



Role of sustainability attributes and occasion matters in determining consumers' beef choice



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ABSTRACT

This study aims to evaluate the influence of socio-environmental attributes on the purchase intention of and the willingness to pay for beef, based on data from Brazilian consumers, using a discrete choice analysis model. Different consumption situations were analysed to check the influence of functional versus recreational/hedonic beef choice. Sixteen (16) hypothetical products were generated in eight (8) scenarios regarding the different socio-environmental attributes of beef. The findings confirm the importance of animal welfare and traceability in the decision-making process for beef purchase. The frequency of consumption, gender, and the presence of a known/familiar brand also influence the beef choice when making a functional (day-to-day) purchase, compared to a recreational/hedonic (barbecue) purchase. The study suggests that the beef industry and retailers should better explore various aspects of greenhouse gas emissions and animal welfare and highlight them in their communication strategies. Investigating the trade-offs between socio-environmental attributes allows a more in-depth evaluation of these attributes and contributes to the literature.

1. Introduction

Consumers come across a multitude of product offerings differentiated by various attributes when making food purchases. Traditionally, price and brand are perceived as the most common attributes (Sharp, 2010). Over the past few decades, however, an increasing number of food products have emerged with high-value attributes and claims, including quality attributes (such as the protected designation of origin) and origin information. Recently, other claims have been used to promote the added value of food products, such as fair trade, low carbon footprint, natural, biodynamic, animal welfare and other sustainable consumption claims (Sirieix, Delanchy, Rемаud, Zepeda, & Gurviez, 2013). Sustainable consumption can result from a decision-making process that considers not only the individual needs of consumers (related to taste, price, and convenience) but also attitudes towards social responsibility (such as environment and fair trade, sustainable labels, and sustainable food production (Vermeir & Verbeke, 2008; Hartikainen et al., 2014; Tait et al., 2019).

In the given context, the first contribution of this study is to evaluate the influence of socio-environmental attributes on the willingness to pay (WTP) for and purchase intention of beef. Literature has investigated the most relevant quality attributes and the trade-offs

between intrinsic and extrinsic quality attributes, in general (Henchion et al., 2019; Stranieri & Banterle, 2015; Zanoli et al., 2012). An awareness of trade-offs, specifically, between the socio-environmental attributes allows a focused evaluation of these attributes and contributes towards expanding the literature on sustainable beef consumption behaviour. This study also examines the consumer's buying attitude towards some hypothetical products at different consumption occasions (day-to-day or recreational, such as barbecue). The second contribution of this study is that it addresses the influence of a sustainable brand on consumers' purchase decisions, considering the recent trend of brand valorisation in the Brazilian beef sector.

The third contribution of this study is that it examines the relevance of studying sustainability attributes related to beef consumption in emerging countries, such as Brazil, which have a different cultural relationship with the product and an overall higher meat consumption rate than other countries (e.g. 100 kg versus 77 kg in the Netherlands). Considering the position of Brazil as the world's largest beef producer and third largest beef consumer (ABIEC, 2018), more studies should be conducted to show the difference in Brazilian consumer behaviour towards socio-environmental attributes (e.g. animal welfare) and the environmental impact of beef production. In this regard, the study analysed certain meat consumption situations in relation to beef choice

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in a consumption occasion. The assessment of the attributes when beef is purchased for functional use (e.g. it has been purchased for consumption on a daily basis) differs from that when its purchase has a hedonic utility (e.g. for recreation or special events—as in the case of purchasing beef for barbecue). Generally, the literature covers certain behavioural aspects of consumers and their price sensitivity at different times (Wakefield and Inman, 2003) or the market segmentation of functional or hedonic goods (Okada, 2005). However, few studies discussed the relevance of attributes influencing food choice, in this case beef, in different occasions—functional or recreational (hedonic) (Baba, Kallas, Costa-Font, MaríaGil, & Realini, 2016). The current study fills this gap in the literature.

2. Sustainability attributes

Studies on beef attributes focused on the intrinsic characteristics of this product. Some of these attributes are tenderness (Grunert, Bredahl, & Brunsø, 2004; Gao & Schroeder, 2009; Velho et al., 2009), freshness (Stranieri and Banterle, 2015; Gao & Schroeder, 2009; Souki, Antonialli, & Pereira, 2004), and leanness (low fat) (Becker, 2000; Barcellos et al., 2009; Velho et al., 2009; Chini, 2015). However, Grunert, Sonntag, Glanz-Chanos, and Forum (2018) indicated the growing interest in the role of credence attributes play in consumer choice, in addition to the search and experience attributes like appearance and taste. Previous studies included sustainability attributes in the estimation of the WTP for food (Aizaki, Sawada, Sato, & Kikkawa, 2012; Saunders et al., 2013; Stranieri & Banterle, 2015; Tait et al., 2019; Van Doorn & Verhoef, 2011; Zanoli et al., 2012).

This study will examine the following sustainability attributes: animal welfare (AWE); traceability, effect of greenhouse gas emissions, and the sustainable brand that seeks to validate attributes of sustainability.

2.1. Animal welfare (AWE)

Animal welfare (AWE) is related to the growing demand of consumers for attributes related to natural, green, organic and eco-friendly production. Consumers also consider these factors when making purchase decisions.

In most related studies, this attribute is evaluated based on the AWE label found during the animal production process. Souza et al. (2013) indicated that the presence of a label guarantees the absence of abuse to the animals and evaluated the additional percentage that the respondent would be willing to pay for the meat with such labels. According to Napolitano, Girolami, and Braghieri (2010), both reliable AWE monitoring and the effective labelling of animal products can help meet growing consumer demand for specific product segments that value AWE. For simplicity, Zanoli et al. (2012) measured animal welfare using an easily understandable identifier, that is, whether cattle could move freely (on pasture or paddock) or were confined and chained.

Chini (2015) considered pasture production as a sign of AWE. Although this production mode negatively impacts the environment, depending on the management, it facilitates environmental integration, when compared to confinement. Consumers consider the pasture-fed rearing method eco-friendly, and they have a higher WTP for such naturally raised beef, as per studies (Li et al., 2016).

Janßen and Langen (2017) discuss the most important set of attributes considered by German consumers, including AWE, when buying milk. The authors mention about a campaign on AWE by the German government wherein it launched a new label only for its meat products.

In a study on pork preferences, Caracciolo et al. (2010) found that European consumers emphasize AWE more than other intrinsic product characteristics. These authors suggest that credence attributes are directly and indirectly linked to food safety and AWE; consumers look for safety labels for meat products, which helps them choose meat with a

high degree of safety. AWE is recognized as one of the most important credibility characteristics for consumers (Caracciolo et al., 2010; Verbeke, Pérez-Cueto, de Barcellos, Krystallis, & Grunert, 2010). Zanoli et al.'s (2012) survey on credence characteristics concluded that ethics and environmental issues play a more relevant role in explaining the variation in the WTP for beef, compared to common product characteristics. This study confirms that AWE is a relevant extrinsic characteristic considered when purchasing organic meat.

