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WILLINGNESS TO PAY FOR QUALITY ATTRIBUTES OF FRESH BEEF. IMPLICATIONS ON THE RETAIL MARKETING

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In recent decades, the demand for food worldwide has undergone significant changes that have highlighted the issue of the quality and safety of food consumed. After international food crisis associated with consumption of fresh meat, consumer concerns about the quality and safety of these products has been increased. However, the attributes for assessing the safety of fresh meat consumption are not directly observable; they are credence attributes. The aim of this work is to investigate consumers' perceptions of safety in Argentina and identify factors that help explain consumers' willingness to pay for different attributes related safety of the beef products, including, a hypothetical hygiene certification in handling and retailing.

The results indicate a positive willingness to pay for fresh meat attributes such as personalized attention in a butcher counter, the presence of a "safety certification" in the place of purchase and the bright red color on the product.





1. Introduction

In recent decades the preferences of consumers of food has been changing and evolving to higher levels of demand for quality attributes in the products. This process has advanced more rapidly in developed economies, the effect of the increase in real income on consumer preferences, is gradually spreading to other countries as well (Sanchez et al., 2001, Unnevehr and Roberts, 2002, Greis, and Noguiera, 2010, Hussain, and Dawson, 2013).

Food safety is included in an expanded definition of food quality, and is currently one of the main concerns of consumers globally. Since the focus of the economics of quality, issues related to food safety concerns arise as information asymmetry problems between consumers and producers regarding the attributes or specific characteristics of the product.

Food safety is an attribute so called "credence" or trust; it reflects the inability of the consumers, without incurring high costs to assess by themselves the presence of such attribute. Traceability systems or third-party certifications are examples of market mechanisms or signals to bridge the gap of information between agents or to reduce the cost of verification. For the effective functioning of these mechanisms passing on information about the "real" quality of products, it is necessary that consumers trust in these signals that ensure the presence of the attributes that differentiate quality. The signals can be divided into intrinsic and extrinsic attributes (Olson and Jacoby, 1972; Bernués et al, 2003). The former refers to the physical aspects of the goods (color, taste, safety, shape), while the latter are related to the product but are not part of it (price, brand, origin, purchase location, certification). Generally, the extrinsic attributes are used to provide the consumer the necessary signals to infer on the intrinsic quality attributes (Schroeder and Tonsor, 2012).

Grunert and Andersen (2000), Grunert et al. (2004), Banovic et al. (2010), as well as, Morales et al, (2013) emphasize the importance of brands as signals of quality. Consumers,



who have successful previous experiences with a brand, rely on it to decide their future purchases and choose the desired product quality. Thus, consumers choose brands to lower search costs and the perceived risk. In the case of Argentina, some empirical studies (Casellas et al, 2004; Berges and Hedon, 2009) examine consumer perceptions and willingness to pay for different types of quality attributes and found that brands are the tool most valued by consumers to ensure quality. These preferences justify business strategies of companies managing brands to differentiate their products and to reduce the intensity of price competition with a better quality positioning in the market.

Consumers infer the quality of the meat through various signals such as color, aroma, type of meat cut, fat color and packaging. However, since there is a time restriction to decide on the purchase, only few of these factors are important in shaping perceptions of quality (Latvala, 2010, Troy and Kerry, 2010). For products having no extrinsic signals, the safety assessment can be especially difficult and hence some questions arise. How do consumers decide about product quality? How do preferences change depending on the decision environment? What are the attributes based on which consumers build their perception of quality?

