

# The importance of intrinsic and extrinsic cues to expected and experienced quality: an empirical application for beef

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## Abstract

This study explains how consumers form in-store expectations about beef quality, and how these insights can help us to determine optimum levels of beef quality. Consumers infer the quality of beef on the basis of intrinsic (colour, freshness and visible fat) and extrinsic (price, promotion, designation of origin and presentation) quality cues. During consumption consumers evaluate experienced quality based on expected quality and quality attributes such as taste, tenderness and juiciness, confirming or disproving their previously formed expectations. Expected quality is a partial predictor of experienced quality, which confirms the importance of sensory perception at the time of consumption. © 2000 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

Cue utilisation in product perception is viewed as complex information processing. It involves a process of making inferences about products from cues available in the sales outlet. Of particular relevance in the case of beef is the identification of the cues currently used by consumers to evaluate quality, as well as the relative importance assigned to each. Based on the research dealing with quality perception (Steenkamp, 1987, 1989, 1990; Steenkamp, Wierenga & Meulenberg, 1985; Wierenga, 1982), as well as its implications for beef (Grunert, 1997; Grunert, Baadsgaard, Larsen & Madsen, 1996; Steenkamp & Van Trijp, 1996), we have devised a model that attempts to understand how consumers form expectations about beef quality and use them to optimise perceived beef quality. Other research on beef has been done by Audenaert and Steenkamp (1997) and ter Hoefstede, Audenaert, Steenkamp and Wedel (1998). These studies form a part of an important stream of research using the means-end chain perspective,

and they point the way toward adopting more qualitative insights based on means-end chain theory.

This paper will first outline the theoretical approach that was used; afterwards, it will offer an analysis of our model and hypothesis.

## 2. Previous research on quality

From a theoretical point of view, products can be conceived as an array of product-related cues. Each cue provides a basis for developing various impressions of the product itself (e.g. Darwar & Parker, 1994; Jacoby, Olson & Haddock, 1971; Richardson, Dick & Jain, 1994; Zeithaml, 1988). Although several definitions of quality have been proposed in the literature, many of them are variants and derivations of the following philosophy: provide characteristics that the consumer desires (Maynes, 1976), which must be relevant to perceived quality judgements. Therefore, given that technical product specifications are responsible for objective quality (Grunert, 1995), the goal has been to improve the physical food product, based on the demands of the consumer; in other words, this entails linking objective quality with consumers' perceptions.

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As a result of this philosophy, Steenkamp and Van Trijp (1996) have formulated the concept of Quality Guidance (Steenkamp & Van Trijp, 1989a) that allows the improvement of the physical food product, based on the demands of consumers. By relating physical product characteristics to consumer quality judgements, companies can identify those aspects of the product that contribute most to high quality (Steenkamp & Van Trijp, 1996). They applied this philosophy to the case of beef. The main results of their study can be summarised as follows:

- Expected quality increases with perceived attractiveness of appearance and freshness and decreases with the amount of visible fat.
- The presence of fat has a negative impact on quality expectations and a positive impact on quality experience.
- Quality performance increases as tenderness becomes greater and decreases as the amount of non-meat components increase. Flavour did not exert a significant effect.
- There is no significant relationship between quality expectation and quality performance.

It should also be mentioned that this framework has been broadened by Poulsen, Juhl, Kristensen, Bech and Englelund (1996), with the inclusion of Quality Formation, in which it is demonstrated that overall quality is the result of both expected and experienced quality. Bredahl, Grunert and Fertin (1998) have also applied this user-oriented quality philosophy. The product in this case was pork. Bredahl et al. (1998) demonstrate that expected and experienced quality diverge widely and are not closely related to objective characteristics. It is therefore clear that the understanding of the relationships between expected and organoleptic characteristics through intrinsic quality cues is the key to a better understanding of how consumers form expectations.

As we have explained, Steenkamp and Van Trijp (1996) study the perception of organoleptic characteristics by measuring the impact on quality expectations and quality performance through intrinsic quality cues and quality attributes. In our study:

- The study has been taken from a real life situation, in which consumers evaluated quality of beef at two different moments: at the moment of purchase, based on a visual impression, and at the moment of eating through a sensory impression.
- Not only have we examined the importance of intrinsic quality cues on the expectation formation process, but we have also checked the impact of extrinsic cues.

