

Relationship between individual and consensus descriptive flavor and texture attributes in ground beef patties



TEXAS A&M
UNIVERSITY

Hannah L. Laird¹, Greg Guidry¹, Rhonda K. Miller¹, Blythe A. Beavers¹, Chris R. Kerth¹,
Edgar Chambers IV², and Koushik Adhikari³

¹Texas A&M University, College Station, TX, ²Kansas State University, Manhattan, KS,

³University of Georgia, Griffin, GA



Introduction

Individual and consensus sensory methods are useful tools for the trained sensory panels to evaluate intensities of attributes.

Objective

To determine the relationship between trained descriptive attributes between individual and consensus descriptive sensory evaluation methods.

Methods

Experimental Design:

- 16 treatments with 3 replicates
- 4 meat sources (chuck, regular, sirloin, and round)
- 2 fat percentages (10 and 20%)
- 2 grind treatments (6.44 mm grind and bowl chopped)
- Subprimals for each treatment were, course ground, and verified for fat content.
- Patties were formed using a patty maker with a 2.54 cm plate.

Expert Descriptive Flavor and Texture Attribute Panel:

- Panelists evaluated the samples individually and then, discussed the attributes and intensities to come to a consensus.
- Flavor and texture descriptive attributes defined by Adhikari et al. (2011) and AMSA (2016).
- 0 = none; 15 = extremely intense.
- References available; distilled and sparkling water and salt-less saltine crackers as palate cleansers.

Statistical Analysis:

- Trained panel descriptive flavor and texture attributes for consensus and individual descriptive sensory methods were analyzed using the GLM procedure in SAS\ with a predetermined alpha of 5%.

Results

- Beef identity flavor was rated higher ($P < 0.05$) by individual panel method than when the consensus method was used.
- Liver-like, buttery, heated oil, smoky charcoal, warmed over, burnt, musty earthy/hummus, and petroleum-like flavor attributes, and sweet basic taste were rated higher ($P < 0.05$) for consensus panel method than the individual panel method.
- Texture attributes were not affected.
- Sour basic taste and cardboard flavor attributes displayed a panel type by fat percentage interaction.
- Patties with 20% fat did not differ in sour basic tastes; however, 10% fat patties were higher ($P < 0.05$) in sour basic taste when the consensus panel method was used.
- Patties with 10% and 20% fat were rated higher ($P < 0.05$) in cardboard flavor when consensus method was used.

Results

Table 1. Least squares means for flavor and texture attributes by sensory method.

	P-value	Individual Assessment	Consensus	RMSE ^c
Flavor Aromatics				
Beef Identity	0.039	9.9 ^b	9.8 ^a	0.69
Browned	0.69	10.1	10.1	0.71
Roasted	0.26	9.0	8.9	0.65
Bloody/Serumy	0.89	2.0	2.0	0.75
Fat-like	0.31	3.5	3.6	0.63
Metallic	0.78	2.4	2.4	0.51
Liver-like	0.001	0.4 ^a	0.7 ^b	0.76
Buttery	0.003	0.9 ^a	1.2 ^b	0.75
Cooked Milk	0.92	0.2	0.2	0.42
Heated Oil	<0.0001	0.8 ^a	1.2 ^b	0.74
Smoky Charcoal	0.0004	0.7 ^a	1.1 ^b	0.90
Sour Milk/Sour Dairy	0.11	0.3	0.4	0.56
Warmed Over	<0.0001	0.5 ^a	1.0 ^b	0.97
Burnt	0.04	0.3 ^a	0.5 ^b	0.72
Musty Earthy/Hummus	<0.0001	0.7 ^a	1.2 ^b	0.92
Refrigerator Stale	0.88	0.2	0.2	0.43
Petroleum Like	0.02	0.4 ^a	0.6 ^b	0.75
Overall Sweet	0.06	1.3	1.3	0.37
Basic Tastes				
Umami	0.97	4.1	4.1	0.64
Sweet	0.01	1.8 ^a	1.9 ^b	0.31
Salt	0.68	2.2	2.2	0.32
Bitter	0.30	2.3	2.0	0.35
Texture Attributes				
Hardness	0.31	5.5	5.5	0.63
Springiness	0.75	5.3	5.4	0.63
Initial Juiciness	0.95	10.7	10.7	0.66
Cohesiveness of Mass	0.18	7.4	7.5	0.49
Particle Size	0.07	3.6	3.5	0.41

^{ab}Mean values within a column and interaction followed by the same letter are not significantly different ($P < 0.05$).

^cRMSE = Root Mean Square Error

Table 2. Least square means for sour basic taste and cardboard flavor attribute interactions of panel type and fat percentage.

Effect	Sour	Cardboard
p-Value	0.015	0.03
Individual by 10% fat	2.7 ^b	2.5 ^b
Consensus by 10% fat	2.9 ^c	3.1 ^c
Individual by 20% fat	2.3 ^a	2.2 ^a
Consensus by 20% fat	2.3 ^a	2.4 ^b
RMSE ^d	0.39	0.63

^{abc}Mean values within a column and interaction followed by the same letter are not significantly different ($P < 0.05$).

^dRMSE = Root Mean Square Error

Conclusions

Intensity scores for minor sensory attributes were higher when sensory data were determined using consensus sensory technique in ground beef patties.

References

- Adhikari, K., E. Chambers IV, R. Miller, L. Vazquez-Araujo, N. Bhumiratana, and C. Philip. 2011. Development of a lexicon for beef flavor in intact muscle. *J Sens Stud* 26: 413-420.
- AMSA. 2016. Research guidelines for cookery, sensory evaluation, and instrumental tenderness measurements of meat.