



How the perception of quality for beef evaluated by the buyer at the time of purchase: Study in three Brazilian cities of different sizes – Curitiba, Campo Mourão and Palotina

Vinicius Cunha Barcellos^{1,2}, Camila Mottin³, Rodolpho Martin do Prado^{3*} , Tiago Schenkel⁴, Cibeli Viana⁵, Ana Carolina Pelaes Vital², Luciano dos Santos Bersot², Carlos Sañudo⁶ and Ivanor Nunes do Prado³

¹Programa de Pós-Graduação em Ciências de Alimentos, Universidade Estadual de Maringá, Maringá, Paraná, Brasil. ²Departamento de Ciências Veterinárias, Universidade Federal do Paraná, Palotina, Paraná, Brasil. ³Departamento de Zootecnia, Universidade Estadual de Maringá, Av. Colombo, 5790, 87020-900, Maringá, Paraná, Brasil. ⁴Programa de Pós-Graduação em Higiene e Inspeção de Produtos de Origem Animal, Universidade Castelo Branco, Rio de Janeiro, Rio de Janeiro, Brasil. ⁵Programa de Pós-Graduação em Medicina Veterinária, Universidade Federal de Viçosa, Viçosa, Minas Gerais, Brasil. ⁶Departamento de Produção Animal e Ciência dos Alimentos, Instituto Agroalimentar de Aragoa, Universidade de Saragoza, Saragoza, Espanha.
*Author for correspondence. E-mail: rodolphoprado@hotmail.com

ABSTRACT. In order to evaluate how beef buyers in the State of Paraná, Brazil south value meat quality indicators, and attributes of credibility, 519 interviews were conducted in three cities with different sizes (Big – Curitiba, Medium – Campo Mourão and Small – Palotina). The interviews were applied after the meat was placed in the shopping cart and were composed of five questions, including question of spontaneous response: (i) factors that the buyer considers at the purchasing time; (ii) information which the buyer considers important to appear on the meat label; and three questions of stimulated response: (i) preference for meat preparation and exposure for sale, (ii) factors that the buyer considers when purchasing the meat, and (iii) preference for marbling (by photograph) according to the beef preparation. The results showed that beef buyers are more concerned with extrinsic meat quality indicators than the intrinsic ones, especially the meat presentation and hygiene of the sale point; have little knowledge about the factors that positively influence the eating experience of beef and do not care about attributes of credibility, except for the meat expiration date. Beef buyers from medium (Campo Mourão) and small (Palotina) cities have a similar behavior, and differ from the buyers of a big (Curitiba) city among the attributes surveyed, in relation to the greater appreciation of inspection, tenderness and marbling, and less importance given to the expiration date. Beef buyers prefer meat cut by the butcher; however, this preference is higher in the small city.

Keywords: animal production; beef cattle; Brazil; meat quality; price.

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Introduction

Brazil is the second largest beef producer in the world, with an estimated production of 9,500 million tons of carcass equivalent in 2017 (Food and Agricultural Policy Research Institute [FAPRI], 2017), in which 7,740 million will be consumed by the domestic market, corresponding to a per capita consumption of approximately 40 kg/habitant/year, one of the largest in the world (FAPRI, 2017). Despite this large domestic market, beef traded in Brazil presents few variations of cuts and presentation, either to differentiate it and add value, or to increase its practicality, which could diversify its market (Taylor, Van de Ven, & Hopkins, 2014).

In order to produce more beef by increasing production efficiency (without increasing the area used) and improving its quality, it is important for Brazil to solve the two main obstacles: low demand for beef with quality and the non-remuneration of the producer basis on the quality. These two issues can be solved based on the knowledge of producers and consumers about the different quality attributes of beef (Eiras et al., 2017; Monteschio et al., 2017; Vital et al., 2018).

Usually the beef is delivered to retail after the industry split the half-carcass into three parts: forequarter, side and hindquarter (Prado et al., 2015b). The commercial cuts are done by the retailer, who

can expose it to sale without packaging in the refrigerator, or pack it in appropriate trays. In this case, there is no identification of the supplier industry or the quality attributes of the meat. There is also beef exposed to the consumer who presents brands. Branded meat may come from the industry already packaged in commercial cuts, or be deboned at the retail.

The greater majority of meats marketed in Brazil does not give any indication of its quality. In this way, the consumer has to observe at the moment of purchase the possible quality indicators to make the judgment and decide for the purchase. However, the consumer's lack of knowledge about the different quality attributes of beef (such as odor, flavor, tenderness, and overall acceptability), and how they vary within the same cuts (Eiras et al., 2017; Guerrero et al., 2018; Mottin et al., 2019; Prado et al., 2015a; Vital et al., 2018) present difficulties at the purchase time.

The quality perception process takes place in two phases: (i) based on the meat extrinsic and intrinsic quality characteristics at the purchase point and (ii) after its preparation and consumption, where it is verified if the expectations generated at the time of purchase are confirmed or not (Acebrón & Dopico, 2000; Borgogno, Favotto, Corazzin, Cardello, & Piasentier, 2015; Grunert, 1995, 1997). Oude Ophuis and Van Trijp (1995) have classified the extrinsic and intrinsic quality characteristics and experience and credence quality.

