1. Introduction

Producers, traders and policy makers are increasingly more interested in knowing the importance and the value consumers attribute to particular products and information on food quality and safety associated with them. The need for producers and traders to survive on the market, establishing and incrementing their competitiveness, and for the public decision makers to orientate agricultural, territorial and food policies are some of the main reasons why knowing the consumers’ needs and their perceptions about food products is becoming increasingly more important and strategic (Grunert et al., 2004). A more in-depth understanding of the aspects tied to consumers’ choices can in fact influence important decisions on the level of policies aimed, for example, at promoting particular typical territories. It can also orientate production systems (choice of particular breeds, choice of production techniques, etc.), and even encourage industries to invest in research and development in view of obtaining particular physical and organoleptic characteristics in the products they place on the market.

In this context, it becomes fundamental for the aforementioned subjects to create an efficient communication system concerning the elements of food quality and safety that the consumer seems to be most sensitive to (Golan et al., 2000; Tonsor, 2011), in view of proposing a product as close as possible to the demands of the final user. Consequently, it becomes increasingly important to know the tastes and preferences of consumers.

These demands are even more evident with complex products with a greater environmental impact, such as those of animal origin, which still represent one of the principal foods of our diet (Grunert, 2006). It is precisely with fresh products (Cicia et al., 2012) and meat in particular that we witness the consumer’s growing interest in origin, certifications and environmentally sustainable productions obtained in respect of animal well-being (Viegas et al., 2011; Tonsor and Olynk, 2011; Lusk, 2004).

The intrinsic characteristics, including taste, tenderness, presence of fat, freshness and succulence, prove to be the most appreciated (Banović et al., 2010; Brunsø et al., 2005; Krystalitis et al. 2007; Verbeke and Viaene, 1999a, 1999b), though the consumer can hardly recognise them at the moment of purchase. This fact increases the importance of the extrinsic characteristics in the final choice on one side and, on the other, suggests that the analysis conducted with visual presentation could provide results that interpret consumers’ behaviour in a better way (Umberger and Mueller, 2010).

Numerous studies on meat, and on beef in particular, have as-
sessed consumer preferences with respect to the certification of origin, the production process, animal feed and breed (Alfines, 2004; Oliver et al., 2006; Verbeke and Ward, 2006). In particular, Schnettler et al. (2004, 2008) have pointed out how the origin of beef is at times more important than price, packaging or quantity of fat. Grunert (2005b), however, notes that the information about origin has no effect on product quality evaluations when consumers do not have sufficient information about the region of origin or when they make trial purchases.

Tonsor et al. (2005) anyhow note that consumers’ preferences change also in relation to their citizenship and it seems very important to point out which are the main differences between them. Alfines (2003) conducted surveys and auction experiments on Scandinavian consumers in view of analysing their preferences regarding beef origin and whether the animals were raised with or without hormones. The results showed that while the Swedes seem to prefer meat from other countries, the Norwegians prefer domestic beef, and the typologies of animal farming employing hormones drew a negative reaction from all consumers.

Van Wezemael et al. (2010) employed an online questionnaire to analyse the effect of the increase of food safety levels on French, German, Polish and Spanish consumers in three phases of the beef supply chain: production, butchery and processing. The results show a greater trust in the food safety of beef among Spanish and British consumers who are also the ones most interested in further actions to improve the level of food safety. German and Polish consumers, on the other hand, seem to be less interested in actions aimed atincrementing the food safety of beef. According to Lusk et al. (2003), who were among the first to utilise discrete choice experiments (DCEs) to assess consumers’ WTP for particular beef attributes, French and German consumers are particularly mindful of indication of origin, which they consider the most important attribute of all, including brand, prices or visible fat. For British consumers, though, the most important attributes are price, colour and fat content. As for marbling, their study concludes that the French and Germans prefer higher levels compared to the British and Americans.

