Meat and Muscle Biology™

Beef Flavor Evaluation on Top Loin Steaks, Sirloin Steaks, Chuck Roasts, and 80/20 Ground Beef Over The Retail Case

C. Pena[1]*, T. Cramer[2], B. Schilling[3], R. Miller[1], C. Kerth[1], J. Legako[2], D. Woerner[4], M. Narayanan Nair[3], and C. Brooks[2]

[1]Animal Science, Texas A&M University, College Station, TX, USA
[2]Animal and Food Science, Texas Tech University, Lubbock, TX, USA
[3]Animal Science, Colorado State University, CO, USA
[4]Animal and Food Science, Texas Tech University, TX, USA
*Corresponding author. Email: cap.02@tamu.edu (C. Pena)

Objectives

Consumer acceptability in meat flavor is one of the driving factors of acceptability. Many studies have found factors that affect beef flavor, but little is known about variability of major beef cuts in the retail meat case where meat is displayed, and customers can choose from.

Materials and Methods

Four beef cuts (chuck roast, top sirloin steaks, top loin steaks, and 80/20 ground beef) were obtained from retail stores in Miami, Los Angeles, Portland, New York, and Denver within a 2-mo period. The study wanted a variety of samples that were from different production systems or contained certain claims that would be available to customers. The meat was shipped with dry ice and stored at –9°C. For evaluation steaks, roasts, and ground beef were thawed 24 h at 4°C. Prior to cooking, chuck roasts were cut 10.16 × 12.7cm from the center of the roast. Each ground beef sample was formulated into 3, approximately 150 g patties. Chuck roasts were placed in a roasting pan on a roasting rack and 2 cups of water. Beef steaks and ground beef patties were cooked on a stovetop grill and cooked to 71°C, steaks and patties were flipped when temperature reached 35°F. Chuck roasts were cut into 1.27cm cubes with no visible connective tissue, fat, or outside browning. Steaks were cut into 1.27cm cubes with no connective tissue or fat. Ground beef patties were cut into 6 wedges. Panelists were served either 2 wedges or 2 1.27 cm samples for evaluation. An expert trained descriptive flavor and texture sensory panel was conducted where panelists evaluated beef flavors and textures. Beef flavor and texture attributes were analyzed using SAS (version 9.4, SAS Institute, Inc., Cary, NC) and principal component (PCA) bi-plots were generated using XLSTAT (Addinsoft, Inc., Long Island City, NY) using $P < 0.05$.

Results

Chuck roasts were associated with bloody/serumy flavor aromatics. Ground beef patties were clustered with fat-like, overall sweet, green hay, and buttery flavor aromatics. Top sirloin steaks samples were more highly associated with off flavors such as liver, cardboardy, and sour flavor aromatics. Top loin steaks were clustered with positive attributes such as umami, beef flavor identity, and brown, roasted flavor aromatics. For the PCA biplot, factor 1 accounted for 60% and factor 2 accounted for 28% of variation. Ground beef was higher ($P < 0.0001$) in brown, fat like, green hay, sour milk/sour dairy, flavor aromatics, and had more salty and sweet basic taste than the other cuts. Ground beef patties had the least amount ($P < 0.0001$) of bloody/serumy, metallic, and liver like flavor aromatics. Chuck roasts had the least ($P < 0.0001$) beef flavor id, brown, roasted flavor aromatics and salt and umami basic taste. Sirloin steaks had the lowest ($P < 0.0001$) fat like flavor aromatic and the highest levels ($P < 0.0001$) of burnt and cardboardy flavor aromatics and bitter and sour basic taste. Sirloin steaks and chuck roasts had more metallic and liver like ($P < 0.0001$) flavor aromatics than other cuts. Top loin steaks were intermediate in flavor attributes.

Conclusion

Flavor descriptive attributes of four beef cuts differed. Results indicated that chuck roasts and top sirloin steaks were associated with negative flavor attributes. Ground beef contained sweeter, fat like attributes with exceptions of green hay, while top loin steaks were associated with more positive beef flavor attributes.