Krystallis et al. (2012) analysed the sustainability attitudes of citizens towards the sustainable characteristics of pig production systems in the European Union, Brazil, and China. In all the three continents, people's attitudes towards the environment and AWE were, on an average, moderately strong. The results imply that the general sustainability attitude of pig rearing is restricted to a small section of specific social groups in the sample. Among the characteristics studied, Europeans and Brazilians attach greater importance to environmental and AWE as criteria to differentiate between “good” and “bad” production practices.

Napolitano, Girolami, and Braghieri (2010) described two elementary trends in the animal product market—(1) consumers increasingly rely on extrinsic signals and credence characteristics during the decision process and (2) AWE is gradually gaining importance in the hierarchy of social issues.

Based on the findings of the aforementioned studies, this research indicates AWE as one of the main socio-environmental attributes influencing the purchase decision of the Brazilian consumer.

2.2. Greenhouse gas (GHG) emissions

According to SEEG estimates (2018), Brazilian beef cattle is one of the main drivers of agricultural expansion; it is also the primary source of GHG emissions in the sector, accounting for 69% of its total emissions. Enteric fermentation of the ruminant livestock (predominantly beef cattle) contributes to the largest share of GHG emissions in the sector. If the production methods fail to integrate low GHG and high carbon sequestration techniques, then the national emissions will continue to increase, contributing to climate change (SEEG, 2018).

To evaluate the effect of GHG emissions' attribute, researchers examined different levels of GHG percentage reduction caused by sustainable agricultural practices. Caputo et al. (2017) based the carbon footprint levels on values reported in the literature on chicken breast production which adopted a 20% and 30% reduction in carbon footprint as alternative levels.

Research suggests that information about the carbon footprint of consumer products may influence the demand for these products (Saunders et al., 2013; Echeverría et al., 2014). Li et al. (2016) examined a hypothetical ‘raised carbon friendly’ (RCF) labelling programme for beef from farms using rotated pasture. This pasture system contributes towards GHG emissions' reduction in a beef production system. The study showed that consumers' support towards the RCF programme indicates that the demand for beef corresponds to GHG reduction practices adopted by cattle ranchers. The authors confirm that this result is consistent with trends favouring niche markets for beef and other foodstuffs. It is likely that beef products providing the desired attributes may receive greater market acceptance and generate higher revenues.

Organic and locally grown products generate positive environmental impacts owing to the low GHGs emitted during their production. de Magistris and Gracia (2016) conducted an experiment of non-hypothetical choice among Spanish consumers. The results suggest that consumers were willing to pay a premium for locally (short-distance) and organically produced almonds, instead of grown far away.

This research aims to identify the behaviour of Brazilian consumers towards GHG reduction during beef purchase.

2.3. Traceability

Research indicates that consumer food choices have been more influenced by concerns about food safety. The perception of food safety appears as a strong requirement when choosing a product. Traceability across the meat supply chain makes the “quality” of the product tangible (Oliveira & Spers, 2018).

Several studies show consumer preferences and WTP for certifying belief attributes related to traceability and the origin of beef (Umberger et al., 2003; Verbeke et al., 2010). Loureiro and Umberger (2007) conducted an investigation with the US consumers and evaluated the certified country of origin attributes, traceability, and tenderness of meat. The results showed that attributes related to ‘inspected food safety’ presented the highest average premium, compared to the other three attributes. The authors also mentioned that “[...] traceability is necessary for verification of credence attributes such as origin; therefore, it is likely that some type of live animal traceability system would be valued by consumers and would assist in maintaining the high quality reputation of the US meat [...]” (Loureiro & Umberger, 2007, p. 510).

Cicia and Colantuoni’s (2010) meta-analysis study on consumer behaviour towards meat traceability helped to summarise the extensive consumer WTP literature on this attribute. It shows that consumers from different countries are increasingly attaching importance to the attributes related to meat traceability. They find ‘food safety’, ‘field traceability’, and ‘animal welfare’ seem to be the most requested attributes (Cicia & Colantuoni, 2010). Caracciolo et al. (2010) suggest that traceability to the farm is another important attribute. In this case, the labels on meat products inform consumers of the meat trail from the ‘farm-to-table’; they are priced at a premium, between 11% and 16.4%.

Stranieri and Banterle (2015) conducted a study to understand consumer attitudes towards the origin of meat, by examining information present on product labels. The results indicate that most consumers showed high interest in different label information on packaged meats. Traceability, certification, freshness, and shelf life were considered crucial variables in the model studied by the authors.

The importance of traceability was analysed by Wu et al. (2017). They interviewed Chinese consumers to understand their preferences for traceable pork, in a real choice experiment. The results revealed that consumers had the highest WTP for traceability certification. Additionally, traceability to slaughter/processing was considered a substitute and a complement to local product labelling and non-local agricultural product labelling, respectively.

Following Epelbaum and Martinez (2014) and Myae and Goddard (2012), this study considered traceability a socio-environmental attribute because it is directly linked to the production process. Traceability by itself does not reduce the asymmetry of information on the credence attribute, but it becomes a necessary condition for controlling unobserved attributes such as AWE and eco-friendly production (Cicia & Colantuoni, 2010). Demand for products with labels containing credence attributes (e.g. natural, organic, local, and ‘human’) require a traceability system to verify the integrity of the label information (Loureiro & Umberger, 2007).

2.4. Sustainable brand

Branding has recently gained relevance in the field of agricultural commodities, with consumers driven to choose among similar products. Consumers perceive a product as advantageous by identifying well-known brands and reliable and identifiable products (Hanf & Kühl, 2005).

In this context, the concept of a branding ecosystem encompasses activities carried out across all the stages of a product’s value chain—from the initial supplier to the final consumer. The collaborative action of strong brands at different levels of the production chain can add value to the final brand in terms of consumer perception of

intangible attributes (such as food safety, traceability, and other trust attributes) linked to the product.

Oliveira and Spers (2018) confirmed the hypothesis that the higher the value given to labels and certifications, the higher will be the value of the brand in the final product. In their study, it was related to enhancing the perception of food safety during pork consumption.

Grunert et al. (2004, p. 267) also highlight the importance of branding as a way of reducing consumer uncertainty at the time of purchase in the following words: ‘branding may appear as an obvious way in which a seller can signal a superior quality and thus reduce consumer uncertainty and encourage consumers to pay a premium for better quality’. The study comprised 310 Danish meat consumers and revealed the brand is an indicator of quality, especially, to consumers less familiar with the product. However, consumers in both the segments—those with high and low familiarity levels—use the brand to form their expectations regarding ‘nutritional’ quality of the meat. The results show that branding can play a key role in product differentiation in the meat industry.