In Argentina, beef is an interesting case to analyze consumer preferences regarding food safety for many reasons. For instance, on the retail marketing consumers express a preference for acquiring beef in butcher shops where shopping is usually unpacked. In such a case, the product has no marks or labels that display information about its origin, nutritional composition, and / or any other quality attribute. According to the Argentine Beef Promotion Institute (IPCVA) 55% of the beef is sold in neighborhood butcher shops and only about 20% in supermarkets and self-services stores. Another reason is due to the high per capita consumption that Argentina holds, 61.1 kilos in the first half of 2013 (CICCRA, 2013), which positions beef as one of the foods that make up the basic food basket of the entire population. Finally, although Argentina has not started in any recent food crises related borne illness (FBD), is no stranger to this kind of problems. Argentina has the highest rate of hemolytic uremic syndrome (HUS) worldwide, associated with the



infection of Shigatoxin-Verotoxigenic *Escherichia coli*, with 11 cases per 100,000 children less than 5 years old (IPCVA, 2013). FBD and HUS caused by verocytotoxigenic *E. coli* from food origin, including beef, have been frequently implicated in worldwide food safety crisis (Greis, and Noguiera, 2010).

The aim of this work is to estimate the willingness to pay for different quality attributes of beef by which the consumer infers that the product he is buying is healthy or no risky to his health and, therefore, they influence his decision to buy it.

Following the approach of stated preferences, we used a choice experiment (CE) that allows a multi-attributes valuation independently and simultaneously. This method provides a better simulation of actual conditions in which consumers make their purchase decisions (Adamowicz et al, 1998)

2. Background

In early studies of demand, the interest of agricultural economists focused on predicting prices and farm incomes but at present, is more oriented to the analysis of consumer preferences and measures of well-being (Unneverh et al., 2010). There is a large body of literature that analyzes the preferences of consumers regarding the attributes of quality and safety in food and the factors that influence their willingness to pay (Akaichi and Gil, 2009, Papanagiotou, et al, 2013).

These subjects are mainly discussed to analyze the pricing policies of firms and product differentiation, the combination of private quality standards and government regulations, as well as, to design effective communication to consumers in information campaigns on the risks associated with food consumption.

The regulations that attempt to reduce the information asymmetry in the market for fresh meat vary considerably between countries, both in the form of certification or labeling and



mandatory controls required, as well as, the actors who are responsible for performing these quality or food safety checks (Teisl and Brian, 2010, Greis and Noguiera, 2010).

Loureiro and Umberger (2007) show that European consumers are much concerned about food quality and food safety than US consumers and that is why the EU policies are more oriented to certifications of traceability of origin and production processes. Moreover, the authors note that Australia, Canada and Japan have developed this type of certification more than the US. Ortega et al. (2011), on the other hand, concluded that the preferences of Chinese consumers about food safety are influenced by the lack of trust in public control structures.

In Argentina, there is a big gap with these countries. Although consumers are concerned about food quality and food safety, the interest and the value they grant to the certifications vary greatly depending on the information they process and their socio-economic status (Casellas et al, 2004). Traceability and food safety certification systems are not widely used and the firms that have been developed them, they have done in response to foreign markets demands. The willingness to pay of argentinian consumers by a certification of process to ensure greater safety controls in food production is low. The better-informed individuals assume that the guarantees should be provided free by the public system while for most, the brand is synonymous with quality and food safety and they are not willing to pay for additional certifications (Berges and Casellas, 2008, Berges and Hedo, 2009).

Focusing on the beef market, a large number of international studies have estimated the WTP for certifications of product origin, processes, no uses of antibiotics and hormones, and other attributes associated with the product quality and safety. Most studies apply to markets in developed economies, where beef is mostly sold packaged and labeled, and the analysis focuses on information provided by product labels and product branding. Among the works that highlight the importance of certifications and labels as a safety signal, in markets with asymmetric information, focusing on beef may be mentioned Barrera Figueroa and Sánchez García (2006); Loader and Hobbs (1999); Hui et al, (1995), Northen



(2001).; Sánchez et al. (2001); Stefani and Henson (2001); Latvala and Kola (2004), Loader and Hobbs (1999), as well as, Morales, et al, (2013). Our paper contributes to extend the research to the case of beef products retailed without labels at butcher shops.

