

# Consumer acceptance and shear force values of top sirloin steaks prepared using sous vide and flat-top grill cookery methods

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**Objective:** To compare consumer acceptance and evaluate the tenderness of top sirloin steaks, aged for 14, 21, and 35 days, cooked with the following methods 1) fully cooked to lethality temperature with sous vide process, followed by warming on a flat-top grill, not-fully cooked with sous vide process, followed by cooking on a flat-top grill to a lethality temperature, or 3) cooked to a lethality temperature on a flat-top grill.

**Materials and Methods:** USDA Choice top sirloin butts ( $n = 240$ ) were aged under refrigeration (0 to 2 °C) for 14, 28, or 35 d ( $n = 80$ /aging time) and assigned to one of four treatments: (1) Non-blade tenderized, cooked via sous vide (internal temperature of 63 °C for 90 min), chilled, and reheated on flat-top grill to internal temperature of 46 °C, as commonly used in foodservice; (2) Non-blade tenderized, cooked via sous vide (internal temperature of 58 °C for 150 min), chilled, reheated on flat-top grill to internal temperature of 46 °C; (3) Blade tenderized, cooked on flat-top grill (internal temperature of 70 °C); (4) Non-blade tenderized, cooked on a flat-top grill (internal temperature of 70 °C). Consumer sensory panelists ( $n=224$ ) were served steaks from a single aging time ( $n = 80$  steaks/aging time) over three consecutive weeks. Panelists evaluated samples using a 9-point scale (1 = dislike extremely; 9 = like extremely) for overall liking, flavor liking, tenderness liking, and juiciness liking. After the sensory evaluation, panelists were divided into groups to conduct a visual evaluation of exterior and interior appearance of the steaks. After cooking, steaks for WBS force were chilled (2 to 4 °C) for 12 to 16 h and were allowed to equilibrate to room temperature before removing 1.3-cm diameter cores parallel to the fiber for shear assessment.

**Results and Discussion:** Steaks from the sous vide treatment with a lower temperature, longer time, and blade tenderized steaks cooked on a flat-top grill differed ( $P < 0.05$ ) in Warner-Bratzler Shear Force values at 14 and 35 d age when compared to other cooking treatments. Mean WBS force values for steaks cooked in treatment 1 were among the highest values within this study across all aging times. No differences ( $P > 0.05$ ) in consumer panelist ratings for flavor liking and juiciness liking were seen between cooking treatments regardless of aging times. Consumer panelists' scores for tenderness liking were highest ( $P < 0.002$ ) for steaks cooked via sous vide at a lower temperature, and longer time when aged for 14 d. Consumer panelists' visual appraisal scores showed differences ( $P < 0.004$ ) in steaks aged for 28 d. However, no ( $P > 0.05$ ) differences in consumer panelists' visual appraisal scores for steaks aged for 14 or 35 d were found. There were no differences ( $P > 0.05$ ) between cooking treatments for overall liking of exterior surfaces for 14 d and 35 d aged steaks. However, treatment 4 steaks aged for 28 d received among the highest ratings ( $P < 0.05$ ) for overall liking of exterior surfaces. Additionally, no ( $P > 0.05$ ) differences were identified in consumer panelists' visual ratings for steak presentation or overall liking of interior surfaces.

**Conclusion:** Tenderness is a leading palatability attribute that drives consumer acceptability of an eating experience. Steaks cooked via sous vide, using a lower temperature, longer time combination, were comparable in tenderness to blade tenderized steaks cooked on a flat-top grill. Top sirloin steaks cooked via sous vide could serve as an alternative preparation method. This could ensure a more consistent product in terms of tenderness and other attributes on a larger scale destined for foodservice, which would result in more consistent eating experiences by the consumer.

**Key words:** Beef, Sous vide, Warner-Bratzler shear force, Tenderness, Consumer acceptance