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What is the Right Labelling Strategy? –  
A Consumer Preference Analysis on the  
Basis of a Conditional Logit Model –**

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## **Interactions between Country-of-Origin, Brands and Food-Safety-Certificates in the Promotion of Beef in Germany – What is the Right Labelling Strategy?**

### **– A Consumer Preference Analysis on the Basis of a Conditional Logit Model –**

**Abstract:** This paper focuses on the deeper analysis of the interaction between Country-of-Origin, QUALITY & SAFETY labels, retailer brands and individual specific data with the target of identifying the best labelling strategies for the GERMAN BEEF market. For this purpose Discrete-Choice-method was applied. The empirical findings have interesting implications with respect to information economics in general, and the signalling effects of GIs, brands and QUALITY & SAFETY -labels in particular. Economic theory suggests that certificates reduce information asymmetries as far as consumers attribute product quality to producers' participation in quality assurance schemes. However, CO-labelled products may already be associated with a superior quality, rendering additional certification less effective. The results show a tendency in that direction. Mostly negative or no interaction effects for the analysed QUALITY & SAFETY-Country-of-Origin combinations were found. Nevertheless, there is the possibility that control labels can support the sales of certain origin as shown for the combination of BAVARIAN BEEF and CONTROLLED QUALITY-BAVARIA.

Keywords: Country-of-Origin, Discrete Choice, Labelling, EconLit: Q130

### **1. Introduction**

In markets for agricultural commodities and low-processed food products, for example beef, it is often too difficult and too costly for producers themselves to signal quality individually. In this situation studies have shown that regional labelling can be important in influencing consumer choice (Landon & Smith, 1998; Loureiro & McCluskey, 2000). Indeed, these protected origin labels represent a significant share of more than 50 % of collective quality labelling in the EU (Peri & Gaeta, 2000). In Europe products labelled with the country or region of origin have a greater share of the total turnover of food (Profeta et al., 2006) and for

many of these products the consumer is willing to pay a premium price (Arfini, 2003). According to Becker (2000), in the beef sector origin is the most important impact factor for the decision to buy a particular brand.

Above all, with regulation (EC) No. 510/06 the EU has a special legislation to protect geographical indications in the food sector against misuse by producers that are outside a defined production area.<sup>1</sup> In the product category beef there are many protected geographical indications (PGI) such as Scotch beef, Welsh beef and Orkney beef and a dozen more French registrations.<sup>2</sup> In Germany an application has been filed for BAVARIAN BEEF (DPMA, 2007) and due to the modification of the regulation for the protection of geographical indications (cp. Profeta & Balling, 2007), applications from third countries such as the well-known ARGENTINE BEEF are to be expected.<sup>3</sup> Café de Columbia, for example, is the first registered third party country PGI.<sup>4</sup>

A second strategy besides CO-labelling in order to signal high quality and/or safety products are national food quality and safety labels such as the German QS or the combined quality and origin certificate CONTROLLED QUALITY-BAVARIA (CQ-Bavaria). The EC-inventory of food quality assurance and certification schemes lists 154 systems that are either run by public institutions or that receive subsidies from member states.<sup>5</sup>

Besides PGIs and publicly initiated QUALITY & SAFETY systems, some retailers, for example Edeka, have launched their own quality systems in Germany which have a brand similar character (e.g. GUTFLEISCH).

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<sup>1</sup> For the year 2010 it is forecasted that the number of protected geographical indications in the food sector will excel 1,000 (Profeta et al., 2006).

<sup>2</sup> See [http://ec.europa.eu/agriculture/qual/de/pgi\\_05de.htm](http://ec.europa.eu/agriculture/qual/de/pgi_05de.htm), 06.02.08.

<sup>3</sup> See Balling (1990) for the high consumer reputation of Argentine beef in Germany.

<sup>4</sup> See the Official Journal of the European Union, L 240, Volume 50, 13. September 2007, p. 7.

<sup>5</sup> The inventory can be found under the following internet-address: [http://foodqualityschemes.jrc.es/en/documents/inventory\\_FQAS\\_Nov\\_2006.xls](http://foodqualityschemes.jrc.es/en/documents/inventory_FQAS_Nov_2006.xls).

Despite the growing number of studies and the progress concerning the methodology in CO-research in recent years, such studies have up to now not investigated the interaction between QUALITY & SAFETY certificates, brands and CO-labels. With the presence of different QUALITY & SAFETY labels or brands, it is supposable that the effects of geographical indications vary (Sattler, 1991; Profeta, 2006). Exact knowledge about the direction and strength of this interaction is important for the marketing of beef producers, food companies and retailers. The high and current relevance of this topic is supported by the fact that QUALITY & SAFETY systems in Germany are no longer only used in their present domain of business-to-business transactions but also in the field of business-to-consumer communication in terms of QUALITY & SAFETY labels on the packaged foodstuff or on blackboards at the sales counter. Since the beginning of 2006, the discounter ALDI South has used the above-mentioned QS programme in product labelling, whereas in 2007 EDEKA started an acceptance test for the label CQ-BAVARIA in the product category beef.<sup>6</sup>

Different CO-studies have revealed that CO and QUALITY & SAFETY labels have positive effects on consumer choice (Hermann et. al., 2002; Enneking, Mtimet & Albisu, 2006; Perrouty et al., 2006; Scarpa et al., 2005; Alfnes, 2004; Ward et al., 2003; Kim et al., 2002; Bonnet & Simioni, 2001). But what happens if both signals can be found at the sales counter or on the packaged goods?<sup>7</sup> Do the effects add? If not, perhaps only one of them is necessary for marketing communication and for the reduction of information asymmetry. The decision of which one to drop has to be made under the consideration of the control costs of the alternatives. If the geographical indication (GI) is not protected under the described EU-regulation as with GERMAN or ARGENTINE BEEF, no such extra control costs accrue and the “simple” GI is maybe the cheaper option. This, however, is only one relevant consideration of the interaction between CO and QUALITY & SAFETY systems.

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<sup>6</sup> <http://www.edeka.de/SUEDBAYERN/Content/de/Presse/Pressemeldungen/Pressemeldung0065.html>.

<sup>7</sup> In 2006 about 48 % of fresh meat was bought as a packaged self-service good. Therefore this amount doubled between 1999 to 2006 (ZMP, 2007)

It is possible that public aid for state-run or state-supported QUALITY & SAFETY systems will be forbidden or more strongly regulated in the future. It could be observed over the last few years that the EC has increased the requirements and obligations of member-state run QUALITY & SAFETY-labelling initiatives (cp. Becker & Benner, 2000; Benner, 2000). Thus, for example, state-run or supported systems like CQ-BAVARIA now have to be accessible for producers from other countries. Additionally, there are deliberations about the introduction of a community-wide QUALITY & SAFETY label that would completely replace national programmes. At the moment this seems to be the worst-case scenario from the point of view of some member states.

If such a new label is introduced, the marketing communication made for the national QUALITY & SAFETY programmes would be devalued. Furthermore, until the consumer is familiar with this new community-wide label, much time and money is needed. From this emerges the question whether GIs, as well as retailer brands, can compensate or limit this loss.

Besides the analysis of the interaction between different QUALITY & SAFETY labels and GIs, knowledge about the interaction between GIs and individual-specific data such as attitudes can be helpful for identifying target groups. It should be mentioned that standard conjoint software often used for CO-analysis until now does not usually offer the feature to model socio-demographic or attitude data directly or does not allow interacting individual specific data with brands (Enneking, 2003).

