Impact of Disclosing Fat Content, Primal Source, and Price on Consumer Evaluation of Ground Beef[1]

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Abstract: The objective of this study was to evaluate the effect of providing information about the fat content, primal source, and price on consumers' palatability ratings of ground beef from the same source. Ground beef chubs that were 80% lean/20% fat ($n = 15$/panel type) were obtained, and 151.2 g patties were manufactured from the chubs. Chubs were assigned randomly to panels for 1 of 3 different panel types. The fat content panels had samples labeled as 90% lean/10% fat (90/10), 80% lean/20% fat (80/20), 73% lean/27% fat (73/27), lean, and extra lean. Price point samples were assigned to 1 of 5 different points: ultra-high, high, medium, low, and ultra-low. Primal panel samples were labeled as ground chuck, ground round, ground sirloin, and store ground. Each panel had one sample with no information given (NONE). Samples were evaluated by consumers ($N = 305$), who were informed of the treatment prior to evaluation for tenderness, juiciness, flavor, texture, overall liking, and purchasing intent and rated each trait as acceptable or unacceptable. Labeling ground beef as 90/10, 80/20, and 73/27 resulted in increased ($P < 0.05$) consumer ratings for tenderness, flavor, and overall liking. Informing consumers of the price of the product resulted in increases ($P < 0.05$) for all palatability traits for samples labeled with ultra-high, high, medium, and ultra-low prices. Furthermore, attaching a primal blend label to the samples resulted in an increase ($P < 0.05$) for all the palatability traits evaluated for all 4 primal blend types. Additionally, purchasing intent was increased ($P < 0.05$) for samples when consumers were informed of the price and primal blend. Ultimately, providing consumers with information about the fat content, price, and primal blend type influences their perceived palatability of ground beef.

Introduction

Consumers are provided with numerous pieces of information related to ground beef products at the retail case. The information used can vary from the price, fat content/leanness, animal or product production practices, primal source, weight, thickness, size of package, quality level, and even brand of the meat being purchased. At the time of purchase, the information in the form of both intrinsic (actual product traits) and extrinsic (outside factors) cues is balanced (McIlveen and Buchanan, 2001). However, most of the previous research evaluating ground beef

palatability has utilized samples in which the panelists were unaware of the treatments, in which products of differing quality characteristics have been evaluated (Berry and Leddy, 1984; Troutt et al., 1992; Blackmon et al., 2015; Kerth et al., 2015). Recent studies utilizing both ground beef and beef steaks have attempted to identify the effect of providing information about the brand and production practices on consumers' eating experience and have indicated that these characteristics influence the overall eating experience consumers receive (Wilfong et al., 2016a, 2016b; Ron et al., 2019). However, it is known that consumers utilize several other characteristics of ground beef including the price, primal source, and fat

content in addition to the brand of ground beef when they are making purchasing decisions.

It has been shown that a positive relationship between the price of a product and the perceived taste of that product exists, with increased price being associated with increased quality perceptions (Valenzi and Andrews, 1971). Additionally, the perceived quality of a product by a consumer will be solely related to price if price is the only cue available at the time of purchase (Dodds et al., 1991). Increasing the price of more palatable food products often shifts consumers' demands to lower-priced, less palatable food (Cabanac, 1995). Previous work has shown price as the most important motivator considered by consumers when purchasing beef products (Wilfong et al., 2016a; Vierck et al., 2018; Olson et al., 2019; Vierck et al., 2021). In the last decade, the price of ground beef has risen from \$5.02 per kilogram in January 2010 to \$9.25 per kilogram in April of 2022 (US Bureau of Labor Statistics, 2020). However, no studies involving meat or ground beef have looked at how the price plays into the consumer's perceived palatability of the product.

The popularity of primal and subprimal-specific blends has increased significantly in the last decade as "premium blend" concepts have become popular throughout the industry. Data from supermarket scanners were reported by Ward et al. (2008), who found ground chuck to be purchased more frequently and at a higher price than commodity product, indicating the popularity of primal blends at the retail level. Numerous recent studies have evaluated the palatability characteristics of ground beef of differing primal and subprimal blends (McHenry, 2013; Blackmon et al., 2015; Kerth et al., 2015; Beavers, 2017). However, these studies have produced conflicting results related to the palatability of these premium blend and primal-specific concepts utilizing both consumer and trained sensory panelists. To date, to the best of our knowledge, no research has evaluated how attaching a primal source label to a ground beef product affects the consumer's perceived eating experience of the product.

The impact of fat content on ground beef palatability was thoroughly investigated throughout the health craze of the 1980s and 1990s (Berry and Leddy, 1984; Troutt et al., 1992; Miller et al., 1993; Berry, 1994; Wong and Maga, 1995). However, this research was all conducted with products that varied in quality. Speer et al. (2015) reported that 70% to 77% lean ground beef accounted for the largest percentage of ground beef sales at retail and indicated the growth of higher fat blends in both the retail and food service

sectors. In 2019, 70% to 77% lean ground beef again accounted for the largest increase in sales and pounds sold among all ground beef sold in the United States (Beef Checkoff, 2021). Moreover, increasing the fat content of ground beef decreases the price of the product in comparison with higher lean points being marketed (Lusk and Parker, 2009). Although research exists in other food products on the impact of disclosing fat content on consumers' impressions of palatability (Solheim and Lawless, 1996; Westcombe and Wardle, 1997), this has not been evaluated in ground beef.

Ground beef is one of the most widely consumed beef products, representing 46% of the total US retail beef consumption (Schulz, 2021). Currently, to the best of our knowledge, no work has evaluated how the various information cues presented to consumers at the point of sale impact consumers' perceptions of the palatability traits of the product. Therefore, the objective of this study was to assess the impact of providing consumers with information about the price, fat content, and primal source of ground beef on the consumers' eating experience.

Materials and Methods

All the procedures outlined within this study were approved by the Institutional Review Board at Kansas State University (Institutional Review Board #7440.7, February 2, 2021).

Ground beef preparation

Because the objective of this study was to assess the impact of labeling the price, fat content, and primal source on ground beef, the research team utilized a method to assess the impact of providing the various forms of information while keeping the actual product identical. Ground beef was allotted to the different treatments so that each consumer would be sampling 5 or 6 samples that were labeled with the different attributes being studied despite there being no actual differences in the product. One sample was designated to have no information associated with it so that a "control" could be established. All the product quality and characteristics of the ground beef were kept as similar as possible to help eliminate any variability within the ground beef and test only the effect of providing different labeling information.

Ground beef chubs ($N = 30$; 4.54 kg chubs) of 80/20 ground beef (IMPS #136) from the same production

lot and day were obtained from a meat purveyor and shipped to the Kansas State University Meat Laboratory in Manhattan, Kansas. Chubs were stored under refrigeration at 0°C to 4°C prior to patty formation.

Ground beef chubs were fabricated 11 d after the date of manufacture using a patty former (Super Model 54 Food Portioning Unit, Hollymatic, Countryside, IL) into 151.2 g patties that were approximately 13 cm in diameter and 1 cm thick. Chubs ($n = 15$/panel type) were randomly assigned to 1 or 2 consumer panel sessions so that all patties consumed within a single panel session came from the same chub to keep patties as similar to one another as possible. Ground beef patties were kept in ordered pairs and were randomly labeled according to the order in which they were formed. Two pairs of ground beef patties from each chub were assigned to texture profile analysis (TPA) and shear force analysis. The remaining patties within each chub were designated for consumer sensory analysis and assigned to 1 of 3 different informed panel types: fat content, primal source, or price. Within the fat content panel, patties were designated to 1 of 5 different fat content treatments: 90% lean/10% fat (90/10), 80% lean/20% fat (80/20), 73% lean/27% fat (73/27), lean, or extra lean. Primal source patties were assigned to 1 of 4 different labeled primal blend treatments: ground chuck, ground round, ground sirloin, or store ground. The store ground treatment was used to represent ground beef often sold at retail from the grinding of trim in-store from a full-service retail case. Price patties were assigned to 1 of 5 different price point treatments: "ultra-high," "high," "medium," "low," or "ultra-low." For the price panels, the average price of ground beef was obtained from several retailers in the Manhattan, Kansas, area for the week of August 17, 2020. The average price was determined to be $8.27/kg, which was set as the medium sample. Prices were then set to be 33% and 66%, higher and lower than the medium or average price. Therefore, the ultra-high price was $13.78/kg, high was $11.02/kg, low was $5.51/kg, and ultra-low was set at $2.75/kg. Price per pound was provided to the consumers. Additionally, within each set of panels, one patty pair was designated as a blank (NONE) with no label information, designated to serve as a control for the panel. Patties were crust frozen on plastic trays and packaged using a rollstock packaging machine (model BullDog 42a300, UltraSource, Kansas City, MO). All samples were then frozen at −40°C until analysis.

