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Characterization of Fresh and Dry-Aged Ground Beef Patties

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Objectives

Consumers have varied preferences for beef flavor and it is known that dry-aging changes the flavor profile of beef. Therefore, the objective of this study was to characterize flavor differences and compositional changes of ground beef blends with varying levels of dry-aged beef.

Materials and Methods

Beef shoulder clods were collected from a commercial processing facility and ground to create 3 treatments: 100% fresh beef, 100% dry-aged beef, and a 50% fresh and 50% dry-aged ground beef blend. Clods used for dry-aged beef were vacuum packaged for 21 d, then opened and aged for an additional 21 d exposed to oxygen. Clods for fresh beef were held in plastic lined combos for 4 d postmortem. Upon completion of its aging protocol, each clod was trimmed and randomly assigned to 1 of 3 treatments. Five batches of each treatment were made to include equal numbers of clods and contain 15% fat. Each batch was ground and formed into 151 g patties. Panelists were trained to evaluate samples for standard beef flavor and textural attributes on a 10 cm line scale. Patties for descriptive sensory were cooked to 71°C on griddle pans over open gas burners. Cooked patties were cut into 8 wedge-shaped pieces for evaluation. Total lipid fatty acids were analyzed from 1 g of homogenized raw sample. Fatty acid methyl esters (FAME) were quantified via gas chromatography, with each individual FAME being reported as a percentage of the total amount of FAME identified. Volatile flavor compounds were measured from cooked patties. Immediately after cooking, sample was placed in a capped glass vial. Volatiles were collected from the headspace via a solid phase microextraction fiber. Quantification was performed using a 7-point internal standard method and compounds were identified from authentic external standards. Treatment comparisons for all analyses were tested for significance using the general linear model procedure of SAS (SAS Inst. Inc., Cary, NC).

Results

Samples comprised of 100% dry-aged beef were rated greatest ($P < 0.01$) for browned/grilled, earthy/mushroom, and nutty/roasted nut flavors; however, panelists also found more intense ($P \leq 0.01$) sour/acidic and bitter flavors. Dry-aged beef also increased ($P < 0.01$) hardness and reduced ($P < 0.01$) tenderness. Dry-aging caused a shift in saturated fatty acids (SFA), as shorter chain SFA (≤ 16:0) were reduced ($P \leq 0.03$) compared to stearic acid (18:0). Meanwhile, increases ($P < 0.05$) of *trans*-octadecenoic acid (18:1 *trans*) and decreases ($P < 0.05$) of *cis* monounsaturated fatty acids were seen in dry-aged beef. Concentrations of 18:2 conjugated linoleic isomers were greatest ($P < 0.01$) in fresh beef and decreased with the addition of dry-aged beef. Several lipid-derived volatile compounds were greater ($P < 0.05$) in dry-aged beef compared with fresh beef. Dry-aged beef showed increases ($P \leq 0.03$) of 3- and 2-methyl butanal, both of which are amino acid-derived Strecker aldehydes. Additionally, 2,3-butanedione and 3-hydroxy-2-butanone, which can be byproducts of spoilage organisms, were greatest ($P \leq 0.04$) in dry-aged beef. Alterations of fatty acids and volatile compounds with dry-aging were determined to be related with intensity of individual flavor attributes.

Conclusion

The inclusion of dry-aged trimmings impacts the flavor profile of ground beef, altering the composition of fatty acids and volatile compounds. This supports the idea that dry-aging may be utilized to impart a more intense beef flavor experience.