ANIMAL PRODUCTION

Influencing factors of consumer willingness to buy cattle meat: An analysis of survey data from three Brazilian cities

Camila Mottin[1*] , Carlos Emanuel Eiras[1], Daniele Maggioni Chefer[2], Vinicius da Cunha Barcelos[3], Tatiane Rogelio Ramos[1] and Ivanor Nunes do Prado[1]

[1]Departamento de Zootecnia, Universidade Estadual de Maringá, 87.020-900, Maringá, Paraná, Brazil. [2]Departamento de Medicina Veterinária, Centro Universitário Integrado, Campo Mourão, Paraná, Brazil. [3]Departamento de Ciência de Alimentos, Universidade Estadual de Maringá, Maringá, Paraná, Brazil. *Author for correspondence. E-mail: camilamottin@hotmail.com

ABSTRACT. Brazil is currently undergoing a process to establish new patterns of consumption habits and the implementation of a new concepts of meat quality. The process emphasizes the quality of information delivered to consumers, which is part of the new approach to meat quality and food safety. The objective of this article is to investigate the attributes considered important when buying beef, knowledge about the production process, labelling, cuts and characteristics of the animals. The study included 276 consumers in three Brazilian cities and their responses were examined in relation to the semi-structured form with fifteen spontaneous and stimulated questions. It was verified that the presentation of the product is regarded as the most important attribute at the time of purchase, they prefer to purchase meat in the butchers, and do not value the labelling of the product, which makes it difficult to identify and offer differentiated products or certificates. The frequency of consumption of beef increases with family income and the vast majority of consumers prefer low marbling meat regardless of the type of preparation. The consumer has little knowledge of more specialized cuts, since the product sold in the butchers has different cuts terminology.

Keywords: beef consumption; buyer preferences; form; meat attributes.

Introduction

A number of food safety issues such as for the sale of overdue products and the addition of prohibited substances, have arisen frequently in Brazilian meat markets. Although the level of quality and safety of Brazilian food is gradually improving, a number of irregularities continue to occur. Recently, a meat scandal in large industries raised doubts about the suitability of Brazilian meat, even though Brazil it is one of the largest meat producers in the world, resulting in significant social repercussions and an extensive confidence crisis on the Brazilian meat regulatory and production systems (Risius & Hamm, 2017). Brazil has the largest commercial herd of cattle in the world with more than 220 million animals and produces approximately 9.71 million tons of carcass weight equivalent per year (Anuário da Pecuária Brasileira [ANUALPEC], 2018). As consequence of the large beef production (despite the higher price of meat compared to chicken and pork), beef consumption increased in recent years, from 30 kg at the end of the last millennium to the current 43.5 kg per capita per year (ANUALPEC, 2018).

Consumers are affected by many external and internal impulses that can modulate their cognitive, emotional and automatic actions (Eiras et al., 2017; Guerrero et al., 2018; Vital et al., 2018). The role of psychological influences on people's behavior has been analyzed and described in the literature, especially in relation to the selection and purchase of different products and services (Font-i-Furnols & Guerrero, 2014). Factors such as psychological (risk, socio-cultural, lifestyle), sensory (visual appearance, in-mouth, texture, flavor and odor) and marketing (price, label, brand and availability) determine the meat purchase (Eiras et al., 2017; Henchion, McCarthy, & Resconi, 2017; Vital et al., 2018). Thus, the meat consumption is determined by many factors, among them: age, personal income, educational level, mobility and consumer habit (Henchion et al., 2017; Hoeksma, Gerritzen, Lokhorst, & Poortvliet, 2017; Risius & Hamm, 2017). In this manner, identifying the factors that determine the decision at the time of purchase helps better understand the consumers, especially at this time of weakening of the sector (Henchion, McCarthy, Resconi, & Troy, 2014).

The role of meat supply chain is to seek consumer confidence and seek to satisfy the needs and desires of consumers, understanding how they perceive, learn and make their decisions. Therefore, understanding the desires of consumers should be the priorities of industry organizations (Risius & Hamm, 2017). Thus, companies should offer attractive products to consumers, both in terms of need and personal satisfaction in obtaining a good, as this improves their self-esteem (Troy, Ojha, Kerry, & Tiwari, 2016). To be able to stay in this highly competitive market, companies need to know the desire and satisfaction of consumers. Big companies should know where, how and when consumers express their will, needs and demands (Troy et al., 2016). In fact, a well-made and effective marketing is essential to know the needs of consumers, providing important subsidies for strategic marketing planning (Siró, Kápolna, Kápolna, & Lugasi, 2008). The importance of knowing the consumer's behavior is necessary to generate some advantages for the companies of the sector, as well as, knowledge of consumers or potential customers. Siró et al. (2008) States that consumer behavior can be related to the individual's reaction to a particular situation or to several factors combined. Human behavior in relation to the acquisition of goods or services is determined by the motivation of the individual in relation to the products and services placed at his disposal (Henchion et al., 2017).