The present study can be seen as an extension of the earlier research.

### 3. The present study

#### 3.1. The model: perception of quality for beef (PQB)

The model is based on the work of Wierenga (1982), which tried to identify all the dimensions that were directly related to the use of quality cues in the evaluation process for a given food product category. For this reason, we have included all the dimensions that can be important and relevant for consumer perception. It represents an extension of the psychological food quality perception process explained by Steenkamp (1987, 1990) and Grunert et al. (1996), and it has been broadened to include the perception of quality for beef. In fact, Steenkamp (1990) makes a distinction between quality cues and quality attributes and the further distinction between expectation and consumption experience, also called quality performance (Steenkamp & Van Trijp, 1996). It is possible to identify quality cues used by consumers to infer quality. The model is very straightforward; it includes all the relevant concepts and explains the formation of the most important constructs: expected quality and experienced quality. In order to identify perceived quality cues and quality attributes, we have based our study on existing research and two focus groups consisting of consumers, who regularly bought, prepared and ate beef.

Furthermore, interviews with sector experts such as butchers and vets helped us to identify all the intrinsic quality cues and the organoleptic characteristics. All of these are specified on the left side of the model.

Consumers form their impressions about expected quality for beef while still in the sales outlet. These expectations are based on available intrinsic and extrinsic cues (Jacoby et al., 1971; Olson & Jacoby, 1972; Steenkamp, 1990). The terminology is, therefore, not easily rendered; and to understand these concepts some brief definitions have been provided.

##### 3.1.1. Organoleptic characteristics

The technical product specifications are the physicochemical characteristics of the product. In our case, vets identified the following as being relevant: pH, intramuscular fat, blood splashes, and water binding. Other authors (Wierenga, 1982) call them the organoleptic characteristics, which determine the objective meat quality (Grunert, 1995).

##### 3.1.2. Intrinsic quality cues

Characteristics that are part of the physical product, which cannot be changed without also changing the physical product itself (Olson, 1977; Olson & Jacoby, 1972). Intrinsic quality cues are related to technical specifications, which also involve physiological characteristics. Relevant intrinsic cues that unequivocally define a given category of beef include origin — although for

other products this cue can be regarded as extrinsic (Grunert et al., 1996) — , race, sex, texture, animal age, colour, visible fat and cut of the meat. Most of these cues are largely unperceived by consumers, either because they are ignored or because such information is not provided.

### 3.1.3. *Extrinsic quality cues*

Characteristics that are related to the product, but are not physically part of it (Olson, 1977) such as price, brand name, place of origin, type of outlet, presentation, influence of store personnel, promotion, packaging, advertising, are determined by marketing efforts (Steenkamp, 1989).

In addition, we have differentiated between intrinsic/extrinsic quality cues and perceived intrinsic/extrinsic quality cues because consumers do not perceive some of these cues which can be indicators of quality. For example, the cut is a very important cue — as a butcher explained to us in the qualitative research — yet the consumer is unable to perceive it. Another example is breed. Breed is another important cue that provides consumers with added value; yet it cannot be perceived by consumers unless some information has been provided. Grunert et al. (1996) has also used this terminology in the TFQ model (1996). Based on the results of the focus group and the existing research related to buying beef, three perceived intrinsic quality cues were selected: colour, freshness and visible fat; and five perceived extrinsic quality cues: price, promotion, store image, presentation and designation of origin.

### 3.1.4. *Expected quality*

Quality expectations at the point of purchase are the product of both perceived intrinsic and extrinsic quality cues. They are the result of visual impressions based on perceived intrinsic and extrinsic cues.

### 3.1.5. *Experienced quality*

Experienced quality is the result of sensory evaluation of the product at the moment of eating. The criteria for evaluating prepared meat differ from those for evaluating expected quality. Meat cannot be completely evaluated until after it is prepared and eaten. We have identified the following determining factors for evaluating experienced quality: tenderness, taste, and juiciness. These are vital in evaluating the experienced quality of many food products that have been prepared and cooked (Morgan, 1993).