Shear force testing was conducted according to the American Meat Science Association (AMSA) guidelines for instrumental tenderness utilizing a straight edge blade (AMSA, 2015). Moreover, TPA was conducted according to the procedures from Bourne (1978) and the AMSA guidelines for tenderness testing (AMSA, 2015).

Consumer sensory analysis

Consumer panelists ($N = 315$; 105/panel type) were recruited from across the Midwest and monetarily compensated for their participation. In order to reach the needed number of consumers, panels were conducted in 3 Midwest locations: Manhattan, Kansas, Southeast Kansas, and North-Central Ohio, with each recruiting consumers from within an 80-km radius. All panels were conducted in a centralized site at each location in an open seating format with a minimum of 2 m of spacing between each seated consumer. Consumers were fed under white florescent lighting. Panels lasted approximately 1 h, and 21 consumers were present for each panel. For each panel type, a total of 5 sessions were held. During the sessions, each panelist was given a plastic fork, napkin, and empty expectorant cup as well as water, apple juice, and unsalted crackers to use as palate cleansers between each sample. Prior to evaluating the samples, consumers were given verbal instructions to explain the evaluation procedures, how to cleanse their palate between each sample, and how to use the digital survey.

For each panel, patties were thawed at 2°C to 4°C for 20 to 24 h prior to cooking. All patties were cooked on clam-shell style grills (Cuisinart Griddler Deluxe, East Windsor, NJ) set to 177°C. A peak endpoint temperature of 71°C was targeted and recorded using a thermocouple-type thermometer (Doric 205, Beckman Industries, Indianapolis, IN). Once cooked, full patties were sliced into 8 equally sized wedge-shaped pieces (approximately 14 g) using a cutting guide, plated, and served immediately to a predetermined consumer.

Prior to their evaluation of each sample, consumers were provided with the designated additional labeling information about each sample. An overhead screen was used to project the information about each sample, consumers were verbally informed of the additional information for the sample, and the information was displayed on their tablet. Samples were fed in a random order for each panel session. A blank screen was shown for the NONE sample, and consumers were told they were eating a ground beef sample with no information provided about it.

Consumers were provided with electronic tablets (Lenovo TB-8505F) to fill out preloaded surveys (Qualtrics XM, Provo, UT). The first page of the survey

asked consumers to give demographic information about their gender, household size, marital status, ethnicity, income, and education as well as identify their weekly ground beef consumption, preferred degree of doneness for ground beef, and the most important palatability trait when consuming ground beef. Additionally, consumers were asked to rate the importance of 18 traits, listed in alphabetical order, that they would consider when purchasing ground beef at retail on 0 to 100-point line scales that were verbally anchored at $0 =$ extremely unimportant and $100 =$ extremely important. For each sample, consumers were asked to rate the juiciness, tenderness, flavor liking, texture liking, and overall liking on 0 to 100-point continuous line scales as well as give their purchasing intent. Scales were descriptively anchored at each end and at the midpoint: $0 =$ extremely dry, tough, dislike flavor/texture/overall extremely, extremely unlikely to purchase; $50 =$ neither juicy nor dry, neither tough nor tender, neither like nor dislike, and neither likely nor unlikely to purchase; $100 =$ extremely juicy, tender, like flavor/texture/overall extremely, and extremely likely to purchase. Furthermore, consumers were asked to rate each palatability trait as either acceptable or unacceptable.

Statistical analysis

The PROC GLIMMIX procedure of SAS (SAS Institute Inc., Cary, NC) was used for statistical analyses. An α of 0.05 was considered significant for all treatment comparisons. All data were analyzed as a completely randomized design. Moreover, for all sensory data, the random effect of panel session was used, and consumer acceptability data were modeled using a binomial error distribution. Mean separation among treatment means was conducted using the LSMEANS statement with a pairwise α of 0.05. Finally, the Kenward-Roger adjustment was used through all analyses as a bias adjustment to more precisely estimate variance components and better estimate denominator degrees of freedom.

To account for changes in consumer scores when information was provided, the change in panelist ratings was calculated for each sample as a change in rating from the NONE score. To calculate this, the consumer's rating for the NONE sample was subtracted from the rating for the labeled sample, divided by the NONE sample, and multiplied by 100 to find the percentage change in the palatability scores as a result of treatment disclosure. For acceptability data, the NONE value was subtracted from the treatment value

and no rescaling was performed. Comparisons of the mean change in consumer scores among treatments followed the procedures outlined, and the treatment means were tested against 0 using the default statistical tests performed using the LSMEANS statement and provided within the default LSMEANS output table. An α of 0.05 was used for all these analyses.

Results

Fat content panels

Demographic results for the 305 participants in all 3 panel types can be found in Table 1. Gender was split almost evenly (49.5% and 50.5%) among the male and female participants in the fat content panel. Additionally, most participants were married (70.6%), Caucasian (97.9%), and from a household of 2 people (40.2%). Over half of the participants made over $50,000. More than 70% of the participants had an education beyond the high school level, with more than 50% of the participants indicating they were a college or postcollege graduate. Participants indicated that flavor (68.5%) was the most important palatability trait when consuming ground beef, followed by juiciness (20.7%). In addition, medium rare was the most preferred degree of doneness for 29.4% of participants, followed by medium (27.2%) and medium well (23.9%). Furthermore, more than 50% of participants consumed ground beef from 1 to 3 times per week. All the consumer participants were asked to rate the importance of 18 different traits when they purchase ground beef at retail, and the results are reported in Table 2. When asked to rate the importance of various traits when purchasing ground beef at retail, "fat content" was rated by consumers as similar ($P > 0.05$) in importance to "animal welfare," "appearance – lean to fat ratio," "color," and "locally raised" but more ($P < 0.05$) important than all other traits evaluated. Finally, consumers in the fat content panels identified "natural or organic claims" as similar ($P > 0.05$) in importance to "animal fed a grass-based diet" but the least ($P < 0.05$) important when compared with the other traits evaluated.

Results for the consumer sensory ratings for the fat content panels can be found in Table 3. Consumers found very few differences when information related to fat content was disclosed prior to sample evaluation. Consumers rated 73/27 labeled ground beef juicier ($P < 0.05$) than 90/10 and extra lean–labeled ground beef but similar ($P > 0.05$) in juiciness to NONE, lean, and 80/20 labeled products. No differences ($P > 0.05$)

Table 1. Demographic characteristics of consumers ($N = 315$; 105/panel type) who participated in ground beef consumer sensory panels with additional information provided about the fat content, price, or primal source

Characteristic	Response	Percentage of consumers		
		Fat content panel	Price panel	Primal panel
Gender	Male	49.5	36.7	60.6
	Female	50.5	63.3	39.4
Household size	1 person	14.1	13.5	21
	2 people	40.2	40.5	39.1
	3 people	21.8	14.6	15.2
	4 people	14.1	15.7	16.1
	5 people	8.7	11.2	7.6
	6 people	1.1	3.4	1
	Greater than 6 people	0	1.1	0
Marital status	Married	70.6	73.9	66.4
	Single	29.4	26.1	33.6
Age	Under 20	2.2	0	1
	20–29	17.2	18	22.9
	30–39	15	18	20
	40–49	17.2	16.9	19
	50–59	26.9	24.7	15.2
	Over 60	21.5	22.4	21.9
Ethnic origin	African American	0	0	2.9
	Asian	0	0	1
	Caucasian/White	97.9	98.9	78.1
	Hispanic	0	0	15.2
	Mixed Race	2.1	1.1	0
	Native-American	0	0	0
	Other	0	0	2.8
Income	Under $25,000	5.9	4.9	15
	$25,000–$34,999	4.7	7.3	11
	$35,000–$49,999	8.2	13.4	16
	$50,000–$74,999	29.4	25.6	16
	$75,000–$99,999	22.4	20.7	13
	$100,000–$149,999	12.9	15.9	18
	$150,000–$199,999	8.2	11	5
	Greater than $199,999	8.2	1.2	6
Education level	Non-high school graduate	0	0	1
	High school graduate	27.2	22.7	4.8
	Some college/technical school	21.7	25	28.5
	College graduate	32.6	38.6	46.7
	Postcollege graduate	18.5	13.6	19
Most important palatability trait when consuming ground beef	Tenderness	7.6	3.4	14.4
	Juiciness	20.7	15.7	16.3
	Flavor	68.5	75.3	63.5
	Texture	3.3	5.6	5.8
Preferred degree of doneness when consuming ground beef	Very rare	0	1.1	1.9
	Rare	4.3	0	3.8
	Medium rare	29.4	9	12.4
	Medium	27.2	30.3	18.1
	Medium well	23.9	34.9	28.5

