



Evaluation of Beef Top Sirloin Steaks of Four Quality Grades Cooked to Three Degrees of Doneness

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Objectives

The objective of this study was to evaluate the impact of quality grade on beef eating quality of top sirloin steaks when cooked to multiple degrees of doneness (DOD).

Materials and Methods

Beef top sirloin butts (IMPS #184; $N = 60$; 15/quality grade) were collected to equally represent 4 quality grades [Prime, Top Choice (Modest and Moderate marbling), Low Choice, and Select]. Top butts were cut into six consecutive steaks, and then divided laterally to get a total of twelve steaks per top butt. Steaks were assigned to one of three DOD: rare (60°C), medium (71°C), and well-done (77°C). Steaks within each DOD were assigned to consumer sensory analysis, trained sensory analysis, fat and moisture analysis, and Warner-Bratzler shear force (WBSF). Consumers ($N = 236$) were fed samples under red lighting and evaluated steaks for juiciness, tenderness, flavor, and overall liking on continuous line scales. Trained sensory panelists evaluated samples for initial and sustained juiciness, myofibrillar and overall tenderness, connective tissue amount, beef flavor intensity, and off flavor intensity on similar continuous line scales. Data were analyzed as a split-plot, with a whole plot factor of quality grade, and sub-plot factor of DOD.

Results

There were no interactions ($P > 0.05$) for all consumer ratings of palatability traits. For quality grade, no differences ($P > 0.05$) were observed for consumer ratings of tenderness, flavor, and overall liking; however, there was a significant effect ($P = 0.01$) on juiciness. Prime top sirloin steaks had higher ($P < 0.05$) juiciness ratings than all

other quality grades, except for Top Choice. Additionally, as DOD increased, consumer ratings and the percentage of steaks rated acceptable for all palatability traits decreased ($P < 0.05$; rare > medium > well-done). There was a quality grade \times DOD interaction ($P < 0.05$) for trained sensory ratings of myofibrillar tenderness, initial juiciness, and sustained juiciness. When steaks were cooked to medium, Prime and Top Choice steaks had higher ($P < 0.05$) panelist ratings for initial and sustained juiciness than Low Choice and Select steaks. Similar to trained panelist ratings of juiciness, Prime and Top Choice steaks had higher ($P < 0.05$) ratings of myofibrillar tenderness than Select steaks. Prime and Top Choice steaks had similar ($P > 0.05$) and higher ($P < 0.05$) ratings for myofibrillar tenderness when compared to Low Choice steaks. Within DOD, each successive increase in DOD resulted in a concurrent decrease ($P < 0.05$; rare > medium > well) in trained panelist ratings of myofibrillar tenderness, initial juiciness, and sustained juiciness. There was no quality grade by DOD interactions ($P > 0.05$) for Warner-Bratzler shear force. Prime steaks were more ($P < 0.05$) tender than Low Choice and Select steaks but were similar ($P > 0.05$) to Top Choice. Moreover, as DOD increased, WBSF concurrently increased ($P < 0.05$; well-done > medium > rare), with well-done steaks having WBSF values 0.8 kg tougher than rare steaks.

Conclusion

These results indicate that regardless of DOD, quality grade had minimal impact on the palatability of beef top sirloin steaks. Therefore, unless cooked to a medium DOD, it is unnecessary for consumers, retailers, and foodservice to pay premium prices for higher quality top sirloin steaks, as the same eating experience will be provided.