Quality characteristics are those factors from which consumers can make a judgment about the quality attributes present in the food. The interpretation of these indicators forms the quality expected. However, the quality expected is not always confirmed during food consumption (Acebrón & Dopico, 2000; Grunert, 1995; Steenkamp & Van Trijp, 1996). The intrinsic quality characteristics are those that are part of the physical structure of a product and cannot be changed without altering the product physically. In the case of foods, they involve physiological characteristics and define their category/classification (Acebrón & Dopico, 2000; Oude Ophuis & Van Trijp, 1995; Troy & Kerry, 2010). Extrinsic quality characteristics are related to the product, but are not part of their physical nature. They can be manipulated by industry or commerce to increase sales or price, without changes in the product (Grunert, 1995; Oude Ophuis & Van Trijp, 1995; Troy & Kerry, 2010).

In relation to beef, Grunert (1995) classified as intrinsic quality characteristics: origin, breed, sex, texture, age of the animal, color, visible fat and cut; and as extrinsic quality characteristics: price, brand, designation of origin, presentation, point of sale, packaging and advertising. It is also necessary differentiate perceived intrinsic/extrinsic quality cues and non-perceived intrinsic and extrinsic quality cues (Acebrón & Dopico, 2000; Grunert, 1997). This is because some indicators cannot be perceived by the consumer at the time of purchase, unless some additional information is provided (Grunert, 1995; Saeed & Grunert, 2014). Thus, for beef, perceived intrinsic quality cues are: color, freshness and visible fat; and the perceived extrinsic quality cues are: price, point of sale, presentation, designation of origin and promotion of the meat (Acebrón & Dopico, 2000; Bredahl, 2004; Mottin et al., 2019; Troy & Kerry, 2010).

The expected quality is that generated at purchase time, through the evaluation by the buyer of the intrinsic and extrinsic quality cues of a food. The experienced quality is the result of a sensory evaluation during its consumption. It may or may not confirm the expected quality and is related to certain quality cues such as taste, flavor and freshness, for example (Acebrón & Dopico, 2000; Becker, 2000; Grunert, 1995; Oude Ophuis & Van Trijp, 1995; Steenkamp & Van Trijp, 1996). In relation to beef, the main attributes that influence experienced quality are tenderness, flavor and succulence (Acebrón & Dopico, 2000; Saeed & Grunert, 2014; Troy & Kerry, 2010).

Credence attributes also help in forming the perception of a food quality. The attributes of this category have in common the fact that it is not possible for the consumer at any time among the purchase and the consumption to verify if they are really present. These factors have no influence on the food experienced quality. The consumer must believe in the assertion of the manufacturer, supplier or seller that these attributes are really present. Examples of credence attributes are nutritional value, food safety, respect for the environment, respect for animal welfare and appreciation of staff involved in food production (Chatterton, Graves, Audsley, Morris, & Williams, 2015; Oude Ophuis & Van Trijp, 1995; Van Loo, Caputo, Nayga Jr, & Verbeke, 2014; Van Wezemael, Caputo, Nayga Jr, Chryssochoidis, & Verbeke, 2014). To know the beef quality cues and quality attributes valued by the consumer is important for the production chain to focus efforts to meet consumer demand, providing, over time, an opportunity to increase its efficiency.

This study was realized to (i) understand what quality cues and quality attributes of beef were observed by the buyers from Paraná State – Brazil and how they value them at the purchase time; and (ii) verify if there is variation of these results due to the city size (big, medium or small) and the time that purchase was made.

Material and methods

This study was conducted through interviews with beef consumers (buyers) in supermarkets, after the consumers put the product in the shopping cart. The interviews were performed in three cities with different sizes (Big – Curitiba – 1,765 millions of citizens, Paraná, Brazil, Medium – Campo Mourão – 94,150 thousand of citizens Paraná, Brazil and Small – Palotina – 22,900 thousand of citizens, Paraná, Brazil) and at four different times on the week: Monday morning (before lunch), Monday after 6:00 pm (after traditional work time, Saturday morning (before lunch) and Saturday after 2:00 pm (traditional shopping time).

Profile of beef buyers interviewed

Interviews were conducted with 519 beef buyers in the three different cities: Curitiba, Campo Mourão and Palotina; in the Paraná, State, Brazil south. The interviewees were classified into four age groups according to Brazilian demographic pyramid: (i) <24 years, (ii) between 25 and 40 years, (iii) between 41 and 55 years, and (iv) >55 years. Sample population used in the present study is from three different cities (Table 1).

Questionnaire and interview dynamics

The questionnaire elaboration, the interviewees' selection, the confidentiality of the information collected, and the dynamics of the interview followed the guidelines of the ICC/ESOMAR International Code on Market and Social Research, published by the European Society for Opinion and Marketing Research. The consumers (buyers) were approached only after place the beef in the shopping cart. In this way we tried to ensure that the interviewee really had the habit of buying beef, and also that the interviewee could remember the factors responsible for your purchase decision.

The questionnaire was composed of five questions, which were presented to the interviewee always in the same order (determined to minimize the effect of each question on the following ones). The answers were noted by the interviewer. Before starting the interview, the data such as gender, age, date, time and supermarket were noted.

The research starts with a question of spontaneous response, where no stimulus was presented to the beef buyer. The question was: "What do you consider when buy a beef?" All responses were noted exactly as answered.

The second question verified the consumer preference in relation to beef preparation and exposure for sale. Thus, three responses were offered, where the interviewee could choose the option that corresponded to his preference. The answers were: "Do you prefer to buy beef..."; "...exposed and packed by the market", "...exposed and packed by the industry", and "...cut/separated by the butcher". Usually, consumers find these three options at the same time in the supermarket, being able to choose the most convenient for them.

