



## Evaluation of Consumer Preferences and Volatile Compounds of Beef Strip Loin Steaks Differing by Quality Grade, Postmortem Aging, and Degree of Doneness

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### Objectives

The purpose of this study was to determine consumer preferences and volatile aroma compounds for differences in flavor concerning quality grade, day of age, and degree of doneness on beef strip loins.

### Materials and Methods

USDA Select ( $n = 18$ ) and USDA upper 2/3 Choice ( $n = 18$ ), boneless beef strip loins (IMPS 180), were selected from a commercial processing plant. Loins were cut in half and wet aged for either 10 or 20 d at 2°C. After aging, loins were cut into 2.54 cm steaks, individually vacuum-packaged and stored in a freezer at -40°C. Steaks were thawed at 4°C for 12 to 24 h prior to cooking. Steaks were cooked on a flat top griddle set to 204.4°C ( $\pm 11.1$ °C). The steaks were cooked to one of three degrees of doneness: 63°C (63; medium rare), 71°C (71; medium) or 80°C (80; medium well) and flipped once at the halfway cook temperature. Steaks were held at 60°C no longer than 20 min. Consumer testing was conducted over five sessions with 93 consumers. Each consumer evaluated the samples on five different attributes: overall liking, overall flavor, appearance juiciness, and tenderness. The consumers rated each sample based on a 9-point hedonic scale. Consumer data were run using a full factorial design using grade, age, and degree of doneness as main effects. The order in which samples were served was included as a random effect and data were blocked by session. Portions of cooked samples were collected for GC analysis by being placed into a 20mL glass jar and collected with a solid-phase micro-extraction fiber for 60 min. The SPME was then placed into a GC/MS to separate and identify each volatile chemical compound. Three-way interactions among volatile compounds were determined to be not significant ( $P > 0.05$ ); therefore,

they were removed from the model. Additionally, volatiles that were not present in cells of two-way interactions were not included. Multivariate relationships between consumer preference and GC/MS data were explored using PCA.

### Results

USDA Choice had a higher ( $P < 0.001$ ) liking score than USDA Select grade beef loins for each of the five attributes tested. The 20-d aged steaks had higher ( $P < 0.03$ ) scores for overall liking, overall flavor, juiciness, and tenderness. The degree of doneness affected overall liking and juiciness liking ( $P < 0.001$ ) with 63°C having the greatest score followed by 71°C and then 80°C. For overall flavor, 63°C and 71°C were greater ( $P = 0.013$ ) than for 80°C. For appearance, the degree of doneness of 63°C was preferred to steaks cooked at 71°C and 80°C ( $P = 0.002$ ). Of the total volatiles ( $n = 52$ ) present in the samples, 20 d age had greater ( $P < 0.04$ ) iso butyraldehyde (pungent), 2-methylbutanal (chocolate), and 3-methylbutanal (fatty almond). Whereas, 3-hydroxy-2-butanone (buttery) was greater ( $P < 0.002$ ) in 10 d age. Octanal (fatty) and nonanal (fatty) were greater ( $P < 0.04$ ) in USDA Select than USDA Choice. 2-methyl pyrazine (chocolate, meaty, roasted) was greater ( $P < 0.04$ ) in 20 d aged steaks cooked to 71°C and 80°C compared to other treatment combinations.

### Conclusion

Consumer preferences were distinctly different based on quality grade, age, and degree of doneness. USDA Choice was generally the most preferred along with 63°C and 20 d age steaks. Positive (by their descriptors) volatile aroma compounds can be improved with aging and a degree of doneness of at least 71°C.