

Consumer Perception of Cured Pork Meats: the Added Value of the Organic Attribute

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Abstract

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Convenience foods, such as cured meats, have always been appreciated in terms of their price, convenience and of course their taste. The pig sector in Italy is substantially stable, and has recently been enhanced by new forms of product differentiation, such as quality certifications. We studied consumer preferences with respect to cured meats from organic farming using a Choice Experiment (CE) and Conditional Logit (CL) approach. In order to estimate consumer attitudes towards organic cured meats, we estimated the weight of externalities that such meats produce presenting them as intrinsic attributes of the product. The final aim was therefore to examine how better health, the protection of biodiversity and the reduction of pollution can affect the choices of organic versus conventional cured meats. Given the characteristics of CE, the trade-offs among these attributes and their value in terms of consumer willingness to pay (WTP) were thus estimated. The results indicate that consumers are well-disposed to organic cured meats, and are aware of the need to support livestock productions that respect the environment and animal welfare.

Keywords: choice experiment; conditional logit; consumer perception; organic pork meat

The evolution in the attributes for organic products is basically following the steps of what happened with traditional products. Initially, by purchasing organic products people could meet their basic needs, thanks in particular to the consumption of foods free of chemicals (GAVIGLIO 2007). Subsequently, the consumers were able to satisfy hedonistic needs in terms of taste, flavour, and enjoyment (DURHAM 2007). Recently, among the components characterising the willingness to pay (WTP) a higher price for organic products it has also been the awareness of environmental protection (BATTE *et al.* 2007), a high content of service (ready-to-eat or cooking quickly) and the highest standards of quality, packaging, and organoleptic characteristics (ZANOLI & NASPETTI 2002). These general aspects are also attributable to organic pork meat, with some distinctions. Consumers seem to pay particular attention to health and the fat content during the purchase of this type of product compared to others (BREDAHL *et al.* 1998; GRUNERT *et al.* 2004).

The purpose of this paper is to evaluate the consumption of cured pork meats from organic farming and the weight of the organic attributes of the products in terms of consumer WTP.

Recently, Conjoint Analysis (CA) has aroused great interest in the world of market research (DARBY *et al.* 2008; MICHAUD *et al.* 2013). CA consists of a set of multivariate statistical methodologies that can detect those attributes of a product that are important in the evaluation process of the consumer, and thus determine the benefit associated with each characteristic of the product (partial utility) and, consequently, the global benefit (global utility). This includes attributes that do not directly benefit consumers, but rather their perception of the benefit to the community.

The result is a very realistic analysis, which is able to reproduce purchasing situations and evaluation processes that are very similar to reality. The methodology for evaluating a multi-attribute Choice Experiment (CE) (choice-based conjoint analysis) is a structured analysis of the choices, made up of sev-

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eral different alternatives, which are then presented to the interviewee. On the basis of what has been prepared by the researcher, consumers judge each aspect of a product by assessing the characteristics and, at the same time, expressing an overall judgment regarding their preferences.

MATERIAL AND METHODS

A total of 120 consumers of organic products residing in the provinces of Milan and Bergamo (Po Valley, Northern Italy, an area where the production and consumption of pork meat, even organic, is particularly important) were interviewed. According to the criteria used by NASPETTI and VAIRO (2004), we decided to stratify the sample between men and women and between habitual consumers (3 times a week) and occasional consumers (once a week) of organic products. After this stratification, almost half of the sample was under 30 years old and approximately 31% was between 31 and 40. The average level of education was quite high, with 70% of the sample having a high school diploma. The families were mostly made up of 2–4 persons (76%), three quarters with children at preschool/school age from 0 to 10 years. The questions concerned:

- Socio-demographic data;
- Preference to organic products;
- Organic pig production;
- Choice experiment: attributes/levels.

Multi-attributes goods analysis. Private goods and services have an economic value that coincides with what the market attributes, that is the price. This simple and direct evaluation reveals problems when the price is linked to the consumer choice, as the price is a unique and global term, while the choice is a result of many subjective considerations. Indeed, the modern theory of the consumer (LANCASTER 1966) states that customers choose a product according to their own particular characteristics, evaluating the overall utility as the amount of partial utilities. That means that a customer does not buy a “basket of goods/services”, but rather a “basket of goods/services that possesses specific characteristics”. It is this subjective element of the choice and the definition of the concept of “partial utility” that have stimulated the research towards the development of the attribute-based stated choice methods. Such methods collect the tools for the multi-attribute analysis (Attribute Based) which then enable us to estimate through questionnaires (Stated Choice) the

shadow prices of particular qualitative characteristics of a certain good, and then assign the customer's WTP (ADAMOWICZ *et al.* 1994), thus bridging the gap between price and choice.

Among these, the CE is particularly used, in which interviewees are asked to assess a certain number of the same nature products, which makes explicit some attributes and their levels of incorporation.