This paper focuses on the deeper analysis of the interaction mentioned as examples between CO, QUALITY & SAFETY labels, retailer brands and individual specific data with the target of identifying the best labelling strategies for the GERMAN BEEF market. For this purpose a German-wide Discrete-Choice-experiment is carried out that allows for the estimation of interaction effects. In the survey we will consider the geographical indications GERMAN, BAVARIAN and ARGENTINE BEEF and the QUALITY & SAFETY certificates QS, the

retailer brand GUTFLEISCH and the state-run system CQ-BAVARIA. The latter is not only a certification scheme that guarantees a certain quality as well as serving as an indicator for the Bavarian origin of a product.

All of the above-mentioned designations are actually used in product labelling at the point of sale and additionally reflect together the main labelling strategies in the GERMAN BEEF sector.

In the following paper, the hypotheses for the empirical analysis are first created on the basis of current and older results of CO-research. Secondly, the study design is displayed and some background information about the applied logit model is given before the empirical results are presented.

## **2. Interaction between Product Attributes and Individual Specific Data**

Obermiller/Spangenberg (1989: 445) have revealed that the consumer only pays attention to geographical indications if no better indicator is available. Where extrinsic features such as brands or quality signs exist, these will be preferred for information processing, if they are more adequate to determine the value of the product (see Olson & Jaocby, 1972; Wheatley et al., 1981). This is also confirmed by Kühn (1993: 120) and Balling (1995: 83; Balling, 1994), who both found that CO-effects especially emerge when specific market or price information are missing. According to these and the results mentioned in the introduction, the hypotheses for the analysed interaction in the product category beef are as follows:

*H<sub>1</sub>: In the absence of QUALITY & SAFETY labels, geographical indications have a positive effect on consumer choice.*

*H<sub>2</sub>: In absence of GIs, QUALITY & SAFETY labels have a positive effect on consumer choice.*

*H<sub>3</sub>: In the presence of a GI, a QUALITY & SAFETY label has no effect on consumer choice.*

We formulated *H<sub>3</sub>* in this way because Becker (2000) showed that the origin is the most important impact factor in Europe in the product category beef. Additionally, Alvensleben

(2000) determined that in combined systems the origin factor dominates. This result shall be verified by the empirical analysis conducted in this paper. Therefore, we temporarily equate the highest importance to the origin as the most adequate variable for determining the value of a beef product.

As mentioned in the introduction, the analysis of the interaction between CO and individual-specific data is also an interesting research field as it may help to identify target groups. Several studies have revealed that a positive attitude towards a region positively influences the evaluation of products manufactured in this region (e.g. Alvensleben, 2000; Balling, 2000: 34; Ittersum, 2001). In order to test this relationship we formulated the following hypothesis  $H_4$  in the context of the origin Bavaria.

*H<sub>4</sub>: A positive general country image of Bavaria has a positive effect on the choice of BAVARIAN BEEF.*

Apart from the general country image, the so-called product specific country image has also to be considered. This is defined as consumers' belief of how suitable a place is for the production of a specific product. Despite the fact that the general country image or the image of a region is an *underlying driver of a product's image* (Johannson et al., 1994: 159), it is often not precise enough in predicting buying behaviour. Therefore the product specific country image has to be taken into account in order to consider attributes which are relevant to consumers in a specific category. Ittersum (2001) puts this in the following way: *"It would be more relevant to measure the product-specific image of a place, which are the beliefs consumers have with respect to the suitability of place for the product of a specific product"*. According to the proposal in this paper the following hypothesis will be tested.

*H<sub>5</sub>: The product-specific image has a positive effect on the choice of BAVARIAN BEEF.*

Nevertheless, in some situations consumers prefer the regional products even if they do not assume a better quality for them. So, for example, in a study carried out by Elliot and Cameron (1994), Australians who were interviewed judged computers from the USA to be

better than those from Australia in terms of quality. When asked about the origin of a computer they would buy, they said, in contrast, that they would choose an Australian computer.

In different studies, consumer ethnocentrism was identified as an important factor influencing the buying decision of regional-labelled products or regional brands (Shimp & Sharma, 1987: 280; Han, 1988). This is defined as “*the beliefs held by consumers about the appropriateness of purchasing products originating in a foreign country*”. Consumer ethnocentrism focuses the effect of ethnocentric feelings on the purchasing decision of the consumer. Consumers who display a marked sense of consumer ethnocentrism tend to preferentially purchase local products compared to consumers with a low sense of consumer ethnocentrism (Ittersum, 2001; Shimp & Sharma, 1987). Therefore, they purchase the local product not because of conviction that it has a higher quality (Balling, 2000: 33), but because of its origin, which satisfies their ethnocentric feelings, thereby producing an added value to regional products.

Besides the above-mentioned CO-labelling-effect, the (general and product-specific) Country-Image-effect, we have now as a third CO-impact factor the ethnocentrism-effect. In this paper we intend to analyse whether a high regional consciousness of the consumer that is a part of the construct ethnocentrism leads to an increased choice of regional beef. At this point, it is important to define the term region. An indication is given by the study of CMA & ZMP (2002), in which consumers had to answer the following question “*When you should explain to someone in which region you are living, what would you say?*” In the above-mentioned German wide survey, 41.2 percent of the respondents stated the federal state they live in as regional whereas none of interviewees indicated Germany. Concerning this result the hypothesis is therefore formulated according to the federal state of Bavaria.

*H<sub>6</sub>: Bavarian respondents with a high regional consciousness have a higher preference for BAVARIAN BEEF.*



We separated the total German sample into north and south German (mostly Bavarian)<sup>8</sup> groups so that the impact of the regional consciousness could be measured for the analyzed BAVARIAN BEEF.<sup>9</sup>

Besides attitudes data this study considers sociodemographic parameters as well. CO-research showed that the factors age and education were most likely to influence the perceived value of a 'region-of-origin' label. Many studies exhibited the fact that older respondents have a higher preference for regionally-labelled products (Balling, 2000: 29; Dornoff et. al, 1974; Han, 1988; Schooler, 1971). According to these results, we combined the analysed Bavarian and regional brands with the variable age in order to test the following hypothesis  $H_5$ .

*H<sub>7</sub>: Older southern German respondents have a higher preference for BAVARIAN BEEF compared to younger consumers.*

As to the impact of education, literature indicated that higher education levels result in a more positive evaluation of foreign products (Anderson/ Cunningham 1972; Dornoff et. al., 1974).

*H<sub>8</sub>: Respondents with higher education have a higher preference for ARGENTINE BEEF.*

Insert Figure 1 here

### 3. Theoretical background

The fact that Choice Experiments are based on random utility theory permits a theoretically sound transformation of parameter estimates into WTP-measures. The random utility framework assumes that an individual  $n$  maximizes his or her utility when choosing between  $J$  alternatives. The researcher is not completely informed about all elements considered

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<sup>8</sup> One of five survey locations (the city of Ulm) in southern Germany was outside of Bavaria. Nevertheless, this city lies directly on the border to Bavaria and revealed the same preferences according to the analysed GIs so that the result of this location was merged with the other data from the Bavarian cities.

<sup>9</sup> At this point the term region is to be definee. An indication is given by the study of CMA & ZMP, in which Bavarian consumers had to answer the following question "When you should explain to someone in which region you are living, what would you say?". In this Germany-wide survey, 41.2 percent of the respondents stated the federal state they live in as regional whereas none of few interviewees indicated Germany.

important by respondents, so utility observed from a researcher's perspective can be broken down into two components,  $V$  and  $\varepsilon$ :

$$U_{in} = (V_{in} + \varepsilon_{in}), \quad (1)$$

Where

$U_{in}$  is the overall utility of choice  $i$  for individual  $n$ ,

$\varepsilon_{in}$  is the random utility component which comprises unobserved individual taste observations, measurement errors and unobserved attributes.