At the time of purchase, the consumer may be motivated by external or internal influences. External influences are determined by the family, by the social class in which the individual is inserted, by the groups that are references to him and by the culture. Internal influences are psychologically related, as they are related to the consumer's motivation for buying, learning, perception, attitudes and personality (Henchion et al., 2017).

This work was carried out to evaluate the beef consumption habits of the inhabitants in the northwest of Paraná and to identify the attributes valued at the time of purchase.

Material and methods

Ethic committee and local

This experiment was approved by Department of Animal Production and Research Ethic Committee at the State University of Maringá and it followed the guiding principles of biomedical research with animal CEP/SD: 732.961 and CAAE: 32433714.7.0000.0092 (Council for International Organizations of Medical Services [CIOMS], 1985), and was carried out in three Brazilian cities.

Consumer and form

The participants of this study were randomly recruited at the Northwest, Paraná State, Brazil South. The selected participants agreed to participate voluntarily only on the criteria of being a consumer of beef. The data used in this paper was obtained from a survey on consumer awareness and purchase behavior on meat quality. The survey was conducted face-to-face and each of the questionnaires took about two minutes to complete. Considering the differences in economic development level and density of population among the cities, we used stratified sampling and random sampling to draw our subjects. A semi-structured form research was used. Where the facts were approached quantitatively, quantifications by means of statistical techniques were performed.

A form was used for the data collection, which was applied at the time of purchase in eight commercial establishments, common places to buy meat such as butchers and supermarkets, seeking to understand the opinions and attributes that influence the purchase decision of the interviewee. The form number was divided equally between the morning and afternoon periods, weekday and weekend in establishments in the downtown and in neighborhoods. The specific sites for investigation were chosen based on the administrative function in Londrina (23°17'34''S51°10'24''W), Maringa (23°25'38″S51°56'15″W) and Campo Mourão (24°2'46″S52°23'2″W), and the number of questionnaires allocated was based on population density.

The first part was composed of stimulated and spontaneous questions about the attributes considered important when buying the meat. The second part was composed of spontaneous questions about buying habits and consumption of beef. The last part was composed of spontaneous questions about socio-economic conditions. The form was applied by a trained team. The questions were read in full and in the order they appeared on the form. There was no interference from the interviewer in the responses. The initial part of the form sought to identify consumption habits. Consumers initially answered spontaneously what attributes, whether visual or not, they consider when buying the meat, because in Brazil few kinds of

meat have labelling. The second question was spontaneously punctuated in a structured hedonic scale with notes from zero (not important) to ten (extremely important) on the importance of attributes such as meat packaging, hygiene of the shop, meat brand, meat expiration date, meat price, sanitary inspection of the meat, meat tenderness, amount of fat and trimmings, presence of marbling in the meat and information of the label in the decision on the purchase of the product. The third question was about the most important factors should contain on meat labelling. The second part of the form consisted of spontaneous multiple-choice questions about the number of times they consumed beef in the week, place of purchase preference, type of storage (fresh meat on display at butchers' shops, trays or vacuum-packed), sex and animal feed and knowledge and willingness to pay more for vacuum-processed and meat traceability.

They were also questioned about knowledge of specialized cuts, being: prime rib, tenderloin, chorizo steak, bottom sirloin, rib boneless, entrecote, T-bone steak, ancho steak, strip rib, cross-cut shank, rump steak and sirloin cap, nomenclature of cuts considered differentiated (gourmet meat) which was introduced recently by meat industries in Brazil. In addition, in this phase, the preference for marbling degree was also evaluated according to two types of preparation: barbecued or cooked using the American Meat Science Association scale (American Meat Science Association [AMSA], 2012) from one to ten. Grade one is the lowest, grade ten the highest. The scale was printed and was shown to consumers at the time of the interview. Each consumer chose a scale grade for each type of meat preparation.

Final part of the form was about the socio-economic consumer's aspects. The questions were related to individual information of each individual, such as sex, age, school education and family income.

Statistical analysis

The data were analyzed using SPSS software version 21.0. For the analysis of the spontaneous and stimulated responses, we used variance analysis (ANOVA) and the Tukey test for comparison between the means and also the interviewees were segmented through hierarchical cluster analysis (HCA) grouped by the Ward Method. Descriptive statistics procedures were done to elaborate the profile of the interviewees.