### 3.1.6. *Quality attributes*

The cues used by consumers to infer experienced quality. Quality attributes — also called quality criteria by Grunert et al. (1996) — are the functional and psychological benefits or consequences provided by the product (Steenkamp, 1990), and they are unobservable

prior to consumption. Prior to consumption, benefits are unknown. Consumers cannot rate the product on the quality attributes as they can only ascertain them at the moment of consumption. For this reason, consumers, at the sales outlet, will use quality cues in choosing between alternatives (Steenkamp, 1989, 1990).

The results are relatively consistent. Four quality attributes, tenderness, taste, juiciness, and freshness have been detected in the majority of studies (Bredhal et al., 1998). Although these quality attributes have been recently supplemented by health, nutrition and wholesomeness (Grunert et al., 1996), in our study we have only included the hedonic dimension of experienced quality and these dimensions have not been included in our model. According to consumers, the following attributes are relevant: tenderness, taste and juiciness. These are the attributes used by USDA (Miller, Topel & Rust, 1976) to measure the grades of beef.

Zeithaml (1988) observed that consumers tend to evaluate products based on intrinsic cues at the time of purchase (Cox, 1962), or when the predictive value of intrinsic cues is high (Darden & Schwinghammer, 1985; Etgar & Malhotra, 1978). However, when objective quality is difficult to evaluate (as it is in the case considered here), or the knowledge needed to evaluate intrinsic cues is lacking, they will also use extrinsic cues (Sawyer, Worthing & Sendak, 1979). Therefore, the most important extrinsic quality cues have been analysed according to this framework.

## 3.2. *Explanation of extrinsic cues*

### 3.2.1. *Price*

There have been many studies in which the influence of price as a reliable indicator of quality has been analysed and contrasted (see Olson, 1977, for a complete review of literature). Price appears as a relevant cue when consumers do not have adequate information about intrinsic quality cues, or when it is the only available cue (Zeithaml, 1988). Although in several studies the association between price and perceived quality is not pronounced, varying greatly according to products and individuals (Gardner, 1970), most of studies have found that price and quality are positively related (Dodds, Monroe & Grewal, 1991; Rao & Monroe, 1989). Therefore, the price has a positive influence on expected quality. The greater the price, the greater the expected quality.

### 3.2.2. *Promotion*

The way in which different distribution outlets promote a given product can make consumers perceive the same product in a different way, depending on whether it is placed on special offer or not. We have included the promotion — whether it is a special offer — as an extrinsic cue that can be used by the consumer to infer

beef quality. As we explained above, the price exerts a positive influence on expected quality, but the special offer — prices below actual price — is associated with less quality.

### 3.2.3. Brands and designation of origin

Spanish law defines *designation of origin* as: “a guarantee that the product conforms to certain specified conditions of geographic origin, identity, homogeneity and reference.” Some previous research has supported the effects of brand names on the perception of product quality (Dodds et al., 1991; Gardner, 1970; Jacoby et al., 1971). These results could also be applied to non-brand name products with designations of origin — as with the products examined here (Ternera Gallega [Galician Veal], Ternera de Avila [Veal of Avila], Morucha de Salamanca [Beef of Salamanca], etc.) — since these perform the function of a brand name, i.e. identification, reference, guarantee and personalisation (Kapferer & Thoenig, 1991). It is especially the brand name (here, the designation of origin) that guarantees a certain degree of homogeneity, identity, and reference for subsequent purchases and word-of-mouth communication. As with a brand name, products with a designation of origin also incorporate an idea of quality per se, in the sense that it tells the consumer something about the origin of the product, the company that makes it, and the standards it conforms to.

The consumption of such products as meat causes satisfaction/dissatisfaction, since there is nothing to identify where the meat came from or where the same meat can be bought again. Identification is one of the main functions performed by the designation of origin, in that it reduces the efforts needed to acquire information, simplifies the evaluation of the product at the time of purchase, and reduces the perceived risk (Sodipo, 1994). Other studies of this type (Teague & Anderson, 1995) support the claim that consumer preference for labels and useful information is consistent with research and recommendations which emphasise the value of information in not only reducing perceived risk (Deturck & Goldhaber, 1989), but also in promoting change in buying behaviour and eating habits through consumer education (Mothersbaugh, Herrmann & Warland, 1993). This is the cue used by consumers to perceive the place of origin. For this reason, we put the place of origin as a cue, and the designation of origin as a perceived cue (see Fig. 1).

