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The Flavor and Texture Attributes of Ground Beef

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Objectives

Ground beef comprises between 50 and 60% of the beef consumed in the United States and is manufactured from beef trimmings from either commodity, grain-fed beef or lean trimmings from older, mature cows and bulls. Examining the impact of final grind, forming, fat/source content, patty thickness, cooking, and holding on ground beef patty descriptive flavor and texture attributes and aromatic volatile chemical compounds provides a method for understanding factors that drive ground beef flavor and texture differences.

Materials and Methods

Ground beef from grain-fed and mature cattle were selected at 2 different fat levels. The ground beef was coarse ground and then segmented into 3 final grinds treatments (bowl chopped, 0.95 cm grind, 0.64 cm grind) and then formed into patties by hand or by machine at either 0.64 cm or 2.54 cm thickness. The patties were cooked using a dry heat cooking method (a flat solid) or a steam cooking method (clam-shell grill) to an internal cook temperature endpoint of 70°C. Hold time was also evaluated at 0, 1, and 3 h in a steam table. Two trained descriptive sensory attribute panels from Texas A&M University ($n = 288$) and Kansas State University ($n = 218$) evaluated patties for flavor and texture descriptive attributes.

Results

Patty thickness impacted flavor attributes with thicker patties having more ($P < 0.05$) beef identity, overall sweet, brown/roasted, fat like flavor attributes; umami, salty, bitter and sweet basic tastes; and particle size, and initial juiciness

texture attributes than thinner patties. Ground beef patties with higher fat content, 20 versus 5% lipid, had higher ($P < 0.05$) levels of beef identity flavor attribute and umami basic taste and ground beef patties manufactured using grain-fed beef versus mature beef had more ($P < 0.05$) beef identity, and brown/roasted flavor attributes. Grind size impacted patty flavor and texture attributes but not to as great of an extent as patty thickness and meat source. Ground beef patties that were ground to either 0.64 cm or 0.95 cm final grind size had more ($P < 0.05$) fat-like flavor attributes. The bowl chopped and final grind size of 0.95 cm were ($P < 0.05$) more springy and harder. Cooking impacted flavor and texture attributes. Patties cooked on the George Foreman grill had more ($P < 0.05$) oxidized flavors, which were magnified when 0.64 cm thick patties were cooked, than patties cooked on a flat grill. Hand formed patties had more ($P < 0.05$) beef identity, brown/roasted, bloody serummy, fat-like flavor attributes and umami and sweet basic tastes than machine formed patties. Holding patties in a steam table for up to 3 h mainly affected oxidative flavors, but had minimal effects on flavor and texture attributes across all treatments ($P < 0.05$). In a partial least square regression bi-plot, thick ground beef patties from commercial grain-fed sources with 20% fat and bowl chopped or fine ground were more closely clustered with the positive flavor attributes including beef identity, brown/roasted, buttery, and fat-like flavor attributes; initial juiciness; and sweet, salty and umami basic tastes than the other treatments.

Conclusion

Selecting specific ground beef patty manufacturing and cooking methods can be used to improve the flavor traits of patties and should be used to maximize consumer acceptance.