Table 1. (*Continued*)

		Percentage of consumers		
Characteristic	Response	Fat content panel	Price panel	Primal panel
	Well done	13	20.2	32.4
	Very well done	2.2	4.5	2.9
Weekly ground beef consumption	1 to 3 times	58.4	50	53
	4 to 6 times	31.7	35.7	30.3
	7 to 9 times	3	10.2	5.9
	10 or more times	6.9	4.1	10.8

Table 2. Ground beef purchasing motivators of consumers ($N = 315$; 105/panel type) who participated in ground beef consumer sensory panels with additional information provided about the fat content, price, or primal source

	Importance		
Trait	Fat content panel	Price panel	Primal panel
Fat content	70.2[a]	69.5[abc]	72.2[a]
Animal welfare	68.9[ab]	69.7[abc]	60.1[bc]
Appearance: lean to fat ratio	68.8[ab]	71.6[ab]	67.3[ab]
Color	68.7[ab]	73.0[a]	66.3[ab]
Locally raised	66.4[abc]	61.9[cde]	52.8[c]
Nutrient content	61.1[bcd]	61.7[cde]	52.9[c]
Size, weight, and thickness	60.1[cd]	56.8[def]	60.4[bc]
Animal fed a grain-based diet	58.3[cde]	63.5[bcd]	56.3[c]
Price	57.3[de]	65.8[abc]	69.0[a]
Primal source	50.8[ef]	54.3[efg]	54.5[c]
Packaging type	45.3[fg]	52.8[fg]	38.3[de]
Brand of product	43.0[fg]	46.4[gh]	37.4[de]
Animal not administered antibiotics	41.0[g]	40.8[hi]	37.9[de]
Growth promotant use in the animal	40.9[g]	46.1[gh]	41.3[d]
Fresh never frozen	38.0[gh]	31.2[j]	43.4[d]
Preformed patty	37.3[gh]	32.8[ij]	30.7[e]
Animal fed a grass-based diet	30.0[ih]	37.2[ij]	37.8[de]
Natural or organic claims	28.4[i]	30.6[j]	31.7[e]
SE[2]	3.0	3.1	3.0
P value	< 0.01	< 0.01	< 0.01

[abcdefghij]Least-squares means within the same panel type lacking a common superscript differ ($P < 0.05$).

[1]Purchasing motivators: 0 = extremely unimportant, 100 = extremely important.

[2]Standard error (largest) of the least squares means

were found in the ratings for tenderness, flavor liking, texture liking, and overall liking among the 6 different treatments; however, all mean ratings fell above the midpoint. Moreover, no differences ($P > 0.05$) were found in consumers' likelihood to purchase the 6 treatments.

Despite the limited differences in consumer ratings, consumers' perception of the ground beef they were consuming when additional labeling information was provided did change (Figure 1). There was an increase ($P < 0.05$) in the ratings for tenderness for 90/10 (20.1%), 80/20 (21.2%), and 73/27 (24.2%) labeled products when the fat content was provided to consumers. Additionally, 73/27 labeled samples had a 24.6% increase ($P < 0.05$) in the ratings for juiciness. Increases ($P < 0.05$) were also found in the ratings for flavor liking for 90/10 (25.2%), 80/20 (25.3%), 73/27 (32.6%), and lean (15.3%) labeled ground beef. Additionally, when the fat content was provided, texture liking ratings increased ($P < 0.05$) for 73/27 (22.1%) and extra lean (19.6%) labeled treatments. Finally, there was an increase ($P < 0.05$) in ratings for overall liking for 90/10 (22.2%), 80/20 (27.5%), and 73/27 (27.1%) labeled ground beef when labeling information was provided.

Consumers were asked to rate each palatability trait as either acceptable or unacceptable as they were evaluating each sample (Table 4). When evaluating tenderness, a higher ($P < 0.05$) percentage of 80/20 labeled ground beef was rated as acceptable in comparison with extra lean labeled and NONE but was similar ($P > 0.05$) to the percentage of lean, 90/10, and 73/27 labeled samples rated as acceptable. Moreover, lean-labeled ground beef had a similar ($P > 0.05$) percentage of samples rated as acceptable for tenderness compared with all other treatments. For juiciness, 90/10 labeled ground beef had the lowest ($P < 0.05$) percentage of samples rated as acceptable in comparison with 80/20 and 73/27 labeled samples and NONE but was similar ($P > 0.05$) to the percentage of lean and extra lean–labeled ground beef rated as acceptable. There were no differences ($P > 0.05$) in the percentage of samples rated as acceptable for flavor, texture, and overall for all treatments evaluated.

Figure 2 presents the means for the change in the percentage of samples rated acceptable for labeled samples when information about the fat content was

Table 3. Consumer ($N = 315$; 105/panel type) palatability ratings[1] for ground beef patties when additional information was given about the fat content, price, or primal blend

Treatment	Tenderness	Juiciness	Flavor liking	Texture liking	Overall liking	Purchasing intent
Fat content panel[2]						
90% lean/10% fat	60.4	58.9[c]	59.6	58.8	58.9	57.1
80% lean/20% fat	66.5	68.1[ab]	63.0	61.2	65.7	62.3
73% lean/27% fat	69.6	70.9[a]	65.5	62.0	64.7	62.3
Lean	63.4	65.9[abc]	58.6	60.7	60.5	58.0
Extra lean	60.1	61.6[bc]	59.1	59.4	58.4	55.4
NONE[3]	63.3	66.7[ab]	58.1	59.9	60.1	57.0
SE[4]	2.6	2.7	2.7	2.7	2.7	3.1
***P* value**	0.09	0.02	0.25	0.96	0.29	0.49
Price panel[5]						
Ultra-high	72.8	73.9[a]	68.6[a]	66.2	69.6	62.4
High	67.3	70.9[ab]	61.5[abc]	62.6	63.8	59.6
Medium	69.4	73.3[a]	66.3[ab]	64.7	68.8	66.8
Low	66.5	65.3[bc]	59.9[bc]	62.6	61.4	57.9
Ultra-low	70.7	74.0[a]	63.9[abc]	64.7	65.0	61.1
NONE[3]	66.7	62.6[c]	56.5[c]	60.4	58.8	55.3
SE[4]	2.5	2.6	2.7	2.7	3.0	3.0
***P* value**	0.29	< 0.01	0.02	0.62	0.06	0.07
Primal panel[6]						
Ground chuck	72.3[a]	73.6[a]	65.9[ab]	70.3[a]	70.4[a]	70.2[a]
Ground round	65.8[b]	69.9[ab]	61.0[bc]	64.2[bc]	64.3[ab]	63.2[bc]
Ground sirloin	71.5[a]	73.9[a]	69.4[a]	69.7[ab]	70.1[a]	69.5[ab]
Store ground	67.7[ab]	70.9[ab]	63.2[abc]	63.8[c]	65.4[a]	62.4[c]
NONE[3]	65.6[b]	65.8[b]	57.5[c]	59.1[c]	58.8[b]	56.9[c]
SE[4]	2.1	2.1	2.4	2.1	2.3	2.6
***P* value**	0.04	0.03	0.01	< 0.01	< 0.01	< 0.01

[abc]Least squares means within the same panel type of the same column lacking a common superscript differ ($P < 0.05$).

[1]Sensory scores: 0 = not tender/juicy, dislike flavor/texture/overall extremely, or extremely unlikely to purchase; 50 = neither tender nor tough, juicy nor dry, neither like nor dislike flavor/texture/overall, or neither likely or unlikely to purchase; 100 = very tender/juicy, like flavor/texture/overall extremely, or extremely likely to purchase.

[2]Additional information given about the fat and/or lean content of the sample provided to the consumer prior to sample evaluation.

[3]NONE: no information was provided.

[4]Standard error (largest) of the least squares means.