In the third question ten terms relating to meat quality, safety, sale point and meat presentation were presented. The consumers were asked to assign a score between zero and ten for each term according to their importance at the purchase time. The following terms were presented in random order: "Packaging", "Hygiene of the establishment", "Meat Brand", "Expiration date", "Price", "Meat Inspection", "Tenderness", "Meat toilet", "Presence of marbled fat" and "Label Information".

The scale between zero and ten was chosen because it was the same one used in the Brazilian educational system, and it was easier to understand by the interviewee according to pre-experiment interviews.

Table 1. Profile of interviewees according to age group, gender, and city (519 interviews).

Age groups	Big city, %	Medium city, %	Small city, %	Total, %
	Curitiba	Campo Mourão	Palotina	
< 24 years	12.3	16.2	9.6	13.6
25 – 40 years	47.3	29.7	19.1	30.5
41 – 55 years	30.1	31.9	39.9	33.7
> 55 years	10.3	22.2	31.4	22.2
Gender				
Female	47.3	43.2	48.4	46.3
Male	52.7	56.8	51.6	53.7

The fourth question also requests a spontaneous response, which was intended to check which quality indicators intrinsic/extrinsic of meat not noticeable are considered important at the purchase time. Thus, the question presented was: "What information you consider important to be on the meat label?" Similar to the first question, all terms cited by the interviewee were noted, with no limit to the number of responses.

In the fifth question the beef buyers were presented to a card containing photographs of ten different degrees of marbling according to the North American scale - American Meat Science Association (American Meat Science Association [AMSA], 2012). The interviewee was asked to indicate which photograph corresponded to his preference of marbling for purchase considering three different preparations: "prepare steak", "prepare in the pan " and "prepare for barbecue". The values corresponding to the indicated photograph were recorded, which varied from 1 (less marbling) to 10 (more marbling).

Treatment of cited terms

In the questions one and four spontaneous answers were obtained, and therefore, non-standard, being necessary a specific treatment to them. This procedure had the objective of allowing analysis and comparison with the answers obtained in the other questions.

All the answers obtained in questions 1 and 4 were classified as indicators or attributes of meat quality according to their meaning in accordance to the model "perception of quality for beef" proposed by Acebrón and Dopico (2000). In this way, it was possible to quantify the number of times that reference was made to each indicator, from the original responses. To perform the classification, each term was presented to two specialists in meat quality. If there was no agreement on the term classification, it was presented to a third expert to solve the doubt.

Statistical analysis

The questionnaire responses were analyzed using SPSS software version 21.0. Descriptive statistics procedures were performed to elaborate the interviewees' profile. For answers analysis within the same group of interviewees, variance analysis (ANOVA) was performed. Duncan and T test were used for comparison between means. According to the answers obtained in the third question the interviewees were segmented through hierarchical cluster analysis (HCA) grouped by the Ward Method. Mann-Whitney test was used to compare the scores given among different clusters.

Results

Spontaneous research

Intrinsic quality cues, extrinsic quality cues, experience quality attributes and credence quality attributes in which the terms cited in the spontaneous research could be classified (Table 2). The most present attributes in the forms were meat presentation and color (41.6% and 29.5%, respectively). A fact that attracts attention is that in none of the forms were registered terms referring to meat inspection. However, the consumer can understand what form of presentation and color could mean similar attributes; thus, form of presentation and color would represent 71.1% of the quality attributes of meat.

Table 2. Percentage of forms which citations refers to the different quality cues and quality attributes of beef in spontaneous research.

Quality cues and quality attributes	Forms containing the terms, %
Presentation	41.6
Color	29.5
Price	24.9
Quality	24.3
Safety	16.2
Cut	12.3
Point of sale	10.2
Fat	9.6
Odor	8.1
Brand	3.7
Tenderness	2.7
Nutritional information	0.4
Not classifiable	0.6

The term "quality" appeared in 24.3% of the forms. This term indicates consumer concern at the time of product acquisition; however, does not bring any specific information, and can assume several meanings. For this reason, when cited, the term "quality" was not considered.

The terms cited by consumers, grouped according to their nature in quality indicator or attribute of credibility (Table 3). More than half of the terms cited referred to extrinsic quality indicators, that is, it has no direct relation with the quality in the consumption of beef. These terms referred to presentation, price, cut, point of sale and brand. About a quarter of the terms cited were related to perceived intrinsic quality indicators (color, presence of fat and freshness).

Influence of the city, purchase period, gender and age

The influence of city size, purchase period, gender and age and their interactions on the importance attributed to the terms surveyed and on the purchase preference related to marbling by photograph (Table 4).

In Brazil, beef is traditionally offered to the consumers previous prepackaged or it can be displayed in refrigerated counter, and be cut according to the consumer's preference by the butcher. The meat packaging can be done in the industry or in the commercial establishment.

In relation to the total number of interviewees, 66.0% preferred the meat cut by the butcher, 18.6% preferred the meat packaged by the industry and 15.4% preferred the meat packed by the establishment. However, differences between cities were observed (Table 5).

Table 3. Percentage of forms which citations refers to intrinsic quality cues, extrinsic quality cues, experience quality attributes and credence quality attributes of beef.

Classification	Forms containing the terms, %
Extrinsic quality cues	50.3 ^A
Intrinsic quality cues	25.7 ^B
Credence quality attributes	9.0 ^C
Experience quality attributes	1.5 ^D
"Quality"	13.2
Not classifiable	0.3

Different letters in the column are different (p < 0.05).

