

# Factors Associated to Purchase of Quality-Labelled Beef

Sepulveda W.<sup>1</sup>, Maza Rubio M.T.<sup>2</sup> and Mantecon A.R.<sup>3</sup>

<sup>1</sup> University of Zaragoza/Department of Agriculture and Agricultural Economics, PhD Student, Zaragoza, Spain

<sup>2</sup> University of Zaragoza/Department of Agriculture and Agricultural Economics, Professor, Zaragoza, Spain

<sup>3</sup> EAE-CSIC, Professor, León, Spain

**Abstract—** The aim of the present study is to identify the factors associated to purchase of quality-labelled beef. For this purpose a total of 364 surveys were carried out on buyers of beef in three Spanish cities. The sample was divided into three groups of buyers according to the beef purchasing habits with a quality label. A logistic regression analysis was used to estimate the differences between groups. The results show the importance of the production region as a quality aspect. Income level, association of quality-labelled beef with “guarantee and tradition” aspects, purchasing frequency, place of purchase, production systems and lifestyles are all variables that enabled us to establish differences between groups.

**Keywords—** beef quality, quality label, consumer perception.

## I. INTRODUCTION

Over the past few decades, the problems experienced in the field of animal production have led to food safety crises in the beef sector and this has forced governments and the industry to react in order to recover consumer confidence. Amongst other things, this has meant that the concept of quality in the food sector in general and in the beef subsector in particular has become more important for all actors involved in the agro-food chain [1]. Quality is, however, a subjective term, the meaning of which varies depending on who it is used by [2]. Whilst primary producers and agro-industries take into account the characteristics of a product to assess its quality using technical indicators, consumers, on the other hand, use cues and experiences, to infer quality from the meat’s attributes [2, 3, 4].

Another point of interest is that, when meat bears a label it contains a great amount of information [5] and is considered as a cue that allows the quality of the meat to be inferred [5, 6], consumer interest being

greater when clearly identifiable quality signals such as quality labels or certified quality brands are included [7]. Quality labels have a positive effect on the quality of the meat perceived by consumers and play a more important role when credence attributes are sought [3]. At the same time, a greater confidence in quality labels as a quality cue, is related to a greater concern of consumers for aspects of health, nutrition and food safety [8, 9], and said quality labels are an indication that guarantees that the meat has undergone a certain type of control [7].

Although beef with a quality label, compared to beef without it is perceived by consumers as a more expensive product, due to its differentiating effect [10], in developed countries the relationship between the purchase of quality-labelled beef and level of income is not clear. For example, whilst Wachenheim et al. [10] reported that a high percentage of buyers of quality-labelled beef were to be found in the high-income range, Martinez et al. [6] state that income does not significantly affect the purchase of this type of meat. Their findings do not coincide in terms of age either.

Bearing in mind the aforesaid, this present work aims to identify those factors associated to purchase of quality-labelled beef. For this purpose we have analysed variables of a socio-demographic type, beef purchasing habits, consumer lifestyles, perceptions and attitudes towards quality-labelled beef and the level of importance attributed to production factors and origin.

## II. METHODOLOGY

The information used in the present study was obtained from questionnaire-based personal survey carried out on a representative sample of the population formed by 364 beef buyers residing in

Madrid, Zaragoza and León, three Spanish cities that are representative of three city sizes: large, medium and small, respectively. For a confidence interval in the results of 95.5% ( $Z=2$ ) and assigning intermediate  $p$  and  $q$  values ( $p=0.5$  and  $q=0.5$ ) an overall sample error of 5.2% was obtained. To achieve representativeness, the sampling that was carried out during the months of March and April 2007, was stratified with equal allocation between cities and proportionate allocation by age ranges in each of them. The SPSS 14.0 version statistical package was used for data analysis.

In order to identify the factors associated to purchase of beef with a quality label by consumers, the 364 respondents were divided into 3 groups of buyers depending on their habit of purchasing quality-labelled beef, which is the general variable to be compared. The first group, which has been termed regular buyers, is characterised by those who always or normally purchase beef with a quality label. The second group, designated as occasional buyers, is characterised by the fact that they sporadically buy beef with a quality label, depending on price or availability. Lastly, the third group comprises non-buyers and is termed as such.

In an attempt to discover some type of bivariate relationship, all of the variables under study, including the socio-demographic ones, were crossed with the general variable to be analysed, that is, types of buyers, following the detection of atypical data and a missing completely at random analysis.

