

CONSUMER SENSORY PANEL RATINGS AND TEXTURE PROFILE ANALYSIS OF GROUND BEEF ACROSS UNITED STATES RETAIL ESTABLISHMENTS

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I. INTRODUCTION

In the United States, fast-food chains, restaurants, institutions, and consumers have made ground beef a frequently used protein source [1]. During 2021, ground beef sales accounted for 51% of all retail beef sold in terms of volume and 40% in terms of dollar value, which was a 9.5% increase from 2020 [2]. The objectives of this study were to assess texture profile and other sensory characteristics of various types of ground beef found in retail, and to collect market data on type (lean point, primal-specific, packaging type, etc.) of ground beef available.

II. MATERIALS AND METHODS

Ground beef was collected between October 2021 and February 2022 from eleven cities: Atlanta, GA; Chicago, IL; Denver, CO; Houston, TX; Kansas City, MO; Los Angeles, CA; Las Vegas NV; New York, NY; Philadelphia, PA; Seattle, WA; and Tampa, FL. Retail chains represented at least one-third of the city's total market share. Ground beef was packed with ice and shipped to Texas A&M University. Upon arrival, products were refrigerated. Packages destined for color evaluation were opened and allowed to bloom for 30 mins before objective and subjective color measures were taken [3]. Ground beef patties were formed and frozen until subsequent thawing and cooking on an electric charcoal grill for texture or consumer analyses. Texas A&M Institutional Review Board approved consumer panel procedures for Use of Humans in Research (IRB2020-1233M), and panelists were recruited using a Qualtrics survey. Consumer panelists evaluated up to 7 samples using a 10-point scale for overall like, flavor like, tenderness like, level of tenderness, and juiciness like. For texture assessment, cooked patties were refrigerated for 12 to 18 hours, removed from the cooler and equilibrated to room temperature before two 2.54 cm cores were removed for compression using TMS-Pro Food Texture Analyzer. Data were analyzed using JMP® Pro, Version 16.0.0. Analysis of variance (ANOVA) was performed using the student's t-test function and least squares mean comparisons were separated using an alpha-level of <0.05. Least squares mean comparisons were analyzed for subjective color panel, pH, objective color, consumer ratings, and texture profile results.

III. RESULTS AND DISCUSSION

Approximately 68.3% of the ground beef packages in self-service cases had at least one brand/claim on the package, with natural being the most prevalent followed by hormone and antibiotic free. Chuck was the predominant primal-specific item followed by sirloin and then brisket. The most frequently reported lean point was 80/20 followed by 90/10 and 85/15. For 2022 sales [2], by leanness, 80 to 89% made up 44% of the market share followed by 90% lean at 17%. The brightest color, bright red to very bright red, was observed in the 90-99% lean group across all package types. Consumer panelists rated products in polyvinyl chloride overwrapped trays the lowest for overall like, flavor like, and juiciness like. Data also revealed that as lean percentage increased, consumers preference for tenderness like and level decreased ($P < 0.05$). Texture profile analysis data for cohesiveness, hardness, gumminess, and chewiness generally decreased as fat level of ground beef increased. Ground beef containing 90-99% lean from chub packaging had the highest means for hardness 1

and 2 in conjunction with the highest means for gumminess and cohesiveness, indicating that the product had a tough first and second bite and required the most energy to chew.

Table 1. Frequency of lean points and packaging type on purchased product

Item	n	%
Lean Points		
73/27	21	5.47
75/25	8	2.08
80/20	83	22.62
85/15	66	17.19
88/12	22	5.73
90/10	75	19.53
91/9	3	0.78
92/8	17	4.43
93/7	40	10.42
96/4	23	5.99
Unknown	26	6.77
Package Type		
Chub	51	13.28
Modified Atmospheric Packaging	18	4.69
Polyvinyl Chloride Overwrapped Trays	206	53.65
Vacuum Packaged Bricks	109	28.31

IV. CONCLUSION

Results showed that package type and lean point played a role in the overall texture and sensory attributes of the ground beef products. These data provide a national baseline of ground beef in the U.S. retail market for factors such as color, consumer sensory ratings, and texture profile analyses based on different lean percentages and package type.

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REFERENCES

1. Savell, J., & Gehring, K. (2020). Meat Perspectives: Ground beef basics at <https://www.meatpoultry.com/articles/23800-meat-perspectivesground-beef-basics>
2. Cattlemen's Beef Board and National Cattlemen's Beef Association. (2023). Ground beef performance: Sales trends by leanness, form, and primal at <https://www.beefresearch.org/resources/market-research-planning/white-papers/ground-beef-performance-sales-trends-by-leanness-form-and-primal>
3. King, D.A., Hunt, M.C., Barbut, S., Claus, J.R., Cornforth, D.P., Joseph, P., Kim, Y.H.B., Lindahl, G., Mancini, R.A., Nair, M.N., Merok, K.J., Milkowski, A., Mohan, A., Pohlman, F., Ramanathan, R., Raines, C.R., Seyfert, M., Sørheim, O., Suman, S.P., & Weber, M. (2023). American Meat Science Association Guidelines for Meat Color Measurement. *Meat and Muscle Biology* 6:12473, 1-81.