### 3.2.4. Product presentation

We have identified two ways of presenting meat: freshly cut from the slab and pre-packaged in trays. A key source of information for consumers is the ability to inspect products to be purchased (Tellis & Wernerfeldt, 1987) because consumers can detect quality cues at close range. For this reason, it is expected to be positively

related with expected quality. Otherwise, some consumers showed a certain distrust of pre-packaged meat. This was also one of the findings in the report of the International Beef Quality Audit (Morgan, 1993), which regards current packaging technology as giving meat a worse quality image, with meat from the slab presenting an image of increased freshness and better conservation.

The study has been limited to the phase of beef quality evaluation. This has been the reason why the effects of store image, which do have an influence on the pre-purchase phase, were not included.

## 4. Hypothesis

According to the explained theory, we have formulated the hypotheses to motivate our research.

### 4.1. Hypothesis for expected quality

The main hypothesis was formulated by Zeithaml (1988) and confirmed by Steenkamp (1989) for food products. Zeithaml (1988), using means-end chain theory, has proven that quality is a multidimensional concept that is perceived based on both the intrinsic and extrinsic cues available in the place where the purchase is made. Steenkamp (1989) also confirmed this for food products. Based on this starting point and the previously explained theory, we explained the remaining hypothesis to be tested with the model. Based on the previous research and the study of Steenkamp and Van Trijp (1996) these are the hypotheses:

**H<sub>1</sub>:** The perceived intrinsic quality cues — colour and freshness — exert a positive influence on the expected quality. The visible fat exerts a negative influence on expected quality.

It is interesting to point out that fat enriches tenderness and the organoleptic characteristics, but not from consumers' visual point of view. According to the explanation of the extrinsic cues we have selected, this is the hypothesis we want to demonstrate:

**H<sub>2</sub>:** The perceived extrinsic quality cues — price, promotion, presentation, and brands or designation of origin — exert a very substantial influence on expected quality.

**H<sub>21</sub>:** The higher the prices, the higher the expected quality.

**H<sub>22</sub>:** The effect of promotion-prices below actual price- exerts a negative influence on expected quality.

**H<sub>23</sub>:** The brands or designation of origin exerts a positive influence on the expected quality.

**H<sub>24</sub>:** The presentation in trays exerts a positive influence on the expected quality.

### 4.2. Hypothesis for experienced quality

Upon consumption, the consumer can ascertain the

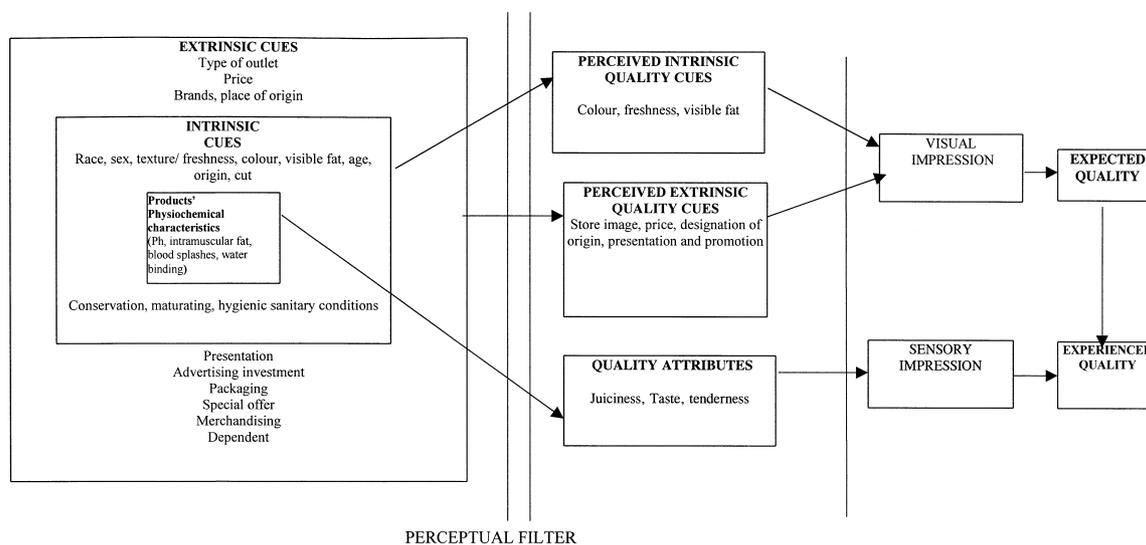


Fig. 1. PQB model: perception of quality for beef. Source: own elaboration based on Wierenga (1982).

