.60) than C steaks (13.63) and had a higher estimated MMb (1.03; $P < 0.05$, S.E. = 0.015) on Day 7 than C steaks (0.95). No other color differences (CIE a*, OMb, DMb, MMb; $P > 0.05$) were found for PVC wrapped steaks regardless of chilling method. Only 1 difference for color was found in VAC RC which had a higher ($P < 0.05$) estimated DMb (1.56) on d 7 than C (1.49). In PVC ground bison, RC resulted in higher ($P < 0.05$) CIE a* (10.34) than C (9.54) on d 4. No reflectance differences associated with chilling method were found in the PVC ground bison. In VAC ground bison, RC meat was more red on d 1 (CIE a*, 16.85) and d 4 (17.02) than C (15.40, 16.15, respectively; $P < 0.05$) Also RC had greater DMb (d 1, 1.52; d 4, 1.59; $P < 0.05$) than C (d 1, 1.46; d 4, 1.57).

Conclusion

Rinse and Chill technology has commercial potential to positively impact bison steak tenderness. Consideration should be given to the type of meat and packaging method used relative to the effect of this technology on meat color.