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Evaluation of Lamb Carcass Quality Characteristics in Relation to Consumer Sensory Scores

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Objectives

Flank streakings and confirmation drive lamb quality grading, but in beef, quality is based on marbling in the ribeye. However, little to no research has been conducted linking flank streaking to lamb eating quality. The objective of this study was to determine the relationship between carcass fat indicator traits, intramuscular fat percentage (IMF), and the palatability traits of tenderness (TEN), juiciness (JUIC), flavor liking (FLAV) and overall liking (OALL), as rated by U.S. consumers

Materials and Methods

Carcasses ($n = 180$; 60/treatment) were selected at a commercial lamb processor in Greeley, CO based on pork marbling standards (PMS) as low (PMS 1), intermediate (PMS 2) or high (PMS 3+), with marbling score and flank streaking (FS) being determined within seconds of carcass ribbing. Full lamb loins (IMPS 232; 1×1 in) representing the 3 targeted marbling levels [LOW, Medium (MED.) HIGH] were obtained, vacuum packaged, shipped to Texas Tech University, and stored under refrigeration (2 to 4°C) until fabrication. On d 21 postmortem, loins were removed from packaging, and marbling (MB) was assessed following a 10-min bloom period. Loins were fabricated, leaving only the Longissimus dorsi, then manually sliced into 2.5 cm thick chops, vacuum packaged, and either frozen immediately or stored at 2°C until 42 d postmortem, then frozen. Untrained consumers ($n = 360$) from Lubbock, TX; Hicksville, OH; Clemson, SC; Logan, UT; and Stillwater, OK rated TEN, JUIC, FLAV and OALL on 100-mm line scales. Data for fat measures (FS, 21d MB, and IMF) were analyzed as complete randomized design using the GLIMMIX procedure of SAS 9.4 (SAS Inst. Inc., Cary, NC) with fixed effects of target marbling

level. Treatment LS means were separated with the PDIFF option of SAS ($\alpha = 0.05$). Pearson correlation coefficients were determined using the CORR procedure of SAS.

Results

FS, MB, and IMF were all influenced ($P < 0.01$) by target marbling level in a linear fashion. As expected, HIGH had the highest values (FS: Mt⁵⁴, MB: Md⁰⁹, and 6.2% IMF), MED were intermediate (FS: Sm⁷¹, MB: Sm⁵⁶, and 4.4% IMF), and LOW had the lowest values (FS: Sl⁵³, MB: Sl⁴¹, and 3.7% IMF). With flank streaking being commonly used to evaluate lamb quality, a strong positive correlation would be expected with marbling level and IMF. Within the eating quality traits, FLAV was most strongly correlated ($r = 0.93$; $P < 0.01$) to OALL, followed by JUIC ($r = 0.63$) and tenderness ($r = 0.62$). TEN and JUIC scores were also strongly related ($r = 0.75$; $P < 0.01$) to each other. There were strong relationships ($P < 0.01$) between MB and IMF ($r = 0.70$), as well as between FS with MB and IMF ($r = 0.60, 0.44$, respectively). When examining the relationships between FS with the palatability traits, only JUIC had a correlation ($r = 0.07$; $P < 0.01$) with FS. MB was correlated ($P < 0.01$) with TEN, JUIC, FLAV, and OALL, ($r = 0.09, 0.13, 0.09$, and 0.09 , respectively). However, IMF was only related ($P < 0.01$) to TEN ($r = 0.08$) and JUIC ($r = 0.09$).

Conclusion

Increasing MB, more so than FS, was positively linked to increasing eating quality scores. Fortunately, FS and MB were strongly associated; however, neither FS nor MB had strong linear correlations with lamb eating quality. Also, tenderness, juiciness and flavor liking are major drivers for consumer sensory scores for overall liking, with flavor liking having the biggest impact on overall liking of lamb.