Tonsor and Shupp’s (2009) survey results suggest that an average American consumer exhibits unwillingness to pay a positive premium for beef, tomatoes, or apples carrying a ‘sustainably produced’ label. However, by assessing only the subset of respondents who initially expressed interest in the product, the authors estimated that a positive premium for sustainably produced beef may exist. This suggests that the use of ‘sustainably produced’ labels may not successfully promote the food item to the general public and may require a selection of consumer subsamples. This may imply that individuals associating sustainable production with organic and eco-friendly production practices will have a substantially higher demand for beef, tomatoes, and apples carrying the ‘sustainably produced’ labels.

Moreover, Cunha et al. (2011) discuss the perception of São Paulo consumers towards the sustainability label. Consumers can understand that the guarantee of origin (GO – from a large retailer) products are differentiated by ensuring suppliers’ commitment to aspects related to environmental conservation, social attributes, and food safety.

Taking the case of pork-based products, Ubilava et al. (2011) revealed how preferences for branded/unbranded products are affected by the introduction of credence attributes. They noted that, in general, the effects of selected credence attributes are higher on unbranded products; in this regard, they suggested that credence attributes have a negative branding effect on brand equity and additional information on unbranded products increases credibility and reduces quality uncertainty associated with such products. Survey results suggest that, on an average, consumers exhibit a higher WTP for branded products (positive brand value), but the introduction of product credence attributes reduces the difference in overall WTP for both brand and unbranded products (negative effect of the brand). This study contradicts this finding, that is, credence attributes (sustainability) increase the WTP for sustainable brands.

Besides studying the trade-offs between socio-environmental attributes, this study addressed certain aspects related to consumer behaviour. It discussed the effect of different consumption occasions as well as frequency of purchase on the importance given to attributes during the food acquisition process.

2.5. Occasion of consumption: Functional versus Hedonic

Researchers in the field of consumer behaviour are increasingly investigating consumer choice based on distinctions involving the purchase and consumption of goods for more utilitarian (functional) versus pleasure (hedonic) purposes. Some studies have examined the trade-offs between goods consumed to induce pleasure and satisfaction and those consumed to achieve an instrumental purpose. These studies explicitly show the contextual effects on the trade-offs involved in choosing between pleasure-inducing and functional alternatives (Khan, Dhar, & Wertenbroch, 2005; Dos Santos, Souza da, & Filho, 2018).

Okada (2005) discussed the choice between functional and hedonic products. The author stated that people invest different levels of time (effort) and money to purchase hedonic versus utilitarian items. They exhibit a willingness to spend more time choosing a hedonic product and more money for utilitarian goods. Other authors studied the sensitivity of consumers according to the time consumption. For example, Wakefield and Inman (2003) examined the potential effect of consumption on the price sensitivity of consumers. The results suggest that consumers are less price sensitive when making a hedonic purchase or in a social context. They show that consumers are relatively less price sensitive to hedonic products when compared to functional products.

Some studies identified the occasion of purchase of beverages (wine and beer). Wine consumption is often associated with social events. Thus, choosing the right wine for the occasion often becomes a self-representing vehicle and can lead to the final selection. Marketing research confirms that consumers look for different attributes or value the same attributes differently, depending on the occasion or the moment (on a daily basis or for a special dinner) when the wine is to be consumed (Costanigro et al., 2007). Although obtaining data for each different situation is quite difficult, it seems reasonable that different consumption occasions are associated with different price ranges and the price is used as a quality suggestion.

In general, literature covers some behavioural aspects of consumers and their price sensitivity at different times; it also discusses the market segmentation of functional or hedonic goods. However, few studies discuss the relevance of attributes influencing a food choice (Andrade et al., 2016). By examining beef consumption on different occasions (functional or recreational (hedonic)), this study seeks to fill this gap in the literature.

2.6. Purchase frequency

Some works on consumer behaviour address buying intensity as a determining factor of the importance given to some attributes during the food purchasing process.

Mondelaers et al. (2009) studied organic vegetables in which health-related attributes scored better than the environmental attributes, when defining consumer preference for organic vegetables. Consumers gave a better score to health and environment-related quality characteristics of organic products, indicating a difference in quality between organic and quality products in general. Price was the least important attribute, while the presence of an organic label increased in relevance with an increase in the purchase intensity of organic vegetables. The study also indicated that heavy users represented the only group in which the price attribute played an insignificant role, that is, within the price range of €1 to €1.75; the heavy users were found price insensitive.

The above study demonstrated a decreasing importance of heavy users in relation to price. This is in line with other studies where the perception of price difference acts as the main purchase barrier for new users of organic foods and keeps light users from increasing their purchase volume. Among heavy users, price is not a problem, at least within the price range of the experiment (O'Donovan & McCarthy, 2002; Bonti-ankomah & Yiridoe, 2006).

Some studies focus on organic food consumers. For example, Bartels and Van den Berg (2011) segmented consumers as non-users, light users, and heavy users of organic food, based on sample consumption patterns, and found significant differences between the three groups on specific innovativeness domain, social identification, and attitudes towards antioxidants in fresh fruits and vegetables.

Díaz, Pleite, Paz, and Garcia (2012) also performed cluster analysis and identified three distinct groups of organic consumers—non-consumers, regular, and occasional consumers. These three groups differed mainly in their levels of knowledge and consumption of organic foods in Spain. These researchers also found that 'regulars' exhibited a WTP a higher price for organic foods. This study analyses purchase intention as

a factor that stimulates the WTP a premium price for a product with sustainable characteristics.

3. Research method

Two distinct steps were taken to conduct this study. Initially, a qualitative research was conducted to identify some attributes that can represent consumers' concerns regarding socio-environmental issues. Subsequently, a quantitative step was implemented to measure their WTP in relation to the selected sustainable attributes.

In the qualitative approach, to map relevant issues related to the purchase intention of sustainable meat products, we conducted five in-depth interviews with specialists involved in the sustainability and marketing functions of the beef production sector. The second qualitative study, based on two focus groups, defined the attributes that would be used in the third phase measuring the consumers' WTP in relation to the socio-environmental characteristics. The first group involved consumers having functional buying habits, that is, individuals who purchased beef for daily consumption. The second focus group contained clients of a high-end beef market in São Paulo, who purchased meat for special occasions, such as barbecues.

In order to analyse the consumers' WTP in relation to sustainability attributes, attributes were selected from the literature review and the results of the interviews with experts and those performed in the two focus groups.

For data collection, we developed a questionnaire addressing the characteristics and habits of the respondents. Additionally, eight choices were included to measure the influence of sustainability attributes on the beef purchase intent.

The tenderness attribute was present in several studies (Barcellos et al., 2009; Gao & Schroeder, 2009; Grunert et al., 2004; Oliveira & Spers, 2018); as indicated by four experts, it was the main quality attribute considered during the meat purchase. During in-depth interviews, meatpacker manager and retail director mentioned that companies must add the tenderness attribute to ensure that 'sustainable' meat can be sold at a higher price. Tenderness is considered one of the most important attributes in terms of palatability, and is highly valuable for consumers. For instance, Miller et al (2001) conducted a study to assess the monetary value that consumers place on tenderness by determining the average price a consumer would pay for a steak in three tenderness categories. A national consumer evaluation was conducted in supermarkets in the United States. Results showed that consumers can notice differences in beef tenderness and that consumers are willing to pay a premium for more-tender beef. Therefore, this study will consider the tenderness attribute as guaranteed for all choices, and thereby focus on purchase preferences for attributes directly linked to sustainability.