true quality of beef. As has been explained, quality will be inferred by quality attributes such as juiciness, taste and tenderness. Moreover, expected quality will exert an important effect on experienced quality. Purchase depends on consumers' expectations regarding the product's ability to satisfy their needs, which is determined at the time of consumption, when these expectations are either met or not met. Therefore, the hypothesis is as follows:

**H<sub>3</sub>:** Experienced quality will be influenced positively by expected quality and quality criteria: juiciness, tenderness and taste.

## 5. Methodology

### 5.1. Quantitative research: sampling, questionnaires and data panel

#### 5.1.1. Sampling

After the qualitative research, the review of existing research and expert interviews, we selected a panel of 239 households from La Coruña. Using probability sampling, the sample units were selected randomly. Within probability sampling, our procedure for selecting the sample can be classified as multistage, since it was necessary to proceed by stages and then stratify according to type of habitat, age and size of household with proportional allocation. These are the criteria used by the Ministry of Agriculture, Fishing and Food (MAPA) for these kinds of studies. It was necessary to delete those units that did not fit into the structure of population. Finally, 159 households were selected. A chi-square test was applied to prove that there were not significant differences between the population and the sample. A comparison of the socio-economic and

demographic characteristics of the sample with those of the Spanish Office of Statistics indicated that the sample was representative of the population of La Coruña.

Habitat, age and number of persons living in the home were the socio-demographic variables used to identify the profile of beef consumers. In order to analyse the information, the data collected from the sample chosen were then encoded and tabulated and a database was made from which the empirical study was carried out.

#### 5.1.2. Questionnaires

After the qualitative research, field work was carried out which began with a pre-test given to 30 individuals, followed by a structured personal questionnaire which collected information on consumers' habits when buying beef. Some minor modifications were introduced. The respondents who had the responsibility for buying beef in each home were given a questionnaire that had to be filled in each time they bought a piece of beef. This empirical part of the study was carried out in a period from 30/3/97 to 5/5/97. The questionnaire listed all the variables included in the study; these are explained in Table 1. The quality of the beef was rated at three different times: expected quality (perceived quality at the time of purchase), perceived quality at the time of cooking, and experienced quality (perceived quality at the time of eating). Each household evaluated expected quality of each piece of beef that had been bought. When this same piece of beef was prepared and eaten, the perceived quality at the moment of cooking and eating was also rated. The criteria for evaluating the experienced quality were juiciness, taste and tenderness. We obtained 962 valid observations and the data were placed in a matrix of 962 rows corresponding to the responses of the individuals, and 13 columns representing the variables used in the analysis (Table 1).

Table 1  
Selected variables and types of scales

Variable	Scale	Transform into dummy	Categories
Colour <sup>a</sup>	Interval scale		1. Dark-coloured 2. Red-coloured 3. Pink-coloured 4. Light-coloured
Freshness <sup>b</sup>	Interval scale		1. Not fresh 2. Not very fresh 3. Fresh 4. Very fresh
Visible fat <sup>c</sup>	Interval scale		1. No fat 2. Little 3. Normal 4. Very much
Price <sup>d</sup>	Interval scale		In thousand of ptas
Promotion <sup>e</sup>	Categorical	✓	1. The meat bought by consumer was on special offer 0. The meat bought by consumer was not on special offer
Designation of origin <sup>f</sup>	Categorical	✓	1. The meat had the designation of origin (Terrerera Gallega specific appellation) 0. The meat had not the designation of origin (Terñera Gallega specific appellation)
Presentation <sup>g</sup>	Categorical	✓	1. In trays 0. Cut
Juiciness <sup>h</sup>	Interval scale		1. Not juicy 2. Little juicy 3. Juicy 4. Very juicy
Taste <sup>i</sup>	Interval scale		1. Not tasty 2. Little tasty 3. Tasty 4. Very tasty
Tenderness <sup>j</sup>	Interval scale		1. Very tough 2. Tough 3. Tender 4. Very tender
Expected quality <sup>k</sup>	Interval scale		From 0 (very poor quality) to 10 (excellent quality)
Perceived quality at the moment of cooking <sup>l</sup>	Interval scale		From 0 (very poor quality) to 10 (excellent quality)
Experienced quality <sup>m</sup>	Interval scale		From 0 (very poor quality) to 10 (excellent quality)