3. Methodology

In order to know consumers' preferences a choice experiment modeling framework was used. Thus, instead of asking consumers whether they would be willing to pay a certain amount of money for a given attribute of a beefsteak, in this method consumers were asked to select their preferred alternative between the choice options. Formally, this attribute-based choice method is based on Lancasterian consumer theory (Lancaster, 1966) which proposes that utility for goods can be decomposed into separate utilities for their component characteristics or attributes, and random utility. Lusk and Schroeder (2004) argument that using of CE methods has been increased due to CE allows reducing the overestimate of WTP.

3.1. Random Utility Theory

The CE method used to collect data in this investigation is consistent with random utility theory. Through the experiment, the purchase decision recreated allows to compare and choosing among different alternatives, defined as a set of attributes (including price) that describe the product. Attributes, alternatives and choice sets are three factors that must be determinate in a CE. An attribute describes one aspect of an alternative, an alternative is a bundle of attributes; two or more alternatives constitute a choice set and a number of choice sets compose a CE. The respondents are asked to choose one alternative from each choice set.

The scenario-making and the product description are generated using experimental design techniques with the objective of minimizing the number of combinations of attributes



presented to the respondents, in order to allow statistical identification of underlying preference function.

In recent years the use of the method has increased because i) it allows that the individual valuation of each attribute be consistent with consumer theory of Lancaster (1966) and the random utility, ii) under CE approach, the decision-making process is much closer to elicit consumer' WTP.

Random utility theory (Luce, 1959; Mc Fadden, 1974) is the typically approach widely adopted by researchers in WTP studies. According to this theory, consumers choose alternatives that give them greater utility restricted to time and income. Consumer utility could be defined by a deterministic component and a random component, as indicated by the expression (1).

$$U_{ni} = V_{ni} + \varepsilon_{ni} \quad (1)$$

Where U_{ni} is n^{th} individual's utility of consuming alternative i ; V_{ni} is the systematic part of the utility function determined by the attributes of alternative i as well as individual i ' characteristics and ε_{ni} is a stochastic part following a certain distribution.

$$V_{ni} = V(Z_{ni}; S_n; B_n; \delta_n) \quad (2)$$

The systematic part V_{ni} depends on:

- Consumers' perceptions about i attributes of the good Z_{ni}
- Consumer n characteristics, (S_n)
- The parameters that relate these Z_{ni} and S_n with the consumer' utility.
Respectively, B_n y δ_n

Assuming a linear relationship:

$$V_{ni} = \alpha_i + \beta_{n1} \cdot Z_{n1} + \beta_{n2} \cdot Z_{n2} + \dots + \beta_{nk} \cdot Z_{nk} + \delta_{n1} \cdot (\alpha_1 \cdot S_{n1}) + \delta_{n2} \cdot (\alpha_2 \cdot S_{n2}) + \dots + \delta_{nk} \cdot (\alpha_i \cdot S_{nk}) \quad (3)$$

Where α_i is a specific constant for each alternative i .



The random component includes unobserved attributes and measurement errors. The presence of the random component allows for probabilistic assumptions about consumer behavior.

Assuming that individuals will try to choose an alternative that yields them highest utility, individual n will choose the alternative i among C alternatives, if only if, its utility U_n is higher than the utility of the other alternatives. Formally, the probability of this occurring event is:

$$Pn(i|C) = Pr[U_{ni} > U_{nj}] = Pr[(V_{ni} + \varepsilon_{ni}) > (V_{nj} + \varepsilon_{nj})], \forall j \in C \quad (4)$$

$$Pn(i|C) = Pr[(\varepsilon_{nj} - \varepsilon_{ni}) < (V_{ni} - V_{nj})], \forall j \in C \quad (5)$$

$$Pn(i|C) = Pr[(\varepsilon) < (V_{ni} - V_{nj})], \forall j \in C \quad (6)$$

With a certain probability distribution of ε ; knowing the attributes of alternative i and j (Z_{ni} and Z_{nj}); consumer' characteristics (S_n) and the chosen alternative, we can estimate the value of the parameters α , B and δ , and then, the willingness to pay for the presence (or increased level) of an attribute.