Table 4. Influence of city size, purchase period, gender and age and their interactions on the importance attributed to the terms surveyed

Quality attributes	City	Purchase time	Gender	Age	City* Purchase time	City* Gender	City* age	Purchase time* Gender	Purchase time* age	Gender *age	City* Purchase time* Gender	City* Purchase time* age	City* Gender* age	Purchase time* Gender* age	City* Purchase time* Gender* age
Packing	ns	ns	0.014	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Hygiene	ns	ns	0.032	ns	ns	ns	ns	ns	ns	ns	ns	0.047	ns	ns	ns
Inspection	0.034	ns	ns	0.008	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.044
Tenderness	0.038	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Brand	ns	ns	ns	0.013	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Price	ns	0.028	ns	ns	ns	ns	ns	0.025	ns	ns	ns	0.040	ns	ns	ns
Label	ns	0.015	ns	0.018	ns	ns	ns	ns	0.010	ns	ns	ns	ns	ns	ns
Toilet	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.028
Expiration data	0.042	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Marbling	0.011	0.016	0.014	0.002	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Marbling by photo															
Steak	ns	0.033	ns	ns	ns	ns	ns	ns	ns	ns	0.026	ns	ns	ns	ns
Pan	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.018
Barbecue	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.009	ns	ns

Table 5. Preference for beef presentation at the sale point according to the city size.

City size	Packed by the supermarket, %	Packed by the industry, %	Cut by butcher, %
Big	16.4	25.3 ^A	58.3 ^B
Medium	14.6	16.8 ^A	68.6 ^{AB}
Small	17.6	6.9 ^B	75.5 ^A

Different letters in the column are different (p < 0.05).

The average scores by city for the ten terms in the stimulated survey were summarized (Table 6). Differences were found between cities in relation to the importance attributed to four of the presented terms: inspection, tenderness, expiration date and marbling.

Differences between the purchase periods

The purchase period influenced the importance of three items: price, label and marbling. There was also a difference in the marbling preference (for photograph) related to meat buy for steak (Table 7).

Clusters

Based on all interviewees, it was possible to classify them into four different clusters related to how they value the surveyed items (Table 8).

Label information

The Intrinsic cues, Extrinsic cues, Experience quality attributes and credence quality attributes that the interviewees believe to be important to appear on the meat label (Table 9). "Shelf life" was expressed in 72.5% of the questionnaires, followed by the "Brand" (29.8%). Few consumers answered terms referring to sex, age of the animal, breed and management, intrinsic cues that are not perceptible and which could indicate the quality in the beef consumption with more precision.

Table 10 shows the terms cited by interviewees grouped according to their nature, which should be on the beef label, according to the opinion of the meat buyers interviewed.

Table 6. Influence of the city size on the searched attributes.

Quality attributes	Big	Medium	Small	P < Value
Packing	8.03 ^B ±0.17	8.03 ^C ±0.18	8.03 ^D ±0.17	ns.
Hygiene	9.70 ^A ±0.06	9.68 ^A ±0.06	9.71 ^A ±0.05	ns
Inspection	7.93 ^{Bb} ±0.29	8.66 ^{Ba} ±0.18	8.68 ^{Ca} ±0.17	0.034
Tenderness	8.39 ^{Bb} ±0.19	9.00 ^{Ba} ±0.13	8.99 ^{Ca} ±0.12	0.038
Brand	5.83 ^C ±0.28	6.53 ^D ±0.24	6.53 ^E ±0.23	ns
Price	8.02 ^B ±0.19	7.99 ^C ±0.16	8.06 ^D ±0.17	ns
Label	7.90 ^B ±0.23	8.20 ^C ±0.21	7.98 ^D ±0.20	ns
Toilet	9.63 ^A ±0.07	9.63 ^A ±0.07	9.62 ^A ±0.07	ns
Expiration date	9.75 ^{Aa} ±0.09	9.43 ^{Ab} ±0.12	9.39 ^{Bb} ±0.10	0.042
Marbling	5.30 ^{Cb} ±0.32	7.02 ^{Da} ±0.21	6.97 ^{Ea} ±0.20	0.011
Marbling by photograph				
Steak	3.08 ^C ±0.18	2.99 ^C ±0.15	2.93 ^C ±0.15	ns
Pan	4.36 ^B ±0.19	4.34 ^B ±0.17	4.37 ^B ±0.17	ns
Barbecue	4.99 ^A ±0.25	5.07 ^A ±0.21	5.14 ^A ±0.22	ns

Results are expressed as mean ± standard error. Means with different lowercase letters in the same line are different (P < 0.05). Means with uppercase letters in the same column are different (P < 0.05).

Table 7. Influence of the purchase period on the searched attributes.