[5]Additional information given about the price of the sample provided to the consumer prior to sample evaluation. Prices: Ultra-High: $13.78/kg; High: $11.02/kg; Medium: $8.27/kg; Low: $5.51/kg; Ultra-Low: $2.75/kg.

[6]Additional information given about the primal source of the sample provided to consumers prior to sample evaluation.

provided. There was an increase ($P < 0.05$) in the percentage of samples rated as acceptable for tenderness for 90/10, 80/20, and 73/27 labeled samples in comparison with extra lean–labeled products, which had a decrease ($P < 0.05$) in the percentage rated as acceptable when information was provided about the treatment. Conversely, when evaluating juiciness, extra lean and 90/10 labeled samples had a larger ($P < 0.05$) decrease in the percentage of samples rated as acceptable in comparison with 80/20 and 73/27 labeled samples when fat content was disclosed. A decrease ($P < 0.05$) in the percentage of samples rated as acceptable for juiciness was found when samples were labeled as 90/10 and extra lean. Additionally, providing the fat content to consumers increased ($P < 0.05$) the percentage of 80/20 labeled samples rated as acceptable for texture. Providing the fat content to consumers did not ($P > 0.05$) change the percentage of samples rated as acceptable for flavor and overall for any of the treatments.

Price panels

Participants involved in the price panel were similar to those in the fat content panel and were predominately married (73.9%), Caucasian (98.9%), and from a 2-person household (40.5%) (Table 1). Different from the fat content panel, 63.3% of the participants were
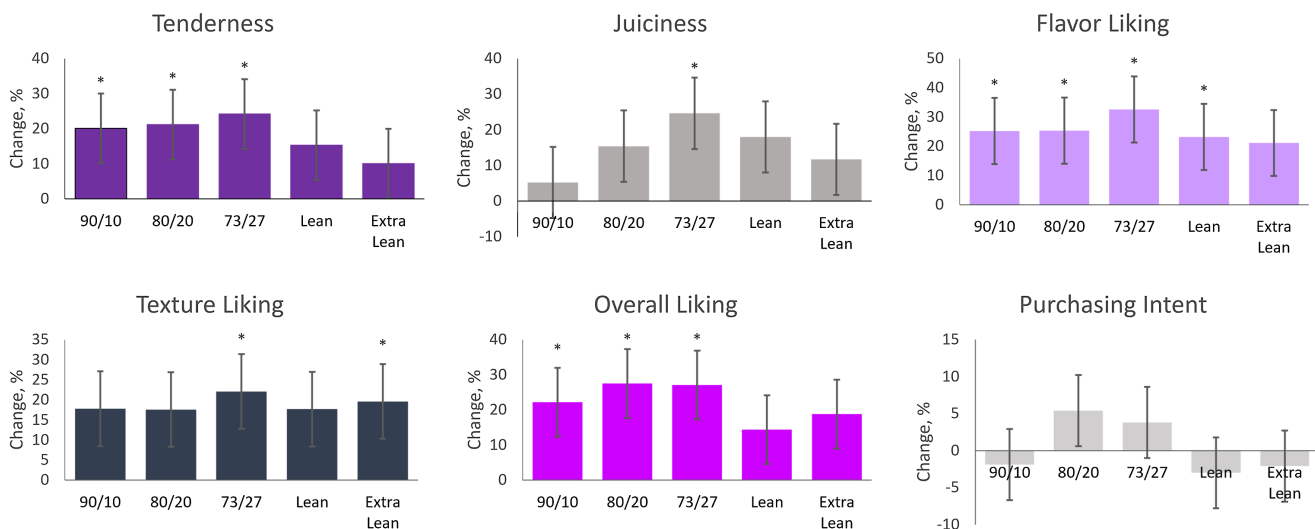
Figure 1. Change in sensory scores due to lean point disclosure prior to sample evaluation. Fat treatments presented as the percentage lean/percentage fat. *Mean differs from zero ($P < 0.05$).

female. Like the fat content panel group, over 50% of the participants made more than $50,000 and were college or postcollege graduates. Again, participants identified flavor as being the most important palatability trait when consuming ground beef at 75.3% of participants. Medium well was the most (34.9%) preferred degree of doneness in the price panel group, followed by a medium degree of doneness preference by 30.3% of participants. Furthermore, similar to the fat content panel, 50% of participants consumed ground beef 1 to 3 times per week.

Consumers were asked to rate the importance of 18 different traits as they are purchasing ground beef at retail (Table 2). "Color" was similar ($P > 0.05$) in importance to "fat content," "animal welfare," "appearance – lean to fat ratio," and "price" for consumers in the price panels but was rated as more ($P < 0.05$) important than the rest of the traits evaluated. "Price" was rated by consumers in the price panels as similar ($P > 0.05$) in importance to "fat content," "animal welfare," "appearance – lean to fat ratio," "color," "locally raised," "nutrient content," and "animal fed a grain-based diet." Also, consumers in the price panels rated "fresh never frozen" and "natural or organic claims" as similar ($P > 0.05$) to "preformed patty" and "animal fed a grass-based diet" but less ($P < 0.05$) important than all other traits.

Consumers in the price panels identified the NONE sample as being the least ($P < 0.05$) juicy when compared with the ultra-high, high, medium, and ultra-low price labeled samples but similar ($P > 0.05$) in juiciness to the low-priced product (Table 3). Additionally, ultra-high, high, medium, and ultra-low

labeled price samples were rated similar ($P > 0.05$) for juiciness. When evaluating flavor, consumers rated the NONE sample lower ($P < 0.05$) for flavor liking when compared with ultra-high and medium-priced samples but similar ($P > 0.05$) to high, low, and ultra-low–priced ground beef. Consumers found no difference ($P > 0.05$) among the treatments for tenderness, texture liking, overall liking, and purchasing intent.

Changes were observed when consumers were informed of the price of the ground beef prior to consuming the samples (Figure 3). Large increases ($P < 0.05$) in tenderness ratings were found for the ultra-high (23.9%), high (17.4%), medium (19.4%), and ultra-low (20.3%) priced samples when the price was conveyed to consumers. Similarly, juiciness ratings also increased ($P < 0.05$) for ultra-high (46.1%), high (44.4%), medium (47.6%), and ultra-low (46.3%) priced samples when the price was known. Additionally, flavor liking ratings increased ($P < 0.05$) by more than 34% for all price labeled samples. Likewise, texture liking also increased ($P < 0.05$) for all priced samples by more than 28% when the price was disclosed to consumers. Ultra-high and medium-priced samples had a larger ($P < 0.05$) increase in overall liking ratings when compared with the low and ultra-low–priced samples; however, the high-priced ground beef had a similar ($P > 0.05$) increase in overall liking ratings when compared with the other 4 treatments. Furthermore, the purchasing intent ratings all increased ($P < 0.05$) by more than 45% when consumers were informed of the price of the ground beef they were consuming.

Table 4. Percentage of ground beef patties considered acceptable for tenderness, juiciness, flavor, texture, and overall liking by consumers ($N = 315$; 105/panel group) when given additional information about the fat content, price, or primal source

Treatment	Tenderness acceptability	Juiciness acceptability	Flavor acceptability	Texture acceptability	Overall acceptability
Fat content panel[1]					
90% lean/10% fat	91.6[ab]	79.8[c]	82.7	89.1	83.8
80% lean/20% fat	96.3[a]	94.2[a]	90.3	93.7	93.4
73% lean/27% fat	91.6[ab]	91.4[ab]	88.5	89.1	85.7
Lean	88.7[abc]	86.5[abc]	81.7	84.4	83.8
Extra lean	80.1[c]	81.7[bc]	83.7	85.3	79.0
NONE[2]	87.8[bc]	92.3[a]	84.6	83.5	84.8
SE[3]	4.0	3.9	3.7	4.0	4.0
P **value**	0.02	0.01	0.46	0.23	0.15
Price panel[4]					
Ultra-high	95.9	96.5[a]	92.8[ab]	88.1	92.9[ab]
High	94.2	95.8[ab]	84.4[bc]	89.0	92.0[ab]
Medium	95.9	97.2[a]	93.7[a]	92.8	93.8[a]
Low	90.7	89.3[bc]	81.5[c]	88.1	84.5[bc]
Ultra-low	96.7	95.8[ab]	81.5[c]	90.0	88.3[abc]
NONE[2]	88.9	86.7[c]	77.7[c]	85.3	80.7[c]
SE[3]	3.5	4.2	4.5	3.7	4.3
P **value**	0.11	< 0.01	< 0.01	0.67	0.03
Primal panel[5]					
Ground chuck	92.8	95.2	89.2	93.5	90.1
Ground round	93.6	94.3	88.3	90.7	91.6
Ground sirloin	95.3	96.2	91.1	88.8	92.5
Store ground	92.8	93.3	84.6	88.8	90.7
NONE[2]	91.9	89.5	81.8	85.9	87.1
SE[3]	2.9	3.0	4.1	3.5	3.7
P **value**	0.87	0.35	0.28	0.50	0.71

[abc]Least squares means within the same panel type of the same column lacking a common superscript differ ($P < 0.05$).

