



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Quality perception of PDO beef producers^{*}

Barreira, M.M., Brandão, A.R.W.,
Lemos, J.P.C. and Aguiar Fontes, M.^{**}

Abstract

Food quality from a consumer perspective includes sanitary aspects as well as nutrition, but also taste, aspect, integrity and the particularity of products. But quality at the consumer level can only be achieved if quality is respected throughout the whole chain. An analysis is undertaken using as a case study Portuguese producers of two types of PDO beef. Results, using multivariate data analysis, show that the main attributes for a quality beef at the producers' level are: feeding, finishing, specific quality, age at slaughter, breed and transport. Results also suggest that producers have distinct quality perceptions on PDO beef.

Keywords: *quality, beef, Protected Designation of Origin, producers' quality Perception*

JEL Classification: Q13, M31

Introduction

Quality of a food product is not an absolute concept, in fact it is a complex definition that often has a different meaning according to each market player: producers, dealers, retailers, consumers (Sornay, 1993 and Wandel and Bugge, 1996).

OECD (1999) establishes that quality can be defined, as the attributes that compose the consumers' utility function, that is to say, are able to lead to one product being preferred to another. In this way, quality of a food product includes "sanitary aspects as well as nutrition, but also taste, aspect, integrity and, eventually, the particularity of products", clearly synthesised in the "4S" of Manguy (1989) in his definition of quality (Lagrange, 1995).

These quality definitions are from a consumer perspective. But quality at the consumer level can only be achieved if quality is ensured throughout the whole chain. This is not an easy task and can only be achieved if there is co-responsibility meaning that it also implies the efforts of all the players. In other words, we can talk of a quality function of food products where quality is a function of agricultural production, industry,

^{*} This work is part of project AGRO 422 - "A quality policy for the beef sector in Portugal: production systems, consumers' tastes and preferences".

^{**} Barreira, M.M. and Brandão, A.R.W.: Instituto Superior de Agronomia- Technical University of Lisbon, Tapada da Ajuda, 1349-017 Lisboa.

Lemos, J.P.C. and Aguiar Fontes, M.: CIISA- Faculdade de Medicina Veterinária- Technical University of Lisbon, Av. da Universidade Técnica, Pólo Universitário Alto da Ajuda, 1300-477 Lisboa.

e-mail corresponding author: magdaaguiar@fmv.utl.pt FAX: + (355) 213652889

distribution, and customer action (Lagrange, 1995).

Consumers in developed economies demand high quality products (Swinbank, 1993; Kinsey, 1993) associated with high levels of safety (keeping in mind that there is no zero risk). The higher purchasing power in such economies is an important determinant of the food consumption pattern. Considering Engel's Law, an increase in income is associated with a less than proportionate increase in the demand for the food product (Ritson, 1988). However, demand for higher quality and service is sensitive to changes in income (Meulenber and Viaene, 2000). Therefore, purchasing decisions become dependent upon factors other than solely the price of the product, namely perceptions, attitudes and motives of the consumers (Duarte *et al.*, 2001; Mansinho and Barreira, 2001).

In the light of this reasoning, Antle (1999) refers to "old" and "new economics" of agriculture, arguing that "new economics" is involved with the markets for quality-differentiated products, implying that the demand function is not only dependent upon prices, incomes and population, but also on the characteristics of this population and non-price attributes of the product. These non-price attributes are in fact quality attributes, which, according to the same author, may include nutritional content, safety and convenience characteristics and also the environmental impact of production and production processes. Barreira and Duarte (1997) showed that prices and incomes have considerably determined beef and fish consumption pattern in Portugal, highlighting the importance of convenience, a quality attribute, in this pattern.

Amongst the products with the attributes previously mentioned are those of specific quality, namely the Protected Designation of Origin (PDO) products. These products are regulated by EU Regulation 2081/92, and pretend to be a way of valuing food products with a recognisable local identity. According to OECD (1999) this can work as:

- (i) a source of protection for regional productions;
- (ii) a marketing improvement, and
- (iii) an instrument to allow consumers identification of products referring to particular regions.

This legislation requires producers to follow a "book of specifications" based on the argument of the authenticity protection of traditional products as well as the specificity of production and the use of traditional production methods.

Tregear *et al.* (1997) say that "despite the existence of these regional food policies, there appears to have been little empirical research into the validity of the underlying premise that consumers perceive and value place identification, or regionality, in food-stuffs, nor into the relative importance of official certification in influencing these perceptions and valuations". Besides the need to develop research concerning consumers' perceptions of PDO products, it is also important to understand how producers perceive quality of PDO products and what kind of attributes have been associated with such products at the primary level of the chain, that is to say at the producers' level.