To analyse consumers' WTP for sustainability, some attributes were selected from the literature review and the results of interviews with experts and those conducted in both focus groups.

The traceability attribute refers to information about beef origin. This reflects the concerns with the production processes related to food safety (Cicia & Colantuoni, 2010; Oliveira & Spers, 2018). This study used three levels of assessment—traceability to farm is considered the maximum level (level 3, from farm-to-fork); the average level considered traceability to meatpackers, wherein an animal is slaughtered (level 2) (a common practice followed by the three largest meatpackers in Brazil (e.g. JBS Sustainability Report)); and on no traceability information was found for the lowest level (level 1).

Regarding brand attribute, it reached level 3 for the 'sustainable beef' of a fictional green beef brand. This fictional brand was considered because of the absence of a known sustainable meat brand. The generic brand 'Friboi', which is a familiar, real-brand in the market, was considered representing the medium level for a sustainable brand (level 2). Friboi is the brand most often remembered in its category (JBS, 2020). It has a reliable appeal in terms of meat origin; however, it does not

meet the criteria for 100% sustainable beef. The lowest level was attributed to unbranded beef (level 1).

Some studies mention that the AWE attribute is directly related to sustainability (sign attribute) (Barcellos et al., 2009; Caputo et al., 2017; Chini, 2015; Napolitano et al., 2010; Oliveira & Spers, 2018; Saunders et al., 2013; Zanoli et al., 2012). AWE certification was also discussed in an article by Souza et al. (2013) where only two levels, certified (guaranteed welfare) or uncertified, were used. We have used the same criteria, as level 1 for certified AWE and level 2 for non-certified.

The attribute of GHG has been discussed in several articles (Caputo et al., 2017; Caracciolo et al., 2010; de Magistris and Gracia, 2016; Echeverría et al., 2014; Michaud et al., 2013; Tait et al., 2011). This study evaluated the percentage reduction in the GHG emitted during beef production. According to some scientists, GHG can cause climate change, and, consequently, global warming. The reductions attributed to levels 1, 2, and 3 were 0%, 30%, and 60%, respectively.

Finally, price is considered mandatory when measuring consumers' WTP for meat with sustainability attributes. Prices were calculated based on the monthly average price of tenderloin in the São Paulo market (IEA, 2017). Level 2 was considered the mid-point, with a value of US\$ 10.88/kg; level 1 received a 30% lower value (US\$ 7.61/kg); and level 3 received a 30% value above level 2 (US\$ 14.14/kg). Table 1 summarises the attributes and the different levels of choices.

Concerning the use of discrete choice analysis, the utility structure is estimated based on a set of options that is typical but not necessarily fixed for all respondents. Each choice can be fully described in terms of its attributes. Respondents are presented with different alternatives and asked to indicate their choice. In this study, sample members were given a 'no choice' alternative to indicate that they would not choose any of the product profiles presented.

From the attribute table, an orthogonal matrix was generated, and 16 hypothetical products were obtained to test the consumers' WTP with respect to sustainability attributes (Table 2).

Owing to the hypothetical products generated, eight choices were tested. Table 3 presents one of the options used in the questionnaire.

The hypothetical products were tested in two different situations—meat purchase for functional consumption (daily) and hedonic purchase for hedonic/recreational consumption such as barbecue.

A logit model was adopted to model the occurrence probability of product choice; this is because the dependent variable (Y) can assume the values 0 and 1. It was assumed that the selected variables may influence the occurrence of 'choice' or 'no choice' of the product. Thus, if the product was chosen by the consumer in the sample, then Y assumes value 1, and is otherwise zero (0). Three Logit models were estimated, each model being specified according to the combination of some of these variables, not necessarily all. The models estimated in the current study presented the following explanatory variables:

- PRICE: refers to the continuous variable of the monetary value that the consumer would be willing to pay for the product; three levels US\$ 7.61/kg; US\$ 10.88/kg and US\$ 14.14/kg.
- As variables referring to Socioenvironmental Attributes:
- TRACEABILITY: refers to the level of traceability used to identify the origin of the product: TRACNO "Not traceable" without identifying

its origin; TRACSLAU "traceable to the slaughterhouse" (from the shelf to the slaughterhouse); or TRACFARM "traceable to the farm" (shelf traceability to the farm).

- BRAND: refers to the meat brand: UnknownBRAND, "unknown" brand; KnownBRAND, "known" brand; and SustBRAND, "Sustainable" brand which has positive socioenvironmental attributes.
- AWE: refers to a dummy variable, indicating 1, for the presence of the animal welfare certificate; and 0, for absence.
- EMISS: refers to the reduction of Greenhouse Gases (GHG) emission levels, with 0%, for no reduction; 30%, for moderate reduction; 60%, for high reduction.

As behavioural and personal variables:

- GENDER: refers to the binary variable, assuming value 1 if it is male; and 0 if it is female.
- FCONSUM: refers to the variable that measures the respondent's consumption of beef, assuming a value of 1 (if 1 to 3 times a week); 2 (if 4 to 6 times a week) and 3 (if every day).
- FPURCHASE: refers to the variable that measures the respondent's meat purchase frequency, assuming a value of 1 (if never); 2 (if rarely); 3 (if sometimes) and 4 (if always).
- MARITALST: refers to the binary variable, assuming 1 if single and 2 if you are married.
- EDUCATION: refers to the variable that measures the respondent's level of education, assuming a value of 1 (if primary school); 2 (if high school); 3 (if technical); 4 (if undergraduate) and 5 (if graduate).

In this study we analyse three models. The first model, called "ALL", was tested using all valid responses collected, that is, after eliminating respondents who do not consume meat, those who "never" buy meat, and the questionnaires that contained missing values. For the second model, called "FUNCTIONAL", we tested the questionnaire that has the manipulation element considering that the respondent will buy the meat for use on a DAY TO DAY basis. The third model, called "HEDONIC", had the phrase: "At this moment you must make the choices below, considering that you are going to buy this meat for a barbecue".

When testing the second and third models, necessary data were obtained to compare the relevance of socioenvironmental attributes and the effect of behavioural and personal variables on the intention to purchase beef on TWO distinct OCCASIONS.

The WTP was calculated based on the works of Belluzzo (1999) and Van Loo et al. (2015), wherein the value is obtained by adding the intercept and the sum of the multiplication of the coefficients estimated in the logit model, with the average values of the variables being in the sequence divided by the price estimated coefficient.

We collected 572 responses to the questionnaires through an online survey. The filtration process led to 539 valid answers—180 on functional purchases and 359 on hedonic purchases.