Quality attributes	Monday morning	Monday afternoon	Saturday morning	Saturday afternoon	P < Value
Packing	8.14±0.18	8.07±0.20	7.84±0.25	8.02±0.20	ns
Hygiene	9.75±0.05	9.78±0.06	9.61±0.09	9.58±0.09	ns
Inspection	8.23±0.25	8.67±0.20	8.43±0.29	8.49±0.25	ns
Tenderness	8.65±0.19	9.04±0.10	8.84±0.21	8.72±0.18	ns
Brand	5.94±0.28	6.43±0.25	6.40±0.30	6.65±0.31	ns
Price	7.69 ^b ±0.19	8.25 ^a ±0.18	8.39 ^a ±0.18	7.76 ^b ±0.24	0.028
Label	8.15 ^a ±0.21	8.21 ^a ±0.23	7.76 ^b ±0.22	7.80 ^b ±0.27	0.015
Toilet	9.74±0.06	9.57±0.08	9.55±0.11	9.64±0.08	ns
Expiration date	9.58±0.08	9.46±0.12	9.57±0.13	9.42±0.15	ns
Marbling	6.15 ^b ±0.28	7.06 ^a ±0.23	6.45 ^b ±0.30	6.25 ^b ±0.32	0.039
Marbling by photograph					
Steak	2.91 ^{a,b} ±0.17	3.17 ^a ±0.18	2.52 ^b ±0.18	3.33 ^a ±0.21	0.033
Pan	4.20±0.19	4.52±0.19	4.15±0.22	4.51±0.22	ns
Barbecue	5.23±0.26	5.06±0.23	4.71±0.27	5.27±0.29	ns

Results are expressed as mean ± standard error. Means with different lowercase letters in the same line are different (P < 0.05).

Table 8. Consumers cluster and their main characteristics

	Scores				P < Value
	Cluster 1 (n = 208)	Cluster 2 (n = 61)	Cluster 3 (n = 170)	Cluster 4 (n = 80)	
Packing	8.44 ^{Da} ±0.12	8.70 ^{Ba} ±0.18	8.65 ^{Ca} ±0.13	5.15 ^{Db} ±0.35	0.000
Hygiene	9.94 ^{Aa} ±0.02	9.79 ^{Aa} ±0.07	9.93 ^{Aa} ±0.02	8.50 ^{Ab} ±0.15	0.000
Inspection	9.27 ^{Ca} ±0.09	3.66 ^{Cc} ±0.51	9.51 ^{Ba} ±0.09	7.80 ^{Bb} ±0.33	0.000
Tenderness	9.17 ^{Ca} ±0.09	6.64 ^{Dc} ±0.44	9.39 ^{Ba} ±0.08	8.39 ^{ABb} ±0.20	0.000
Brand	6.45 ^{Fa} ±0.23	4.79 ^{Fb} ±0.38	7.29 ^{Ea} ±0.19	5.18 ^{Db} ±0.42	0.000
Price	7.74 ^{Eb} ±0.17	7.34 ^{Cb} ±0.34	8.48 ^{Ca} ±0.14	8.03 ^{Bb} ±0.22	0.009
Label	8.63 ^{Da} ±0.15	7.62 ^{Cb} ±0.31	7.88 ^{Db} ±0.25	7.14 ^{Cb} ±0.38	0.000
Toilet	9.79 ^{Aa} ±0.04	9.66 ^{Aa} ±0.08	9.86 ^{Aa} ±0.03	8.68 ^{Ab} ±0.20	0.000
Expiration date	9.49 ^{Ba} ±0.09	9.85 ^{Aa} ±0.06	9.85 ^{Aa} ±0.04	8.56 ^{Ab} ±0.28	0.000
Marbling	6.46 ^{Fab} ±0.23	5.93 ^{Eb} ±0.49	7.24 ^{Ea} ±0.21	5.60 ^{Db} ±0.35	0.001
Marbling by photograph					
Steak	2.96 ^C ±0.14	2.51 ^B ±0.21	3.20 ^C ±0.18	3.03 ^B ±0.23	ns
Pan	4.47 ^B ±0.16	4.21 ^A ±0.32	4.21 ^B ±0.18	4.49 ^A ±0.25	ns
Barbecue	5.25 ^{Aa} ±0.21	4.18 ^{Ab} ±0.34	5.16 ^{Aa} ±0.23	5.11 ^{Aa} ±0.31	0.04
Main characteristics					
	81.7% female	59% male	79.4% male	63.8% female	
	61.1% over 40 years	67.2% up to 40 years	65.6% between 25 and 55 years	62.6% between 25 and 55 years	
	87.5% prefer meat cut by the butcher	50.8% Big city	54.7% prefer prepackaged meat	51.3% bought meat on Saturday	

Results are expressed as mean ± mean standard error. Means with different lowercase letters in the same line are different (P < 0.05). Means with uppercase letters in the same column are different (p < 0.05).

Table 9. Percentage of forms with citations referring to the different intrinsic quality cues, extrinsic quality cues, experience quality attributes and credence quality attributes that should appear on the meat label according to the interviewees.

Quality or attribute indicator	Forms containing the terms, %
Shelf life	72.5 ^A
Brand	29.8 ^B
Price	14.6 ^C
Cut	10.9 ^C
Weight	9.3 ^C
Nutritional information	8.9 ^C
Inspection	7.9 ^{C,D}
Preparation/conservation instructions	3.3 ^D
Quality	2.6 ^D
Hygiene	1.7 ^D
Color	1.3 ^D
Sex/Race	1.3 ^D
Traceability	1.3 ^D
Presentation	1.3 ^D
Age	1.0 ^D
Management	1.0 ^D
Costumer Service	0.7 ^D

Means with different uppercase letters in the same column are different (p < 0.05).

Table 10. Percentage of terms cited referring to Intrinsic quality cues, Extrinsic quality cues, Experience quality attributes and credence quality attributes that should appear on the meat label according to the interviewees.

Classification	Forms containing the terms (%)
Credence quality attributes	54.0 ^a
Extrinsic quality cues	38.5 ^b
Intrinsic quality cues	2.7 ^c
Others	2.4
Not classifiable	2.4

Means with different lowercase letters in the same column are different (p < 0.05).