One can then say that quality of beef must run throughout the whole chain becoming a function of producers, meat processors, distributors, retailers and consumers. It should be bared in mind that retailers are the interface with consumers. Lagrange (1995), using the beef chain, presented different quality criteria according to the chain level. Hence, for this author, agricultural producers beef quality criteria were mainly live weight, conformation and fatness of live animals, dressing and carcass weight. At the butcher level

were mainly colour and saleable meat yield, whilst at the consumer these criteria were tenderness and fat content. Therefore attention should be paid to how do different players in the chain perceive quality, since at the consumer level it can only be achieved if it is respected throughout the whole chain.

For the present case study we analysed producers of two PDO beef producers from *Alentejo* region, in Portugal: “Carnalentejana” and “Carne Mertolenga”.

The PDO beef chain for this case can be presented as depicted in Figure 1.

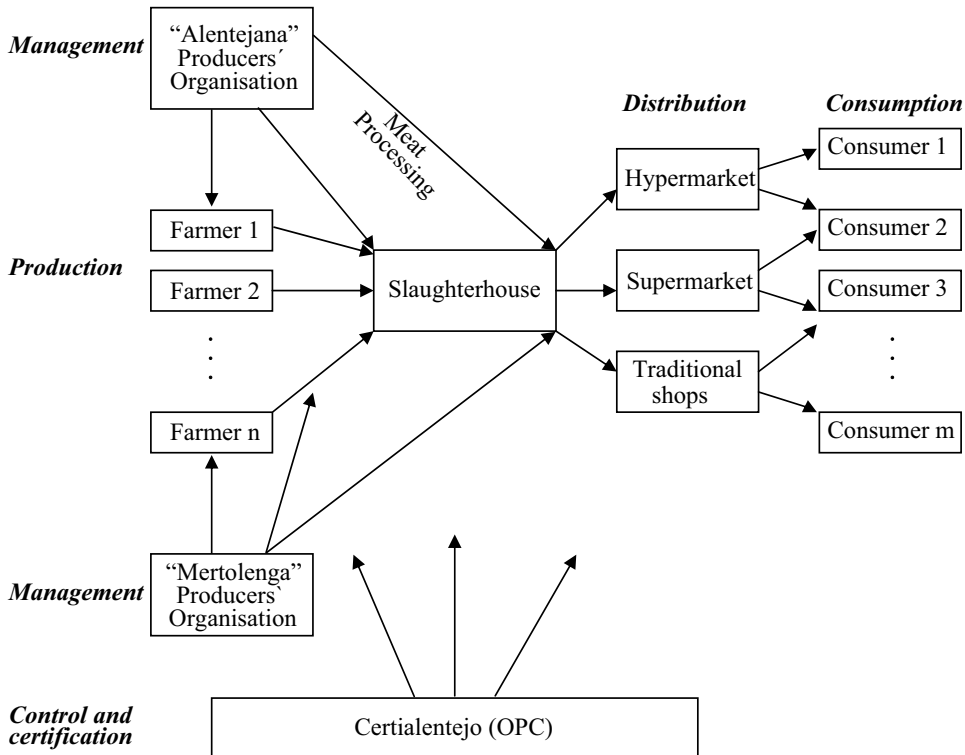


Figure 1. PDO beef chain in *Alentejo* Region.

There are two private institutions dealing with the management of “Carnalentejana” and “Carne Mertolenga”, which coincide with the producers’ organisations. These institutions, amongst other functions, are responsible for the definition of the “book of specification” of each PDO.

To be able to be certified as PDO, animals have to be registered in the Genealogical Book of the Breed. Those registered as producers of “Carnalentejana” and “Mertolenga” have to follow the requirements clearly defined for these PDO products. Animals are raised under extensive systems (<1.4 LU/ha) and in accordance with regional practices. Herd replacements are normally made with animals from the farm.

After weaning at 6-9 months, calves are kept on natural and/or improved pastures and supplemented with forages and/or concentrates during the periods of low availability of grass. Prior to slaughter, animals are finished on concentrates during 100-150

days. Supplements and concentrates, mainly based on cereals, are strictly defined by the Producers Organisations. Usually animals are slaughtered between 14 to 24 months. Transport from the farm to the slaughterhouse is normally ensured by the respective Producers Organisations and in accordance with all the legal EU and Portuguese requirements.

The slaughterhouse is the same for these two PDO. After proper conditioning, the different meat cuts are sent to the clients (hypermarkets, supermarkets, and traditional shops) by the producers' organisation. All the chain is controlled and the beef produced is certified by the Private Organisation for Control and Certification (OPC¹).

The main objective was to determine how producers evaluate the different aspects linked with the production method in order to obtain quality meat. Therefore aspects covering the whole chain are considered: those exclusively related with farm practices, with transport conditions to the slaughterhouse, with slaughterhouse procedures, with the entities responsible for the control and certification of quality meat and, finally, questions related with marketing and producers' organisations.