McFadden (1974) shows that if the error terms are independent and identically distributed (IID) with a Gumbel distribution, the probability of choosing alternative i is:

$$Pn(i|C) = \frac{\exp(\mu V_{in})}{\sum \exp(\mu V_{jn})} \quad (7)$$

The probability of individual n choosing alternative i can be written as the following closed-form conditional logit model (CLM), where the scale parameter μ is inversely proportional to the variance of the error term, and typically assumed to equal one (Ben-Akiva & Lerman 1985).



We used the maximum likelihood estimation to estimate the utility parameters of the systematic component (α ; β y δ) (Greene, 2003).

3.2. Willingness to pay

In CLM model the coefficients cannot be directly interpreted as the direct effects of the respective explanatory variables on the probability of choosing each particular striploin steak. Rather, they represent the direct effects associated with each of the explanatory variable on the utility function, which can be used to calculate the mean WTP for each of the attributes. Each of the estimates was calculated using the ratio of the coefficient associated with the attribute of interest over the price coefficient. So that, to calculate the mean WTP for each attribute, we have to estimate the ratio ($-\hat{\beta}_{attribute}/\hat{\beta}_{Price}$). The ratio is understood as a price change associated with a unit increase in a given attribute.

3.3. Choice experiment

Before designing the CE, we tested the attributes and their levels and the feasible price range in two focus group discussions (segmented by income) with six to eight consumers in order to adjust different alternative included in the choice sets. Besides the questions related to the experiment, the survey requested information regarding respondents' purchasing behavior and their attitudes about beef products and food safety and their socio-demographics characteristics.

The survey was carried on in Mar del Plata city in November 2011. The city is located in Pampeana region and its population characteristics are close to those of the most important cities in the central area of the country. Respondents were interviewed randomly in different neighborhoods selected by income level and following quotas by age, gender and education level. The sample was representative of the city population according with the National Census 2001¹. Finally, the sample included 232 respondents who completed the CE to calculate de WTP for safety and quality attributes.

¹ In the latter Census, 2010, population education levels are not available.



In this choice-modeling experiment, participants were given the opportunity to select between three beef strip loin steak types: Option A, B and C exhibiting different prices and extrinsic attributes and Option D, the no-purchase option, 'neither Option A nor B is preferred'. Strip loin was the product of choice, since it is commonly available in supermarkets, meat shops, and restaurants within the country and consumers are familiar with this type of beef cut.

Four attributes with two levels were selected to be included in the CE: price, color, mode of retail sale and certification of the place of purchase. Detailed information regarding the specific attributes and their levels are presented in table 1.

The definition of those attributes was:

- Color: Bright red color - associated to freshness- and less bright color.
- Price: The price per kilo of the strip loin steak.
- Mode of retail sale: Product may be purchased packaged and displayed in the gondola or at the counter. We select these alternatives in order to include Argentinean consumers' preferences, packaged at the supermarket and at the counter (at the supermarket or at the butcher shop). In our country, consumers value the dialogue with the butcher and his advices when they decide beef products purchases.
- Certified place of purchase: The place of purchase shows a guaranteeing to have been inspected for a third party. Is an extra certification of process that guarantee high hygienic standard at the place of purchase.

With these four attributes and their two levels defined, choice experiments were constructed. The first step was to generate a set of 2^4 alternatives that can be randomly combined to construct the choice sets presented to the interviewed. Table 2 shows an example of three of the 14 alternatives finally selected in one of choice sets (card #4)².

²Two of the alternatives were discarded because they represented no feasible options in the market.



Each individual was faced to four of the different choice sets versions designed and 918 valid choices were obtained.

4. Results

Table 3 shows socio demographics characteristics of the respondents.

In the first section of the survey, consumers were requested about their attitude towards food safety and beef in particular. Most of them trust in brand (34%) or in the place of purchase (32%). Only the 18% referred to quality labels in the products. In addition, 12% trust in government controls. The food that consumers perceive more risky are, in order from highest to lowest, fish, mollusk, dairy products, poultry, beef, pork and fruit and vegetables.