[1]Additional information given about the fat and/or lean content of the sample provided to the consumer prior to sample evaluation.

[2]NONE: no information was provided.

[3]Standard error (largest) of the least squares means.

[4]Additional information given about the price of the sample provided to the consumer prior to sample evaluation. Prices: Ultra-High: $13.78/kg; High: $11.02/kg; Medium: $8.27/kg; Low: $5.51/kg; Ultra-Low: $2.75/kg.

[5]Additional information given about the primal source of the sample provided to consumers prior to sample evaluation.

When evaluating juiciness, there was a higher ($P < 0.05$) percentage of samples rated as acceptable for the ultra-high and medium-priced samples in comparison with low priced and NONE (Table 4). Moreover, there was a higher ($P < 0.05$) percentage of medium-priced samples rated as acceptable for flavor in comparison with the high, low, and ultra-low–priced samples and NONE but was similar ($P > 0.05$) to the percentage of samples rated as acceptable for the ultra-high–priced samples. Additionally, medium-priced ground beef had a higher ($P < 0.05$) percentage of samples rated as acceptable overall when compared with low priced and NONE but was similar ($P > 0.05$) to the percentage of samples rated as acceptable overall for ultra-high,

high, and ultra-low–priced samples. For tenderness and texture, there was no difference ($P > 0.05$) in the percentage of samples rated as acceptable among the treatments.

Informing consumers of the price of the ground beef they were consuming resulted in changes in the percentage of samples rated as acceptable (Figure 4). There was a greater ($P < 0.05$) increase in the percentage of samples rated as acceptable for juiciness when priced in the ultra-high, high, medium, and ultra-low prices in comparison with the low-priced samples. Moreover, there was a greater ($P < 0.05$) increase in the percentage of samples rated as acceptable for flavor when priced at the medium price in comparison with high, low, and
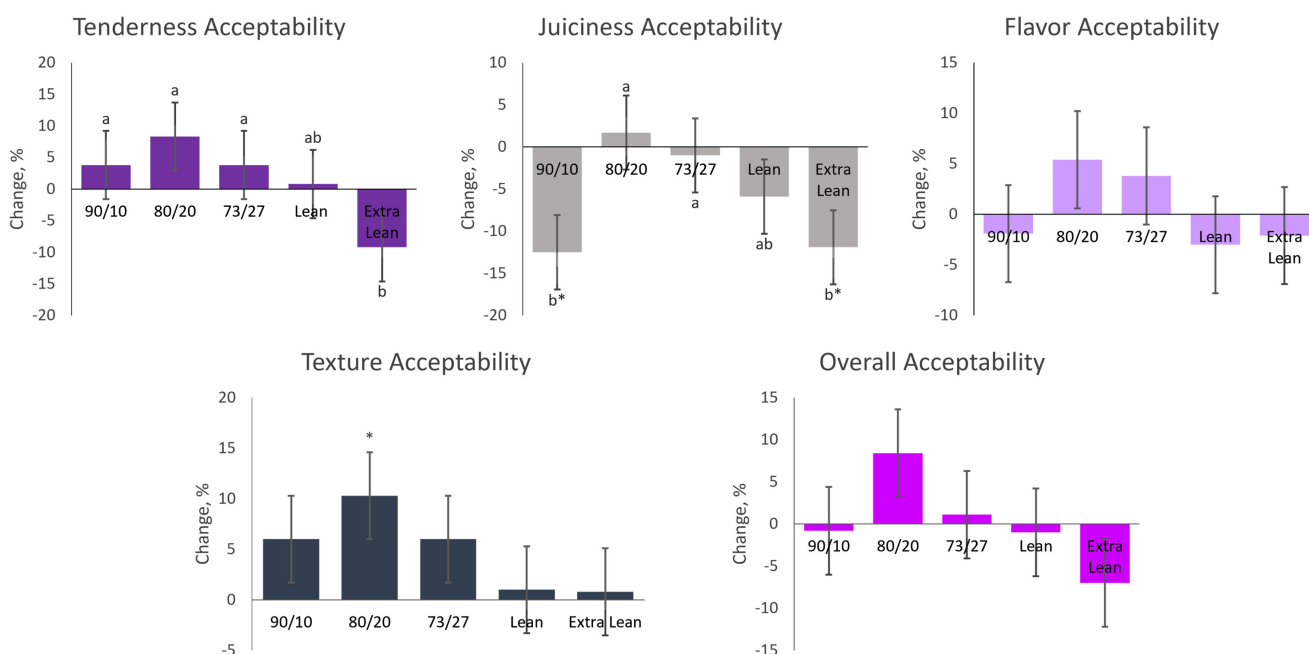
Figure 2. Change in the percentage of samples rated as acceptable by consumers due to lean content disclosure prior to sample evaluation. Fat content presented as percentage lean/percentage fat. [ab]Least square means within the same trait lacking a common superscript differ ($P < 0.05$). *Mean differs from zero ($P < 0.05$).
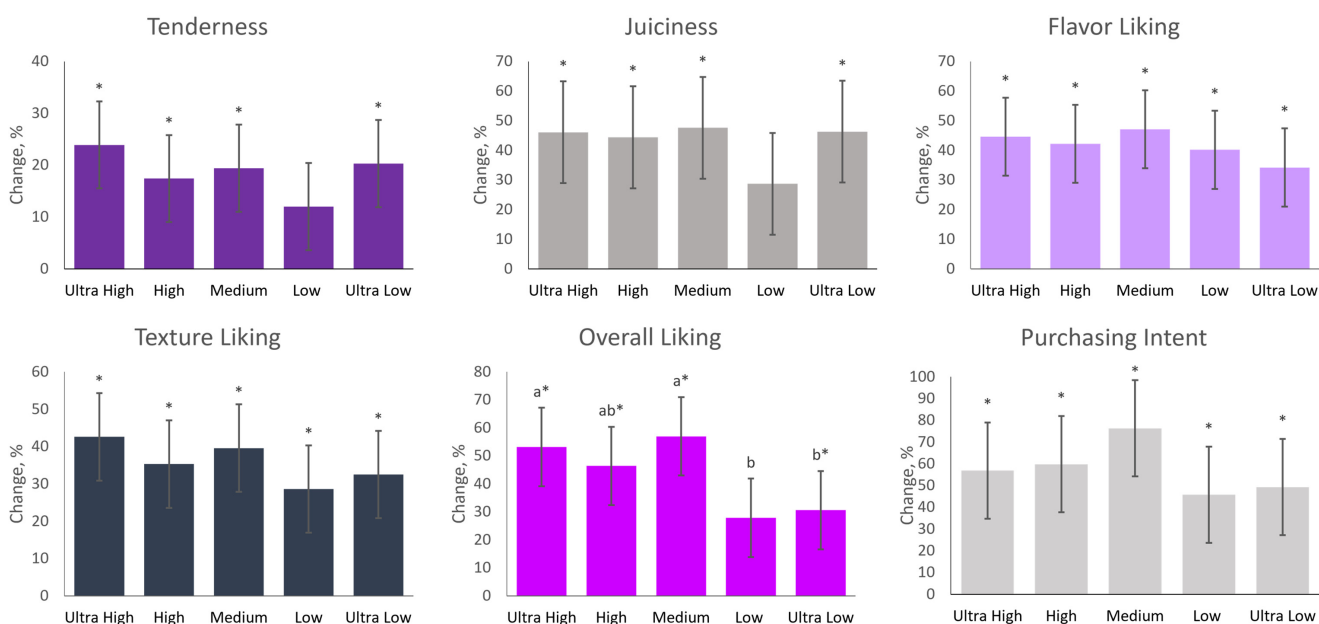

Figure 3. Change in sensory scores due to price being disclosed prior to sample evaluation. Prices: Ultra-High: \$13.78/kg; High: \$11.02/kg; Medium: \$8.27/kg; Low: \$5.51/kg; Ultra Low: \$2.75/kg. [ab]Least square means within the same trait lacking a common superscript differ ($P < 0.05$). *Mean differs from zero ($P < 0.05$).

ultra-low–priced samples but was similar ($P > 0.05$) to the change of the ultra-high–priced samples. There was a large ($P < 0.05$) increase in the percentage of samples rated as acceptable for the ultra-high (12.4%), high (11.1%), and medium (13.3%) priced samples when the price was given to consumers prior to sample evaluation. Providing the price to consumers did not ($P > 0.05$)

change the percentage of samples rated as acceptable for tenderness and texture for any of the price points.