$V_{in}$  is the systematic or measurable utility which is a function of  $\mathbf{X}_{in}$  and  $\beta_i$  and an unknown parameter vector to be estimated.  $\mathbf{X}_{in}$  defines (i) a matrix of attributes that pertain to choice options, (ii) a matrix of characteristics that pertain to individuals, (iii) a matrix of interaction of attributes with individual characteristics or (iv) a vector of interaction of individual characteristics with choice option intercepts (Louviere, 2001). In most practical applications  $V_{in}$  takes a linear-in-parameters additive form.

If  $A$  is defined as the universal choice set of discrete alternatives, and  $J$  the number of elements in  $A$ , then individual  $n$  will choose alternative  $i$  over some other option  $j$  if and only if

$$U_i > U_j \quad \text{all } j \neq i \in A \quad (2)$$

and the probability that individual  $n$  chooses  $i$  from set  $A$  is given by:

$$P_{in} = P[\{\varepsilon_{jn} - \varepsilon_{in}\} < \{V_{in} - V_{jn}\}], \text{ for all } j \neq i. \quad (3)$$

In order to specify the choice probabilities in (3), assumptions must be made with regard to the distribution of the random components. From the outset of Choice Experiments (McFadden, 1974), the independent and identically distributed type I extreme-value distribution proved convenient for computational ease. This distribution leads to the popular multinomial (conditional) logit model (MNL)<sup>10</sup>

$$P_{in} = \frac{e^{V_{in}}}{\sum_{j=1}^J e^{V_{jn}}}, j = 1, \dots, J, \quad j \neq i \quad (4)$$

In the case of a binary choice, (4) reduces to

$$P_{in} = \frac{1}{1 + e^{V_{in}}} \quad (5)$$

In our study the utility model all  $\beta$ s that will be calculated by maximum-likelihood estimation are completely interacted with the respective origin  $i$  because we are interested in origin-related effects (see formula 6).

$$U_{COin} = \beta_{COi} + \beta_{COi \times price} \text{price} + \beta_{COi \times Quality\&Safety-Labeling} \text{Quality \& Safety - labelling} + \beta_{COi \times IndividualspecificVar} \times \text{Individualspecific var} + \varepsilon_{in} \quad (6)$$

$U_{COin}$  stands in this case for the utility of country-of-origin  $i$  for individual  $n$ . In this formula  $\beta_{COi}$  represents the impact coefficient for consumer  $n$  on the choice for country-of-origin  $i$  that is neither affected by experimental variables nor by individual specific data.  $\beta_{COi \times price}$ ,  $\beta_{COi \times Quality\&Safety-Labeling}$ ,  $\beta_{COi \times IndividualspecificVar}$  display the interaction coefficients between the country-of-origin  $i$  and the price, QUALITY & SAFETY labels and individual-specific data such as age, income or attitude data.

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<sup>10</sup> For an exhaustive derivation of the MNL model see Louviere et al. (2000).

The presented model considers the interaction between CO-labellings and QUALITY & SAFETY certificates and thus follows the recommendation of Louviere et al. (2000: 87), which stated that *“including Interaction suggested by theory or previous empirical evidence often provides insights otherwise not possible, and ignoring or assuming non-significance of Interaction in applications can be dangerous.”* Furthermore, the consideration of interaction can prevent violating the IIA-assumption because they can display existent multicollinearity if one such occurs. No random parameter or latent class logit model is therefore needed when an appropriate interaction effect model is specified that accounts for population heterogeneity (cp. Urban, 1993: 147).

In a linear (multinomial) logit model, the ratio of two  $\beta$  coefficients represents respondents' willingness to trade off one attribute for another. If the attribute in the denominator is a monetary item, this ratio is called implicit price:

$$\text{Implicit Price} = \beta_{\text{quality changed attribute}} / (-\beta_{\text{monetary attribute}}) \quad (7)$$

Since both models (4) and (5) are based on random utility theory, the parameter estimates  $\beta_i$  can be used to calculate measures like Compensating Variation. Compensating Variation is defined as the amount of money that makes an individual as well off as before a quality change:

$$V(M, 0) = V(M - CV, 1), \quad (8)$$

where  $M$  is income,  $CV$  is Compensating Variation, 0 represents the status quo and 1 corresponds to a changed situation.

In the case of a linear-in-parameters additive model Compensating Variation surplus ( $CV$ ) is defined as

$$CV = 1/(-\beta_{\text{monetary}})(\ln \sum_n \exp(V_i^0) - \ln \sum_n \exp(V_i^1)), \quad (9)$$

where

$-\beta_{\text{monetary}}$  is the marginal utility of income (= the negative marginal disutility of price)

$V_i^0$  represents the utility of the current situation, and

$V_i^1$  represents the utility after a quality change (Bennett and Adamowicz, 2001: 67).

The general expression  $(\ln \sum_n \exp(V_i^0) - \ln \sum_n \exp(V_i^1))$  in equation (9) permits WTP-calculations when several attributes contribute to an alternative's utility, and it takes the probability of choosing each alternative into account. However, this is not necessary in valuation experiments where only one 'non market' attribute is considered. In this case the implicit price  $(\beta_{\text{quality changed attribute}} / -\beta_{\text{monetary attribute}})$  can directly be interpreted as the WTP for a quality improvement measured per product unit and hence results in Compensating Variation (CV) for a CO-label as follows:

$$CV_{\text{CO-label}} = \beta_{\text{CO-label}} / (-\beta_{\text{price}}) \quad (9)$$

### 3. Methodology and Study Design

For the analysis of the importance of GIs, QUALITY & SAFETY labels, retailer brands in product labelling and interaction among them we applied the Discrete-Choice-method. This technique of quantitative market research is based on the conditional logit model and enables the measurement of the impact of product attributes alternatively specific (Urban, 1993). Therefore the above-mentioned interaction can be accounted for.

To determine the extrinsic attributes which are to be investigated apart from the indication of origin, the method of dual questioning for choice of relevant product characteristics was used (compare Alpert, 1971: 184). An extensive catalogue of relevant characteristics is the foundation of this method. To compile such a catalogue – as well as experts being questioned and statutory regulations for the production and identification of the chosen product category beef being assessed – information was also drawn on which could be identified by visually observing existing products within the chosen product categories. In addition to this, group discussions with consumers (focus groups) were carried out in May 2003 to ascertain further product relevant characteristics.

The resulting catalogue of questions was presented to 68 persons in May 2003. The selection criterion for the test persons was that they had to have bought beef at least three times in the last year. In accordance with the procedure of dual questioning, the task set for the test persons was to value – on a 5-point rating scale – the importance of the characteristics and the perceived heterogeneity of attributes with respect to products typical of the market<sup>11</sup>. Both scale values were multiplied, resulting in a maximum possible score of 25.

According to this calculation rule, the origin is the most important factor for the decision to buy followed by the attributes colour/appearance, quality and certification marks, and price (see table 1). This ranking complies with the results of studies carried out by Becker (2000).<sup>12</sup>

Insert Table 1 here

Due to the fact that extrinsic product attributes are the focus of this study, the attribute price was incorporated into the experimental design whereas the attribute colour/appearance did not enter the analysis or was held constant over all alternatives.<sup>13</sup> Thereof, and on the basis of the comments already made, the attributes origin (with the characteristics BAVARIAN BEEF, GERMAN BEEF, ARGENTINE BEEF und ‘no geographical indication’), QUALITY & SAFETY-label/retailer brand (with the characteristics CQ-Bavaria, QS, GUTFLEISCH and no QUALITY & SAFETY label) and price (with the characteristics 7.00 €, 8.00 €, 9.00 € and

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<sup>11</sup> The questions asked were:

(1) How important are the following criteria when you purchase beef?