The analysis is based on the random utility theory (MCFADDEN 1984), whereby the utility guaranteed by a good is composed of an observable part and a non-observable stochastic error. Considering a good, composed of x attributes, we can express the utility U guaranteed to i -th individual by choosing the j -th option as follows:

$$U_{ji} = \beta_j x_{ij} + \varepsilon_{ji} \quad j = 1, \dots, J, i = 1, \dots, I \quad (1)$$

where: β_j – vector of coefficients associated with the vector of attributes

If, like in the Logit model, errors are Identically and Independently Distributed (IID) and satisfy the condition of Independence and Irrelevance of Alternatives (IIA), the probability that the i -th individual chooses the j -th option is calculated as follows:

$$P_{ji} = \frac{\exp(\mu \beta_j x_{ji})}{\sum_{k=1} \exp(\mu \beta_j x_{ki})} \quad (2)$$

This model is called Conditional Logit (CL; SALI 2003). It excludes the socio-economic independent variables from the analysis and uses only the attributes of the product as regressors. This model allows the estimation of the trade-offs among different attributes and consequently the WTP for any non-monetary attribute nm , that is:

$$WTP_{nm} = \frac{\beta_{nm}}{\beta_m} \quad (3)$$

where: β_m – coefficient of the price attribute

Individuation of the attributes of the product choice and relative levels. Four attributes were identified with three levels each (Table 1), concerning food expenditure [EXP – from ERSAP, Il mercato dei suini, Produzione e consumo (2011)]: the healthiness (HEA) (NASPETTI & VAIRO 2004), safeguarding biodiversity (BIOD) (NASPETTI & VAIRO 2004), and the level of pollution (POL) (NASPETTI & VAIRO 2004).

Table 1. Attributes and levels for the analysis

| EXP (€/month) | HEA (% lipids) | BIOD (No. of native breeds) | POL (kg N/ha/year) |
|------------------|-------------------|--------------------------------|-----------------------|
| 50 (sq) | 30 (sq) | 1 (sq) | 170 (sq) |
| 60 | 28 | 2 | 160 |
| 70 | 26 | 3 | 150 |

EXP – food expenditure; HEA – healthiness; BIOD – biodiversity; POL – level of pollution

For each non-monetary attribute, a relative indicator was associated which acts as the units of measurement of the levels, or *status quo* (sq), adopted for the choice set, and two related levels:

- **HEA:** content of 30% (sq) lipids (average of lipid content of different cured meats) and a reduction in lipid content by 2% for each level (arbitrary levels);
- **BIOD:** one native breed (sq) (Cinta Senese) and the introduction of a second and a third (Nero delle Madonie and Nero Calabrese) (arbitrary levels derived from the low number of native breeds in Italy today);
- **POL:** 170 kg/ha/year (sq) (maximum value allowed by the Nitrates Directive No. 676 (this Directive was transposed to Italy with Legislative Decrees No. 152/1999 and No. 152/2006 and the Decree of the Ministry of Agriculture and Forestry on April 7, 2006). for the vulnerable areas and the organic products regulation (European Regulation No. 834/2007) and a reduction in the emission by 10 kg N/ha/year for each level (arbitrary levels that involve the achievement of a final level of 150 kg N/ha/year which, in terms of animal load/ha/year, corresponds to an approximate reduction by 2 adult head/ha/year);

In the choice of the monetary attribute (EXP), the starting level was set at €50 per month (according to ERSAP) concerning the weekly shopping of conventional pig products. We proposed supplementary levels of monthly spending which differ by €10.

Known attributes and levels, we created a limited number of *choice sets*, so as to avoid overwhelming the interviewees, but enough to guarantee a comparison among different levels (MAZZANTI 2002). Starting from n attributes and k levels, we get a number of F_t combinations equal to:

$$F_t = k^n \quad (4)$$

This made it necessary to apply the method of the principal effects, which avoids the repetition of combinations and thus we could extract the most significant. Thus, starting with 81 possible combinations, we selected 16, constructing 8 sets of choice

which we then proposed to the interviewees, option which does not provide any improvement in the attributes of the product, without an extra cost. The statistical analysis enabled us to estimate the WTP for the various attributes.

RESULTS AND DISCUSSION

Cognitive survey. Our results revealed that interviewees paid peculiar attention to the intrinsic characteristics of the product (78%), while the extrinsic ones are playing a secondary role (21%) [although the respect for the environment derived from organic production techniques, in order of importance, represents the second purchasing motivation (21%) (Table 2). The price was generally considered high (74%).

The percentage of expenditure for organic products is rather low: 90% of the respondents spend less than 40% of the total, of which 41% settles up to 10%.

Regarding the type of meat consumed – both conventional and organic – it is interesting to note that pork, especially the cured meats, was in the second place of the most frequently chosen products (24%). Beef was in the first place with 37%, and poultry in the third (21%).

Econometric survey. Regarding the analysis of the results of the CL model, the attributes studied were all highly significant (Table 3). The WTP (sign of the β -coefficient) decreases as the negative characteristics of the product increase, and increases as the positive ones increase. According to the law of demand, the propensity to purchase decreases as the price of the product (EXP) rises. The same relation is observable with the rise in lipid content (HEA) and the pollution connected with the breeding activities (POL). Instead, the opportunity to protect the biodiversity (BIOD), through the sale of products of pig breeds at risk of extinction and thus favouring the maintenance of their adequate number, has a positive influence.