Regarding risk perceived through the beef marketing chain, consumers report the distribution and retail as the riskiest links of the chain.

The 47% of the respondents choose a trustworthy butcher, as their usual place to shop, opposite to what might happen in others urban center, only 5% acquire packaged meat. However, “supermarket” was elected (34%) considering the possibility of being served at the counter in it.

All respondents or at least one member of the household consume meat. Regarding the frequency of consumption, the majority (51%) responded 3 to 4 days a week, 27% between 1 and 2 times, 18% at least 5 days a week, and only 4% said not consuming every week. Beef meat remains as one of the food most preferred in our country, especially in the Pampeana region, which Mar del Plata is a representative city. Among the ways to prepare it at home, the most chosen are cutlets (86% of cases), steaks (68%), stews (67%) and grilled or baked meat (63%). Relatively fewer respondents prepared hamburgers (36%) and meatballs (4%).



The respondents rated their level of information about risks of disease and food poisoning at 3.5 (from a 1 to 5 scale in increasing order), while their knowledge of the care and "safe" management of food at home in their opinion deserved 4.2. Although 42% reported having recognized or paid attention to safety related food news - most of them through television-, not all consumers are properly informed to what are appropriate handling practices at home to reduce risks in food. We implemented a brief true or false questionnaire about common practices at home and almost 30% of the respondents failed.

4.1. WTP Results

The CLM presented in the methodology was estimated without interactions, including only the attributes that are combined in the choice alternatives. The probability of choosing the alternative A of a set $E = A, B, C, D$ is as shown in (8), which is equivalent to (7)

$$Pn(A|E) = \frac{\exp(\mu V_{An})}{\exp(\mu V_{An}) + \exp(\mu V_{Bn}) + \exp(\mu V_{Cn})} \quad (8)$$

$$V_{in} = \beta_1 Fcom_{ij} + \beta_2 Cert_{ij} + \beta_3 Col_{ij} + \beta_4 Price_{ij} \quad (9)$$

Where, *Fcom* is mode of retail sale, *Cert* corresponding to certified place of purchase and *Col* corresponding to color.

All coefficients (Table 4) are statistically significant and have the expected sign. The utility increases with personalized attention at the counter, with the presence of a healthy and safety certification and the freshness of the product, perceived by consumers for the bright red color of meat. The utility will be lower at higher prices paid for the product.

The WTP corresponds to the marginal rate of substitution between an attribute and the price, that is, it measures the change in the price necessary to compensate for the change in the attribute keeping utility constant, while the rest of the attributes are not changed³.

³The marginal rate of substitution implies $dU = \hat{\beta}_{attribute} * d(attribute) + \hat{\beta}_{price} * dPrice = 0$



The table 5 shows the WTP for each attributes and the SE calculated by delta method (Kanninen, 1993 y Vermeulen *et al.*, 2008).

The results indicated that consumers are willing to pay a positive premium of \$ 4.48 in average for a certification at the place of purchase. This certification of the existence of a hygienic control of the shop reflects consumer preferences for this attribute, especially in cases where - like most retailed beef- products are sold unbranded. The estimated value for this attribute represents approximately 16% above the lowest price of \$ 28 per kilo of strip loin at the survey period in Mar del Plata.

The results also show a mean willingness to pay of \$ 5.64 / kg (approximately 20% higher than the price considered) for purchasing beef at the counter, opposite to the packaged – displayed in gondola modality. Although actually there are no relevant price differences derived from these two forms of marketing, the WTP value observed might reflect, in monetary terms, consumer preferences for butcher shops and interacting with the butcher when deciding the purchase.

The third attribute included in the experiment, bright red color had the lowest WTP (\$3.91). While this is a well-known attribute in consumer beef analysis, in our country seems to be relatively less important than the other two attributes studied. It is likely that the color be relevant to infer food safety to the extent that consumers have to compare fresh beef signals for packaged - displayed in the gondola, but lose relevance for the mode of sale at the counter.