Table 1
Attributes selected for this study.

variable	Level 1	Level 2	Level 3
PRICE (USD/Kg) Beef	USD 7.61	USD 10.88	USD 14.14
TRACEABILITY	NO Traceability	Traceability to Slaughterhouse	Traceability to Farm
BRAND	NO Brand	Known Brand	Sustainable Brand
GHG EMISSION REDUCTION	0% Reduction	30% Reduction	60% Reduction
ANIMAL WELFARE certification	NON Certified	Certified	

Source: authors.

Table 2
All Hypothetical Products used to test Willingness-to-pay (WTP).

Hypothetical product	Price (USD)	Traceability	Brand	CO ₂ emission reduction	Animal welfare certification
1	7.61	NO	NO	0%	NO
2	10.88	NO	Sustainable	0%	YES
3	14.14	NO	NO	30%	YES
4	7.61	NO	Sustainable	30%	NO
5	7.61	To Farm	NO	30%	YES
6	7.61	NO	Known	60%	NO
7	7.61	To Farm	Known	0%	YES
8	14.14	To Slaughterhouse	NO	0%	NO
9	10.88	To Farm	NO	0%	NO
10	10.88	To Slaughterhouse	Known	30%	NO
11	14.14	NO	Known	0%	YES
12	7.61	To Slaughterhouse	Sustainable	0%	YES
13	7.61	To Slaughterhouse	NO	60%	YES
14	14.14	To Farm	Sustainable	60%	NO
15	10.88	NO	NO	60%	YES
16	7.61	NO	NO	0%	NO

Source: Authors.

Table 3
Choice # 4.

Attribute	Option A	Option B
Price (usd/Kg) Beef	USD 7.61	USD 14.14
Traceability	Traceability to Farm	Traceability to Slaughterhouse
Brand	Known Brand	No Brand
GHG Emission Reduction	0% Reduction	0% Reduction
Animal Welfare certification	Certified	Non Certified
I choose:		
<input type="radio"/> none of them	<input type="radio"/> Option A	<input type="radio"/> Option B

4. Results and discussion

Three logit models were estimated and analysed, and each model was specified according to the combination of some of these variables.

4.1. Proposed models

The first model, called ‘ALL’, was tested using all the valid answers. At the end, 539 valid responses were obtained. In the second model, called ‘FUNCTIONAL’, 180 valid responses were tested from the ‘functional’ questionnaire that had as a ‘manipulating element’ the following sentence: ‘At this moment, you should make the following choices by considering that you will buy this beef for daily use’. In the third model, called ‘HEDONIC’, 359 valid responses were tested from the second questionnaire that had as an element of manipulation the following sentence: ‘At this moment, you should make the following choices considering that you will buy this beef to make BBQ’.

When testing the second and third models, we obtained data necessary to compare the relevance of the socio-environmental attributes and the effect of the behavioural and personal variables on the intention to buy beef on the two different occasions.

The results obtained from the adjustment of logit models, defined as ‘HEDONIC’ and ‘FUNCTIONAL’, are presented in Table 4. For all models, coefficients that were significant, with significance levels varying from 1% to 10%, presented expected signs to the analysis in question.

4.2. Comparison between the FUNCTIONAL and HEDONIC models, using the manipulated occasion

A comparison of the results between functional and hedonic consumption situations indicates a greater concern (plus 1.8%) for AWE, in

the case of respondents who buy Beef for barbecue when compared to those who use it for daily consumption. The higher frequency of consumption (FCONSUM) influences the choice of the product with socio-environmental attributes (SEA) (plus 2%) for the functional occasion when compared to that for hedonic consumption. The importance of SEA for sustainable brand is indicated by an additional 1.7% for hedonic meat consumption when compared to its exclusive use for functional consumption. However, for the known brand this importance drops to 1.3%. However, traceability shows a similar influence for both uses—a 5.2% and a 3.3% increase, respectively, for traceability to slaughterhouses and to the farm

Gender shows distinct influence on two types of occasion. Women show a probability of increasing the purchase of this type of product by 3.4% for functional occasions, while men show a 2.3% increase in the probability of buying the product for hedonic consumption.

It is important to note that the variable ‘EMISS’, depicting the reduction in GHG emissions, did not present significant results, and therefore, it was withdrawn from all the three models

4.3. Results of WTP calculation

Table 5 presents comparative data from the WTP, considering the two ‘manipulated’ occasions in which the respondent indicated own choice by either considering a beef purchase for day-to-day use (functional) or recreational use (hedonic). For the HEDONIC model, we considered the analysis, the base variables (such as female gender and the absence of a brand), traceability, and an animal welfare certification (AWEC). In this combination, the ‘base WTP’ is equivalent to US\$ 3.03. Male consumers would be willing to pay US\$ 1.83 more for the base product indicated for female consumers.

Caputo et al. (2017) pointed out that women usually have higher WTP. Results indicate that female gender has a greater WTP for functional use, while male has a higher WTP for recreational/hedonic use. The frequency of consumption leads to a greater WTP on both occasions, with heavy users having a higher WTP value, as reported by Díaz et al. (2012) and Bartels and Van den Berg (2011). The level of education influences the consumers differently on both occasions. The higher the education level, the greater the WTP for hedonic use; however, the relationship is inverse in the case of functional consumption. In other words, highly educated individuals value socio-environmental attributes when purchasing beef for recreational use and do not value these attributes when purchasing beef for daily consumption.

The WTP for AWEC is higher than that of for uncertified beef. These results are consistent with the findings of Caracciolo et al. (2010), which show that the AWE is recognized by consumers as one of the most important credibility characteristics. This attribute is increasingly

Table 4
Coefficients and respective marginal effects values estimated using the logit model.

Variables	Logit model – Functional				Logit model – Hedonic			
	Coefficient	Std. Error (coef)	Marginal Effect	Std. Error (MgE)	Coefficient	Std. Error (coef)	Marginal Effect	Std. Error (MgE)
Intercept	0.428	0.672	–	–	0.415	0.568	–	–
PRICE	–0.046***	0.009	–0.004***	0.001	–0.037***	0.006	–0.003***	0.001
TRACSLAU	0.687***	0.224	0.052***	0.015	0.625***	0.153	0.052***	0.012
TRACFARM	0.447**	0.210	0.034**	0.015	0.385***	0.144	0.033***	0.011
KnownBRAND	0.621***	0.231	0.046***	0.015	0.737***	0.158	0.059***	0.011
SustBRAND	0.497**	0.199	0.038***	0.014	0.665***	0.139	0.055***	0.010
AWE	1.095***	0.170	0.105***	0.017	1.161***	0.117	0.123***	0.013
FCONSUM	0.517***	0.112	0.043***	0.009	0.249***	0.076	0.023***	0.007
FPURCHASE	0.423***	0.149	0.035***	0.013	–	–	–	–
GENDER	–0.401**	0.165	–0.034**	0.014	0.251**	0.114	0.023**	0.011
EDUCATION	–0.151*	0.091	–0.013*	0.008	0.117**	0.056	0.011**	0.005
MARITALST	0.404**	0.177	0.036**	0.017	–	–	–	–
N	180				359			

Source: authors.