<sup>a</sup> Colour: the colour perceived by consumers at the moment of buying beef.

<sup>b</sup> Freshness: (what butchers defined as "being in good condition").

<sup>c</sup> Visible fat: quantity of fat.

<sup>d</sup> Price: price/kg.

<sup>e</sup> Promotion: the meat was on special offer.

<sup>f</sup> Designation of origin: the meat had the identification (Galician Veal (Terñera Gallega)). It provided the information that the region of origin was Galicia.

<sup>g</sup> Presentation: the two ways to present beef were: in trays and cut from slab.

<sup>h</sup> Juiciness: what consumers perceived just after eating beef.

<sup>i</sup> Tasty: what consumers perceived just after eating beef.

<sup>j</sup> Tenderness: what consumers perceived just after eating beef.

<sup>k</sup> Expected quality: perceived quality at the moment of buying beef.

<sup>l</sup> Perceived quality at the moment of cooking: perceived quality at the moment of cooking.

<sup>m</sup> Experienced quality: experienced quality at the moment of eating beef.

### 5.1.3. Data panel, regression and correlation

Using these data, the validity of these cues as reliable indicators of expected and experienced quality was analysed by means of a multiple linear regression.

The selected variables were measured on a metric scale with proportional or interval scales, otherwise non-metric and categorical variables can be used for both independent and dependent variables. We then converted these into dummy variables with the value 1 if they belonged to a class or category and the value 0 if they did not (Johnston, 1975). Such a conversion was needed in order to check the influence of the presentation in trays, promotion, and designation of origin variables (see Table 1). The relationships described in the preceding sections have been analysed by means of a multiple linear regression, in which the expected quality was used as the dependent variable and colour, visible fat, freshness, price, promotion, designation of origin and presentation the variables used as the independent variables.

In order to analyse experienced quality we have again used a multiple linear regression, with experienced quality at the time of eating as the dependent variable, and taste, tenderness, juiciness and expected quality as independent variables. In both cases the co-linearity was measured. One of the assumptions of multiple regression is that there is no linear relationship between any of the independent variables in the model. If such a relationship does exist, variables are co-linear. A common means of assessing multiple variable co-linearity is by means of tolerance and variance inflation factor (VIF) (Hair et al., 1998). Tolerance is the amount of variability of the selected independent variables not explained by the other independent variables. Thus, very small tolerance values (and thus large VIF values) denote high co-linearity. In order to analyse the consistency in the evaluation of quality at the time of purchase, cooking and eating, we devised a correlation between them.

## 6. Analysis and results

### 6.1. Expected quality

#### 6.1.1. Perceived intrinsic quality cues

The results obtained for a total of 962 observations are shown in Table 2. The values of  $\beta$  are the beta weights or the standardised regression coefficients. As it has been explained, quality is a multidimensional concept that is perceived based on both intrinsic and extrinsic quality cues available in the sales outlet. It is clear that colour ( $\beta=0.080$ ,  $p<0.001$ ), visible fat ( $\beta=-0.165$ ,  $p<0.001$ ), and freshness ( $\beta=0.315$ ,  $p<0.001$ ), as we have hypothesised in  $H_1$ , have a significant influence on expected quality. In other words,

Table 2  
Regression of expected quality on quality cues

Variable	$\beta$	SIG T <sup>a</sup>
(Constant)		0.000
Colour	0.080	0.000 <sup>a</sup>
Freshness	0.315	0.000 <sup>a</sup>
Visible fat	-0.165	0.000 <sup>a</sup>
Price (thousands of ptas)	0.112	0.000 <sup>a</sup>
Promotion	-0.033	0.304
Designation of origin	0.011	0.711
Presentation in trays	-0.125	0.000 <sup>a</sup>
Multiple R	0.464	
R squared	0.215	
R squared (adjusted)	0.209	
Standard error	1.050	