By means of direct surveys, Verbeke and Ward (2003) pointed out that Belgian consumers consider meat traceability secondary compared to other more specific characteristics directly connected with the concept of quality which do not only concern obligatory information such as expiration date or breed name. Through focus groups, Verbeke et al. (2010) conducted a quality study on consumers of beef in France, Spain, the United Kingdom and Germany in order to assess their opinions on different beef muscle profiles, and their interest in a beef eating-quality guarantee system. This case points out how the concept of eating-quality guarantee is more appreciated by French and Spanish consumers compared to British and German consumers.

Gao et al. (2010) show that American consumers’ willingness to pay is heavily influenced by the presence or absence of the indication of origin on the label, and it grows if this information is present and Umberger et al. (2003) evaluated an increase of the consumers’ willingness to pay of 11% and 24% for steak and hamburger, respectively, with a certified national origin. On the other hand, the study Steiner et al. (2010) conducted on beef and buffalo steaks by means of a choice experiment on a sample of Canadian consumers, reveals that traceability only has a significant and positive effect on consumers’ choice probability in the case of families with one or more children. At the same time, the wording GMO-free has a positive effect for both beef and buffalo meat, while consumers who regularly purchase organic products are less likely to purchase meat in general.

As for studies in the Italian ambit, Banterle and Stranieri (2008) conducted an explorative analysis on the meat supply chain and consumers’ preferences expressed via a telephone survey. It emerged that on the side of supply, a greater traceability resulted in a better distribution of responsibility among the agents of the meat supply chain and a strengthening of vertical agreements. On the side of demand, the results showed the consumer’s marked interest in information on the label, such as meat origin, information concerning the breeding system, the animal’s diet and date of slaughter. However, our literature search did not produce any other relevant results regarding specific studies on the preferences of Italian beef consumers.

Most of the studies in the sector, even those using different methodological approaches, usually consider only generic beef without specifying a specific cut (Sans et al., 2008; Aizaki et al., 2012; Chung, 2009), or they usually consider a single cut of meat (Grebitus et al., 2009; Aaslyng et al., 2010; Reicks et al., 2011). This does not allow to assess the effect that relevant cues could have with respect to the different beef cut.

In light of this, the primary aim of this study is to analyse Italian beef consumer preferences in order to provide strategic information for the development of marketing and commercial strategies. In this study we consider different beef cuts as we want to analyse if willingness to pay varies also in respect to the cut. Our investigation was based on a visual choice experiment approach conducted by means of an on-line questionnaire-based survey with a sample of 1500 Italian beef consumers. In the experiment, respondents were asked to choose their favourite packaging of beef among five alternatives1, plus the no-choice option, as recommended by Adamowicz et al. (1998), inasmuch as this represents a normal element in the consumer’s behaviour. The stated choices were analysed using a multinomial conditional logit model to derive estimates of preferences for beef.

Results describe Italian beef consumer as an “ethnocentric” subject who strictly prefers beef with a local certification of origin while dislikes foreign origin, as well as he does not appreciate foreign breeds. Furthermore, beef cut plays a very important role in the final choice, price seems not to interfere so much.

2. The survey

A sample of 1500 completed and valid questionnaires was recruited in November 2011 by a web market research company, in order to outline Italian consumer preferences for beef. Partic-
Imagining you are in a shop where you normally purchase beef: the following 500 gr packages are available. Would you buy any of them? If yes, which one in particular?

Respondents had to choose between five packages of beef (plus the no-choice option) representing every time five cuts (Cutlet, Minced meat, Minced meat with fat, Steak, Marbled Steak) with different levels of the following attributes: Certification of Origin, Production Technique, Price and Breed, according to the structure of the orthogonal design. Important insights emerging from the literature review and focus group were instrumental for designing the experiment and identifying attribute levels:

- **Certification of Origin**: Italy, Tuscany, European Union, Italy PGI, Mugello CAF.
- **Production technique**: Organic, GMO Free, Conventional, Conventional.
- **Price**: -20%, -10%, Average Price of each cut, +10%, +20%.
- **Breed**: Limousine, Chianina, Romagnola, Charolaise, No breed information.