The bivariate analyses employed were contingency tables with chi-squared tests and multiple comparisons of means tests. In the blocks of questions in which the respondents rated the level of importance of production factors and a series of quality attributes, as well as attitudes (Likert's scale) and lifestyles, factor analyses were applied in order to summarise and reduce the information [11]. The method of extracting factors used was that of Main Components and the factor scores in each analysis were estimated by means of the regression method and were consequently used to carry out logistic regression.

In order to identify the factors that determine the differences between the three groups of buyers, a binary logistic regression (logit) between each pair of groups was carried out, as shown in the table 1.

Table 1. Model approach

<b>Comparisons</b>
<u>Model 1</u>
$G_i \begin{cases} G_i = 1 = G1 = \text{Group of regular buyers} \\ G_i = 0 = G3 = \text{Group of non buyers} \end{cases}$
<u>Model 2</u>
$G_i \begin{cases} G_i = 1 = G1 = \text{Group of regular buyers} \\ G_i = 0 = G2 = \text{Group of occasional buyers} \end{cases}$
<u>Model 3</u>
$G_i \begin{cases} G_i = 1 = G2 = \text{Group of occasional buyers} \\ G_i = 0 = G3 = \text{Group of non buyers} \end{cases}$
<b>General model for all comparisons</b>
$P_i = \text{Prob}(G_i = 1) = \frac{1}{1 + e^{-z_i}}$
$1 - P_i = \text{Prob}(G_i = 0) = 1 - \left( \frac{1}{1 + e^{-z_i}} \right)$
$\ln \left[ \frac{P_i}{1 - P_i} \right] = Z_i = \beta_0 + \beta_1 X_{i1} + \dots + \beta_j X_{ij}; \text{ where}$
$\beta_0 = \text{constant of the model}$
$\beta_j = \text{estimated parameter for the variable } X_j$
$X_j = \text{explanatory variables, and}$
$\frac{P_i}{1 - P_i} = \text{odd ratio} = e^{z_i} = OR_i$
$\frac{\partial OR_i}{\partial X_j} = e^{\beta_j}$

Having selected the variables to be taken into account for the development of the models (Table 2), we proceeded to estimate the parameters for each model or comparison between groups, employing the Wald's regressive method, based on the initial variables selected [12].

The parameters were estimated through maximum likelihood method. The final models were selected taking into account the following criteria: i) Nagelkerke R square and the classification table; ii) Wald statistics for the selection of the most significant variables [11, 12]. In each case the best-fit model that gave the greatest possible number of variables was chosen since, rather than looking for predictive models, explanatory models that would help to identify the associated factors in each case were sought.

Table 2. Specification of the variables included in the models

<b>Explanatory variables</b>	<b>Description</b>
<b>Socio-economic variables</b>	
High income level.	1= High income level. 0= Low income level.
Average to high income level.	1= Average to high income level. 0= Low income level
Average income level.	1= Average income level. 0= Low income level.
<b>Beef purchasing habits</b>	
High purchasing frequency (more than once a week).	1= High purchasing frequency. 0= Sporadic purchasing frequency.
Weekly purchasing frequency (once a week).	1= Weekly purchasing frequency. 0= Sporadic purchasing frequency.
Low purchasing frequency (less than once a week).	1= Low purchasing frequency. 0= Sporadic purchasing frequency.
Frequent place of purchase of beef.	0= Traditional butcher's. 1= Super/ hypermarkets.
<b>Beef quality aspects</b>	
Level of importance of the production region.	Importance placed on the production region to obtain quality beef.
Level of importance of animal feeding.	Importance placed on animal feeding to obtain quality beef.
Production system quality attributes factor.	Factor scores with regard to production system quality attributes factor.
Credence quality attributes factor.	Factor scores with regard to credence quality attributes factor.
Search quality attributes factor.	Factor scores with regard to search quality attributes factor.
<b>Attitudes towards quality-labelled beef</b>	
Tradition guarantee factor.	Factor scores with regard to tradition and guarantee factor.
Social prestige factor.	Factor scores with regard to social prestige factor.
<b>Lifestyles</b>	
“Green, healthy life” factor.	Factor scores with regard to “green, healthy life” factor.
“Active social life” factor.	Factor scores with regard to “active social life” factor.

### III. RESULTS

In model 1, the factors that significantly affect and seem to determine the differences between regular buyers of quality-labelled beef compared to non buyers of this type of meat, i.e. between groups G1 and G3, are high income levels, the importance placed on the production region as an aspect of quality, the “guarantee and tradition” factor and the “active social life” lifestyle.

The households with the two highest levels of income compared to the lowest level of income increase the probability of the regular purchase of quality-labelled beef.