1) totally unimportant 2) rather unimportant 3) neither nor 4) rather important 5) very important

(2) How great do you find the difference for the mentioned attributes for beef which can be purchased in different outlets?

1) very small 2) rather small 3) middle 4) rather large 5) very large

<sup>12</sup> Becker (2000) put in a European-wide consumer survey the question of which information cues are the most important in predicting the so-called “eating quality” in the product category of beef. For this purpose the interviews had to rank several information cues according to their importance.

<sup>13</sup> All alternatives were displayed with the same product foto.

10.00 €)<sup>14</sup> were used (see table 2). Thus the three most important extrinsic attributes of the dual questioning were part of the analysis.

Insert Table 2 here

Insert Figure 2 here

The Software Fedorov with the underlying Fedorov algorithm (cp. Fedorov, 1972) was used for the construction of a computer-optimized experimental design. On the basis of the described attributes and their characteristics, fifty-four choice sets each with 4 alternatives were constructed. In the survey the choice task was presented in picture-form as shown in figure 2.<sup>15</sup> The respondents were requested to choose one of the alternatives of the choice task. The concrete question was as follows: *“Imagine that you have to buy beef. Which one of the four displayed roast beefs would you buy on the indicated information?”*. A “no choice option” did not exist.

Table 3 gives an overview about the used non-experimental variables in the estimated model. The product specific country image is measured by three or four statements<sup>16</sup> as shown in table 3. From these statements for each survey region an index for the product specific image was created (Cronbach’s alpha: North = 0.8222, South = 0.7055). The general country image was measured with the question *“What is your general attitude to Bavaria?”* using a five-point Likert-scala ranging from very positive to very negative. Because of the large amount of statements that are needed to measure consumer ethnocentrism with the CET-Scale (Shimp & Sharma, 1987: 280), just a part of this construct was regarded in this survey. In accordance to

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<sup>14</sup> The price levels were determined on the base of price data from the German ZMP (Central Market and Price Reporting Institution) for roast beef.

<sup>15</sup> In the survey the illustration of the attributes was bigger than shown in figure 1.

<sup>16</sup> The statements were created on the basis of two focus groups with beef consumers.

a quantitative pre-study as a conclusion, an index of regional consciousness was created based on the six statements *“I buy as much food as possible from my own region”*, *“I love the region I live in”*, *“I try to buy as many products as possible from my own region, in order to support the local industry”*, *“Products from one’s own region are fresher”*, *“Products from one’s own region are environmentally sound”* and *“I trust products from my own region more than other products”*. For both regions where the questionnaires were held an acceptable Cronbach’s alpha could be found for the developed regional conscience scale (north = 0.7551, south = 0.8581).

All experimental and individual specific parameters described were included in a full interaction model according to formula 6 as shown in table 4. As you can see from the generated model, the origins Germany and Argentina were both interacted with the label CQ-BAVARIA. For this purpose in the choice set for the latter combination the Argentine flag was integrated in this label as shown in figure 3. As already mentioned, this certification scheme is at the moment accessible for all European member countries and in the future it is conceivable that this openness will comprise third countries as well. Therefore, this combination simulates a possible future labelling combination.

Insert Table 4 here

Insert Figure 3 here

Data was collected in pedestrian areas and shopping centres using personal computer-assisted interviews. In this way, interviewers found respondents who were in a shopping mood so that the survey could at least partly mirror the point-of-sale context. People were approached according to a simple random rule and only those who eat beef at least occasionally were asked to participate in the interview. In the period from June 2003 to January 2004, 1070 interviews were conducted in 11 cities in Germany (see table 5).



Insert Table 5 here

The choice modelling literature recommends at least 500 choices to allow for valid maximum likelihood estimations (e.g. Long, 1997)<sup>17</sup>. We asked for a maximum of three choices from each of the 994 respondents. Therefore 2972 choice sets were available for analysis.

### 3. Empirical Results

#### 3.1 Model and Model Adequacy

For testing hypothesis  $H_6$  and in order to consider preference heterogeneity, the sample was divided in the sub-samples north and south (see tables 6 and 7).<sup>18</sup> Based on the described variables, two mixed logit models were estimated by the software package STATA 8.0. To make the individual specific parameters in the system identifiable all individual specific interacted parameters of the alternative “no origin” and the corresponding alternative specific constant (ASC) are normalized to zero. The parameters therefore show the relative effect of an attribute on the alternative compared with the zero normalized alternative. A negative parameter indicates a reduction in relative utility compared with this alternative. For the experimental variables there is no need for a zero normalized variable (Urban, 1993).<sup>19</sup> Therefore these parameters for the QUALITY & SAFETY label/retailer brand indicate directly the change in utility for the respective origin.

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<sup>17</sup> In this study a larger sample was needed because we intended to model many individual specific variables and because we estimated models with sub-samples (i.e. northern and southern Germany).

<sup>18</sup> If in a sample the variances of the residuals of two groups are identical, then a conjoint estimation with interactions terms that is created for identifying the groups is to be preferred (Kühnel, 1996: 152). In any other case, separate estimations are better. In order to analyse possible differences of residual variances, the Goldfeld-Quandt test can be used. Because this test is not available in STATA 8.0 for conditional logit-models, the confidence intervals of the parameter of the separated estimations were compared with each other. Because bigger differences could be found, the decision was made to carry out two separated estimations.

<sup>19</sup> The estimation coefficients for the experimental variables (QUALITY & SAFETY labels) do not change even if the zero normalized brand is changed.

Having compared several linear utility functions of the conditional logit model, the specification displayed in tables 6 and 7 respectively was chosen based on the likelihood ratio (LR) tests (vgl. Felsenstein, 1981; Huelsenbeck & Crandall, 1997). In order to test the contribution of subsets of variables across all brands, the full model was compared to restricted models where one subset at a time was eliminated (LR test). Most of the subsets are significant at the 0.01 level. Group-internal collinearity was checked using fixed-effects regression (xtreg) in STATA 7.0 and additionally the correlation matrix was analysed, although neither case displayed interfering collinearity.

Overall both models exhibit with pseudo  $R^2$  of 0.1060 (northern Germany) and 0.2066 (southern Germany) a relatively good performance, at least for southern Germany (table 6 and 7).<sup>20</sup> By means of a Hausmann test, the assumption of independence of irrelevant alternatives could be affirmed. In order to verify the assumption of linearity of the predictor variables, the locally weighted scatterplot-smoother (LOWESS) of Cleveland (1979) was applied.<sup>21</sup> Discrepancies with this assumption could not be found.

Tables 4 and 5 show the brand-specific estimators (logit coefficient) and the z-values (t-ratio) of the experimental and the exogenous variables. In the remainder of this chapter, the results will be discussed focusing on brand-specific effects. In the following interpretation of results t-values will be regarded in order to facilitate the comparison of differently scaled variables (Urban, 1993: 38).

In order to measure the brand strength, the coefficients of the alternative specific constants (ASC) are utilized. For the estimation the socioeconomic, psychographic and the price variables are recoded to achieve symmetry around zero. This recoding makes sure that the

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<sup>20</sup> According to Constanzo et. al. (1982) a pseudo  $R^2$  of 0.2 to 0.4 documents a good model estimation.