<sup>a</sup> Significant  $p<0.001$ .

fatty meat, darker meat, and less fresh meat are perceived as being of less quality. This result is consistent with the results of the quantitative study carried out by Bello Acebrón, Gómez Arias and Calvo Dopico (1997), in which most consumers preferred pinkish and light-coloured meats (65%) with little or no fat (85%) that were either fresh or very fresh (100%).

#### 6.1.2. Perceived extrinsic quality cues

Furthermore, the results confirm that price (see  $H_{21}$ ) ( $\beta=0.112$ ,  $p<0.001$ ) has a positive effect on expected quality, which indicates that it is used as a quality cue by consumers to infer quality. However, and contrary to our expectations (see  $H_{22}$ ), the fact that the product is on special offer ( $\beta=-0.033$ ,  $p>0.304$ ) is not significant, which suggests that meat on special offer does not significantly affect expected quality. The effect of the *Ternera Gallega* designation of origin (see  $H_{23}$ ) ( $\beta=0.011$ ,  $p>0.711$ ) is not significant. Although our data tell us that this kind of beef has 28% of the market share, this can be explained by a faulty perception by consumers who perceived the existence of this beef even though it was not available at the place of purchase. The results also show that the presentation of meat in trays (see  $H_{24}$ ) has a significant negative effect ( $\beta=-0.125$ ,  $p<0.001$ ). Previous theory emphasises the fact that presentation exerts a positive influence to consumers' perception because consumers can inspect the product prior to purchase. Consumers have an unfavourable perception of the handling and conservation process for meat in trays, as opposed to meat cut fresh from the slab, which was detected in both group meetings.

#### 6.2. Experienced quality

The results (see Table 3) show that the evaluation of experienced quality is largely explained by these cues, both expected quality ( $\beta=0.285$ ,  $p<0.001$ ) and by the

Table 3  
Regression of experienced quality on quality attributes and expected quality

Variable	$\beta$	SIG T
(Constant)		0.000 <sup>a</sup>
Juiciness	0.186	0.000 <sup>a</sup>
Taste	0.301	0.000 <sup>a</sup>
Tenderness	0.266	0.000 <sup>a</sup>
Expected quality	0.285	0.000 <sup>a</sup>
Multiple R	0.794	
R squared	0.630	
R squared (adjusted)	0.628	
Standard error	1.010	

<sup>a</sup> Significant  $p < 0.001$ .

quality criteria with taste ( $\beta = 0.301$ ,  $p < 0.001$ ) and tenderness ( $\beta = 0.266$ ,  $p < 0.001$ ) being more important than juiciness ( $\beta = 0.186$ ,  $p < 0.001$ ).

The overall accuracy of the adjustment is quite good, and a significant part of the evaluation of experienced quality is explained by these variables.

The co-linearity was not found. The VIFs for each regression (expected and experienced quality) were checked and they were always below 5.

#### 6.2.1. Differences between quality judgements

In order to analyse the consistency in the evaluation of quality at the time of purchase, cooking and eating, we devised a correlation in which it was observed that consistency is not absolute, since the correlation between the evaluation of quality at the time of purchase and the time of cooking is 0.69, but only 0.54 between the time of purchase and the time of consumption. There is therefore an important difference between expected and experienced quality. This means that the sensory perception at the time of eating is very important. In fact, the expected quality explains 29% of variance ( $0.54^2$ ) and the additional 34% ( $0.63 - 0.29$ ) of it are explained by juiciness, tenderness and taste.

## 7. Discussion

We have proposed a model of perceived quality for beef (PQB) to understand how consumers form expectations about beef quality and how this issue can help us to address optimum levels of objective quality. Quality is a multidimensional construct that is perceived based on both perceived intrinsic and extrinsic quality cues available in the shop.