Discussion

Some studies with beef buyers at the point of sale have been using a sample population that is balanced by gender and age according to the demographic census where the research is carried out (Eiras et al., 2017; Vital et al., 2018). However, it can be observed in this study that the distribution of meat buyers is not uniform at different periods of the week, nor is it balanced by gender or age with the demographic data from Brazil.

During the business hours (Monday before 12 pm) a greater relative number of buyers up to 25 years were observed than at other times. On the other hand, outside business hours, there was an increase in interviewees in the age group between 25 and 55 years. In relation to gender, there was an increase in the presence of men on Saturdays. Probably these changes are related to the families' dynamics, where the shopping activity varies during the week according to the availability of time of each person.

The spontaneous interviews aimed to capture the criteria used by buyers at the level of their conscious. The other questions were elaborated in an attempt to validate the information. In this way, interviewees spontaneously responded that the "Presentation of the product" is the most observed quality indicator. Then, "color", "price", and "security" were mentioned. These results agree with those found by Van Wezemael, Ueland, and Verbeke (2011) and Halme and Kallio (2011). Presentation, color and price can be easily interpreted by buyers, and therefore this result was expected (Grunert, 1995, 1997).

One worrying fact is the lack of importance given by the interviewees to safety, aggravated by the fact that it is practically restricted only to the meat's expiration date. Even this care with the expiration date is relative, since it was present in just over 16% of the interviews; In addition, the vast majority of meat buyers said that they prefer the meat cut by the butcher at the time of purchase, that is, without known the expiration date. Especially in Europe, the concern with meat safety has greatly increased since the late 1990s, with the crisis caused by the bovine spongiform encephalopathy (BSE) outbreak. This fact has certainly increased the population's level of attention to food safety as a whole and to meat in particular (Gellynck, Verbeke, & Vermeire, 2006; Schönfeldt & Hall, 2012).

Comparing the answers obtained in the first spontaneous question with those obtained in the stimulated research (question 3), it can be observed that the item "meat toilet" is among the highest average scores and the item "packaging" appears with an intermediate note. These two factors are part of the "presentation" quality indicator. This fact, reinforced by the preference for the meat cut by the butcher (therefore without packaging) makes believe that the Brazilian really values the meat toilet.

The expiration date of the meat was also among the highest average scores, again with greater importance than the inspection. The biggest discrepancy between spontaneous and stimulated research is in the item "hygiene of the establishment", while in the first question the establishment was little remembered, in stimulated research this item received the highest average grade, showing to be very important. The fact that consumers trust more on the meat served by the butcher than the one packaged by the industry also corroborates with the impression that the trust in the commercial establishment is a very important point for the meat buyer. Probably this difference between the surveys occurred because the interviews developed inside the supermarket, and therefore, this question "trustworthy selling point" is already resolved in the head of the consumer, not being at the level of his conscious. When this question is presented in the stimulated research, it becomes aware of it and assigns a high score, proportional to the relevance of this point.

Previous studies have already pointed out that the price of beef is of relative importance for Brazilian consumers (Eiras et al., 2017; Vital et al., 2018). In general, the price elasticity of beef in Brazil is negative, but close to zero, indicating that increases or reductions in price cause little change in consumption. However, the income elasticity is positive, being higher for the population with the lower income. Thus, when the Brazilian income increases, also increases the meat consumption, being this increase greater in the poorest populations.

Marbling and branding had little importance in both surveys. In fact, the commercialization of branded beef is a very recent novelty in Brazil, and despite its benefits (Bredahl, 2004; Oude Ophuis & Van Trijp, 1995) the consumer has not yet realized its advantages over the beef sold in bulk. In relation to marbling, the preference for lean meats was reinforced by the answers obtained in question 5, where, for none of the three suggested ways of preparation, the consumer said he preferred meat with a high degree of marbling.

The interviewees cited much more terms related to extrinsic quality indicators than intrinsic to beef. This is not an encouraging fact for the production chain, since these factors (price, presentation, point of sale, brand) are manipulated by the industry or trade without the need to change the quality of the product (Acebrón & Dopico, 2000; Becker, 2000; Borgogno et al., 2015; Grunert, 2006). Also in the labeling research this fact was repeated; however, in a more worrying way. As expected, credibility attributes were the most cited because the label is where they are normally present (Oude Ophuis & Van Trijp, 1995; Van Loo et al., 2014). The intrinsic quality indicators corresponded to a very small percentage of the terms cited. This fact

demonstrates the little knowledge of buyers about the product because it is exactly on the label where the perceived intrinsic quality indicators – those that have the greatest influence on the quality of meat consumption – can be informed to the consumer (Gellynck et al., 2006). The fact that $\frac{3}{4}$ of the interviewees cited at most two important factors for the meat purchase and few cared about sex, age, breed and animal management, reinforce the idea that for the meat buyer interviewed, buy a meat is almost a lottery activity.

The four clusters obtained in this study have some distinct characteristics. In relation to Cluster, the largest group, the meat buyers considered hygiene and toilet the most important factors, while price, marbling and brand were considered the least important. The majority of this cluster were female (81.7%) and 87.5% preferred the meat cut by the butcher.

Most of the interviewees corresponding to cluster 2 were under 40 years old (67.2%), and 50.8% were from the big city. For this cluster little importance was given to inspection, marbling and branding.

In Cluster 3 are the buyers who assigned the highest average scores for nine of the ten items surveyed, including higher scores to marbling, price, and brand, differing from the other clusters. In this group, 79.4% are males and 54.7% prefer pre-packaged meat, also differing from most of the interviewees.