<sup>21</sup> Furthermore, an "Outlier" analysis was carried out that did not lead to an elimination of cases. For the purpose of the "Outlier" analysis,  $\Delta\chi^2_{P(j)}$  was used. This measure shows the change of the Pearson-Chi-Quadrat statistics, when the covariate-sample j is deleted from the survey data. In order to identify the cases that are only poorly explained by the model,  $\Delta\chi^2_{P(j)}$  is plotted against the predicted probabilities of the alternatives (Kohler/Kreuter, 2001: 285).

average effect on each of the utilities of the socioeconomic, psychographic and price variables equals zero. The experimental variables, with exemption of the price, are dummy-coded, where 1 means labelled and zero non-labelled. Thus the ASC shows the effect without labelling and the recoding allows us to interpret the ASC as the mean utility of the alternative. The ASC can therefore be interpreted as the strength of the corresponding GI (cp. Alfnes, 2004; Kohler & Kreuter, 2001: 192).

Insert here table 6 and 7

### **The Effect of GI-labelling**

According to the ASC, all analysed origins have a significant positive impact on the choice decision both in northern and southern Germany and thus  $H_1$  can be stated. The ranking hereof is as follows: BAVARIAN BEEF (3.88<sub>North</sub>, 6.96<sub>South</sub>), GERMAN BEEF (3.51<sub>North</sub>, 5.23<sub>South</sub>), ARGENTINE BEEF (2.10<sub>North</sub>, 1.67<sub>South</sub>) and WITHOUT GI (0.00<sub>North/South</sub>). Overall the impact of GIs is higher in southern than in northern Germany.

Because the ASCs that symbolise the GI-strength are calculated on the base of the zero normalized alternative 4, the price coefficient of this alternative was used for the calculation of the CV<sup>22</sup>. Only thus it is possible to determine how much money must be given to the individual in order to ensure that s/he is as well off with this alternative as before it was labelled with a certain origin. If we transfer the results to the CV we have the following results for the survey regions as shown in table 8.<sup>23</sup> According to the estimation coefficients the CVs are higher in the south than in the north for all three analysed origins. In the north, for example, BAVARIAN BEEF gets an average price premium of 1.19 €/kg whereas it yields a premium of 3.94 €/kg in the south. Additionally, from table 7 we see results that show in the

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<sup>22</sup> The Compensation Variation is, as already mentioned, defined as the amount of money that makes an individual as well off as before a quality change.

<sup>23</sup> Confidence intervals of WTP were estimated on a significance level of 95% applying the bootstrap methodology (Efron & Tibshirani, 1998). To compute bootstrap confidence intervals, 1000 samples were taken from the observed data with replacements. Beta coefficients were estimated and WTP was calculated for each of these samples; the distribution of WTP was then computed based on these 1000 observations.

south there are wider confidence intervals, however we can observe that there for GERMAN BEEF and BAVARIAN BEEF the lower boundary ( $CV_{\text{BAVARIAN BEEF}} = 2.42 \text{ €/kg}$ ,  $CV_{\text{GERMAN BEEF}} = 1.71 \text{ €/kg}$ ) lies over the upper boundary ( $CV_{\text{BAVARIAN BEEF}} = 1.77 \text{ €/kg}$ ,  $CV_{\text{GERMAN BEEF}} = 1.62 \text{ €/kg}$ ) of the results in northern Germany.

Insert here table 8

### **The Effect of QUALITY & SAFETY Labelling/Retailer brand**

In addition to the results on the importance of geographical indications, the impact of the analysed quality marks (QUALITY & SAFETY labelling/retailer brand) will be discussed. We start this consideration from the estimation results of alternative 4 that is not labelled with a GI. This approach is reasonable because there are, as is later shown, interaction between CO and quality marks. This interaction leads to the problem that in the presence of a GI the coefficient of a quality mark is biased, meaning that its pure effect can not be measured. This bias can be excluded for alternative 4 due to the not existing CO-labelling.

The estimation results and the calculation of the CVs for northern Germany exhibit that especially the indications CQ-BAVARIA ( $z\text{-value} = 3.53$ ;  $CV = 1.37$ ) and GUTFLEISCH ( $z\text{-value} = 2.60$ ;  $CV = 0.84$ ) have both a significant impact on the decision to buy (see table 6). The effect of the indication QS however is negative and not significant ( $z\text{-value} = -1.41$ ). The results in southern Germany show positive effects for all indications analysed ( $z\text{-value}_{\text{CQ-BAVARIA}} = 4.53$ ,  $CV = 2.91$ ;  $z\text{-value}_{\text{QS}} = 2.75$ ,  $CV = 1.64$ ;  $z\text{-value}_{\text{GUTFLEISCH}} = 2.72$ ;  $CV = 1.71$ ). Overall, with the exception of QS in northern Germany,  $H_2$  can therefore be stated.

It emerges from tables 6 and 7 that significant positive interaction only exists between the origin BAVARIAN BEEF and the indication CQ-BAVARIA ( $z\text{-value}_{\text{North}} = 4.31$ ,  $CV_{\text{North}} = 1.36 \text{ €}$ ;  $z\text{-value}_{\text{South}} = 2.64$ ,  $CV_{\text{South}} = 0.79 \text{ €}$ ). On the other hand, the indications QS and GUTFLEISCH both have a negative impact on the choice probability of BAVARIAN BEEF.

Altogether we can observe for the indication QS that it has negative interaction with all analysed origins. Thus, it has, as already mentioned, a positive effect only for the non GI-labelled alternative 4 in southern Germany. A similar effect can be observed for the indication GUTFLEISCH. This has its biggest impact where it is combined with alternative 4. According to the results,  $H_3$  can not be stated in general. In fact, every interaction between geographical indications and certifications marks and / or brands has to be analyzed separately in order to determine the direction of the effect.

Insert here table 9

In this study CQ-BAVARIA and BAVARIAN BEEF have, as already mentioned, a positive interaction whereupon for southern Germany the effect of the CQ-BAVARIA sign is much lower as when displayed on the unlabelled alternative 4. According to the estimation coefficients (but not for the z-values) we can observe a similar effect for northern Germany. This is in line with the 'perceived risk theory' which posits that consumers perceive higher risks with generic than with branded (in this case "origin" branded") food items (Mitchell, 1998: 177).

One possible interpretation of the interaction between the GI BAVARIAN BEEF and CQ - BAVARIA is that this coefficient reflects the (pure) control effect that is an aspect besides the origin component of the latter mentioned QUALITY & SAFETY label. Because writing BAVARIAN BEEF already indicates the Bavarian origin, one can assume that the origin effect that emanates from the QUALITY & SAFETY label CQ-Bavaria tends towards zero.

Under this assumption we can calculate the net control effect and the net origin effect of the QUALITY & SAFETY label CQ-BAVARIA as described in formula 9. If we deduct the CV of the interaction effect of BAVARIAN BEEF and CQ-BAVARIA (control effect) from the

interaction effect of NO GI and CQ-BAVARIA (total effect) we obtain the net origin effect of the QUALITY & SAFETY label CQ-BAVARIA as described by formula 11.

$$CV_{\text{net control effect CQ-Bavaria}} = \beta_{\text{Interaction BAVARIAN BEEF / CQ-Bavaria}} / (-\beta_{\text{price}}) \quad (10)$$

$$CV_{\text{net origin effect CQ-Bavaria}} = [(\beta_{\text{Interaction No GI / CQ-Bavaria}}) / (-\beta_{\text{price}})] - [(\beta_{\text{Interaction BAVARIAN BEEF / CQ-Bavaria}}) / (-\beta_{\text{price}})] \quad (11)$$

or in words

$$\text{Total effect GQ} = \text{Control effect} + \text{Origin effect} \iff \text{Origin effect} = \text{Total effect GQ} - \text{control effect}$$

Table 10 shows the calculated point estimates and the confidence intervals for the CV of the control and origin effect of the label CQ-BAVARIA. For this purpose, bootstrap methodology has been applied (Efron & Tibshirani 1998).