Beef production in Portugal

Animal output in Portugal accounted for 38% of the total value of agricultural output in the period 1999-2001. Beef production accounted, in the same period, for 4% of agricultural final output (market prices) (GPPAA, 2003). Beef production in Portugal, based on total slaughters approved for consumption, has declined (in quantity terms) at an annual growth rate (a.g.r.) of 2%, from 1997 to 2005, while beef production with quality designations has increased at an a.g.r. of 8%. In 1997, PDO beef production accounted for 1.3% of the total beef produced and in 2005 this proportion was 2.7%. (INE, 2001; IDRHa, 2006). This trend is probably linked to the BSE crisis that surrounded the beef sector (Barreira and Vicente, 2001).

According to IDRHa (2007) in 2005 there were thirteen protected denominations of beef in Portugal, namely, Protected Denomination of Origin (PDO) and Geographical Identification (GI). However, within these thirteen, only eleven were actually produced and marketed, of which "Carnalentejana" and "Carne Mertolenga" account for 42% and 14%, respectively, of total beef produced with protected designations in 2005.

Quality attributes of PDO beef and objectives of the research

Quality of food products from a consumer perspective, as previously seen, includes sanitary aspects as well as nutritional, organoleptic and legal aspects. Hence, we can refer to intrinsic and extrinsic attributes and within the intrinsic attributes there are, food safety, nutrition, sensory/organoleptic, production method, amongst others. Within the extrinsic attributes we can have price, brand, labelling, packaging, store name, which are considered as quality cues (Caswell, 2001). All these attributes are involved in consumer's expectation concerning the quality of a food product and have been analysed by Bech *et al.* (2001), Duarte *et al.* (2001) and Senauer (2001), amongst others.

To form expectations about the quality of a food product consumers use all the known quality dimensions (search, experience and credence dimensions as well as prior experience). Some are clearly intrinsic attributes and these can fall in different quality

dimensions. Intrinsic attributes of PDO products have been subject to some research.

Different quality attributes are used to form expectations about beef quality. Grunert (1997), states that consumers' quality perception on beef is mainly based on fat content and colour. Bernués *et al.* (2001) argue that "new extrinsic attributes of meat are being increasingly considered in the consumer decision making process". They also state that attributes, which relate to the quality of the production process, are becoming more relevant to the consumer, helping him to infer on the quality of a particular type of meat.

Grunert *et al.* (2004) sought to "determine how consumers use intrinsic and extrinsic cues to form expectations about beef quality" using for that, data from four European Union (EU) member states. It is interesting to notice that some of the intrinsic and extrinsic quality cues used are influenced by what is the rule at the farm level and at the slaughterhouse.

Specific attributes have been analysed and are supposed to be directly linked with the final evaluation of the meat in terms of sensory analysis. Sensory analysis has been used, namely, to find negative aspects of a particular product, or to make the most of particular attributes or characteristics (Nute, 1999). Quality attributes such as colour, smell, taste, tenderness, can all be assessed within sensory analysis and they all influence the final quality of a particular type of food under analysis. These parameters are influenced by the techniques followed at the farm level and at the slaughterhouse. Some of the quality attributes are clearly the result of the methods used and followed at the farm level. The production system and the diet do influence some of the intrinsic meat attributes, as well as the slaughter technology and the chilling systems, which are supposed to influence significantly the colour and tenderness of the meat (intrinsic attributes).

Bredhal *et al.* (1998) tried to relate consumer perceptions of pork quality to physical product characteristics, with results showing that quality expected and experienced diverge and are "only weakly related to objective product characteristics". The same authors highlight the fact that from the producers' perspective, a major constraint is the "translation of consumer demands into technical/physiological product specifications". It is widely acknowledged that to form quality expectations about a food product, consumers use quality cues, either intrinsic or extrinsic. As mentioned before these cues include, amongst others, origin or brand. The use of a PDO label works as a brand, with all the inherent advantages associated with such a marketing tool.

A study undertaken in Denmark has proved that branding can "play a major role in the marketing of differentiated meat products" (Grunert *et al.*, 2004). These authors also argue that meat products can also be differentiated by eating quality, health and convenience, and by process characteristics (such as PDO beef).

Research has examined PDO beef composition in terms of total cholesterol, pH, water-holding capacity, fatty acids profiles, total lipids, amongst others (Alfaia *et al.*, 2003a,b; Huidobro *et al.* 2003; Prates *et al.*, 2006). These objective analyses are often linked to quality attributes, namely sensorial quality and nutritional value.

In the light of these reasoning we can conclude that practices in the farm do influence the final quality of the meat obtained.

The fulfilment of the wants and needs of consumers determines the success or failure of a product in the market place and producers must be involved in this process. The objective should be to make the quality experience that the consumer will have as close

as possible to the expected quality he had prior to product use, or even surpass it. Hence, to minimise the difference between these qualities, efforts should start at the producer level.

Understanding how producers perceive and evaluate quality attributes of beef is crucial for quality assurance throughout the meat chain and for designing quality policies as a whole.