As far as expected quality is concerned, the most significant cues are colour, freshness, visible fat, price, and presentation. Most of the results are consistent with the study elaborated by Steenkamp and Van Trijp (1996), although we have based our study on a real life situation and also considered the effects of extrinsic cues on

expected quality. Expected quality increases with perceived attractiveness of appearance and freshness and decreases with the amount of visible fat. Colour in this case produces different effects. In our case, light-coloured meat is preferred over darker meat, while in the study of Steenkamp and Van Trijp the evaluation of a positive appearance increases as redness increases. This same conclusion was reached in a cross-cultural research study carried out by Grunert (1997), in which it was shown that for Spain light-red and light colours are preferred to darker-coloured meats. This is a relevant conclusion because it explains that habits (Bello Acebrón et al., 1997) and experience have a bearing on the formation of consumers' preferences and selection of food products (Steenkamp et al., 1985). Our contribution has been to evaluate the effect of extrinsic cues on expected quality. Price exerts a very positive influence on expected quality, which is a very relevant issue for managerial decisions. These findings were also discovered by Steenkamp and Van Trijp (1989b). In addition, they detected that consumers would pay more for better quality beef and pork. This must be considered for positioning the product in the market, given that consumers could pay a premium on price for better beef quality. Presentation exerts a negative value. It seems that consumers do not have a good perception of the handling and conservation process that go into packaging meat in trays, as opposed to meat cut fresh from the slab, which was explained in both meeting groups. More research is required in this connection. The designation of origin, *Tenera Gallega*, for such a product as beef, incorporates not only intrinsic cue standards (meat must fulfil certain technical criteria: origin, breed, feeding) that not only directly affect the product's purely sensory characteristics, but also symbolic and geographical cues reflecting cultural and ethnic origin and provides information to the consumer about product characteristics; even so, the effect is not significant. We recognise the limitations of our study because this type of meat is not available in many stores (especially in butcher's shops), and the study is limited only to the geographical area of La Coruña.

Insofar as experienced quality is concerned, the cues were expected quality and sensory characteristics (juiciness, taste and tenderness). Expected quality is a key to explaining experienced quality, which gives very satisfactory results consistent with the findings of other studies (Grunert, 1997). We have introduced a measure of quality at the moment of purchase (expected quality) and at the moment of consumption (experienced quality) and measured the influence of expected quality on experienced quality. Consequently, there is part of variance that is shared by two variables. Nevertheless, the expected quality is only a partial predictor of the experienced quality (see Table 3) and a very important part of variance is explained by the sensory characteristics. This

has not been motivated by the consistency in the respondents' judgements because there has been quite a number of respondents that evaluated expected quality very favourably while experienced quality was evaluated in less favourable terms. For this reason, we were able to come up with a very good regression analysis and could explain 63% of variance. Although the same consumer evaluates the same piece of beef twice, these moments are distinct from each other, representing situations in which the piece of beef has really changed. Besides, according to the theory of satisfaction (Grewal, 1996; Poulsen et al., 1996), expected quality has an influence on experienced quality. As we have just explained, expected quality is only a partial predictor of experienced quality, which confirms the importance of sensory perception at the time of eating. Policy recommendations must be focused on giving information to consumers at the place of purchase about the results of experienced quality.

### 7.1. Limitations and further research: a new method to measure expectations

One of the assumptions of regression analysis is that residuals are independent from one observation to the next. We obtained several observations per household and we need to know whether the residuals are correlated. We must recognise a limitation in the study because we would need many more observations per household, at least 15 for each, and there are only 6 (962/159). Nevertheless, we have examined the stability of the parameters in the panel data. We can estimate separate cross-section regressions, with each regression involving  $N$  observations (Pindick & Rubinfeld, 1998). For each observation the cross-section regression would have 159 observations because we have 159 households. Due to the fact both  $\alpha$  and  $\beta$  are relatively constant over cross units, more efficient parameters can be obtained by combining all the data so that one large regression is run with all observations.

Nevertheless, what we want to recognise is the small  $R^2$  in the first equation, which means we must develop a better scale to measure the expectations or change the method to measure this construct. Working with continuous or interval variables, both the maximum likelihood and the unstandardised least squares method (ULS) are suitable procedures normally used for estimating parameters. Because of the very large sample size, we can use a procedure of maximum likelihood available in major structural analysis such as Amos or Eqs for Windows.

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