Primal source panels

There was a higher percentage (60.6%) of male participants in the primal panel than the fat and price
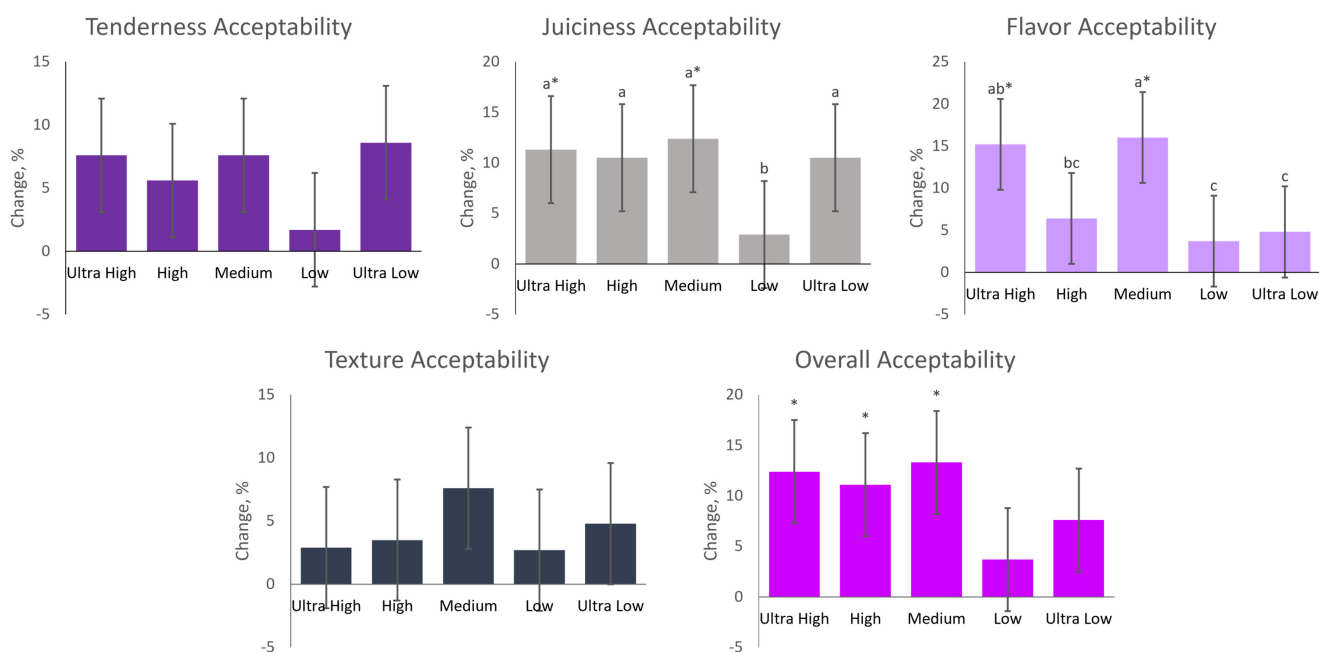
Figure 4. Change in the percentage of samples rated as acceptable by consumers due to price being disclosed prior to sample evaluation. Prices: Ultra-High: $13.78/kg; High: $11.02/kg; Medium: $8.27/kg; Low: $5.51/kg; Ultra Low: $2.75/kg. [abc]Least square means within the same trait lacking a common superscript differ ($P < 0.05$). *Mean differs from zero ($P < 0.05$).

panels (Table 1). Similar to the fat and price panels, participants in the primal panel were again married (66.4%) and from a 2-person household (39.1%) but different in ethnicity makeup from the fat and price panels because 15.2% of the participants were Hispanic and 78.1% were Caucasian. Once again, income was fairly evenly distributed over all the participants, with over 50% of the participants in the primal panel making more than $50,000. Likewise, over 50% of participants were college or postcollege graduates. Consumers again identified flavor as the most important palatability trait when consuming ground beef at 63.5% of participants, followed by juiciness at 16.3%. Well done was the most (32.4%) preferred degree of doneness in the primal panels. Finally, similar to the fat and price panels, more than 50% of the participants consumed ground beef 1 to 3 times per week.

"Fat content" and "price" were rated similar ($P > 0.05$) in importance to "appearance – lean to fat ratio" and "color" by consumers in the primal panels when purchasing ground beef but more ($P < 0.05$) important than all other traits evaluated (Table 2). Additionally, consumers in the primal panel rated "primal source" as similar ($P > 0.05$) in importance to "animal fed a grain-based diet," "size, weight, and thickness," "nutrient content," "locally raised," and "animal welfare." "Preformed patty" and "natural or organic claims" were rated similar ($P > 0.05$) to "packaging type," "brand of product," "animal not administered

antibiotics," and "animal fed a grass-based diet" but less ($P < 0.05$) important than all other traits evaluated.

Of the 3 groups of information looked at in this study, primal blend type labeling had the largest impact on the palatability traits evaluated. Consumers rated ground chuck and ground sirloin–labeled samples higher ($P < 0.05$) for juiciness than ground round–labeled and NONE samples but similar ($P > 0.05$) to store ground–labeled ground beef. Likewise, ground chuck and ground sirloin–labeled samples were rated as more ($P < 0.05$) tender than NONE by consumers but were rated similar ($P > 0.05$) to ground round and store ground–labeled samples. Conversely, ground sirloin–labeled ground beef was rated higher ($P < 0.05$) for flavor liking when compared with ground round–labeled and NONE samples but was similar ($P > 0.05$) to ground chuck and store ground–labeled ground beef. Ground chuck–labeled product was rated higher ($P < 0.05$) for texture liking when compared with labeled samples of ground round, store ground, and NONE. For overall liking, NONE was rated lower ($P < 0.05$) overall than ground chuck, ground sirloin, and store ground–labeled products, with ground round–labeled samples similar ($P > 0.05$) to all other treatments. When asked about their likelihood to purchase the products, consumers were more ($P < 0.05$) likely to purchase ground chuck–labeled products in comparison with those labeled as ground round, store ground, and NONE.
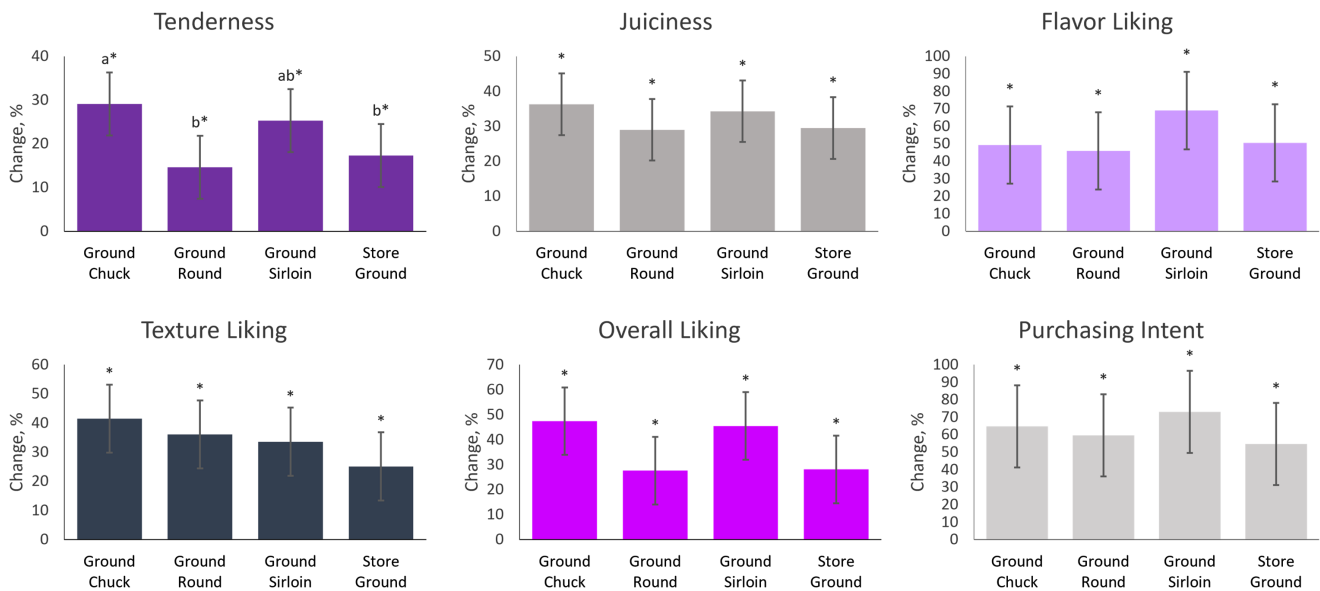
Figure 5. Change in sensory scores due to primal source being disclosed prior to sample evaluation. [ab]Least square means within the same trait lacking a common superscript differ ($P < 0.05$). *Mean differs from zero ($P < 0.05$).