The present work seeks to expand our knowledge concerning quality perception of PDO beef producers. Particularly it intends to assess which attributes producers consider as important/determinant for the quality of their production. There is not, to the best of our knowledge, research on such subject. The literature is vast concerning consumers' perception of beef quality, objective (sensory) quality, and the linkage between these two, but producers' perception of quality has not been given much attention.

Do producers know what practises in the farm influence the final quality of the meat obtained? Do they know what procedures during transportation and slaughter influence the meat produced? Are there differences in the way they form quality perceptions?

The research presented seeks to gain comprehensive understanding on these questions, using factor and cluster approaches. The first objective was to investigate what attributes, at the farm and at the slaughterhouse levels, producers considered more important to obtain a quality product. The second objective was to identify differences between producers in their evaluation and try to explain these differences.

Sample and data collection

This research was undertaken in straight collaboration with the Private Organisation for Control and Certification (OPC) which made available a list of 105 PDO producers of "Carnalentejana" and 133 of "Carne Mertolenga" in 2003. A sample of 10% was randomly selected from this set of producers. The questionnaires were implemented through a telephone survey that took place in January 2004². Discussions with technicians from both POs, from the OPC, and from the slaughterhouse lead to a final questionnaire design.

The questionnaire included four sections. The first section, dealt with the farm characterisation: localisation, cattle herd and distribution by age, age at slaughter, and land use. The second section, included producers evaluation in terms of importance of several quality attributes at the farm level necessary to have a high quality beef: breed, method of production, feeding, finishing, age at slaughter, transport time length and transport conditions to the slaughterhouse (scale ranging from 1– unimportant to 5 – extremely important). Respondents were also asked to evaluate beef production in *Alentejo* region (scale ranging from 1– fair to 5 – excellent). In the third section, the relationship between producers and the meat processor was appreciated. Producers were asked to indicate the degree of concordance with a series of statements concerning the slaughterhouse (seven-point Likert scale ranging from 1 – totally disagree to 7 – totally agree). Finally, the fourth section included questions related with the entities responsible for the control and certification, producers' organisations and marketing, and if they consider that production and marketing of PDO beef was worth it.

The sample used in the analysis was composed of 23 PDO beef producers, 52% of which producing "Carnalentejana", 39% "Carne Mertolenga" and 9% producing both. Of those interviewed 30% also produced undifferentiated meat and 39% produced other

animal species (pork, goat and particularly sheep). Farms in this sample have, on average, an area of 190 ha, breeding heard of 112 heads and normally slaughter their animals at the age of 12-18 months. This was the most mentioned slaughter age class (61%), followed by the age class of 18-24 months (48%), then 6-12 months (35%) and, finally, up to 6 months (17%)³.

Taking into account that this is an exploratory analysis with a small number of producers in the sample, due to cost and time restrictions, though representing approximately 10 per cent of the total number of PDO beef producers in *Alentejo* region, the results are only illustrative. However, results are quite interesting and can be used as a starting point for further research.

Analysis and results

The main question to be addressed was how do PDO beef producers perceive and evaluate the quality attributes at the farm level and which technological factors influence them the most.

Data was analysed using factor and cluster techniques in two stages. Factor analysis was used to obtain key factors of quality attributes for both farm and slaughterhouse levels. Using cluster analysis, groups of PDO beef producers were identified, based on the factors previously obtained. The profile of these groups was based not only on those factors but also on original ratings and other variables, such as characteristics of the farm and producers' evaluation of PDO beef quality. It should be highlighted that as the sample is small, results can never be highly robust. Some authors (Hair *et al.*, 1992) pointed out that with small samples and low ratios observations to variables (in this case we have a ratio of 3:1) any findings should be interpreted cautiously. Nevertheless, it was considered that they allow shedding some light on an interesting field of research for future work.

Quality attributes at the farm level

The respondents were asked to evaluate in terms of importance a series of quality attributes at the farm level (Table 1). Results suggest that within the quality attributes at the farm level, feeding and finishing (those intrinsic to the farm), were considered by respondents as the most important ones. On the other hand, transport time length, transport conditions, and breed (those extrinsic to the farm) were considered as the less important ones.

In order to better understand the importance score given to these different attributes at the farm level, the scores were subject to factor analysis. A total of three factors were identified with eigenvalues exceeding 1, which accounted for 78.7% of the variance in importance scores across the 7 items presented to the respondents (Table 1).

These factors can be interpreted as follows:

Factor 1: The attributes that contribute the most to this factor are transport time length, transport conditions and the fact of being a PDO beef product. Therefore, this suggests that this factor is associated with the post-production attributes at the farm level.

Factor 2: The items that loaded most heavily on this factor – feeding, finishing and slaughter age – are directly associated with the on-farm production and are those upon

which the farmer has a higher capacity to influence and intervene.

Factor 3: This is a trivial factor where breed is the unique attribute identified, a pre-production attribute, considered as distinct from the others.