The DCE utilises an orthogonal main effect plan design (OMEP) consisting of 125 choice sets formed by five alternatives (plus the no-choice) with a statistical efficiency of 99% (Street and Burgess, 2007).

The experimental design is structured so that the price is considered as specific for each alternative (for each cut), and was built by inserting all of the possible price level combinations for each cut of meat. This procedure produced an elevated number of choice sets, which made the division into blocks (Hess and Rose, 2009) necessary. As a matter of fact, if an orthogonal design has been found, it may still be too large to give all choice situations to a single respondent. An often used procedure called blocking can split the orthogonal design into smaller designs. Each block is not orthogonal by itself, only the combination of all blocks is orthogonal.

Blocking mainly ensures that attribute level balance is satisfied within each block, such that respondents do not just face only low or high attribute levels for a certain attribute. Blocks are typically determined by using an extra uncorrelated column with a number of levels equal to the number of blocks (Rose and Bleimer, 2008).

In our case, nine blocks were randomly obtained, eight of which were composed of fourteen choice sets, and one of thirteen. Each block was randomly assigned to an interviewee, so as to guarantee, in any event, an equal numerosity of replies per block.

The last section of the questionnaire was dedicated to collecting socio-demographic information on the interviewees.

### 3. Methodology

Discrete choice experiments represent a valid approach for the analysis of consumers preferences as these models offer the opportunity to investigate many aspects that influence consumer behaviour, especially if applied in the field of food demand research (Louviere et al., 2000; Adamowicz and Swait, 2011).
CEs make it possible to overcome many limitations of contingent valuation and enable to derive willingness to pay highlighting the trade-off that each individual makes between attributes. If one of the attributes is the money that a person would have to pay to secure the change, it is possible to generate estimates of the marginal value of changes in each attribute. Moreover a single DCE application can be used to generate estimates of compensating surpluses for an array of specific environmental qualitative or quantitative changes relative to the “business-as-usual” situation (Hanley et al., 2001). DCEs are consistent with random utility model (RUM) (Thurstone, 1927; McFadden, 1973).

The theoretical model of reference implies that for each individual $i$, a given level of utility is associated to each alternative $j$. The alternative $j$ will be chosen if and only if the relative utility, in the group of choices, is higher. This utility can depend on the characteristics (attributes) of the product and on the socioeconomic characteristics of the individuals. Hanemann was the first to point out that the structure of the function of utility is made up of an observable deterministic element and a stochastic element representing the unobservable component of the individual choice. The random nature of the error can be explained, for example, by unobserved attributes, tastes and unobserved preferences, errors in measurement, and the use of instrumental variables (Ben-Akiva and Lerman, 1985).

Formula (1) represents the utility of the $i$-th individual associated with the choice of the $j$-th alternative:

$$U_{i,j} = \hat{U}_{i,j} + \varepsilon_{i,j}$$

where $\hat{U}_{i,j}$ is the deterministic portion of the utility modelled by the researcher, while $\varepsilon_{i,j}$ represents the random error component that makes the true utility $U_{i,j}$ unobservable.

The most diffused functional form of the utility’s deterministic part $\hat{U}_{i,j}$ is the linear functional form in parameters (2).

$$\hat{U}_{i,j} = X_{i,j} \beta$$

where $X_{i,j}$ is the vector of the values of the variables that represent the characteristics of the alternative $j$ and of the socioeconomic characteristics of the $i$-th individual, while $\beta$ is the vector of the coefficients that weighs the effect of the exogenous variables on the utility.

