Objectives

The objective of this study was to determine the effect of degree of doneness (DOD) on the palatability of beef strip loin steaks of varying marbling levels.

Materials and Methods

Paired strip loins (IMPS # 180) were collected from 4 USDA quality grades [Prime, Top Choice (Modest and Moderate marbling), Low Choice, Select; \( n = 12 \) pairs/quality grade]. Additionally, 12 pairs of Select strip loins were collected for a salt and alkaline phosphate enhancement solution (108% of raw weight). Subprimals were aged for 21 d and fabricated into 2.54-cm thick steaks. Steaks were fabricated in groups of 3 consecutively cut steaks, with a total of 6 groups per strip loin pair. Groups were assigned to a DOD: very-rare (55°C), rare (60°C), medium-rare (63°C), medium (71°C), well-done (77°C) or very well-done (82°C). Steaks were cooked on clamshell style grills to their specified DOD. Consumers (\( n = 360 \)) were fed 8 samples under red lighting and evaluated for juiciness, tenderness, flavor, and overall liking on continuous line scales. Additionally, consumers rated each trait as either acceptable or unacceptable.

Results

There were no interactions (\( P > 0.05 \)) between quality treatment and DOD for consumer ratings of all palatability traits. Select Enhanced steaks had the highest (\( P < 0.05 \)) consumer ratings for all traits, followed by Prime steaks having higher (\( P < 0.05 \)) ratings than Top Choice, Low Choice, and Select steaks. Select steaks had the lowest (\( P < 0.05 \)) consumer ratings for all traits except tenderness, for which they were similar (\( P > 0.05 \)) to Low Choice. Juiciness was similar (\( P > 0.05 \)) between very-rare and rare, as well as between rare and medium-rare. Very-rare, rare, and medium-rare steaks had similar (\( P > 0.05 \)) ratings for all palatability traits except juiciness. There was a quality grade by DOD interaction (\( P < 0.05 \)) for the percentage of steaks rated acceptable for juiciness, tenderness, and overall liking. At very rare, rare, and medium-rare, all quality grades except Select were similar (\( P > 0.05 \)) in the percentage of steaks rated acceptable for juiciness. However, as DOD increased, marbling had a greater impact, with Prime having a greater (\( P < 0.05 \)) number of samples rated acceptable for juiciness than all non-enhanced samples at very well-done. Select Enhanced steaks had the greatest (\( P < 0.05 \)) percentage of samples rated acceptable for tenderness at very-rare, but Prime was similar (\( P > 0.05 \)) to Select Enhanced for all other DOD. Additionally, Select had the lowest (\( P < 0.05 \)) percentage of steaks rated acceptable for tenderness at medium-rare and medium, but were similar (\( P > 0.05 \)) to Low Choice at all other DOD. Prime and Select Enhanced steaks had similar (\( P > 0.05 \)) percentages of samples rated acceptable overall for all DOD except medium and well-done, in which Select Enhanced was higher (\( P < 0.05 \)). Select had a similar (\( P > 0.05 \)) percentage of steaks rated acceptable as both Choice treatments at very-rare and rare, but had a lower (\( P < 0.05 \)) percentage than Low Choice at medium-rare and was lower than both at medium.

Conclusion

These results indicate that increased marbling level or enhancement has a positive impact on palatability ratings across all DOD. However, beef with higher marbling levels are acceptable at a higher rate at elevated DOD. With this, consumers can purchase steaks of lower quality when cooking to lower DOD, and vice versa, and still have a desirable eating experience.