

RELATIONSHIP BETWEEN DESCRIPTIVE FLAVOR AND TEXTURE ATTRIBUTES AND CONSUMER LIKING OF GROUND BEEF

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I. INTRODUCTION

Varying formulations and grind treatments have been used to maximize consumer acceptance of ground beef; however, understanding the relationships between trained descriptive sensory flavor and texture attributes and consumer liking have not been documented. The objective was to determine the relationship between consumer and trained descriptive flavor and texture attributes in ground beef that varied in fat level (10, 20%), meat source (chuck, regular, sirloin, round), and grind treatment (6.4 mm grind, bowl chopped).

II. MATERIALS AND METHODS

Knuckle, outside round flat, and chuck shoulder clod subprimals and 50/50 beef trim were used to formulate sirloin, round, and chuck treatments, respectively. Regular coarse ground beef with 20% fat was the regular treatment and trimmed knuckles were added to make 10% fat regular ground beef. For each source (regular, sirloin, round and chuck), the ground beef was divided into two batches and ground with a commercial grinder (6.4 mm final grind) or bowl chopped; three replicates were used. Hand formed 2.54 cm patties within a batch per treatment were used for trained and consumer testing. Patties were cooked on a flat stainless-steel grill (163°C) to an internal cook temperature of 71°C. For trained and consumer testing, patties were cut in half and each panelist (trained or consumer) received a half patty identified using a random three-digit code. Panelist used distilled water and saltless saltine crackers as palate cleansers. For descriptive flavor and texture evaluation, attributes were measured using Adhikari et al. (2011)¹ and AMSA (2016)² (0 = none; 15 = extremely intense). Panelist evaluated attributes seated in individual booths under red lights. Consumers (n=314 total) were recruited from Griffin GA, Portland OR, Manhattan KS, and State College PA; were between 20 and 66 years of age; and consumed ground beef at least one time per week. Consumers evaluated eight random samples. Consumers rated overall (OL), flavor (FL), texture (TL) and appearance liking (AL) using 9-point, end and center anchored hedonic scales. Data were analyzed (SAS Institute, Cary, NC) at $\alpha < 0.05$ and differences in LSMeans were determined using the pdiff function. Partial least squares regression (PLS) was conducted (XLSTAT, Addinsoft, New York, NY). The PLS bi-plot and regression equation for OL was presented.

III. RESULTS AND DISCUSSION

Meat source by fat interactions for beef identity, brown, roasted, bloody/serummy, umami, salty, and particle size were reported. Bowl-chopped patties were harder and springier. The 6.4 mm ground patties were higher in umami and had a more defined particle size. Round and sirloin ground beef patties were slightly higher in bitter and fat-like flavor than ground beef patties from regular and chuck meat sources; and round patties were slightly higher in sour basic tastes. As fat source increased, sirloin patties had higher levels of beef identity, brown, roasted, umami and lower levels of bloody/serummy attributes. Across meat sources, 20% fat patties had slightly lower bitter, cardboardy, liver-like, smoky charcoal, and sweet flavor attributes; were juicier; and had slightly higher levels of buttery, fat-like, and heated oil flavors. Consumers (n = 314) from four cities across the United States liked ground beef patties that were ground using a 6.4 mm grind size compared to bowl-chopped patties for consumer attributes ($P < 0.05$). Consumers liked ($P < 0.05$) the flavor of chuck patties and the texture of sirloin and chuck ground beef. Ground beef patties with 20% fat were rated higher

in TL. A grind by fat interaction existed for AL, OL, and FL, while a meat source by fat interaction was found for FL. A PLS biplot to examine trained flavor and texture descriptive attribute sensory and consumer liking attributes is presented (Figure 1). Chuck meat source clustered closely with consumer liking attributes and positive beef flavor attributes. Consumers preferred the texture of 20% fat patties, and 20% fat patties had positive trained panel attributes. Consumers preferred the 6.4 mm ground patties over the bowl chopped patties. Beef flavor identity, brown, roasted, fat-like, umami, salty, bitter, sweet, overall sweet, cardboard, cooked milk, heated oil, musty/earthy/humus, smoky charcoal, initial juiciness, and more defined particle size were positively and sour, metallic, liver-like, burnt, bloody/serumy, buttery, springy, harder and more cohesive ground beef patties were negatively associated with OL.