Results and discussion

Characterization of participants

According Hausman (2000) to study consumer buying behavior, it is important to develop a model, that is, a replica of the phenomenon that one wishes to represent, including the variables necessary to explain it and its interrelationships. Thus, for the analysis of the data of the present study, a theoretical model of the purchasing decision process of beef consumers was developed, based on the models proposed. The form distributed provided information about consumer characterization as sex, age, family income and educational level (Table 1).

Table 1. Characterization of beef buyers interviewed (n = 276).

Characterization		%
Sex	Male	51
	Female	48
Age, years	18 – 24	12
	25 – 34	23
	35 – 44	19
	45 – 54	22
	55 – 64	14
	> 65	10
Family income, salary*	Up to 2	19
	2 to 6	47
	6 to 10	22
	> 10	10
Educational level	Elementary school	15
	High School	34
	College education	32
	Postgraduate	16

*= The minimum salary (one) in Brazil corresponds to about USD 300

In fact, the age of 64% of people ranged from 25 to 54 years. These percentages represent the characterization of the age of the Brazilians people. The studies carried out with meat consumers in Brazil, show age percentages very close of observed in this study, because it is the economically active population (Brandão, Ceolin, Canozzi, Revillion, & Barcellos, 2012; Eiras et al., 2017; Souki, Salazar, Antonialli, & Pereira, 2011).

Main family income of the interviewees ranged from 2 to 6 salaries (47%). According to data from the Brazilian Institute of Geography and Statistics (IBGE) in relation to per capita household income, the average value of Brazil's income is USD 350. Pinheiro, Gomes, and Lopes (2010), Kirinus, Fruet, Klinger, Dörr, and Nörnberg (2013) and Dias et al. (2015) also observed that the family income from different regions of Brazil (South, Midwest and North) ranges from 1 to 3 salaries. However, in this study the family income was higher (between 2 and 6 salaries) than the average observed for the rest of Brazil. This may have occurred because the survey was conducted in some wealthier cities in the interior of the state of Paraná, characterized by higher income from agribusiness.

The educational level of the participant was mainly high school level, similar results have been compiled by (Dias et al. (2015); Pinheiro et al. (2010)) and Kirinus et al. (2013) in other regions of Brazil.

Consumption habits

Beef is part of the regular feeding habit of Brazilian individuals (Table 2). The most frequent consumption of beef was > 4 times/week and the percentage obtained (62%) agreed with other Brazilian beef studies (Behrens et al., 2010; Eiras et al., 2017). Around 20% said that eat beef three times a week, 14% twice and 4% only once a week. Thus, the sum of individuals who consume beef 3 or 4 times a week is 82%. According to Brandão et al. (2012) the meat consumption can be considered high when it is superior to 3 times a week, demonstrating that the interviewees in this study have high meat consumption. According to Kirinus et al. (2013) current socio-economic changes and the increase on the salary of Brazilian population consequently is reflected as an increase on beef consumption decreasing other basic aliment as rice or bean.

The majority of consumers chose to buy their meat from a supermarket butcher (82%) followed by in trays (10%) and with a lower percentage of consumers purchasing the meat vacuum packed (8%). A similar tendency had been previously reported in Brazil by Mazzuchetti and Batalha (2004) and Kirinus et al. (2013). As Behrens et al. (2010) reported the increase of purchasing meat in supermarkets is consequence of the changes on food habits and modern life style, which demands time saving efforts and reduction of available time. Supermarket helped people in purchasing different kinds of products in the same establishment. Nevertheless, buying meat directly on trays is an increasing habit due to it being easier to freeze and store (Velho, Barcellos, Lengler, Elias, & Oliveira, 2009). Brisola and Castro (2005) evaluating the preferences of beef consumers from Brasilia regarding purchase and product purchased, noticed that the consumer decision-making process is determined from the level of information pertinent to the product.

Table 2. Habits and frequencies in the consumption of beef.

Answers	%
Spontaneous questions	
Frequency of beef consumption per week	
> 4 times	62
3 times	20
2 times	14
1 time	4
Place where you buy meat	
Fresh meat displayed in butchers' shop	82
Trays	10
Vacuum package	8
Commercial type of animals	
Little importance	42
Heifers	33
Steers	20
Bulls	3
Cows	2
Feeding system	
Pasture	42
Feedlot	24
Does not matter?	34

Regarding of beef cattle category preferred, meat from heifers (33%) followed by steers (20%) was preferred when compared with that from bulls (3%) and cows (2%) (Table 2), as observed by Eiras et al. (2017) and Guerrero et al. (2018). However, in the spontaneous survey for the majority of the interviewees (42%) the animal category has little importance at the time of buying the meat.