Consumer purchases are negatively affected by increasing the monthly expenditure, lipid content, and

Table 2. Percentage distribution of reasons for purchasing

| Reasons for purchasing | (%) |
|-------------------------------|-----|
| Absence of harmful substances | 30 |
| Environmental protection | 21 |
| Better quality | 18 |
| Health improvement | 16 |
| More control | 14 |
| No data | 1 |
| Other | 0 |

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Table 3. Results of Conditional Logit approach (CL) model and willingness to pay (WTP) calculated

| Attribute | <i>b</i> coefficient | Significance | WTP (β_{nm}/β_m) |
|-----------|----------------------|--------------|------------------------------|
| EXP | –0.0486 | 0.000 | – |
| HEA | –0.1629 | 0.000 | €3.35 |
| BIOD | 0.4731 | 0.000 | €9.73 |
| POL | –0.0603 | 0.000 | €1.24 |

EXP – food expenditure; HEA – healthiness; BIOD – biodiversity; POL – level of pollution

the pollution produced by the breeding activities. On the other hand, they are positively affected by guaranteeing the survival of pig breeds at risk of extinction. It is interesting to note that the price attributes are less important, which confirms the sensitivity to environmental issues (BIOD and POL) and the nutritional characteristics (HEA). Lastly, customers are willing to pay up to €9.73 more per month for the safeguard of each endangered pig breed. They are also prepared to pay an extra €3.35 if the lipid content is reduced by 2%. The WTP for the organic attribute, approximated by the POL variable, is €1.24 for each level of nitrate reduction per hectare.

Table 4 shows the trade-off analysis among non-monetary attributes. Similar to the WTP calculation, the trade-offs among different attributes indicate the priority that consumers give to the attributes above and how they relate to each other. For example, a reduction of 7.84 kg N/ha/year (POL/BIOD) has the same preference as increasing the numbers of a native breed; or a 3.7% reduction in lipid content is equivalent to a reduction of 1 kg N/ha/year. On the other hand, the same satisfaction for the raising of 1 native breed is also obtained with a 2.9% reduction in lipid content. In this case too, the positive or negative value depends on the positive or negative evaluation of the same attributes.

It is mainly through the assessment of the WTP and the trade-off among the non-monetary attributes that we can get indications about strategies to accompany the sale of these products. Our results

Table 4. Trade-off among non-monetary attributes

| | HEA | BIOD | POL |
|------|-------|-------|-------|
| HEA | 1.00 | –0.34 | 2.70 |
| BIOD | –2.90 | 1.00 | –7.84 |
| POL | 0.37 | –0.13 | 1.00 |

HEA – healthiness; BIOD – biodiversity; POL – level of pollution

suggest that marketing should focus on the protection of biodiversity, as willingness to pay for this attribute is higher than for the others. Rather than the values and their significance, it is useful to exploit this information taking into account the order of preference, derived from the initial experimental design. This means that the calculated terms have value in indicating that consumers seem to be more sensitive to biodiversity and to health than to pollution from nitrates. However, this consideration suggests that the consumer is still very interested in environmental issues, but probably does not perceive the issue of nitrates as a prerogative of organic products, compared to the role in the reduction of chemical fertilizers, pesticides and antibiotics.

CONCLUSIONS

The literature identifies the following principal reasons for buying organic products: health, taste, environment protection, animal welfare, food safety, and the support of the local economy (HUGHENER *et al.* 2007).

Our results show that consumers are willing to pay a premium price compared to conventional foods in order to ensure health, environmental and biodiversity protection.

In particular, there is a high level of interest from consumers of organic pork meat for the protection of biodiversity and native breeds. This result is not reflected in other works in literature where, however, it has been a little discussed subject until now (ZANDER & HAMM 2010). We can however consider this aspect as connected with the concept of animal welfare and protection of the genetic heritage that is reflected instead in other similar researches (GRUNERT *et al.* 2004). In addition, this interest might be justified by the particular local context in which the analysis was conducted, where there are several organic pig farms and where the culture of pork meat consumption is rooted.

In the literature, the importance of environmental issues among the attributes of purchase is inconsistent. ZANOLI and NASPETTI (2002) found that they are not a driving factor of organic purchase, in contrast with other works (HILL & LINCHEHAUN 2002; AARSET *et al.* 2004).

By our results, the fact that environmental issues seem to have less importance than other non-monetary attributes means probably that organic production has reached a certain level of credibility in the environmental protection (GAVIGLIO 2007) (especially regarding the livestock manure), so now

consumers are looking for other attributes to satisfy, such as the animal welfare and their biodiversity.

Considering the importance of non-monetary attributes in consumer perception, we feel the need to exploit these trends and assure the consumer of organic pork meat about the real capability of this type of production to guarantee an adequate level of environment and biodiversity protection, to ensure a higher level of animal welfare and, especially in the case of organic pork products, a healthier and especially thinner product.

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