Insert here table 10

If we delete any CO-labelling, then the country-of-origin effect that emanates from GQ-BAVARIA dominates, at least in southern Germany. In the north there is a positive effect too but not to such an extent and thus the control effect is higher there

At this point one can put forward the question of why the effect of the label CQ-BAVARIA is lower in both subsamples than for the origin BAVARIAN BEEF. As discussed the effect of CQ-BAVARIA consists of a control and an origin effect and one would conclude that this is likely to result in a superior evaluation of this sign compared to the pure effect of the origin BAVARIAN BEEF. A possible explanation is that the sign CQ-BAVARIA was sometimes interacted with the origin ARGENTINE BEEF in the experimental design (see figure 2). Therefore, the consumer could not be always sure that this certificate stands for beef from Bavaria. It is even feasible that the combination of this label with GERMAN BEEF increased that uncertainty. Maybe this situation has caused a devaluation of this certification scheme. The first results of a current similar study carried out by the authors seem to support this hypothesis. In this analysis on the one hand the certificate CQ-BAVARIA was not interacted

with other origins and on the other the effect for CQ-BAVARIA was significantly higher than for BAVARIAN BEEF.

### **Country Image**

Tables 4 and 5 show that a positive attitude to Bavaria leads to an increased choice probability of BAVARIAN BEEF and this effect is stronger in the north than in the South ( $z\text{-value}_{\text{North}} = 4.18$ ,  $z\text{-value}_{\text{South}} = 2.97$ ). In southern Germany a positive attitude to Bavaria leads to a decreased choice probability of GERMAN BEEF ( $z\text{-value} = -2.99$ ) and ARGENTINE BEEF ( $z\text{-value} = -5.21$ ). The attitude construct product country image has a positive impact on the choice of BAVARIAN BEEF ( $z\text{-value}_{\text{Nord}} = 4.72$ ,  $z\text{-value}_{\text{Süd}} = 5.78$ ) and GERMAN BEEF ( $z\text{-value}_{\text{Nord}} = 3.29$ ,  $z\text{-value}_{\text{Süd}} = 2.30$ ). Altogether  $H_4$  and  $H_5$  can be stated

### **Regional Awareness**

Whereas the country image has an impact in northern and southern Germany the regional awareness exerts an effect only in the south and only for the alternative BAVARIAN BEEF ( $z\text{-value} = 1.88$ ). That means only southern German respondents with a patriotic attitude and a positive evaluation of regional products buy BAVARIAN BEEF with greater probability. On the other hand ARGENTINE BEEF is demanded by respondents with a low regional awareness ( $z\text{-value} = -1.90$ ). According to these results hypothesis  $H_6$  can be stated.

### **Impact of Sociodemography and the Buying Frequency in Southern Germany**

For ARGENTINE BEEF in southern Germany a high income leads to an increased choice probability of this alternative ( $z\text{-value} = 3.03$ ). Buyers of the alternative GERMAN BEEF tend to have a higher education than the other respondents ( $z\text{-value} = 2.56$ ) and thus hypothesis  $H_8$  can not be stated. The variable buying frequency has a negative effect on the demand of the GIs GERMAN BEEF and ARGENTINE BEEF. That means that the

respondents with a low buying frequency buy from these origins with an increased probability. For the age factor, a negative effect could be found only for the alternative GERMAN BEEF. So, hypothesis H<sub>7</sub> can not be stated.

#### **4. Discussion**

The empirical findings have interesting implications with respect to information economics in general, and the signalling effects of GIs, brands and QUALITY & SAFETY-labels in particular. Information economics suggests that asymmetric information with respect to product quality affects market performance (Akerlof, 1970), and that food labels can transform aspects of quality from credence to search attributes (Trijp van et al., 1997). However, in order to support positive sales, sellers can not only rely on third party certification as in the case of QS but can also build trust through using GIs in product labelling. This study reveals that the GI-effect for BAVARIAN BEEF beef is larger than QUALITY & SAFETY labelling in this product category according to the calculated CVs at least in southern Germany, and thus supports the findings of Alvensleben (2000) and Becker (2000).

The empirical results show that all analysed origins exert a positive effect on the choice decision in the product category of beef. The same holds for the analysed QUALITY & SAFETY labels with the exemption of QS, for which no significant impact can be shown for northern Germany. As such, this study in general supports the growing body of literature suggesting that certificates which aim at reducing information asymmetries in the food market prove to be influential on (brand) choice (e.g. Baker, 1999; Cicia et al., 2002).

The question of whether respondents react differently to QUALITY & SAFETY labels combined with different origins was of particular interest in the presented study. Economic theory suggests that certificates such as QS reduce information asymmetries as far as consumers attribute product quality to producers' participation in quality assurance schemes



(Weisenfeld-Schenk, 1997). However, CO-labelled products may already be associated with a superior quality, rendering additional certification less effective.

The results show a tendency in that direction. We found mostly negative interaction or no effects for the combinations of QS and GUTFLEISCH with the analysed origins. Nevertheless, there is the possibility that control labels can support the sales of a certain origin as shown for the combination of BAVARIAN BEEF and CQ-BAVARIA. But marketers have to consider possible interaction *ex ante* in order to prevent negative effects of such a combined labelling strategy.

Another result that should be pointed out is that the combined quality and origin certificate CQ-BAVARIA exerts a control and an origin effect whereas the latter one dominates in the home region of the federal state of Bavaria. Against this background and transferring these insights to the huge number of European member state-run combined quality and origin certificates, it should be stated that the suppression of such labels by the Commission would destroy a huge amount of producer welfare. Nevertheless, this hypothesis has to be tested for further products and product categories.

First results from a similar study compared with the insights of this paper furthermore indicate that the opening of state-run combined quality and origin certificates for other member countries as required by the European promotion guidelines leads to a value loss of such labels. One reason for this fact could be the loss of (origin-) clarity that is associated with such an opening (cp. Obermiller & Spangenberg 1989). Empirical studies using different experimental designs could validate this assumption.

Further research is still needed which takes into account additional product categories and the costs associated with the QS and GI-labelling systems. In order to validate the results, controlled store tests should be carried out. The data merging approach using hypothetical data (e.g. from discrete choice experiments) and non-hypothetical data (e.g. from controlled store test) could help to validate the data.