The traditional Brazilian beef production systems, due to agro-climatic conditions and pasture availability, are under broad conditions (Ferraz & Felício, 2010). Thus, the meat from the animals finished in this production system was the best accepted by consumers (42%), followed by meat from animals finished in feedlot (24%); whereas 34% believe that the beef production system does not influence their preferences. The similar answers were obtained by Eiras et al. (2017) in recent survey accomplished in Maringá – Paraná state, next to the city where this study was carried out. Thus, consumers have preferences for pasture feeding, but are not related to sensory attributes, but to habits (Simonne, Green, & Bransby, 1996), where most Brazilian animals are finished in this system.

Hence, with spontaneous questions, when asked "*What are the most important factors when you buy meat?*" the majority of the consumers considered meat presentation to be one of the most important attributes to beef purchase intention (Table 3), which is in agreement with Ripoll, Albertí, Casasús, and Blanco (2013). This fact may be associated with the color and visual appearance of the meat. The meat color is the main attribute that influences the consumer at the time of purchase (Mancini & Hunt, 2005; Renerre, 2004). Chambers and Bowers (1993) working with sensory perception of consumers, argue that before any other feature consumers are primarily concerned with the sensory properties of flesh presentation, such as color and odor.

Following presentation, the second most important factor for these consumers was the meat quality. However, a low proportion of Brazilian participants considered that price is the most important factor in beef purchasing decisions, as happened with European consumers, who considered other factors such as origin or animal feed to be more important than price when choosing meat (Realini et al., 2013). Still, hygiene on the store, meat preparation method, expiration date and brand have little importance.

Table 3. Meat buying habits of interviewees (n= 276).

Answers	Score
Spontaneous questions	
What is the most important factor when you buy meat	
Presentation	520
Meat quality	262
Price	159
Hygiene at butchers' shop	90
Preparing methods	38
Expiration date	38
Brand or source	26
Stimulated questions	
What the most important factor when you buy meat	
Hygiene at butchers' shop	9.7[a]
Amount of fat and trimmings	9.5[b]
Presentation	9.4[b,c]
Expiration date	9.4[b,c]
Sanitary inspection	9.3[c]
Tenderness	8.7[d]
Price	7.8[e]
Label	7.8[e]
Package	7.8[e]
Marbling	7.0[f]
Brand	6.0[g]
Spontaneous questions	
What is the most important factor in the meat label	
Expiration date	593
Hygiene at butchers' shop	123
Nutritional composition	46
Label	36
Animal characteristic	69
Preparing type	43
Price	25
Brand or source	75
Presentation	14

In the stimulated question the preference of the consumer is more ambiguous. Thus, the business hygiene was considered the most important attribute (P < 0.05), followed by amount of fat and trimmings, presentation, expiration date and sanitary inspection. It was considered intermediate tenderness, price, label and package. And finally, meat brand and marbling are attributes less relevant to consumers in both questions.

Brazilian consumers are not used to buying label packaged meat, so only expiration date (61%) is considered important (Table 3). The other attributes were low scored.

Consumer knowledge of meat cuts

Concerning the knowledge of meat cuts, 85% of the interviewees said they are familiar with three cuts (Table 4), being the best known, rump steak, tenderloin and bottom sirloin. It has been observed that more specialized cuts such as entrecote, T-bone, ancho steak are little known by consumers. Women know on average three to five cuts and men know three to six cuts.

Consumers marbling preference

In Brazil, the beef is consumed preferably cooked in saucepans, grilled or baked as barbecue. In this way, for a greater succulence it is necessary that the meat present certain amount of internal fat (marbling). The results obtained in relation to the marbling preference of preparation showed that the interviewees preferred the meat with a medium marbling degree for cooked meat (Figure 1). Grade 5 (29%) was the most preferred for braised meat, followed by grade 1 (21%) according American Meat Science Association (AMSA, 2012) scale. Intermediate grades (2, 3, 4 and 6) also were preferred by low consumer percentage. For the consumer of grilled meat grade 1 was preferred, and most consumers scored on meats with a grade less than 5 (72%).

For meat consumed in the form of barbecue, grade 5 was also the most preferred; but in a smaller percentage (20%) when compared to the meat consumed cooked in the saucepan preparation, followed by grade 1 (13%). On the contrary, marbling grade of the meat preferred for cooking in the pan, for meat consumed as a barbecue marbling grade had low importance, since it ranged from 2 to 7. When analyzing these results, it can be observed that the marbling grade is a characteristic little known to most of the interviewees, they tend to associate this parameter with possible deleterious effects on the health.

