EFFECT OF SIRE BREED AND AGE AT HARVEST ON SENSORY AND VOLATILE ATTRIBUTES OF LAMB LEG ROASTS

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I. OBJECTIVES

The objective of this study was to identify differences in tenderness and flavor of lamb *semimembranosus* roasts from wethers differing in sire breed and age at harvest.

II. MATERIALS AND METHODS

Frozen lamb *semimembranosus* muscles ($N = 60$; $n = 30$/age; $n = 20$/sire breed) were received from wethers sired by one of 3 different breeds (Rambouillet, South African Meat Merino, or Suffolk) and harvested at either 11 or 18 mo of age. Packages were opened, and slices were removed from the frozen roasts for chemical analyses, including total and soluble collagen content. Roasts were then assigned a 3-digit code, repackaged, and kept in frozen storage at −10°C until sensory analyses. Roasts were thawed at 4°C for 12 to 24 h prior to cooking, placed on a baking rack in a baking pan that contained 237 mL of water in the bottom, and roasted in an oven set at 177°C to an internal temperature of 71°C. Roasts were cut into 2.54-cm slices; trimmed of external fat and connective tissue; and cut into cubes (1.3 cm × 1.3 cm × slice thickness). Cubes were served to a trained descriptive sensory panel and evaluated for 17 flavors and 3 texture attributes. Extra cubes were frozen in liquid nitrogen and stored at −80°C until volatile analyses. Five grams of meat was placed in a glass collection vile with a Teflon lid and heated on a heating block at 65°C. Volatile compounds were collected using a solid phase microextraction portable field sampler placed into the headspace for 20 min. The solid phase microextraction was then injected into a multidimensional gas chromatographer/mass spectrometer that desorbed, separated, and identified each volatile compound. Data were analyzed using JMP version 14.0 (SAS Institute Inc., Cary, NC) for a 3 (breed) by 2 (aging time) factorial arrangement of a completely randomized design.

III. RESULTS

Total collagen (mg/g) and the percentage of soluble collagen determined from chemical analyses slices did not differ among sire breed ($P > 0.05$). Although total collagen did not differ between age groups ($P > 0.05$), lambs harvested at 11 mo of age had a higher percentage of soluble collagen ($P < 0.05$). Sensory attributes did not differ among any of the age or sire breed treatments ($P > 0.05$). Hentriacontane volatile was greatest in roasts from Suffolk-sired wethers ($P < 0.05$). Wethers slaughtered at 18 mo had greater nonadecane ($P < 0.05$), whereas wethers slaughtered at 11 mo had greater eicosane, 2-pentanone (a sweet, fruity aroma), pentanal (fermented, bready), and thiobis-methane (sulfurous, tomato, or creamy depending on the concentration; $P < 0.05$). There was a moderate positive correlation ($r = 0.510$, $P < 0.05$) between tenderness and juiciness and a weak positive correlation ($r = 0.301$, $P < 0.05$) between juiciness and connective tissue. Tenderness and connective tissue had a strong, positive correlation ($r = 0.729$, $P < 0.05$).

IV. CONCLUSION

Lambs harvested at 11 mo of age had greater soluble collagen; however, sensory panelists did not detect a difference in tenderness. Sire breed did not largely affect volatile compounds present. Although no flavor differences were found, the concentration of certain volatile compounds differed based on age at harvest.

Keywords: gas chromatography-mass spectrometry, lamb, sensory, volatile compounds