Ground chuck labeling had a greater ($P < 0.05$) increase in consumers' tenderness scores in comparison with ground round and store ground–labeled samples (Figure 5). Moreover, large increases ($P < 0.05$) in juiciness ratings were observed for ground chuck (36.3%), ground round (29.0%), ground sirloin (34.3%), and store ground (29.5%) labeled products when primal blend was conveyed. Likewise, flavor liking ratings increased ($P < 0.05$) by more than 45% and texture liking ratings increased ($P < 0.05$) by more than 25% when information was provided for all 4 primal treatments. Additionally, overall liking ratings increased ($P < 0.05$) for ground chuck (47.4%), ground round (27.6%), ground sirloin (45.5%), and store ground (28.1%) labeled samples because of treatment disclosure. Furthermore, consumers' purchasing intent increased ($P < 0.05$) by more than 50% for all 4 treatments when they were told the primal source prior to sample evaluation.

No differences ($P > 0.05$) were found among the 4 different primal source grinds and NONE for the percentage of samples rated as acceptable for tenderness, juiciness, flavor, texture, and overall (Table 4). Over 80% of the samples for all 5 treatments were rated as acceptable for all the traits evaluated. Providing information about the primal source increased ($P < 0.05$) the percentage of samples rated as acceptable for juiciness for ground chuck and sirloin-labeled samples (Figure 6). Additionally, providing consumers with information about the primal blend did not ($P > 0.05$) increase the percentage of samples rated as acceptable for

tenderness, flavor, texture, and overall liking for the 4 primal blend labels.

Shear force and texture profile analysis

A sample from each chub was utilized for shear force and TPA analysis. The average mean plus or minus the standard deviation for shear force was 2.68 ± 0.21 kg across the 30 chubs of ground beef utilized. Moreover, TPA results (mean $\pm$ standard deviation) were as follows: hardness: 12.56 ± 1.68; cohesiveness: 0.39 ± 0.01; gumminess: 4.97 ± 0.75; springiness: 71.68 ± 2.38; and chewiness: 3.61 ± 0.63.

Discussion

Demographic profile of consumers

The demographic profile of the consumers used in the current study, overall, was more educated, earned a higher income, and represented a greater percentage of Caucasian consumers than the overall US population (US Census Bureau, 2020). However, these demographics related to ethnicity and education level were representative of the Kansas and Ohio communities in which these consumers were recruited (US Census Bureau, 2020). Though comparing consumers of differing demographic backgrounds was not within the objectives of the current study, previous authors who have evaluated the impact of a diversity of
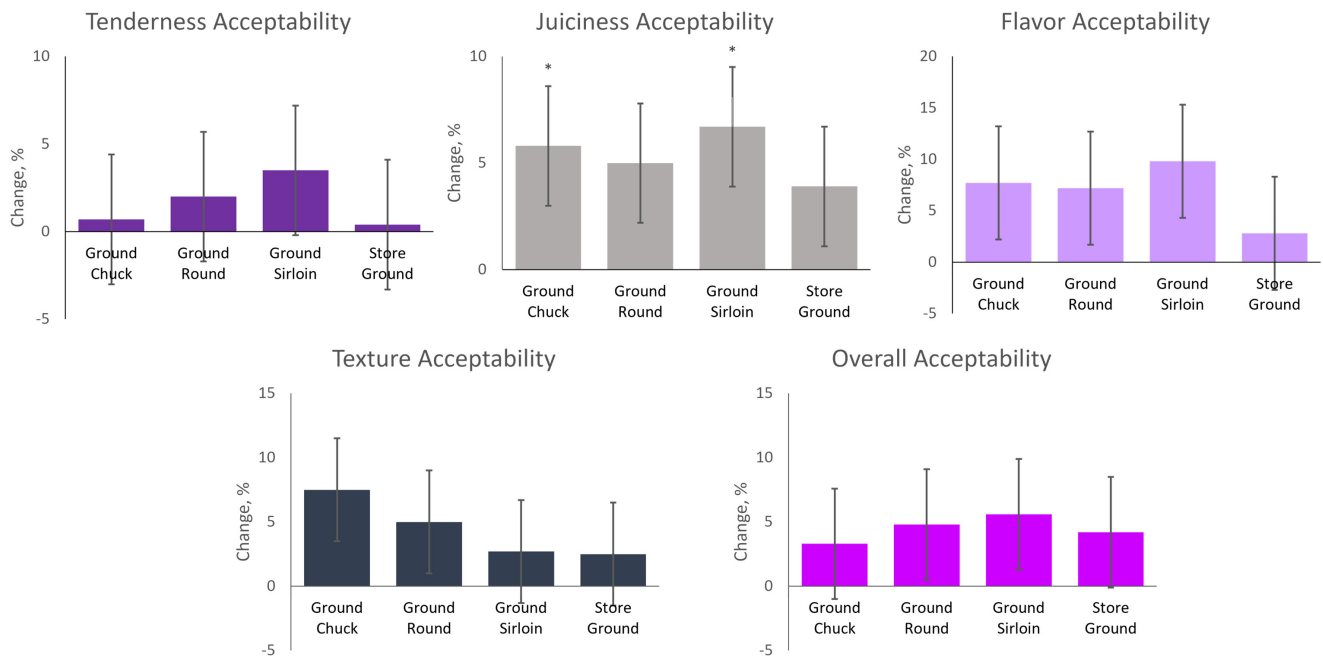
Figure 6. Change in the percentage of samples rated as acceptable by consumers due to primal source being disclosed prior to sample evaluation. *Mean differs from zero ($P < 0.05$).

demographic backgrounds and geographical locations on beef eating quality have demonstrated only minimal impacts (Miller et al., 2001; Mehaffey et al., 2009), providing evidence that the results from the current study would likely not be impacted by any such variations.

Fat content

The modern consumer places a great deal of emphasis on the type and amount of fat they consume. Previous work has indicated consumers are more concerned with the total amount of fat contained within the ground beef than they are with the price or package size (Lusk and Parker, 2009). Within the same consumer survey, consumers indicated they were willing to pay a premium for the 90/10 product over the 80/20 product (Lusk and Parker, 2009). Similarly, in the current study, fat content was identified as one of the most important factors considered when consumers purchase ground beef. Research with other food products on cheese and yogurt of various fat percentages found consumers to be less accepting of those with a lower fat percentage than those with a higher fat percentage when the fat content was disclosed prior to evaluation (Westcombe and Wardle, 1997). Conversely, when evaluating packages of ground beef of various fat percentages, Pohlman (2017) found consumers to prefer ground beef labeled as 20% fat or unlabeled. However, it is noteworthy that the Pohlman (2017) study

consisted of a population of primarily younger consumers and was limited in sample size, and thus their results should be interpreted accordingly.