Note: ***, **, * = significance level 1%, 5% e 10%.

Table 5
Additional WTP compared with the WTP base *(USD).

Attribute	Manipulated occasion	
	Functional	Hedonic
AWEC (Certified Animal Welfare)	6.36	8.46
TRACSLAU (Traceability to Slaughterhouse)	3.99	4.55
TRACFARM (Traceability to Farm)	2.60	2.81
KnownBRAND	3.61	5.36
SustBRAND (Sustainable Brand)	2.89	4.85
GENDER (Male)	–2.33	1.83
FCONSUM-Low (Consumption 1–3 times a week)	3.01	1.82
FCONSUM-High (Daily Consumption, Heavy user)	9.02	5.44
EDUCATION-Low (High school)	2.20	0.85
EDUCATION-High (Graduate)	–4.40	4.26

Source: authors.

*WTP base = female, no traceability, no brand, no animal welfare certification.

becoming the most relevant subject in the hierarchy of social issues (Napolitano et al., 2010; Zanoli et al., 2012) and has also been validated in other Brazilian studies (Chini, 2015; Souza et al., 2013). Results of the two focus groups indicate the relevance of this attribute when choosing beef. AWE appears to be in a state of ‘dormancy’ in the consumers’ minds and should be ‘brought to the fore’ to enhance its relevance as an attribute when purchasing beef.

The WTP for beef that contributes towards the reduction of GHG emissions was not significantly higher than that of meat, which does not contribute towards GHG reduction. These findings contradict studies conducted in other countries that indicated a greater propensity of consumers to pay for RCF or low-carbon footprint products (Li et al., 2016; de Magistris and Gracia, 2016; Saunders et al., 2013). Echeverria et al. (2012) show that even consumers from emerging countries (Chile) are very sensitive to the issue of global warming, and although they are unfamiliar with the concept of carbon footprint, they desire more information on this issue. The result obtained in this study is relatively consistent with that of Van Loo et al. (2015), which demonstrated the low WTP of American consumers for products (chocolate) with a carbon footprint certification label, which can be attributed to the lack of familiarity with certification and confusion with their meaning.

The WTP for a traceable meat is greater than for one without this attribute, and traceability back to the slaughterhouse was identified as more important than back to the farm. This study’s results confirm the need for traceability to verify credence attributes (Loureiro & Umberger, 2007), with food safety being a highly requested attribute among consumers (Cicia & Colantuoni, 2010; Stranieri and Banterle, 2015; Wu et al., 2017). In our survey, respondents attached a higher

importance to traceability to the slaughterhouse rather than traceability to the farm (complete). This may be due to the lack of clarity on definitions; however, the results clarify that both types of traceability are valued against the non-traceable product.

For a known brand and a sustainable brand, the WTP is greater if compared to that of an unknown brand. Additionally, the WTP for the known brand is greater than the sustainable brand. Opposing the findings of Ubilava et al. (2011), our study indicates that credence attributes (socio-environmental attributes) increase consumers’ WTP for products with a sustainable brand. It was also observed that the known brand had a higher value than the sustainable brand, which can be explained by the valorisation of intrinsic quality attributes that the known brand brings as a way to reduce consumers’ uncertainty at the moment of purchase (Grunert et al., 2004; Morales, 2020).

The sustainability attribute linked directly to the animal (AWE) and the production process (traceability) is more easily understood by the consumer, while environmental attributes (GHG emissions’ reduction) are hardly perceived/understood by the consumer. They may explain the non-significance of the results related to the GHG emissions’ reduction attribute. This calls for more information on emissions. An association of the effects of GHG emissions with global warming can facilitate the understanding of this attribute, which would make possible its appreciation by the consumer.

The findings confirm the importance of animal welfare and traceability attributes in the decision-making process of beef purchase. The study also indicates that the frequency of consumption, gender, and the presence of a known/familiar brand influence the choice of beef for functional (day-by-day) purchase when compared to a recreational/hedonic (barbecue) purchase.

5. Conclusions

Results suggest that the beef industry and retailers should better explore the aspects of GHG emissions’ reduction and AWE and highlight them in their communication strategies. The subject ‘GHG reduction’ (climate change) has been addressed by Brazilian government in some commitments (e.g. Paris Agreement), wherein policies, such as the ABC Plan (National Plan for Low Carbon Emission in Agriculture, by the Ministry of Environment), were developed to reduce the effect of emissions. However, conducted at a macro level, this discussion does not reach the consumers, which partly explains the non-significant result of this attribute (GHG emission) in this study. Hence, a more consumer-driven approach is needed for increasing the relevance of this attribute. Different actors in the supply chain, industry, and retail space should emphasize the socio-environmental attributes (e.g. GHG emissions) to minimise the WTP difference between attributes and,

consequently, increase the perceived sustainability level of the product.

The benefits of products/brands with socio-environmental attributes provide a scope for their development and market positioning. This study is aligned with De Souza et al. (2017, p.5) as they claim that ‘some consumers are advocating to raise animal welfare and health standards, even if it results in a higher cost of beef. Industry can increase consumer trust by using clear labels and assurance schemes that are backed by brand values, which may enhance the transparency and communication of its products. The consideration of traceability aspects along the entire beef supply chain is essential.

This study indicates that traceability is more industry- than farm-related, and hence implies the need for better consumer communication about the benefits of having a food product traced back to the origin.

One limitation of this study is that responses were obtained through an online survey (Tapresearch), which may lead to some kind of bias due to distraction among sampled members during the interview on the manipulated occasion (functional or hedonic consumption). Hence, personal interviews must be conducted to facilitate a better distinction of different occasions. This article has targeted consumers in the middle-high income group (over USD 1250 per month); the income group is revealed by a filter question presented to participants before they started answering the questionnaire answering in order to maximize answers from higher-income respondents. The exclusion of low-income public is seen as a limitation as the findings cannot be extended to the Brazilian population as a whole. This procedure was adopted considering that consumers with income above USD 15,000 per year should be part of the public that can understand the concept of sustainability attributes on beef.

Future research should test the GHG emissions’ reduction attribute more objectively and visibly, such as by using the term ‘meat without deforestation’ or by referring to the fact that meat comes from grazing animals in areas where no recent deforestation occurred.

Given the limited focus of this study, future research should test the WTP by considering other socio-environmental attributes applied to animal protein or even to other foods within the context of an emerging country. A study using eye-tracking or alternative methods could effectively explore the importance given by consumers to sustainable attributes. It could investigate how consumers’ visual attention to sustainable food attribute information would influence the WTP in beef choice. Using experiments, some known brands and real-life ‘sustainable brands’ could be tested to clearly measure beef consumers’ intention to purchase these products. The socio-environmental attributes researched in this study must be tested in other countries to understand behavioural differences between consumers in emerging and non-emerging countries with respect to sustainable attributes in beef.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

ABIEC. (2018). Relatório Anual 2018. Perfil da Pecuária no Brasil. Disponível em: < <http://abiec.siteoficial.ws/images/upload/sumario-pt-010217.pdf> >. Accessed on 12 March 2019.

