



RESEARCH BRIEF PRODUCT QUALITY

BEEF RESEARCH

The Impact of Enhancement, Degree of Doneness, and USDA Quality Grade on Beef Flavor Development

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Abstract

The objective of this study was to determine the impact of enhancement, degree of doneness (DOD), and USDA quality grade on beef volatile flavor compounds from cooked strip loin steaks. This study also aimed to evaluate relationships between volatile compounds and consumer sensory responses. Beef strip loins ($n = 72$; 24/grade) of 3 quality grades (USDA Prime, Low Choice, and Low Select) were enhanced (8% of green weight with brine containing 0.35% salt and 0.4% sodium phosphate) or not enhanced, and cooked to 3 DOD (Rare: 60°C; Medium: 71°C; Very Well Done: 83°C) before volatile analysis. Volatile compounds were evaluated through a split-plot design where enhancement level and quality grade were used as the whole plot factors and DOD served as the subplot factor. Principal component analysis (PCA) was utilized to explore relationships between volatile compounds, consumer response, and treatments. The majority of compounds ($n = 32$) were impacted ($P < 0.05$) by the interaction between DOD \times enhancement \times quality grade. Four compounds- methanethiol, dimethyl-disulfide, methyl-benzene, and acetic acid were affected ($P < 0.05$) by enhancement \times DOD. Two compounds -dimethyl sulfone and d-limonene, were impacted ($P < 0.05$) by quality grade \times enhancement. Phenylacetaldehyde and hexanoic acid, methyl ester was affected ($P < 0.05$) by the interaction of USDA quality grade \times DOD. The DOD main effect was only implicated in Maillard products ($P < 0.05$), including 2-methylbutanal, a Strecker aldehyde, and 2 pyrazines (methyl-pyrazine and trimethylpyrazine). Nonanal was the only compound impacted ($P < 0.05$) by a quality grade effect. No enhancement main effects were observed for any compounds ($P > 0.05$). In agreement, PCA indicated volatile compound production was primarily driven by degree of doneness and quality grade. There was no strong link between enhancement and beef volatile flavor compound development, despite the dramatically improved flavor liking scores from consumers.

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