In the buying process, regular buyers, compared to non buyers of quality-labelled beef, place greater importance on the production region as a production aspect for obtaining quality beef. Furthermore, a more positive attitude towards quality-labelled beef being a traditional product that provides greater guarantees is linked to regular buyers; on the other hand, in the case of persons with a lifestyle that is more marked by habits such as eating out or more frequent travelling, the probability of their buying beef with these quality labels decreases.

When discriminating between regular buyers and occasional buyers of quality-labelled beef (Model 2, groups G1 and G2), variables such as frequency of purchase, frequent place of purchase, level of importance given to the production region, value placed on production systems and a more positive attitude towards beef with a quality label offering greater guarantees compared to beef without said quality label, are seen to have a significant influence.

As far as frequency of beef purchases are concerned, it was detected amongst the respondents, that a frequency of once a week compared to those whose purchases were more sporadic, is more linked to regular buyers than to occasional buyers.

In relation to the frequent place of purchase of beef, regular buyers placed more importance on butcher's shops as the frequent place of purchase and quite a lot less on the super/hypermarkets. In relation to production aspects to obtain quality beef, the regular buyers place more importance on the production region and on the production system factor than occasional buyers do. A more positive attitude of buyers towards quality-labelled beef being a traditional product that offers greater guarantees to consumers, is more linked to regular buyers.

In model 3, as in model 1, variables such as the level of income, level of importance placed on the production region as an aspect for obtaining quality beef and the lifestyle termed “active social life”, seem to be the variables that help to discriminate between occasional buyers and non-buyers of quality-labelled beef.

As far as the model fit measures are concerned, in general, the Nagelkerke R square and the Hosmer and Lemeshow test show a proper fit for the three models. In line with the above, the classification tables show a better total prediction for model 1 (88.2%), followed, in order of importance, by model 2 (76.6%) and lastly, model 3 (77.1%)

## II. CONCLUSIONS

In view of the results obtained, it can be concluded that there are clear differences between regular buyers of quality-labelled beef compared to occasional buyers and non-buyers, but not between the occasional buyers and the non-buyers. The importance placed on the production region as a sign of the quality of the beef would seem to be the key variable that enables discrimination between the three types of buyers, which indicates that there is a clear relationship between the purchase of quality-labelled beef and its origin.

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## REFERENCES

1. Barreiro D (2003). Las marcas de calidad en el sector vacuno. *Eurocarne* 117:103-121
2. Becker T (2000). Consumer perception of fresh meat quality: a framework for analysis. *Br Food J* 102(3):158-176
3. Bello L, Calvo D (1998). Propuesta de un modelo positivo del proceso de compra de carne de ternera y evaluación de las preferencias de los consumidores. *Revista Española de Economía Agraria* 183:201-220
4. Maza MT, Ramírez V (2006) Distintas consideraciones en torno a los atributos de calidad de la carne de vacuno por parte de industria y consumidores. *Itea* 102(4):360-372
5. Bredahl L (2004). Cue utilisation and quality perception with regard to branded beef. *Food Qual Prefer* 15(1):65-75
6. Martinez S, Hanagriff R et al. (2007) Factors affecting demand for branded beef, Proc 39th Annual Meetings Program Southern Agricultural Economics Association, Mobile, United States
7. Verbeke W, Ward R (2006) Consumer interest in information cues denoting quality, traceability and origin: An application of ordered probit models to beef labels. *Food Qual Prefer* 17(6):453-467
8. Bernués A, Olaizola AM, Corcovan K (2003) Extrinsic attributes of red meat as indicators of quality in Europe: an application for market segmentation. *Food Qual Prefer* 14(4):265-276
9. Verbeke W, Viaene J (1999) Consumer attitude to beef quality labeling and associations with beef quality labels. *Journal of International Food & Agribusiness Marketing* 10(3):45-65
10. Wachenheim C, Alonso C, Dumler M (2000) Marketing a branded fresh beef product. *Journal of Food Products Marketing* 6(1):53-79
11. Uriel E, Aldas J (2005) Análisis multivariante aplicado. Thomson Editores Spain, Madrid
12. Silva LC, Barroso IM (2004) Logistic regression. La Muralla, Madrid

### Corresponding author:

- Authors: Sepulveda W., Maza Rubio M.T.
- Institute: University of Zaragoza/Department of Agriculture and Agricultural Economics
- Street: Calle Miguel Servet 177
- City: Zaragoza
- Country: Spain
- Email: wilmer@unizar.es, mazama@unizar.es
  
- Author: Mantecon A.R.
- Institute: EAE-CSIC
- Street: Finca Marzanas, 24346, Grulleros
- City: León
- Country: Spain
- Email: mantecon@eae.csic.es