Results suggest that respondents differentiate the above seven attributes and group them in three distinct factors: pre, post and on-farm production. It should be highlighted that attributes included in factor 2, those considered as more important, are the ones more directly controlled by farmers and over which they have good knowledge. On the other hand, the attributes included in factor 1, considered as less important by the respondents, are those upon which the farmer has lower capacity to intervene.

Table 1. Factor loadings for importance scores on quality attributes at the farm level

<i>Attribute</i>	<i>Mean Score</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>h²</i>
Breed	3.65	-0.001	0.040	0.945	0.895
Feeding	4.17	-0.023	0.808	0.349	0.777
Finishing	4.04	0.293	0.756	0.075	0.664
Age at slaughter	3.65	0.221	0.834	-0.359	0.872
Transport conditions	3.30	0.889	0.054	-0.127	0.809
Transport time length	3.26	0.931	0.158	-0.044	0.894
PDO	3.74	0.633	0.288	0.337	0.597
Eigenvalue		2.864	1.464	1.181	
Variance (%)		31.359	29.026	18.307	
Cumulative variance (%)		31.359	60.385	78.692	

Bartlett's test for sphericity: $\chi^2_{21} = 63.424$ ($< 0,000$).

Kaiser-Meyer-Olkin measure of sampling adequacy: KMO = 0.515.

Loadings were derived for each of these factors using a varimax rotation.

Table 2. Factor loadings for concordance degree on slaughterhouse statements.

<i>Statements:</i>	<i>Mean Score</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>h²</i>
<i>The slaughterhouse has</i>				
Specialized technicians	5.96	0.329	0.832	0.801
High level of organisation	5.48	0.348	0.734	0.660
Correct carcass classification	5.39	-0.069	0.795	0.637
High sanitary level	5.65	0.795	0.181	0.664
Correct ageing time	5.17	0.741	0.211	0.594
Correct cutting techniques	5.13	0.857	0.234	0.788
Correct chilling conditions	5.09	0.936	0.023	0.877
Eigenvalue		3.025	1.995	
Variance (%)		43.213	28.500	
Cumulative variance (%)		43.213	71.713	

Bartlett's test for sphericity: $\chi^2_{21} = 78.194$ ($< 0,000$).

Kaiser-Meyer-Olkin measure of sampling adequacy: KMO = 0.609.

Loadings were derived for each of these factors using a varimax rotation.

Quality attributes at the slaughterhouse level

Another objective of the survey was to understand the relationship between producers and meat processors and how they perceive or evaluate the slaughterhouse where their animals were processed. Results presented in Table 2 show that statements which obtained the higher degree of concordance are, the slaughterhouse has “specialised technicians” and “high sanitary level”, whilst those that show the lowest degree are “correct chilling conditions”, “correct cutting techniques” and “correct ageing time”. Factor analysis undertaken with these levels allowed the identification of two factors, with eigenvalues above 1, which explain 71.7% of total variance (Table 2).

We can interpret the results, on the basis of these factor loadings, as follows:

Factor 1: the statements that loaded most heavily on this factor are “correct chilling conditions”, “correct cutting techniques”, “high sanitary level” and “correct ageing time”. This suggests that this factor is associated with the technology used in the slaughterhouse.

Factor 2: the statements “specialised technicians”, “high level of organisation” and “correct carcass classification” are identified in this factor, suggesting that it is associated with management of the slaughterhouse.

The statements identified in factor 2 were the ones with an overall higher degree of concordance by the respondents. This might be explained by the fact that producers evaluate these statements more easily than those associated with the technology used in the slaughterhouse. As previously mentioned, animal transport and slaughter are, at present, ensured by the Producers’ Organisations, as it is their responsibility. Hence, the knowledge that producers may have, on an individual basis, at this level depends upon their own interest.

Clusters of PDO beef producers

The K-means cluster analysis technique was used to identify groups of PDO beef producers according to their evaluation and attitude towards quality. Using the five factors above mentioned, three at the farm level and two at the slaughterhouse level, three clusters were obtained (Table 3).

Cluster 1: with approximately 35% of respondents, with positive values for all factors, therefore with values above the sample average, designated here as the *Optimists*,

Table 3. Cluster means for farm level and slaughterhouse factors.

<i>Factor</i>		<i>Cluster 1</i>	<i>Cluster 2</i>	<i>Cluster 3</i>	<i>F-value</i> ⁽¹⁾	<i>p-value</i>
Farm level	Post production	0.44570	0.13946	-0.56772	2.432	.113
	On-farm	0.98075	-0.57064	-0.48144	11.629	.000
	Pre production	0.25731	-1.02133	0.63635	10.130	.001
Slaughterhouse	Technology	0.18049	-0.60169	0.34599	2.056	.154
	Management	0.81613	-0.06363	-0.76045	8.308	.002
Number of respondents		8	7	8		
Percentage of respondents (%)		34.78	30.44	34.78		

Method: K-means cluster.