Compared to other clusters, the average scores given by Cluster 4 were not the highest in any of the items surveyed, and hygiene, expiration date, tenderness and toilet received the highest scores, being considered more important for these buyers. This Cluster was composed of 63.8% of female buyers and 51.3% made their purchase on Saturday.

The data showed that there is a difference in the importance attributed to meat inspection, tenderness, expiration date and marbling in relation to the city size. Regarding these four parameters, a similar behavior among beef buyers in the middle and small city was observed, deferring from the big city. Thus, in medium and small cities there was a greater appreciation of inspection, tenderness and marbling and less importance was given to the expiration data than in the big city.

The size of the city in which interviews were conducted also has an influence on the preference for presentation for sale. In the big and medium-sized city, preference is given to the meat cut by the butcher in relation to the pre-packaged meat, without distinction between that which has been packaged by the industry or by the market. In the small city there is also a preference for the meat cut by the butcher, however there is also a preference for the meat packaged by the market than the meat packed by the industry.

In relation to responses of spontaneous research the data show that the expiration date appeared in about 16% of the forms, however, in stimulated research it was one of the most valued items. The meat cut by the butcher at the time of purchase has no information about the expiration date. In addition, acquiring the meat cut by the butcher means to face queues, making the process less practical than simply choosing the product already cut and exposed in the refrigerator counter. Thus the greater preference of the interviewees for the meat cut by the butcher suggests that the buyer can have great confidence in the honesty/capacity of this professional. Moreover, as the results demonstrate the lack of knowledge of beef buyers about the quality cues that influence experienced quality, relying on the information provided by the butcher may be the way buyers have found to solve the issue related to the quality of purchased meat.

Differences were found in how interviewees (meat buyers) valued price, marbling and label at different purchase time. The price was most important for buyers interviewed on Monday afternoon and Saturday morning, label for interviewees at both Monday times, and marbling for the interviewees on Monday afternoon. These differences may be associated to the variation in consumer age that frequents the supermarket at different purchase times (data not shown). While the frequency of purchasers above 55 years was relatively uniform in all periods evaluated, there was a higher frequency of young people in both periods on Monday than in both periods on Saturday. At the same time, there was a greater presence of buyers of meat of productive age (between 25 and 55 years) on Monday afternoon than in the other three periods surveyed.

In any case, despite the age gives an indication about the differences found, (as a greater concern with the price by buyers in a productive age), it is necessary further investigation to better understand the causes that led to these differences.

Conclusions

Beef buyers interviewed are much more concerned with extrinsic meat quality indicators than the intrinsic ones. Among them the meat presentation and the sale point stood out. The interviewees also

present little knowledge about the factors that positively influence the experience of eating beef (tenderness, juiciness and marbling) and value attributes of credibility, with the exception for expiration data. In this context, the slight importance given to the meat and the lack of knowledge about traceability are of concern.

Beef buyers from medium and small cities have a similar behavior, and differ from the buyers of a big city among the attributes surveyed, in relation to the greater appreciation of inspection, tenderness and marbling, and less importance given to the expiration date. Beef buyers in all cities prefer meat cut by the butcher, even with the least practicality generated by this habit; however, this preference is higher in the small city. Future studies are necessary to better understand the reasons for the differences detected.

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References

- Acebrón, L. B., & Dopico, D. C. (2000). The importance of intrinsic and extrinsic cues to expected and experienced quality: an empirical application for beef. *Food Quality and Preference*, *11*(3), 229-238. doi: 10.1016/S0950-3293(99)00059-2
- American Meat Science Association [AMSA]. (2012). *Meat color measurement guidelines*. Savoy, IL: American Meat Science Association.
- Becker, T. (2000). Consumer perception of fresh meat quality: a framework for analysis. *British Food Journal*, *102*(3), 158-176. doi: 10.1108/00070700010371707
- Borgogno, M., Favotto, S., Corazzin, M., Cardello, A. V., & Piasentier, E. (2015). The role of product familiarity and consumer involvement on liking and perceptions of fresh meat. *Food Quality and Preference*, *44*, 139-147. doi: 10.1016/j.foodqual.2015.04.010
- Bredahl, L. (2004). Cue utilisation and quality perception with regard to branded beef. *Food Quality and Preference*, *15*(1), 65-75. doi: 10.1016/S0950-3293(03)00024-7
- Chatterton, J., Graves, A., Audsley, E., Morris, J., & Williams, A. (2015). Using systems-based life cycle assessment to investigate the environmental and economic impacts and benefits of the livestock sector in the UK. *Journal of Cleaner Production*, *86*, 1-8. doi: 10.1016/j.jclepro.2014.05.103
- Eiras, C. E., Guerrero, A., Valero, M. V., Pardo, J. A., Ornaghi, M. G., Rivaroli, D. C., ... Prado, I. N. (2017). Effects of cottonseed hulls levels in the diet and aging time on visual and sensory meat acceptability from young bulls finished in feedlot. *Animal*, *11*(3), 529-537. doi: 10.1017/S1751731116001749.
- Food and Agricultural Policy Research Institute [FAPRI]. (2017). *Food and Agricultural Policy Research Institute*. Retrieved from <http://www.fapri.iastate.edu/tools/outlook.aspx>.
- Gellynck, X., Verbeke, W., & Vermeire, B. (2006). Pathways to increase consumer trust in meat as a safe and wholesome food. *Meat Science*, *74*(1), 161-171. doi: 10.1016/j.meatsci.2006.04.013
- Grunert, K. G. (1995). Food quality: A means-end perspective. *Food Quality and Preference*, *6*(3), 171-176. doi: 10.1016/0950-3293(95)00011-W
- Grunert, K. G. (1997). What's in a steak? A cross-cultural study on the quality perception of beef. *Food Quality and Preference*, *8*(3), 157-174. doi: 10.1016/S0950-3293(96)00038-9
- Grunert, K. G. (2006). Future trends and consumer lifestyles with regard to meat consumption. *Meat Science*, *74*(1), 149-160. doi: 10.1016/j.meatsci.2006.04.016
- Guerrero, A., Rivaroli, D. C., Sañudo, C., Campo, M. M., Valero, M. V., Jorge, A. M., & Prado, I. N. (2018). Consumer acceptability of beef from two sexes supplemented with essential oil mix. *Animal Production Science*, *58*(9), 1700-1707. doi: 10.1071/AN15306
- Halme, M., & Kallio, M. (2011). Estimation methods for choice-based conjoint analysis of consumer preferences. *European Journal of Operational Research*, *214*(1), 160-167. doi: 10.1016/j.ejor.2011.03.049

