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Effects of Marbling Texture on Consumer Palatability Ratings of Beef Strip Loin Steaks

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Objectives

To determine the effect of marbling texture (fine, medium, and coarse) on consumer sensory and visual ratings of beef strip loin steaks of 3 USDA quality grades.

Materials and Methods

Beef strip loins ($n = 117$; 39/grade) were selected to equally represent 3 marbling texture categories (fine, medium, and coarse) within 3 quality grades [Top Choice (Modest^{00}– Moderate^{100} marbling), Low Choice, and Select] based on visual appraisal of marbling texture. For selection, 75% of the marbling in the ribeye had to meet the USDA-AMS-LS-SB-02 marbling texture reference for the texture category. Prior to analysis, each strip loin was aged for 21 d and fabricated into 2.5 cm steaks, vacuum packaged, and frozen at –20°C. Each steak was cooked to 71°C on clamshell grills for consumer panel analysis. After cooking, each steak was cut into 2.5 × 1×1 cm cubes and 2 cubes were served to each panelist. Untrained consumer panelists ($n = 104$) evaluated 9 samples, 1 from each treatment, for tenderness, juiciness, flavor liking, and overall liking on 100 mm line scale, and rated each trait as acceptable or unacceptable. Each consumer was also asked to visually rate the appearance of a steak from each treatment using a digital survey on an electronic tablet. Pictures of each steak were edited to 2.5 × 6.4 cm dimensions of the center of the steak to remove any external fat or muscling differences. Consumers rated their preferences for the appearance of each steak as well as how likely they were to purchase the steak pictured on line scales with verbal anchors at each end and midpoints. Data were analyzed as a completely randomized design with a 3 × 3 factorial arrangement with marbling texture, quality grade, and their interaction as fixed effects.

Results

There were no marbling texture × quality grade interactions ($P > 0.05$) for all traits evaluated. Additionally, marbling texture had no effect ($P > 0.05$) on palatability traits, as consumers rated all texture groups (fine, medium, and coarse) similar for tenderness, juiciness, and flavor. When asked if samples were acceptable for each trait, consumers rated a similar ($P > 0.05$) percentage of samples from each texture treatment as acceptable. Likewise, marbling texture did not affect ($P > 0.05$) the percentage of strip loin steaks rated as unsatisfactory, everyday, better than everyday, or premium quality. When asked to visually rate the steaks, consumers rated all marbling texture treatments similar ($P > 0.05$) for the desirability of the appearance of the steak as well as for purchase intent. Low Choice steaks were rated higher ($P < 0.05$) than Select steaks for tenderness, flavor liking, and overall liking. Consumers rated Low Choice steaks similar ($P > 0.05$) to Top Choice steaks for all palatability traits evaluated. When asked to rate samples as acceptable or unacceptable for tenderness, juiciness, and overall liking, there were no differences ($P > 0.05$) between quality grade treatments; however, a lower percentage of Select samples were rated as acceptable ($P < 0.05$) for flavor than either Top or Low Choice steaks.

Conclusion

These results indicate marbling texture does not impact consumer ratings of tenderness, juiciness, flavor liking or overall liking of beef strip loin steaks from the evaluated quality grades. Moreover, consumers did not exhibit a visual preference for steaks of differing marbling texture or marbling levels.