⁽¹⁾ F_{2,20}.

valuing above all on-farm production attributes and evaluating more positively the management conditions at the slaughterhouse.

Cluster 2: with approximately 30% of respondents, with negative values for almost all factors, designated as the *Pessimists*, attributing a level below average to breed (pre-production attributes) and to on-farm production attributes, and evaluating technology statements below average.

Cluster 3: with approximately 35% of respondents, they show either negative or positive values, designated as *Flyers*, attributing higher importance to pre-production factor and less to the others. They show a concordance degree above the sample average on technology statements, and below on management statements.

Attributes at the farm level, like feeding and finishing identified on factor on-farm production (factor 2), were the items with higher mean scores. The cluster means for this factor are statistically different, and allow us to conclude that *Optimists* give more value to these attributes than the remaining respondents. The importance of the breed attribute in meat quality (trivial factor 3) also shows statistically significant differences between clusters: *Pessimists* attributing a low value and *Flyers* a higher value. At the end of the importance scale, transport conditions and time length of transport, identified in factor post-production (factor1), do not show significant differences amongst respondents, though they are consensual in terms of its influence on the meat quality.

At the slaughterhouse level, technological aspects (factor 1), such as “chilling conditions”, “cutting techniques” and “ageing time”, with, on average, a lower degree of concordance, are also consensual amongst respondents. This can be explained by the fact that producers’ knowledge on slaughterhouse technology is not very good and their responses tend to concentrate in the middle of the scale. On the other hand, the statements identified with factor management of the slaughterhouse (factor 2), show differences between respondents: higher degree of concordance for *Optimists* and lower for *Flyers*.

In order to verify if there were differences or similarities between respondents, mean cluster values for some farm characteristics were calculated (Table 4).

Table 4. Farm characteristics by clusters.

<i>Farm characteristics</i>	<i>Cluster 1 Optimists</i>	<i>Cluster 2 Pessimists</i>	<i>Cluster 3 Flyers</i>	<i>Total</i>	
“Mertolenga” Breed	0.50	0.71	0.63	0.61	
“Alentejana” Breed	0.75	0.29	0.38	0.48	
Also with undifferentiated beef	0.13	0.29	0.50	0.30	
Cattle herd (heads)	105	102	128	112	
Sale	Up to 6 months	0.13	0.14	0.25	0.17
	6 to 12 months	0.13	0.57	0.38	0.35
	12 to 18 months	0.63	0.71	0.50	0.61
	18 to 24 months	0.50	0.43	0.50	0.48
Other animal species	0.38	0.14	0.63	0.39	
Area	146.6	135.9	292.0	189.4	

Although an exploratory analysis, we can see that *Optimists* is mainly composed by “Carnalentejana” producers (75%), on average with 100 heads and an area of 150 ha. Slaughter age is normally between 12 and 24 months. *Pessimists*, is mainly characterized by “Carne Mertolenga” producers (71%), with an average heard of the same size as the previous cluster, with a low number of respondents producing other animal species and with an average area of 135 ha. The most frequent slaughter age is between 6 and 18 months. Lastly, cluster 3 named as *Flyers*, is mainly formed by respondents that simultaneously produce PDO beef, generally “Carne Mertolenga”, and undifferentiated meat. On average, are also characterised by a higher heard (130 heads), with other animal species and a significantly higher area (290 ha). The slaughter age shows a higher dispersion than for the other clusters and is worth mentioning that a quarter of respondents sell the animals at weaning.

Finally, respondents were asked to evaluate the quality of the meat produced in Alentejo region and the performance of the OPC. They were also asked if they consider the production and marketing of PDO beef as worth it.

Differences between clusters were only statistically significant on the evaluation of the OPC performance. However, the *Optimists* give a higher score to the quality of beef produced in Alentejo region and to the OPC performance. *Pessimists*, attributing a lower classification to the quality of the beef produced in the region and to the OPC performance, are, nevertheless, the ones that consider the production of PDO beef as most worth it (86%). Lastly, *Flyers* producers are the ones that consider least worth it the production of PDO beef (63%). *Pessimists*, though evaluating below the average all the attributes, unexpectedly evaluated PDO production as worth it. This can be explained by the fact that if they didn't consider it, they should be *flying* to undifferentiated meat, and therefore they would be included in cluster 3.

Concluding remarks

Results given should be interpreted with some reservation since the analysis undertaken is exploratory. With a small number of producers in the sample, results are only illustrative, though representing 10% of the total number of PDO beef producers in Alentejo region. The small sample size was clearly a constraint but could be outweighed by the interesting and highly elucidating results concerning the producers' quality perceptions. Moreover this is an area of research that has not been given too much thought.

The results previously mentioned show that on-farm production attributes were given the highest scores in importance terms. Management attributes received the higher degree of concordance, as they might evaluate these statements more easily than technological ones.