5. Conclusions

These findings and analysis are useful for understanding how consumers evaluate and choose between different attributes that allow them to infer about meat safety. This information is important when investing in commercial product differentiation strategies or public policies that promote the safety of meat along the value chain.



The benefit of investing in additional security guarantees depends largely on the structure of consumer preferences, perception on the level and effectiveness of the improvement resulting from these additional guarantees and the cost structure associated with implementation of certifications facing by producers. Therefore, meat consumer preferences and perceptions of risk contribute to identify the signals considered by the consumers to infer quality and safety. Hence, it is relevant when deciding on what might be the appropriate link to invest in certifications in the beef chain. This research shows that consumers perceive major risks regarding food safety in the retail marketing stage, rather than production or slaughterhouse levels.

Considering that information on food safety has some characteristics of a public good to the extent that consumption of an individual "not exhausted" consumption possibilities of the rest, the level of provision will be less than the socially desirable optimum. The existence of a positive WTP as an incentive might increase the amount of safety available to consumers, improving consumer welfare.

Future research should incorporate models that facilitate the interactions of WTP with socioeconomic characteristics of consumers under different identified potential segments. It would also be useful to advance in the design of quality certifications applicable to fresh beef, which might be accepted by Argentine market, public institutions or private companies; taking into account preferences for "unpackaged" meat shown by the consumers.

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Table 1. Beef attributes in the choice experiment

Attributes	Levels
Price	\$28 per kilo of strip loin steak \$34 per kilo of strip loin steak
Mode of retail sale	Packaged - displayed in the gondola At the counter (butcher)
Certified place of purchase	With certification Without certification
Color	Bright red Less bright red

Table 2. Example of a choice sets

Card#4 – Suppose that you want to purchase strip loin steak to cook it at home. Please select the alternative (A, B, C or D) that best matches yours preferences.

	Alternative A	Alternative B	Alternative C
Mode of retail sale	Self-service at the gondola	Self-service at the gondola	At the counter
Place of purchase with an extra certification of process that guarantee high hygienic standard	Without certification	With certification	Without certification
Color of the beef	Bright red	Bright red	Less bright red
Price	\$ 28 x kilo	\$ 34 x kilo	\$ 34 x kilo
	D. None of these products		



Table 3. Respondents characteristics in the sample. Mean and Standard Deviations

Variables	Description	Mean	SD	Frequency
Age	In years	45,16	17,18	-
Gender	1 if female; 0 if male	0,54		-
Education Level	Elementary (complete or not)			35%
	High School (complete or not)			40%
	College (complete or not)			25%
Household Size	Single Adult			20,3%
	Adults Couple no child			16,8%
	Adults Couple with children			36,6%
	One adult and children			9,9%
	Others			16,4%
Household Income	Low (Less than \$2500)			15,5%
	Middle Low (Between \$2500 and \$6000)			39,7%
	Middle High (Between \$6000 and \$10000)			32,3%
	High (More than \$10000)			12,5%

Table 4. CLM Estimates

Variables	β	S.E.	t	P value
Mode of retail sale (<i>Fcom</i>)	0.5449	0.0409	13.313	0.0000
Certification (<i>Cert</i>)	0.4330	0.0486	8.897	0.0000
Color (<i>Col</i>)	0.3774	0.0491	7.680	0.0000
Price	-0.0966	0.0171	-5.640	0.0000
Log likelihood: -1009.6247		Pseudo R ² : 0.139		Observations: 919



Table 5- Mean WTP (\$ per kilo of steak) for each attribute

Attribute	Mean WTP (\$ per kilo)	SD
Mode of sale at the counter (<i>Fcom</i>)	5,64	2,02
With Certification (<i>Cert</i>)	4,48	1,68
Bright red color (<i>Col</i>)	3,91	1,44