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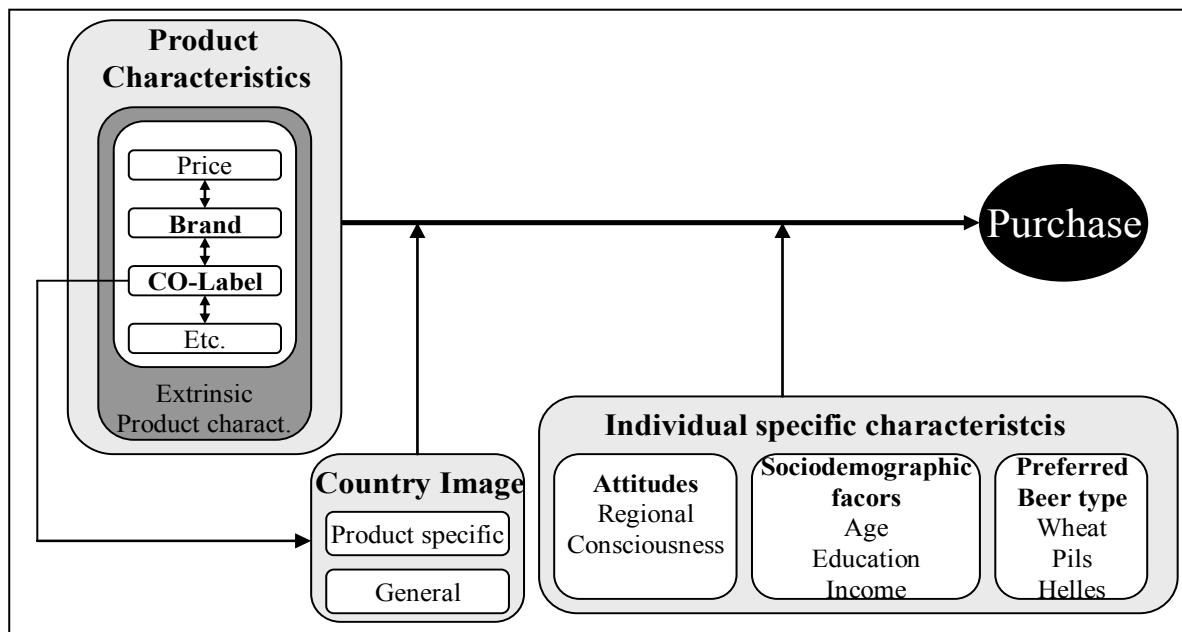
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Figure 1: Overview on the analysed interdependencies in the empirical study.



Source: compiled by the author.

Table 1: Means of the importance and perceived variation of the product in these parameters

Attributes	Importance at purchase	Variation at the market	Importance x Variation
Origin	4.2	2.7	<b>11.3</b>
Colour/Appearance	4.4	2.5	<b>11.0</b>
Price	3.6	2.7	<b>9.7</b>
Quality /certification marks	4.1	2.3	<b>9.4</b>
Information about controls	3.7	2.5	<b>9.3</b>
Fat content	3.7	2.4	<b>8.9</b>
Meat marbling	3.5	2.5	<b>8.2</b>
Inf. about animal husbandry	3.4	2.4	<b>5.8</b>
Brands	2.7	2.2	<b>5.9</b>

Source: Own study








Table 2: Attributes and characteristics of the experimental design

Attribute	Characteristics
<b>Origin</b>	BAVARIAN BEEF GERMAN BEEF ARGENTINE BEEF No geographical indication
<b>QUALITY &amp; SAFETY-Label/Retailer brand</b>	CONTROLLED QUALITY-BAVARIA QS GUTFLEISCH No QUALITY & SAFETY-label
<b>Price</b>	7.00 €/kg 8.00 €/kg 9.00 €/kg 10.00 €/kg

Source: Own description.



Figure 2: Choice set example

<p>1</p>   <p>Rindfleisch 9,00 € je kg</p>	<p>2</p>   <p>Bayerisches Rindfleisch 7,00 € je kg</p>	Set 1
<p>3</p>   <p>Deutsches Rindfleisch 8,00 € je kg</p>	<p>4</p>  <p>Argentinisches Rindfleisch 10,00 € je kg</p>	

Source: Own illustration.

Table 3: Non-experimental variables in the estimated model

<p><b><u>Regional Consciousness (Variable name in model = Regional consciousness)*</u></b>  I buy as many food products as possible from my own region.  I love the region I live in.  I try to buy as many products as possible from my own region, in order to support the domestic industry.</p> <p><b><u>Attitude to Bavaria (General Country Image)**</u></b>  What is your general attitude to Bavaria? (Variable name in model = Attitude to Bavaria)</p> <p><b><u>Product specific country image*</u></b>  I buy as much food as possible from my own region.  I love the region I live in.  I try to buy as many products as possible from my own region, in order to support the local industry.  Products from one's own region are fresher.  Products from one's own region are environmentally sound.  I trust products from my own region more than other products.</p> <p><b><u>Socio-demographic variables</u></b>  Age (Variable name in model = Age)  Education (Variable name in model = Education)</p> <p><b><u>Buying intensity</u></b>  Several times a week  Once a week  Less often than once a week  Less often than once a month</p>
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\* Rating-Scale 1-5: 1 = "totally agree" to 5 = "totally disagree".

\*\* Rating-Scale 1-5: 1 = "very positive" to 5 = "very negative".

Table 4: Full Interaction Model Specification

$$\begin{aligned}
U_{\text{BAVARIAN BEEF}} &= \beta_{\text{BAVARIAN BEEF}} + \beta_{\text{BAVARIAN BEEF} \times \text{price}} \text{Price} + \beta_{\text{BAVARIAN BEEF} \times \text{CQ-BAVARIA}} \text{CQ - BAVARIA} + \\
&\beta_{\text{BAVARIAN BEEF} \times \text{QS}} \text{QS} + \beta_{\text{BAVARIAN BEEF} \times \text{GUTFLEISCH}} \text{GUTFLEISCH} + \\
&\beta_{\text{BAVARIAN BEEF} \times \text{RegionalConsciousnes}} \times \text{Regional Consiousness} + \\
&\beta_{\text{BAVARIAN BEEF} \times \text{AttitudetoBavaria}} \times \text{Attitudeto Bavaria} + \\
&\beta_{\text{BAVARIAN BEEF} \times \text{Product-Country-Image}} \times \text{Product - Country - Image} + \\
&\beta_{\text{BAVARIAN BEEF} \times \text{Income}} \times \text{Income} + \beta_{\text{BAVARIAN BEEF} \times \text{Education}} \times \text{Education} + \\
&\beta_{\text{BAVARIAN BEEF} \times \text{BuyingFrequency}} \times \text{Buying Frequency} + \varepsilon_{in} \\
\\
U_{\text{GERMAN BEEF}} &= \beta_{\text{GERMAN BEEF}} + \beta_{\text{GERMAN BEEF} \times \text{price}} \text{Price} + \beta_{\text{GERMAN BEEF} \times \text{CQ-BAVARIA}} \text{CQ - BAVARIA} + \\
&\beta_{\text{GERMAN BEEF} \times \text{QS}} \text{QS} + \beta_{\text{GERMAN BEEF} \times \text{GUTFLEISCH}} \text{GUTFLEISCH} + \\
&\beta_{\text{GERMAN BEEF} \times \text{RegionalConsciousnes}} \times \text{Regional Consiousness} + \\
&\beta_{\text{GERMAN BEEF} \times \text{AttitudetoBavaria}} \times \text{Attitudeto Bavaria} + \\
&\beta_{\text{GERMAN BEEF} \times \text{Product-Country-Image}} \times \text{Product - Country - Image} + \\
&\beta_{\text{GERMAN BEEF} \times \text{Income}} \times \text{Income} + \beta_{\text{GERMAN BEEF} \times \text{Education}} \times \text{Education} + \\
&\beta_{\text{GERMAN BEEF} \times \text{BuyingFrequency}} \times \text{Buying Frequency} + \varepsilon_{in} \\
\\
U_{\text{ARGENTINE BEEF}} &= \beta_{\text{ARGENTINE BEEF}} + \beta_{\text{ARGENTINE BEEF} \times \text{price}} \text{Price} + \beta_{\text{ARGENTINE BEEF} \times \text{CQ-BAVARIA}} \text{CQ - BAVARIA} + \\
&\beta_{\text{ARGENTINE BEEF} \times \text{QS}} \text{QS} + \beta_{\text{ARGENTINE BEEF} \times \text{GUTFLEISCH}} \text{GUTFLEISCH} + \\
&\beta_{\text{ARGENTINE BEEF} \times \text{RegionalConsciousnes}} \times \text{Regional Consiousness} + \\
&\beta_{\text{ARGENTINE BEEF} \times \text{AttitudetoBavaria}} \times \text{Attitudeto Bavaria} + \\
&\beta_{\text{ARGENTINE BEEF} \times \text{Product-Country-Image}} \times \text{Product - Country - Image} + \\
&\beta_{\text{ARGENTINE BEEF} \times \text{Income}} \times \text{Income} + \beta_{\text{ARGENTINE BEEF} \times \text{Education}} \times \text{Education} + \\
&\beta_{\text{ARGENTINE BEEF} \times \text{BuyingFrequency}} \times \text{Buying Frequency} + \varepsilon_{in}
\end{aligned}$$