- Monteschio, J. O., Souza, K. A., Vital, A. C. P., Guerrero, A., Valero, M. V., Kempinski, E. M. B. C., ... Prado, I. N. (2017). Clove and rosemary essential oils and encapsulated active principles (eugenol, thymol and vanillin blend) on meat quality of feedlot-finished heifers. *Meat Science*, *130*, 50-57. doi: 10.1016/j.meatsci.2017.04.002
- Mottin, C., Eiras, C. E., Maggioni, D., Barcelos, V. C., Ramos, T. R., & Prado, I. N. (2019). Influencing factors of consumer willingness to buy cattle meat: An analysis of survey data from three Brazilian cities. *Acta Scientiarum Animal Sciences*, *41*(43871), 1-10. doi: 10.4025/actascianimsci.v41i1.43871
- Oude Ophuis, P. A. M., & van Trijp, H. C. M. (1995). Perceived quality: A market driven and consumer oriented approach. *Food Quality and Preference*, *6*(3), 177-183. doi: 10.1016/0950-3293(94)00028-T.
- Prado, I. N., Cruz, O. T. B., Valero, M. V., Zawadzki, F., Eiras, C. E., Rivaroli, D. C., ... Visentainer, J. V. (2015a). Effects of glycerin and essential oils (*Anacardium occidentale* and *Ricinus communis*) on the meat quality of crossbred bulls finished in a feedlot. *Animal Production Science*, *55*(12), 2105-2114. doi: 10.1071/AN14661
- Prado, I. N., Passetti, R. A. C., Rivaroli, D. C., Ornaghi, M. G., Souza, K. A., Carvalho, C. B., ... Moletta, J. L. (2015b). Carcass composition and cuts of bulls and steers fed with three concentrate levels in the diets. *Asian-Australasian Journal of Animal Sciences*, *28*(9), 1309-1316. doi: 10.5713/ajas.15.0021
- Saeed, F., & Grunert, K. G. (2014). Expected and experienced quality as predictors of intention to purchase four new processed beef products. *British Food Journal*, *116*(3), 451-471. doi: 10.1108/BFJ-10-2011-0262.
- Schönfeldt, H. C., & Hall, N. G. (2012). Consumer education on the health benefits of red meat — A multidisciplinary approach. *Food Research International*, *47*(2), 152-155. doi: 10.1016/j.foodres.2011.04.035
- Steenkamp, J. B. E. M., & van Trijp, H. C. M. (1996). Quality guidance: A consumer-based approach to food quality improvement using partial least squares. *European Review of Agricultural Economics*, *23*(2), 195-215. doi: 10.1093/erae/23.2.195
- Taylor, J., van de Ven, R., & Hopkins, D. L. (2014). SmartShape™ technology. Modifying the shape of the beef cuberoll and the consumer response to shaped scotch fillet steaks. *Meat Science*, *96*(3), 1125-1132. doi: 10.1016/j.meatsci.2013.10.029
- Troy, D. J., & Kerry, J. P. (2010). Consumer perception and the role of science in the meat industry. *Meat Science*, *86*(1), 214-226. doi: 10.1016/j.meatsci.2010.05.009
- Van Loo, E. J., Caputo, V., Nayga Jr, R. M., & Verbeke, W. (2014). Consumers' valuation of sustainability labels on meat. *Food Policy*, *49*, 137-150. doi: 10.1016/j.foodpol.2014.07.002
- Van Wezemael, L., Caputo, V., Nayga Jr, R. M., Chryssochoidis, G., & Verbeke, W. (2014). European consumer preferences for beef with nutrition and health claims: A multi-country investigation using discrete choice experiments. *Food Policy*, *44*, 167-176. doi: 10.1016/j.foodpol.2013.11.006
- Van Wezemael, L., Ueland, Ø., & Verbeke, W. (2011). European consumer response to packaging technologies for improved beef safety. *Meat Science*, *89*(1), 45-51. doi: 10.1016/j.meatsci.2011.03.019
- Vital, A. C. P., Guerrero, A., Kempinski, E. M. B. C., Monteschio, J. O., Sary, C., Ramos, T. R., ... Prado, I. N. (2018). Consumer profile and acceptability of cooked beef steaks with edible and active coating containing oregano and rosemary essential oils. *Meat Science*, *143*, 153-158. doi: 10.1016/j.meatsci.2018.04.035