Aizaki, H., Sawada, M., Sato, K., & Kikkawa, T. (2012). A non-compensatory choice experiment analysis of Japanese consumers’ purchase preferences for Beef. *Applied Economics Letters*, 19, 439–444.

Andrade, J. C., Nalério, E. S., Giongo, C., Barcellos, M. D., Ares, A., & Deliza, R. (2016).

Influence of evoked contexts on rating-based conjoint analysis: Case study with lamb meat. *Food Quality and Preference*, 53, 168–175.

Baba, Y., Kallas, Z., Costa-Font, M., MariaGil, J., & Realini, C. E. (2016). Impact of hedonic evaluation on consumers’ preferences for beef attributes including its enrichment with n-3 and CLA fatty acids. *Meat Science*, 111, 9–17.

Barcellos, M., Pedrozo, E., & Van der Lans, I. (2009). Beef Lovers: a cross-cultural study of beef consumption. In A. Lindgreen and M.K. Hingley (Eds.) *The new cultures of food: marketing opportunities from ethnic, religious and cultural diversity* (pp. 11:127–145). London: Gower.

Bartels, J., & Van den Berg, I. (2011). Fresh fruit and vegetables and the added value of antioxidants: Attitudes of non-, light, and heavy organic food users. *British Food Journal*, 113, 1339–1352.

Becker, T. (2000). Consumer perception of fresh meat quality: A framework for analysis. *British Food Journal*, 102, 158–176.

Belluzzo, W., Jr (1999). Avaliação contingente para a valoração de projetos de conservação e melhoria dos recursos hídricos. *Pesquisa de Planejamento Econômico*, 29(1), 113–136.

Bonti-Ankomah, S., & Yiridoe, E. K. (2006). Organic and conventional food: A literature review of the economics of consumer perceptions and preferences. *Organic Agriculture Centre of Canada*, 59, 1–40.

Caputo, V., Van Loo, E. J., Scarpa, R., Nayga, R. M., Jr., & Verbeke, W. (2017). Comparing serial, and choice task stated and inferred attribute non-attendance methods in food choice experiments. *Journal of Agricultural Economics*, 69(1), 35–57.

Caracciolo, F., Cembalo, L., Cicia, G., & Del Giudice, T. (2010). European preferences for pork product and process attributes: A generalized random utility model for ranked outcome. *Proceedings in Food System Dynamics*, 161–173.

Chini, J. (2015). Influência do atributo de sinal na disposição a pagar pela carne bovina produzida a pasto. Dissertação (Mestrado em Administração)–Escola Superior de Propaganda e Marketing, (p. 111), São Paulo.

Cicia, G., & Colantuoni, F. (2010). WTP for traceable meat attributes: a meta-analysis. *Proceedings in Food System Dynamics*, 678–690.

Costanigro, J., McCluskey, J., & Mittelhammer, R. (2007). Segmenting the wine market based on price: Hedonic regression when different prices mean different products. *Journal of Agricultural Economics*, 58(3), 454–466.

Cunha, C.F., Spers, E. E., & Zylbersztajn, D. (2011). Percepção sobre atributos de sustentabilidade em um varejo supermercadista. *RAE-Revista de Administração de Empresas*, 51(6), 542–552, 2011.

Díaz, M. F., Martínez-Carrasco Pleite, F., Paz, J. M. M., & García, G. P. (2012). Consumer knowledge, consumption, and willingness to pay for organic tomatoes. *British Food Journal*, 114(3), 318–334.

Dos Santos, A. J. C., Souza da, E. M., & Filho, A. E. J. M. (2018). Value perception in the consumption of convergent technology products with green attributes. *Gestão & Produção*, 25(4), 713–725. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-530X2018000400713&lng=en&nrm=iso&tlang=en.

Echeverría, R., Moreira, V. H., Sepúlveda, C., & Wittwer, C. (2014). Willingness to pay for carbon footprint on foods. *British Food Journal*, 116(2), 186–196.

Epelbaum, F., & Martínez, M. (2014). The technological evolution of food traceability systems and their impact on firm sustainable performance: A RBV approach. *International Journal of Production Economics*, 150, 215–224.

Gao, Z., & Schroeder, T. (2009). Effect of label information on consumer willingness-to-pay for food attributes. *American Journal of Agricultural Economics*, 91(3), 795–809.

Grunert, K. G., Bredahl, L., & Brunso, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector – a review”. *Meat Science*, 66, 259–272.

Grunert, K. G., Sonntag, W. I., Glanz-Chanos, V., & Forum, S. (2018). Consumer interest in environmental impact, safety, health and animal welfare aspects of modern pig production: Results of a cross-national choice experiment. *Meat Science*, 137, 123–129.

Hanf, J.H., & Köhl, R. (2005). Branding and its consequences for German agribusiness. *Agribusiness*, 21(2), 177–189. <https://doi.org/10.1002/agr.20042>.

Hartikainen, H., Roininen, T., Katajajuuri, J. M., & Pulkkinen, H. (2014). Finnish consumer perceptions of carbon footprints and carbon labelling of food products. *Journal of Cleaner Production*, 73, 285–293.

Henchion, M. M., Virginia, M. M., & Resconi, C. (2019). Beef quality attributes: A systematic review of consumer perspectives. *Meat Science*, 128, 1–7.

IEA (2017). Instituto de Economia Agrícola. Tabela de preços médios mensais no varejo. Accessed on 26 February 2017.

Janßen, D., & Langen, N. (2017). The bunch of sustainability labels e Do consumers differentiate? *Journal of Cleaner Production*, 143, 1233–1245.

JBS (2020). Available at <https://jbs.com.br/en/marca/fruiboi-en/>. Accessed on 8 June 2020.

Khan, U., Dhar, R., & Wertenbroch, K. (2005). A behavioral decision theory perspective on hedonic and utilitarian choice. Inside consumption: Frontiers of research on consumer motives, goals, and desires, 1, 144–165.

Krystallis, A., Grunert, K. G., de Barcellos, M. D., Perrea, T., & Verbeke, W. (2012). Consumer attitudes towards sustainability aspects of food production: Insights from three continents. *Journal of Marketing Management*, 28(3/4), 334–372.

Lí, X., Jensen, K. L., Clark, C. D., & Lambert, D. M. (2016). Consumer willingness to pay for beef grown using climate friendly production practices. *Food Policy*, 64, 93–106.