Figure 3: Design of CQ for the Argentine Origin



Table 5: Basic data of the survey

<b>Kind of survey</b>	- Face-to-face, computer-assisted
<b>Survey locations totally N = 1070</b>	- North: Bremen (n = 78), Dresden (n = 109), Berlin (n = 61), Paderborn (n = 76), Vechta (n = 31), Göttingen (n = 121), Hamburg (n = 55) - South: Ulm (n = 69), Freising (n = 181), Nürnberg (n = 159), Augsburg (n=130)
<b>Sex</b>	- female = 50.9 %, male = 49.1 %
<b>Age</b>	- under 18 years = 4.0 % - 19 to 39 years = 35.3 % - 40 to 59 years = 34.0 % - over 59 years = 26.7 %
<b>Filter</b>	- 100 % buyers of beef, who bought beef at least three times during the last year.

Source: Own illustration.

Table 6: Estimation results Northern Germany

	<b>BAVARIAN BEEF</b>		<b>GERMAN BEEF</b>		<b>ARGENTINE BEEF</b>		<b>Without GI</b>	
	coeff.	z-value	coeff.	z-value	coeff.	z-value	coeff.	z-value
<b>ASC</b>	<b>0.84</b>	<b>3.88***</b>	<b>0.76</b>	<b>3.51***</b>	<b>0.54</b>	<b>2.10**</b>	-	-
<b>Price</b>	<b>-0.08</b>	<b>-1.70*</b>	<b>-0.36</b>	<b>-5.98***</b>	<b>-0.28</b>	<b>-3.38***</b>	<b>-0.71</b>	<b>-7.89***</b>
<b>CQ-Bavaria</b>	<b>0.58</b>	<b>4.31***</b>	<b>-0.31</b>	<b>-2.04**</b>	<b>-0.67</b>	<b>-2.71***</b>	<b>0.97</b>	<b>3.53***</b>
<b>Q+S</b>	<b>-0.57</b>	<b>-4.04***</b>	<b>-0.59</b>	<b>-4.13***</b>	-0.42	-1.57	-0.33	-1.41
<b>GUTFLEISCH</b>	<b>-1.05</b>	<b>-4.70***</b>	0.17	0.85	-0.39	-1.58	<b>0.62</b>	<b>2.60***</b>
<b>Attitude Bavaria</b>	<b>0.33</b>	<b>4.18***</b>	0.13	1.50	0.06	0.64	-	-
<b>P. Country Image</b>	<b>0.42</b>	<b>4.72***</b>	<b>0.30</b>	<b>3.19***</b>	0.17	1.48		

Observations = 5944; LR  $\chi^2 = 436.64$  (p = 0.0000); log likelihood = - 1841.71; pseudo R<sup>2</sup> = 0.1060.

Source: Own calculations (\*  $\alpha = 0.10$ , \*\*  $\alpha = 0.05$ , \*\*\*  $\alpha = 0.01$ ).

Table 7: Estimation results Southern Germany

	BAVARIAN BEEF		GERMAN BEEF		ARGENTINE BEEF		Without GI	
	coeff.	z-value	coeff.	z-value	coeff.	z-value	coeff.	z-value
ASC	<b>1.77</b>	<b>6.96***</b>	<b>1.33</b>	<b>5.23***</b>	<b>0.52</b>	<b>1.67**</b>	-	-
Price	<b>-0.13</b>	<b>-2.96***</b>	<b>-0.33</b>	<b>-5.01***</b>	-0.05	-0.59	<b>-0.45</b>	<b>-4.86***</b>
CQ-Bavaria	<b>0.36</b>	<b>2.64***</b>	<b>-0.78</b>	<b>-4.60***</b>	-0.10	-0.36	<b>1.31</b>	<b>4.53***</b>
Q+S	<b>-1.00</b>	<b>-7.34***</b>	<b>-1.45</b>	<b>-8.10***</b>	-0.43	-1.37	<b>0.73</b>	<b>2.75***</b>
GUTFLEISCH	<b>-1.33</b>	<b>-5.72***</b>	<b>-0.42</b>	<b>-1.93*</b>	0.13	0.47	<b>0.76</b>	<b>2.72***</b>
Attitude Bavaria	<b>0.29</b>	<b>2.97***</b>	<b>-0.31</b>	<b>-2.99***</b>	<b>-0.62</b>	<b>-5.23***</b>	-	-
P. Country Image	<b>0.65</b>	<b>5.78***</b>	<b>0.29</b>	<b>2.30**</b>	0.19	1.27	-	-
Regional Con.	<b>0.24</b>	<b>1.88*</b>	-0.15	-1.16	<b>-0.31</b>	<b>-1.98**</b>	-	-
Income	0.01	0.10	0.01	0.06	<b>0.17</b>	<b>3.03***</b>	-	-
Education	0.03	0.44	<b>0.21</b>	<b>2.86***</b>	0.12	1.46	-	-
Buying frequency	0.05	0.30	<b>-0.47</b>	<b>-2.31**</b>	<b>-0.59</b>	<b>-2.52***</b>	-	-

Observations = 6028; LR  $\chi^2 = 863.07$  ( $p = 0.0000$ ); log likelihood = - 1657.61; pseudo  $R^2 = 0.2066$ .

Source: Own calculations (\*  $\alpha = 0.10$ , \*\*  $\alpha = 0.05$ , \*\*\*  $\alpha = 0.01$ ).

Table 8: Compensating variation for the GIs

	North		South	
	point estimate	95 % confidence interval	point estimate	95 % confidence interval
BAVARIAN BEEF	1.19 €	1.77 - 0.55 €	3.94 €	6.04 - 2.42 €
GERMAN BEEF	1.07 €	1.62 - 0.38 €	2.96 €	4.71 - 1.71 €
ARGENTNINE BEEF	0.76 €	1.43 - 0.07 €	1.15 €	2.79 - (-0.14 €)

Source: Own calculations.

Table 9: Compensating variation for the Quality Indications combined with alternative 4

	North		South	
	point estimate	95 % confidence interval	point estimate	95 % confidence interval
CQ- BAVARIA	1.36 €	2.11 € - 0.47 €	2.92 €	4.42 € - 1.41 €
QS	-0.47 €	0.26 € - <b>(-1.34 €)</b>	1.64 €	3.12 € - 0.10 €
GUTFLEISCH	0.87 €	1.49 € - <b>(-0.08 €)</b>	1.71 €	3.01 € - 0.38 €

Source: Own calculations.

Table 10: Compensating variation for the Net control and the Net Origin effect of CQ-Bavaria

	<b>North</b>		<b>South</b>	
	point estimate	95 % confidence interval	point estimate	95 % confidence interval
Net effect control	0.82 €	1.44 € - 0.37 €	0.82 €	1.80 € - 0.15 €
Net effect Origin	0.54 €	1.45 € - <b><u>-0.73 €</u></b>	2.10 €	4.65 € - 0.98 €

Source: Own calculations.