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Volatile Compounds Profile of Roasted Beef from Crossbred Animals Finished on Feedlot or Pasture

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Objectives

Aroma and flavor are important sensory attributes for roasted beef and can influence consumers´ acceptance, beyond tenderness. Beef quality can be affected by several factors such as breed, age, gender, finishing system and diet. Finishing system affects growth performance, fat deposition and fatty acid composition, which leads to different lipid oxidation and aroma precursors such as oleic and linoleic acid. These precursors form different aldehydes, ketones and other compounds responsible for roasted beef aroma. As there are few studies of beef aroma compounds from animals finished on feedlot or pasture on Brazilian conditions, this study aimed verify the effects of finishing system, sire breed, cow genetic group and gender on the chemical profile of the main volatile compounds in Brazilian beef.

Materials and Methods

Beef (*longissimus thoracis* muscle) from animals of 4 genetic groups, bulls and heifers, the offspring of Angus or Limousin bulls and 1/2 Angus + 1/2 Nellore or 1/2 Simmental + 1/2 Nellore cows, finished on feedlot or pasture were analyzed. Beef samples of 2.5 cm were roasted in a electric oven, pre-heated at 180°C, until the sample reach an internal temperature of 75°C and ground. Solid-phase microextraction technique was used for volatile compounds extraction, using a CAR/PDMS (Carboxen/polydimethylsiloxane) fiber as stationary phase. Gas Chromatography coupled to Mass Spectrometry (GC–MS) was used to separate and identify the beef volatile compounds. Specific compounds of each volatile compound was selected, transformed to log10 and analyzed by Analysis of Variance (ANOVA) by GLM procedure, where production system/diet, sire breed, cow genetic group and gender were considered as fixed effects. Means were compared by Tukey test at 5% significance level. Principal component analysis was also applied to see if there was any separation between groups within the studied effects based on the volatile compounds.

Results

Ninety-four compounds were detected and 37 were selected as they were associated to beef characteristic aroma. All the studied effects affected the qualitative profile of volatile compounds on beef, being the finishing system (feedlot or pasture) and sire breed (Angus or Limousin) the major ones. For finishing system, octanal, nonanal, 1-heptanol and 3-hydroxi-2-butanone were affected. Beef from feedlot-finished animals was characterized by the presence of volatile compounds from lipid oxidation, as nonanal, octanal, octanoic and nonanoic acids, 3-hydroxi-2-butanone e 1-octen-3-ol while pasture-finished animals presented 4-heptanal, 1-pentanol, 2-methyl-pyridine, 2-ethyl-thiophene and pentanoic acid. There was no clear separation between feedlot and pasture-finished animals as expected in PCA and it can be due the fact that feedlot animals were confined for a short period of time (90 d). Sire breed presented the higher number of volatile compounds with significant difference ($p < 0,05$) between the treatments: octanal, nonanal, 2-nonenal, 3-hydroxibutanone, 2-heptanone, 3-octanone, 2-*n*-butylfuran, 2-pentylfuran, octanoic and nonanoic acids, 1-octen-3-ol and benzaldehyde. In PCA for sire breed, a clear separation was found. Cow genetic group and gender also affected the beef volatile profile, but in minor proportion.

Conclusion

Sire breed affected more the volatile compounds profile than production system. Cow genetic group and gender had minor effect.