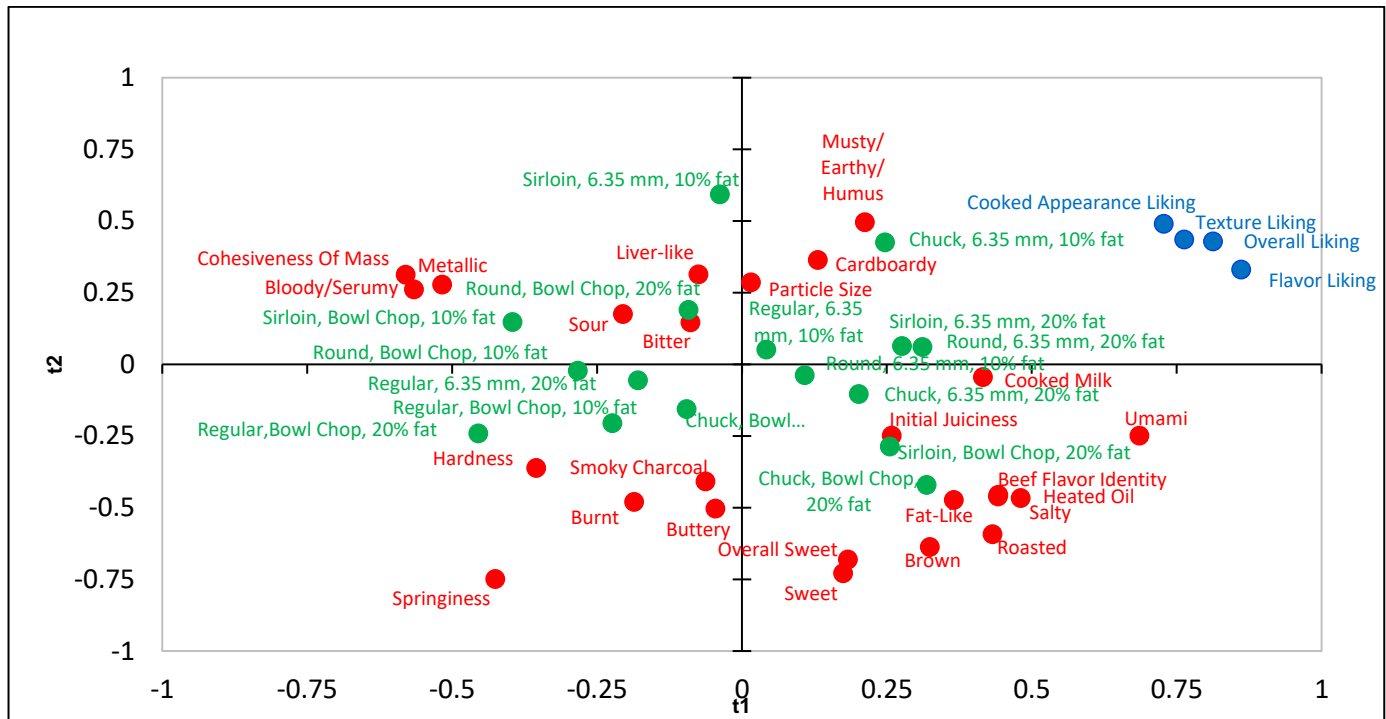


Figure 1. Partial least squares regression biplot for consumer liking attributes (blue), trained descriptive flavor and texture attributes (red), and ground beef treatments (green) (Y accounted for 80.9% of the variation in X; X accounted for 32.6% of the variation in Y). The PLS equation: Overall Liking = 4.347+0.043*Beef Flavor Identity+0.049*Brown+0.049*Roasted+0.010*Bloody/Serumy+0.124*Fat-like+0.020*Metallic+0.031*Liver-like + 0.345*Umami-0.174*Overall Sweet-0.282*Sweet-0.104*Sour+0.040*Salty+0.001*Bitter-0.017*Burn-0.177*Buttery+0.078*Cardboard+0.013*Cooked Milk+0.046*Heated Oil+0.021*Musty/Earthy/Humus+0.029*Smoky Charcoal-0.490*Springiness-0.292*Hardness+0.220*Initial Juiciness+0.561*Particle Size-0.180*Cohesiveness Of Mass.

CONCLUSION

Trained flavor and texture descriptive attributes in ground beef are related to consumer liking. These trained attributes can be used to predict consumer liking for ground beef using the presented equation.

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REFERENCES

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