Several authors (Caswell, 2001; Grunert *et al.*, 2004; Grunert, 1997) in the literature show that beef consumers look for particular intrinsic attributes, some of them directly related with on-farm procedures (feeding, finishing...). This same perception is understood by producers as these are given the highest scores in importance terms. So, at the first stage of the beef chain, it will be easy to guarantee that the attributes important for consumers are satisfied. However, it should be stressed, that co-responsibility throughout the whole chain is necessary to ensure quality.

The analysis showed a division between producers of PDO beef in Alentejo region:

Optimists, *Pessimists* and *Flyers*, with different attitudes and motivations. As expected, producers are mainly distinguished by their evaluation on on-farm than on slaughter attributes, as they are more familiar with the procedures at the farm level (than at the slaughterhouse). Farm characteristics do not seem to differentiate the groups. Instead these are distinguished by the organisational framework in which they are involved.

Belonging to a well-established and very well organised producers association in terms of production, slaughter and marketing, producers of “Carnalentejana” can be more *Optimists*, as the communication flows and standards required are defined from early stages of production. These producers believe that this is the way to be in the market in order to achieve their objectives.

On the other hand, producers’ organisation of “Carne Mertolenga” is at an earlier stage of its development, therefore producers are *Pessimists* as they are suspicious about all considered attributes. These producers still deal with some difficulties concerning market relations, price variability, amongst others. *Flyers* hesitation can be explained by these aspects, therefore, it is not surprising that there is a group of “Carne Mertolenga” beef producers that, in the short run, “fly” between being PDO producers or not.

Understanding how producers perceive and evaluate quality attributes of beef is crucial for quality assurance throughout the meat chain and for designing quality policies as a whole.

Note

- ¹ Throughout the text this will be referred to as OPC, which stands for “Organismo Privado de Controle e Certificação”.
- ² The telephone survey was undertaken by the OPC. This method was chosen as it is a relatively inexpensive way of collecting data from agricultural producers and is a technique usually followed by the OPC in similar studies.
- ³ More than one possible answer.

References

- Alfaia, C.M.M.; Ribeiro, V.S.S.; Quaresma, M.A.G.; Portugal, A.P.; Bessa, R.J.B.; Castro, M.L.F. and Prates, J.A.M. (2003a) Biologically Active Fatty Acids in Bovine Meats from Intensive Feeding Systems and Carnalentejana – PDO, a Portuguese Meat with Protected Denomination of Origin. 49th International Congress of Meat Science and Technology, 2nd Brazilian Congress of Meat Science and Technology, Brazil.
- Alfaia, C.M.M.; Ribeiro, V.S.S.; Quaresma, M.A.G.; Portugal, A.P.; Bessa, R.J.B.; Castro, M.L.F. and Prates, J.A.M. (2003b) A Comparison of Conjugated Octadecadienoic Isomers in Portuguese Beef from Intensive and Traditional (Carnalentejana – PDO) Production Systems. 49th International Congress of Meat Science and Technology, 2nd Brazilian Congress of Meat Science and Technology, Brazil.
- Antle, J.M. (1999) The New Economics of Agriculture. *American Journal of Agricultural Economics* 81, 993-1010.
- Barreira, M. M.; Duarte, M. F. (1997) An Analysis of Changes in Portuguese Meat Consumption. In B. Wierenga *et al.* *Agricultural Marketing and Consumer Behaviour in a Changing World*. Kluwer Academic Publishers. Dordrecht, The Netherlands, 261-273.

