EFFECT OF SIRE BREED AND AGE AT HARVEST ON SENSORY AND VOLATILE ATTRIBUTES OF LAMB LOIN CHOPS

K. Wall[1*], C. Kerth[1], Z. Hicks[1], R. Miller[1], T. Murphy[2,3], W. Stewart[4], and J. Boles[3],

[1]*Animal Science, Texas A&M University, College Station, TX, USA*,

[2]*Genetics, Breeding, and Animal Health Research Unit, USDA-ARS, Clay Center, NE, USA*,

[3]*Animal and Range Sciences, Montana State University, Bozeman, MT, USA*,

[4]*Animal Science, University of Wyoming, Laramie, WY, USA*,

*wall4165@tamu.edu

I.   OBJECTIVES

The objective of this study was to identify flavor differences of lamb loin chops due to sire breed, preharvest age, and degree of doneness (DOD).

II.   MATERIALS AND METHODS

Rambouillet (RAM), South African Meat Merino, and Suffolk rams were bred to RAM ewes to produce lambs for this study in Bozeman, Montana. Wether lambs ($n = 60$; 20/breed; 30/age) were randomly assigned to one of 2 finishing groups (11 or 18 mo of age at slaughter) and fed a concentrate diet for approximately 60 d before harvesting at a commercial facility. Frozen, boneless loin samples were shipped to Texas A&M University and cut into 1.9-cm-thick chops, randomly assigned a DOD (63°C or 71°C), and packaged individually. Samples were thawed at 4°C overnight, cooked on an electric flat-top grill, and served as cubes for sensory evaluation. A 5-member panel of trained sensory panelists provided a consensus evaluation of each sample for flavor and texture attributes using a 16-point hedonic intensity scale. Representative cubes were quick frozen and broken apart for gas chromatography-mass spectrometry analysis. Pieces of each sample (5.0 g) were placed in a 20 mL scintillation vial and heated to 60°C for a 30-min collection period with a Solid Phase Micro-Extraction fiber. Samples were run on a gas chromatography-mass spectrometry and tentatively identified using the Wiley Spectrum Library. Collagen amount and solubility were determined from the raw sample. Statistical analyses were performed using JMP Pro 15 software (SAS Institute Inc., Cary, NC) with an alpha value of 0.05. Mean separations of the trial were determined using analysis of variance with sire breed, age at slaughter, and DOD and interactions as main effects with day included as a random effect for sensory analysis. Principal component analysis and correlations were used to explore trends between flavor and texture attributes.

III.   RESULTS

Younger lambs were more bitter ($P < 0.05$) and had lower muscle fiber tenderness and higher connective tissue amount scores ($P < 0.001$) than older lambs (8.9 vs. 11.7 and 10.8 vs. 12.3, respectively). A lesser DOD resulted ($P < 0.05$) in juicier, more cardboardy, more bloody/serumy, more sour, more roasted, and less fat-like intensity of flavor. Although lamb identity did not differ ($P > 0.05$), mutton increased ($P < 0.05$) with lambs sired by RAM. Volatile aromatic compounds ($n = 47$) identified contributed sweet, dairy, green, citrus, roasted, sulfurous, waxy, and fermented aroma compounds. Suffolk-sired lambs had greater ($P < 0.01$) total amount of collagen than either South African Meat Merino or RAM (5.85 vs.

3.62 and 4.44 mg collagen/g, respectively). No differences ($P > 0.05$) in collagen solubility were detected.

IV.   CONCLUSION

Sire breed of lambs has an influence on flavor and tenderness of lamb chops. Preharvest age impacts the texture of the meat but did not induce off-flavors.

Keywords: gas chromatography-mass spectrometry, lamb, sensory analysis