Loureiro, M., & Umberger, W. (2007). A choice experiment model for beef: What US consumer responses tell us about relative preferences for food safety, country-of-origin labelling and traceability. *Food Policy*, 32(4), 496–514.

de Magistris, A., & Gracia, A. (2016). Consumers’ willingness-to-pay for sustainable food products: The case of organically and locally grown almonds in Spain. *Journal of Cleaner Production*, 118, 97–104.

Michaud, C., Llerena, D., & Joly, I. (2013). Willingness to pay for environmental

- attributes of non-food agricultural products: A real choice experiment. *European Review of Agricultural Economics*, 40(2), 313–329.
- Miller, M.F.; Carr, M.A.; Ramsey, C.B.; Crockett, K.L. & Hoover, L.C. (2001). Consumer thresholds for establishing the value of beef tenderness. *Journal of Animal Science*, Volume 79, Issue 12, December 2001, Pages 3062–3068, <https://doi.org/10.2527/2001.79123062x>.
- Mondelaers, K., Verbeke, W., & Van Huylenbroeck, G. (2009). Importance of health and environment as quality traits in the buying decision of organic products. *British Food Journal*, 111(10), 1120–1139.
- Morales, L.E., Griffith, G., Wright, V., Fleming, E., Umberger, W., & Hoang, N. Variables affecting the propensity to buy branded beef among groups of Australian beef buyers. *Meat Science*, 94, 239–246.
- Myae, A. C., & Goddard, E. (2012). Importance of traceability for sustainable production: A cross-country comparison. *International Journal of Consumer Studies*, 36(2), 192–202.
- Napolitano, F., Girolami, A., & Braghieri, A. (2010). Consumer liking and willingness to pay for high welfare animal-based products. *Trends in Food Science and Technology*, 21(11), 537–543.
- O'Donovan, P., & McCarthy, M. (2002). Irish consumer preference for organic meat. *British Food Journal*.
- Okada, E. (2005). Justification effects on consumer choice of hedonic and utilitarian goods. *Journal of Marketing Research*, 42(1), 43–53.
- Oliveira, R., & Spers, E. (2018). Brand equity in agribusiness: Brazilian consumer perceptions of pork Products. *Revista de Administração de Empresas*, 58, (Jul.-Aug.).
- Saunders, C., Guenther, M., Tait, P., Saunders, J. (2013). Assessing consumer preferences and willingness to pay for NZ food attributes in China, India and the UK. In: Annual Conference of the Agricultural Economics Society, 87th, 2013, United Kingdom. Proceedings. United Kingdom: University of Warwick, United Kingdom.
- SEEG. (2018). Sistemas de Estimativas de Emissões de Gases de Efeito Estufa. Emissões do setor de agropecuária – período 1970-2016. 2018. Disponível em: < <http://seeg.eco.br/wp-content/uploads/2018/06/relatorios-SEEG-2018-agro-final-v1.pdf> > . Acesso em: março de.
- Sharp, B. (2010). *How brands grow, what marketers don't know*. Oxford: Oxford University Press.
- Sirieix, L., Delanchy, M., Remaud, H., Zepeda, L., & Gurviez, P. (2013). Consumers' perceptions of individual and combined sustainable food labels: A UK pilot investigation. *International Journal of Consumer Studies*, 37(2), 143–151.
- Souki, G. Q., Antonialli, L. M., & Pereira, C. A. (2004). Atributos do ponto-de-venda e decisão de compra dos consumidores: Subsídios para estratégias dos agentes da cadeia produtiva de carne bovina. In: ASSOCIAÇÃO NACIONAL DOS PROGRAMAS DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO – ENANPAD, 29.
- Souza, D. M., Petre, R., Jackson, F., Hadarits, M., Pogue, S., Carlyle, C. N., Bork, E., & McAllister, T. (2017). A review of sustainability enhancements in the beef value chain: State-of-the-art and recommendations for future improvements. *Animals*, 7(3), 26.
- Souza, M. C., Casotti, L., & Lemme, C. (2013). Consumo consciente como determinante da sustentabilidade empresarial: respeitar os animais pode ser um bom negócio? *Rev. Adm. UFSM, Santa Maria*, v. 6, Edição Especial, pp. 229–246, maio.
- Stranieri, S., & Banterle, A. (2015). Consumer interest in meat labelled attributes: Who cares? *International Food and Agribusiness Management Review*, 18, 4.
- Tait, P., Saunders, C., Dalziel, P., Rutherford, P., & Guenther, M. (2019). Estimating wine consumer preferences for sustainability attributes: A discrete choice experiment of Californian Sauvignon blanc purchasers. *Journal of Cleaner Production*, 2331, 412–420.
- Tonsor, G., & Shupp, R. (2009). Valuations of 'Sustainably Produced' Labels on Beef, Tomato, and Apple Products. *Agricultural and Resource Economics Review*, 38(3), 371–383.
- Ubilava, D., Ken, F., Jayson, L., & Nilsson, T. (2011). Differences in consumer preferences when facing branded versus non-branded choices. *Journal of Consumer Behaviour*, 10, 61–70.
- Umberger, W. J., Feuz, D. M., Calkins, C. R., & Sitz, B. M. (2003). Country-of-origin labeling of beef products: US consumers' perceptions. *Journal of Food Distribution Research*, 34, 1–23.
- Van Doorn, J., & Verhoef, P. C. (2011). Willingness to pay for organic products: Differences between virtue and vice foods. *International Journal of Research in Marketing*, 28(3), 167–180.
- Van Loo, E.J., Caputo, V., M., Nayga Jr., R., Seod, H.S., Zhang, B., & Verbeke, W. (2015). Sustainability labels on coffee: consumer preferences, willingness-to-pay and visual attention to attributes. *Ecological Economics*, 118, 215–225.
- Velho, J., Barcellos, J., Lengler, L., Elias, S., & Oliveira, T. (2009). Disposição dos consumidores porto-alegrenses à compra de carne bovina com certificação. *Revista Brasileira Zootecnia*, 38(2), 399–404.
- Verbeke, W., Pérez-Cueto, F. J., de Barcellos, M. D., Krystallis, A., & Grunert, K. G. (2010). European citizen and consumer attitudes and preferences regarding beef and pork. *Meat Science*, 84(2), 284–292.
- Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behavior and the role of confidence and values. *Ecological Economics*, 64, 542–553.
- Wakefield, K., & Inman, J. (2003). Situational price sensitivity: The role of consumption occasion, social context and income. *Journal of Retailing*, 79, 199–212.
- Wu, L., Gong, X., Qin, S., Chen, X., Zhu, D., Hu, W., & Li, Q. (2017). Consumer preferences for pork attributes related to traceability, information certification, and origin labeling: Based on China's Jiangsu Province. *Agribusiness*, 33, 424–442.
- Zanoli, R., Scarpa, F., Napolitano, E., Piasentier, Naspetti, S., & Bruschi, V. (2012). Organic label as an identifier of environmentally related quality: a consumer choice experiment on beef in Italy. *Renewable Agriculture and Food System*, 28 (1), 70–79.