- Barreira, M. M.; Vicente, S. (2001) Os efeitos da BSE na procura de carne em Portugal. In Barreira, M. M. and Jorge, R. *Agricultura, Economia e Sociedade, Ensaios de Homenagem ao Professor Fernando Estácio*, IFADAP, Lisboa, 131-152.
- Bech, A. C.; Grunert, K.G.; Bredahl, L.; Juhl, H.J. and Poulsen, C.S. (2001) Consumers' Quality Perception, In L. J. Frewer; Risvik, E. and Schifferstein, H. *Food, People and Society. A European Perspective of Consumers' Food Choices*. Springer.
- Bernués, A., Olaizola, A. and Corcoran, K. (2001). Importance of Extrinsic Attributes of Red Meat as Indicators of Quality in Europe. 71st EAAE Seminar, April 18-20, 2001, Zaragoza, Spain.
- Bredahl, L., Grunert, K.G. and Fertin, C. (1998) Relating Consumer Perceptions of pork Quality to Physical Product Characteristics. *Food Quality and Preference*, 9 (4), 273-281.
- Caswell, J. A. (2001) Food Safety and the U.S. Consumer. 71st EAAE Seminar – The Food Consumer in the Early 21st Century, Zaragoza, Spain.
- Cox, D.F. (1962) The measurement of information value: A study in consumer-decision making. In W.S. Decker (ed.), *Emerging concepts in marketing*. Chicago: American Marketing Association.
- Duarte, M. F.; Mansinho, M. I. and Barreira, M. M. (2001) A percepção da qualidade pelos consumidores numa perspectiva económica: o caso da maçã. Communication presented in Seminário da Associação Portuguesa de Horticultura. Qualidade da Fruta e dos Legumes na Perspectiva dos Consumidores, Lisboa.
- GPPAA (2003) *Portuguese Agriculture. Main Indicators*. Gabinete de Planeamento e Política Agro-Alimentar. Ministério da Agricultura, do Desenvolvimento Rural e das Pescas, Lisboa.
- Grunert, K.G. (1997). What's in a steak? A cross-cultural study on the quality perception of beef. *Food Quality and Preference*, 8 (3), 157-174.
- Grunert, K.G.; Bredahl, L. and Brunso, K. (2004) Consumer perception of meat quality and implications for product development in the meat sector – a review. *Meat Science*, 66, 259-272.
- Hair, J.F. Jr, Anderson, R.E., Tatham, R.L. and Black, W.C. (1992) *Multivariate Data Analysis with Readings*. 3rd Edition, Macmillan Publishing Company.
- Huidobro, F.R., Miguel, E., Onega, E. and Blázquez, B. (2003) Changes in meat quality characteristics of bovine meat during the first 6 days post mortem. *Meat Science* 65, 1439-1446.
- IDRHa (2004) *Evolução dos Produtos Tradicionais com Nomes Protegidos (Produção, Valor da Produção, Índices de Quantidades, Preços e Valores) 1997 a 2001*. IDRHa – Direcção de Serviços de Planeamento; Divisão de Estudos Planeamento e Prospectiva, Ministério da Agricultura, Desenvolvimento Rural e Pescas.
- IDHRA (2007). “Produtos tradicionais com nomes protegidos.” Instituto de Desenvolvimento Rural e Hidráulica.
- IDHRA (2006). “Produtos tradicionais com nomes protegidos.” Instituto de Desenvolvimento Rural e Hidráulica.
- INE (2001) *Estatísticas Agrícolas*. Instituto Nacional de Estatística, Lisboa.
- Kinsey, J. (1993) GATT and the economics of food safety. *Food Policy*, 18 (2), 163-176.
- Lagrange, L. (1995) *La commercialisation des produits agricoles and alimentaires*. 2e édition, Technique and Documentation- Lavoisier.
- Mansinho, M. I. and Barreira, M. M. (2001) Compra e consumo de maçã: práticas, motivações, critérios de escolha. In Barreira, M. M. and Jorge, R. *Agricultura, Economia e Sociedade, Ensaios de Homenagem ao Professor Fernando Estácio*, IFADAP, Lisboa, 323-335.
- Meulenbergh, M.T.G. and Viaene, J. (2000) Changing food marketing systems in western coun-

- tries. www.sls.wau.nl/menm/innovation/snacks/macrotrends
- Nute, G. R. (1999) Sensory assessment of poultry meat quality, In R. I. Richardson and G.C. Mead, *Poultry Meat Science*, CAB International.
- OCDE (1999) Qualité et sécurité alimentaires. Les dimensions commerciales. OCDE, Paris. Prates, J.A.M.; Quaresma, M.A.G.; Alfaia, C.M.M. and Castro, M.L.F. (2003) Total Lipids and Total Cholesterol in Carnalentejana – PDO, a Portuguese Beef with Protected Denomination of Origin. 49th International Congress of Meat Science and Technology, 2nd Brazilian Congress of Meat Science and Technology, Brazil.
- Prates, J.A.M.; Quaresma, M.A.G.; Bessa, R.J.B.; Fontes, C.M.G.A. and Alfaia, C.M.M. (2006) Simultaneous HPLC quantification of total cholesterol, tocopherols and β - carotene in Barrosã – PDO veal, a Portuguese meat with Protected Designation of Origin. *Food Chemistry*, 94, 469-477.
- Ritson, C. (1988) *Agricultural Economics. Principles and Policy*. 5th Edition, BSP Professional Books.
- Senauer, B. (2001) The Food Consumer in the 21st Century: New Research Perspectives. 71st EAAE Seminar – The Food Consumer in the Early 21st Century, Zaragoza, Spain.
- Sornay, J. (1993) Qualité de la matière première et sa transformation chez les bovins. In: Viande et produits carnés, 17-20.
- Swinbank, A. (1993) The economics of food safety. *Food Policy*, 18(2), 83-94.
- Tregear, A.; Moxey, A. and Kuznesof, S. (1997) Marketing of Regional Foods: A Policy Perspective. AES Annual Conference, Edinburgh.
- Wandel, M. and Bugge, A. (1996) Environmental concerns in consumer evaluation of food quality. *Food Quality and Preference*, 8 (1): 19-26.