The impact of fat content on the palatability of ground beef has been extensively studied. Numerous authors have reported in studies involving trained sensory panels that increased fat content results in increased juiciness ratings (Kregel et al., 1986; Troutt et al., 1992; Wong and Maga, 1995; Garzon et al., 2003). However, in the few studies involving consumers consuming ground beef of various fat percentages, differing results for juiciness have been found. As ground beef increased from 10% to 30% fat content, no differences were found by Pohlman (2017) or Davis et al. (2021). However, Wilfong et al. (2016a) found consumers to rate higher fat (73/27 and 80/20) ground beef as more juicy than 90/10 ground beef in the blind portion of their study. Yet when the same consumers were informed of the fat content, their ratings changed for juiciness, with ground beef labeled as 90/10 and 90/10 Certified Angus Beef Ground Sirloin resulting in large increases in the consumer ratings for juiciness (Wilfong et al., 2016a). Consumers in the present study found differences in the juiciness of the treatments labeled with higher fat contents having an increased perception of juiciness, despite there being no differences in the actual product. At retail, consumers are aware of the increased fat content of ground beef because it is a labeled attribute of ground beef and, therefore, may have the perception that the added fat

in the ground beef could contribute to the product being juicier. It is proposed that consumers have an anecdotal sense of what is known in the meat science literature as the "lubrication theory." The lubrication theory states that intramuscular fat present around the muscle fiber of steaks and whole muscle cuts creates a juicer product throughout mastication (Smith and Carpenter, 1974). Current results would indicate that consumers also believe this phenomenon occurs in ground beef, with ground beef of higher fat percentages being associated with juicier eating experiences.

In the current study, there was a difference in the percentage of samples rated as acceptable, with extra lean–labeled ground beef having the lowest percentage of samples rated as acceptable. Davis et al. (2021) found a higher percentage of 90/10 samples rated as acceptable for tenderness than 80/20 ground beef. Alternatively, when Wilfong et al. (2016a) informed consumers of the fat content on commodity product without the Certified Angus beef label, consumers found a similar percentage of samples as acceptable for tenderness for both 90/10 and 80/20 ground beef. However, numerous trained sensory panels have concluded that fat content and tenderness are linearly related (Kregel et al., 1986; Berry, 1994; Wong and Maga, 1995; Garzon et al., 2003). Again, current data indicate that consumers have a bias toward the tenderness commonly associated with higher fat ground beef.

In the present study, 2 samples were labeled as lean and extra lean while also having a sample labeled as 90/10. For ground beef to be labeled as lean, it must contain less than 10 g of fat and less than 4.5 g of saturated fat per 100 g (AskUSDA, 2019). To be labeled as extra lean, ground beef must contain less than 5 g of total fat and less than 2 g of saturated fat (AskUSDA, 2019). Conversely, it is presumed that product labeled as 90/10 has approximately 10 g of total fat contained within a 100-g sample. Despite there being minimal differences nutritionally between the lean and 90/10 labeled sample, consumers were more favorable in their ratings for samples of 90/10 than lean-labeled samples. Furthermore, labeling ground beef as lean and extra lean decreased the percentage of samples rated as acceptable. Although some consumers are more receptive of lower-fat products based on their needs, labeling ground beef in the present study as lean or extra lean was not as favorable as simply stating the lean and fat content. This may be a reflection of the consumers' knowledge level related to these labeling terms in comparison with their understanding of the fat levels they are most familiar with at retail.

Price impact

At the time of purchasing, consumers are many times faced with the challenge of selecting a product with a similar label but priced at varying price points. To no surprise, Valenzi and Andrews (1971) established that a synergistic relationship between the taste quality of a food product and the price of the product existed. Dodds et al. (1991) found that if price is the only available cue at the time of purchase, the quality perception found by the consumer will be solely related to the price of the product. Price along with brand packaging strongly affect the eating experience consumers have as they are consuming food products (Méndez et al., 2011). Although the number of unbranded products available to the consumer has greatly decreased in the last decade (Kelly, 2016), the price of the unbranded products is sometimes the only cue available to the consumer. Previous studies have indicated price as the most important trait considered by consumers purchasing steaks and ground beef at retail (Lucherk et al., 2016; Wilfong et al., 2016a; Vierck et al., 2018; Olson et al., 2019; Prill et al., 2019; Vierck et al., 2021). Consistent with those studies, consumers in the current study also identified price as being an important trait when purchasing ground beef. However, it is unknown if those consumers who identified price as the most important trait prefer higher or lower prices. In the current study, a range of prices based around the average market price were used to try to capture if consumers preferred higher or lower-priced items.

Labeling ground beef at the 3 higher price points resulted in significant increases for both consumer ratings for juiciness and flavor as well as an increased percentage of samples rated acceptable for tenderness, juiciness, and overall liking. It was hypothesized that there would be an advantage for the highest and lowest price categories, but consumers indicated a preference for the 3 higher price points over the 2 lower price points. Jo and Lusk (2018) report that if consumers see a higher-priced food product, they more commonly associate that product as being healthier for them. Consumers in the current study could have potentially been swayed by the fact that the higher-priced options had a greater benefit attached to them than the lower-priced samples. Furthermore, Wachenheim et al. (2000) found consumers of higher socioeconomic status to be generally willing to pay a premium price for beef. In the present study, over 40% of the consumers made more than $75,000, which could make them more likely to be willing to pay for the higher-priced product and thus perceive a palatability benefit.

One of the observations made in this study was the impact of the low versus ultra-low–priced samples. Consumer ratings for the ultra-low–priced samples changed more than the low-priced samples. In turn, it is hypothesized that consumers recognized that the discount at the ultra-low price was significant enough to change consumers' perception of the product, but at the low price, not enough of a discount is recognized as value by the consumer. On the other hand, Woodside and Davenport (1976) observed that when pricing cleaning kits at a range of prices, consumers were more reluctant to purchase products at a very reduced price than at a slightly discounted price. Alternatively, Andreyeva et al. (2010) reported that consumers who are experiencing economic hardship are more likely to purchase the lowest cost item available in order to simply put food on the table. However, given the timeframe and geographic location of the current study and the economic status reported by consumers, it is unlikely that consumers in the present study were experiencing economic hardships.

Primal source

In today's meat case, primal source–identified ground beef represents close to 20% of the product that is marketed (Beef Checkoff, 2019). Adding a primal source label is meant to allow for a level of product differentiation in the meat case (Beef Checkoff, 2019). Moreover, adding a primal-specific source also adds a level of complexity to the ground beef, especially when layered with other package and ground beef attributes (Savell and Gehring, 2020). To be labeled with a primal source, ground beef must be derived all or in part from the primal source to be used with the exception of adding up to 6% shank meat for those being labeled as from the chuck or round (USDA, 2005). Furthermore, Ward et al. (2008) reported ground chuck to be purchased more frequently and at a higher price than commodity ground beef in an analysis of supermarket scanner data, indicating a level of consumer demand and use of these products. Of the 3 sources of information evaluated, adding the primal source blend had the greatest effect on consumer ratings in the current study. Despite consumers finding these differences, primal source was considered intermediate in terms of importance as consumers are purchasing ground beef. However, consumers clearly indicated a preference for labeling the ground beef with a primal source.

Much of the research in the past 10 y evaluating ground beef has been centered around primal-specific blends (McHenry, 2013; Blackmon et al., 2015; Kerth et al., 2015; Beavers, 2017). However, conflicting results have been reported within these studies. When utilizing consumers, Beavers (2017) found consumers prefer the flavor of ground round, ground sirloin, and commodity ground beef over the flavor of ground chuck, along with preferring the texture of commodity ground beef. Additionally, consumers in this study did not have a preference overall for the various blends and fat contents that were evaluated (Beavers, 2017). Conversely, a similar study utilizing consumers was reported by Kerth et al. (2015), who found consumers to have no preference in the primal source of fat trimmings utilized in various ground beef blends. Yet, trained sensory panels have noted differences in blends from various primal sources including the brisket, chuck, plate, and round (McHenry, 2013; Blackmon et al., 2015; Kerth et al., 2015). Despite there being unclear advantages from any of the primal sources from a palatability standpoint, there has been a large push from both the retail and foodservice sector to develop and market a large array of primal blends. The present study demonstrated that despite there being few differences in the product quality, consumers showed a clear preference for the primal source blends in many of the traits evaluated. It is proposed that consumers are naturally drawn to the concept of their ground beef coming from a single source because it appeals to a more natural and higher quality product, as outlined by Fenger et al. (2015).

Conclusions

Ultimately, the labeling and marketing of a commodity product such as ground beef allows for product differentiation in the marketplace. Labeling the fat content and primal source does influence the consumer's palatability experience, with the primal source label attaching a perceived level of quality. Furthermore, the price found on the product does impact the consumer's eating experience, with higher prices cueing the consumer to believe it has added taste benefits. Current results indicate that all the cues used in marketing beef products at retail play a role in consumers' perception of palatability. Those who are marketing and labeling beef products need to be mindful of the impact that prices, fat content, and primal source have on the consumer's eating experience.

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