Maximising the consumer’s utility consists in his choosing the alternative that the highest utility is associated with. If the consumer $i$ selects the alternative $j$, this means that $U_{i,j}$ is the highest utility obtainable among the possible chosen Js. Therefore, the probability ($P_{i,j}$) that the alternative $j$ will be chosen by the individual $i$ is given by (3):

$$P_{i,j} = \text{Prob} (U_{i,j} > U_{i,a}; a = 1,2,...J; a \neq j)$$

$$P_{i,j}(\varepsilon_{i,j} - \varepsilon_{i,a} > \hat{U}_{i,j} - \hat{U}_{i,a}; a = 1,2,...J; a \neq j).$$

The choice model that can be utilised depends on the assumptions adopted about the distribution of the stochastic part of the utility function. If we assume (Maddala, 1997) that each $\varepsilon_{i,j}$ is independent and identically distributed (IID) according to an extreme value distribution represented by (4),

$$F(\varepsilon_{i,j}) = \exp (-e^{-\varepsilon_{i,j}})$$

then it ensues that the differences of the errors reported in (3) are characterised by a logistic distribution. Consequently, a multinomial conditional logit model is capable of representing the probability (5) that the $i$-th consumer will choose the $j$-th alternative (pack of beef).

$$P(y_i = j) = \frac{e^{x_i \beta}}{\sum_{j=1}^{J} e^{x_i \beta}}$$

The log likelihood of the multinomial conditional logit model is given by (6):

$$L = \prod_{i=1}^{n} \prod_{j=1}^{J} \text{Prob}(y_i = j)^{y_{ij}},$$

where $y_{ij} = 1$ if the $j$-th alternative is chosen, and $y_{ij} = 0$ if it is not.

4. Results

The results of the multinomial conditional logit model (MNL) allow to assess the preferences of the Italian beef consumers. According to Table 2, the preferred cut is Cutlet, followed by Minced meat and Marbled steak. Minced meat with fat is the least appreciated cut and it produces a negative impact on the utility function of the consumer. As regards the certification of origin, PGI Italy is perceived as the best level while the European origin of beef is associated to a negative cue, as well as a generic Italian origin if it has not any brand. Consumers seem strongly encouraged to purchase as the no-choice option is evaluated very negatively. Italian breeds have always a positive impact on consumers utility function whereas foreign breeds produce the opposite effect. As regards the production technique information, consumers show a predilection for Organic and GMO free beef.

The elaborations were conducted with Latent Gold Choice® (LGC) software. All variables were considered nominal and were effect-coded. This phase is automatic in LGC. While this procedure is mandatory for the categorical variables such as Cut, Certification of Origin, Breed and Production Technique, as regards Prices we chose to consider them as nominal because the overall model was more efficient. As a matter of fact, the model run with Prices as numeric variables had a lower value in the variance fit. Probably, the reason is that beef consumers do not show a linear behaviour with the increasing of prices (this is highlighted also by the not significance of the estimations of many Price level beta) (Casini et al., 2013). Thus, assuming that prices are continuous variables decreases the ability of the model of explaining consumers choices.

From the estimation of the coefficient derives the assessment of the importance of the attributes (see Graph 1), which highlights the role played by each of them in affecting Italian consumers’ choices for beef.

The method implemented to estimate importance was that of the relative effect with respect to the Log-likelihood value of the model assessed without the attribute whose importance is subject to measurement (Louviere and Islam, 2008). All in all, the importance estimated in this manner is related to the marginal effect of an attribute in improving the estimate of the model as a whole.
The Italian beef consumer is focused on the type of cut he is willing to buy, but he considers the certification of origin very important for the final decision. He also accounts the production technique as a secondary criterion through which he decides the beef package to buy. Information about breed plays a marginal role in the final decision as well as the price.