Consumer knowledge about ageing and traceability of meat

The current changes and demands have encouraged the development of highly efficient production systems in order to maximize the potential growth of the animals, reduce the age at slaughter and increase the meat quality (Ito et al., 2010; Prado et al., 2009). Therefore, there is increasing interest in the "green image" of animal products. Traceability of animal production system (pasture *vs.* feedlot) is therefore a major challenge for scientists, commercial structures and farmers (Dian et al., 2007; Dian, Andueza, Jestin, Prado, & Prache, 2008).

Table 4. Meat cuts knowledge

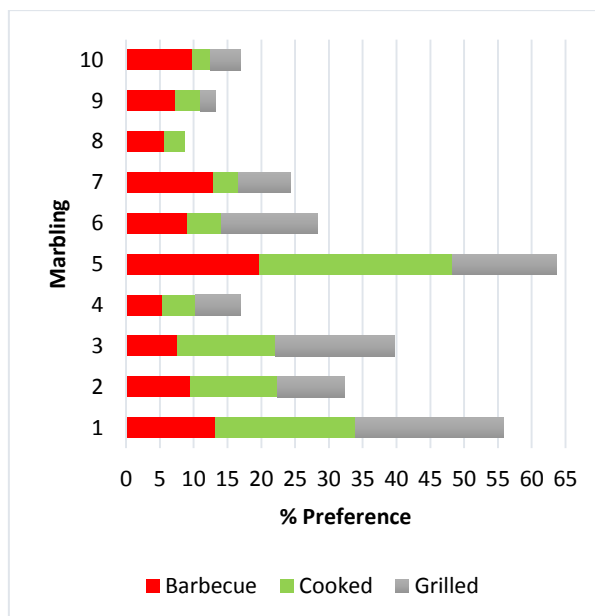| Answers	%
Spontaneous questions	
Meat cut knowledge	
Rump steak	96
Tenderloin	94
Bottom sirloin	87
Rib boneless	41
Chorizo steak (Argentinian cut)	23
Strip rib	15
Sirloin cap	67
Cross-cut shank	17
Ancho steak (Spanish cut)	13
Entrecote (French cut)	14
T-Bone steak	15
Prime rib	11

Figure 1. Preference of marbling in the meat among the consumers according to meat preparation.

On the other hand, in Brazil the aged meat consumption is still little used due to meats characteristics and consumption habits. The ageing is one of the most commonly used methods to improve the quality of beef (Obuz, Akkaya, Gök, & Dikeman, 2014). During the ageing process, many biochemical processes occur, which are responsible for quality enhancement, mainly tenderness (Eiras et al., 2017) and flavor development (Guerrero et al., 2018). Thus, the last part of the research would like to know about two important aspects in the production system and commercialization of the meat: traceability and ageing of the meat.

The results on the knowledge and willingness to pay for traceability obtained in this study show that a large proportion of consumers (42%) are aware of the concept of traced meat (Table 5). This result could be surprising since the knowledge about the traceability of the meat is a recent issue. In fact, tools used in traceability of meat are still scarce, expensive and difficult to apply (Prache, 2009; Prache et al., 2007).

However, 40% of the interviewees considered that there is no benefit of the traced meat in relation to the untraced meat. This fact can also be related to the value of the meat traced, since in Brazil certified meat can present values up to 30% higher than the product that does not have certification of origin (Lazzarotto, 2003). Angulo and Gil (2007) reported that in order to determine the consumer's perceptions of quality control systems, it should be better disseminated to the population.

In the same way we observed that the consumer is familiar with aged meat (47%) but does not have the habit of consuming this product, besides not liking its sensorial characteristics (Table 5). Besides that, the ageing process implies higher costs and the consumer is not willing to pay for it.

Table 5. Knowledge about meat production system

Response	%
Do you know what traceability means?	
Yes	42
No	28
Unknown	30
Would you pay more for traced meat?	
Yes	35
No	40
They do not know	25
Do you know what aged meat means?	
Yes	47
No	21
Unknown	32
Would you pay more for an aged meat?	
Yes	50
No	18
They do not know	32

Conclusion

Research indicates that the consumer values the presentation of the product as the most important attribute. The consumer prefers the purchase of meat at the butchers and does not value the labeling of the product which makes it difficult to identify and offer differentiated or certified products. The frequency of beef consumption increases with family income, and although the vast majority of consumers prefer low marbling meat regardless of the type of preparation the meat will be subjected to, there appears to be a consumer group that prefers meat with this attribute developed when the goal is to prepare barbecue.

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