Table 3 shows the willingness to pay (WTP) of the Italian beef consumers. The computation of the WTP was developed by applying the following formula:

\[
WTP_a = -\frac{\beta_i}{\beta_p} \]

Where \(\beta_i\) is the estimated coefficient of the level \(i\)-th of the attribute \(a\)-th and \(\beta_p\) is the coefficient associated to the vector of prices for each cut. In the specific, \(\beta_p\) is calculated (Mueller et al., 2013) estimating the following function:

\[
\beta_{ip} = \gamma + \beta_p \text{Price}_i + \epsilon \quad (8)
\]

where \(\beta_{ip}\) is the estimated coefficient of \(i\)-th level of \(c\)-th beef cut price, \(\gamma\) is the intercept and \(\text{Price}\) is the price level of the \(c\)-th beef cut, \(\epsilon\) is the error term of the regression estimation.

In our study, as the variable Price is specific for each cut, we estimated five different \(\beta_p\).

In this specific case, the differential values are put in perspective with respect to the “Italy” level in the case of certification of origin, “No Breed” as far as the attribute of Breed is concerned, and “Conventional” in the case of the Production Technique. The highest increment in average WTP occurs following the introduction of the “Italy PGI” level (average WTP 5.2 euro), while the minimum WTP concerns the “European Union” level (average WTP -3.5 euro). The willingness to pay deeply varies with respect to the beef cut and it is always higher for the marbled steak. Ground beef with fat, on the contrary, always shows the minimum increase of willingness to pay, regardless of each attribute level.

It is interesting to note how the incremental effects of WTP of the various levels are always greater on steak with marbling than on steak without marbling, while the contrary occurs for ground beef: the WTP for each level is greater for ground beef without fat. As a matter of fact, the presence of fat has a different effect on quality with respect to the cut: marbling is a witness of high quality for the steak, while a high level of fat in minced meat has a negative impact on the perception of quality and on the relative WTP.
5. Conclusions

The research allows to define the preferences of Italian beef consumers and to highlight the importance of understanding how consumers process information when making food choices. Only very few studies have explored the relative importance of such a wide variety of both intrinsic and extrinsic attributes both jointly and visually. We address two important issues that have potentially strong implications for the validity of estimated attribute values: intrinsic attributes are likely to be underestimated in their importance if not presented visually; DCEs that exclude important attributes (such as intrinsic characteristics) are likely to overestimate the value of product characteristics. This kind of approaches provides a very useful basis on which marketing and commercial strategies develop. What comes out from our study is a consumer primarily focused on the meat-cut he is willing to buy. This important aspect has never been analysed as normally similar studies are focused on the interpretation of consumer preferences of a specific cut, with the result of overestimating the importance of other attributes such as the Country of Origin Labelling (COOL), even if this attribute still plays a very important role also for Italians. In this framework it is interesting to note that the relative willingness to pay changes deeply with respect to the portion (beef cut) and to the fat level of the same cut. This aspect allows and leads producers and traders to differentiate their production and commercial policies. The Italian beef consumer can be defined as an “Ethnocentric consumer” as he strongly prefers certified and local Italian origin (PGI or local brands) and he dislikes foreign breeds, even if their organoleptic characteristics are usually very high. With the range of values that we used in this research, prices play a marginal role in interfering consumer choices. Furthermore, Italian consumer prefers to gain some information rather than buying a beef package with a minimal label.

In the light of these considerations, bearing in mind also the low level of awareness with respect to the brands and certification, it seems that the Italian consumer makes his choices more for “emotional” reasons than in relation to his real knowledge. Furthermore, he always shows a higher preference and willingness to pay for those elements that have a logo in the label (PGI, Mugello CAF, Organic, GMO-free), even if the consumer claims not to know their meaning. This aspect highlights on one side the opportunity for a greater product differentiation, but on the other it emphasizes the need of improving informative campaigns and underlines the potential risk of fraudulent communications. In this context the role of public bodies is crucial to ensure and monitor the appropriateness of the information contained on the label.

In the light of the results obtained and of the test developed a further improvement of this research is represented by the identification of different consumer segments. Thus, this process will provide even more important information for the producers and policy makers. From a methodological point of view this improvement will consist in the development of a latent class approach, that allow to differentiate consumers according to their preferences.

References


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