Country-of-Origin Labeling for Uruguayan Beef[1]

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Abstract

The objective of this research is to identify Chilean consumer attitudes towards COO (Country-of-Origin) labeling, determine the importance of COO, and identify consumers who are most likely to buy COO-labeled beef products from Uruguay. The results suggest that age, number of children at home, whether the interviewee was the primary person responsible for meal selection, and whether interviewees purchased beef from different countries were significant determinants of whether a Chilean interviewee regarded COO as important. Age, income level, beef purchase frequency, and homemaker were significant determinants of whether an interviewee would purchase COO-labeled beef from Uruguay. These results suggest that COO is not a particularly important variable to consumers surveyed in this study.

Introduction

Understanding consumer preferences and producing food products that possess characteristics being demanded is essential for profitability of all participants in the agricultural food production and processing industries. This is especially critical for food products that are sold predominantly through export markets. Recent events like BSE occurrences in Japan and Canada and Foot and Mouth Disease in South America demonstrate the importance of stable export markets. Uruguay is a good example of a country whose overall prosperity, in particular its agricultural sector, is highly dependent upon beef exports. From 1995 to 2002, beef exports averaged

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60% of total Uruguay production and 15% of the country's total exports. Overall, beef is the country's largest export, although they are not a relatively large player in world beef trade. Therefore, identifying characteristics of beef products that target particular demands of international consumers and developing a reputation for providing that product is important for establishing a viable market.

One way a particular country can establish an international identity is to develop a national brand associated with product from that country. Although motivated by consumers' right to know and food safety issues, country of origin labeling can prove beneficial to countries that can establish a reputation of quality associated with beef from that country in the minds of consumers. Country of Origin (COO) labeling of beef is becoming increasingly important in numerous countries as international trade continues to increase. Chile was one of the first countries implementing COO labeling at the retail level in 1997. Recently, Japan and the EU have also required such labeling. The U.S. is discussing such legislation which is scheduled for implementation in September 2004.

In 2002, Chile was the only export country for Uruguay where COO labeling was mandatory. At the retail level, which is about 80 percent of consumption, beef in Chile is identified with the country and firm of origin enabling consumers to verify the source of beef.   The important question facing Uruguay is whether Chilean COO labeling can be used to help market Uruguay beef in the country. The objective of this research is to identify Chilean consumer attitudes towards COO labeling, determine the importance of COO, and identify consumers who are most likely to buy COO-labeled beef products from Uruguay.[1] Results are important in assisting Uruguayan firms in marketing beef to consumers under a COO label.

Summary of Relevant Literature on COO Labeling

There has been extensive research on COO labeling and its effects on consumers' perceptions, preference, and behavior. Schooler was one of the first to note that COO affects consumers' images of a product. Since then determining the magnitude of the effect has been the subject of much research. Grunert noted that COO had practically no effect on the formation of quality expectations in France, Germany, Spain and the UK.

Subsequent studies, however, reported different results. Becker (1999) highlights that COO has been used as a cue to signal quality to the consumer and (or) as a cue to signal safety (e.g.: those countries with minimum risk of BSE). The importance of COO for the consumer is particularly increasing on the fresh meat market. Place of purchase and COO gain importance for the consumer cue evaluation process, in particular when brands, the most reliable signal of product quality for many foodstuffs, and other extrinsic cues are missing.

Country of Origin may be regarded as a cue for eating quality or as a cue for food safety. According to Becker's (1998) study in six European countries, COO was regarded as being most helpful in assessing the eating quality of beef and of beef safety. Country of Origin was ranked first or second by consumers as an indicator for predicting eating quality in Germany, Ireland, Sweden and France.   For all meats, there was a statistically significant correlation between the importance of COO in predicting eating quality and safety of fresh meat with gender and age.

Kim and Unterschultz evaluated Korean meat-buyer attitudes towards Canadian beef relative to competing US and Australia beef. They evaluated the importance of COO in buying decisions of the major hotels in Korea who were found to strongly prefer beef from the United States. In a survey conducted by Hoffmann in Sweden, COO was a relevant quality indicator. COO was ranked as the most or one of the most important cues in predicting eating quality, both intrinsic as well as extrinsic. For food safety, COO was ranked second after freshness.

Corcoran, Bernués, and Baines concluded that COO was perceived by consumers as a major quality indicator and was the most important cue given on the label. Roosen, Lusk and Fox highlighted the importance of COO in consumers' beef purchasing decisions. They analyzed consumer attitudes towards private and government labeling using a mail survey in Germany, France, and the UK. Respondents were asked to indicate the importance of several factors (marbling, color, external fat, price, brand, COO) in their beef steak purchasing decision. Results suggested that COO labels were rated as the most important factors in consumer beef steak purchasing decisions for Germany and France. In the UK, however, COO was less important, on average, than steak color, price and fat content. Loureiro and Umberger, through a survey conducted in several grocery stores in Colorado, assessed consumer willingness to pay for a mandatory COO labeling program. Results indicated that consumers were generally concerned about source verification issues, and as a consequence they were willing to pay for COO labeling.

In summary, various studies have been done on COO. First, the studies have shown a general home-country selection bias, with alternative product choice selection affected by product class, for a specific product and for a specific brand. Second, stereotyping has been found for some countries and evaluation of imported products can vary significantly from one country to another. Moreover, consumers in the same country can have significantly different perceptions of the COO and these perceptions can vary over time due to a change in their country's level of industrialization, marketing development, and lifestyle. Third, most of the studies have focused on consumers in developed countries. Finally, demographic variables also played a role in COO perception. Females, especially those with children, generally tend to have a more positive COO bias towards domestic products than males, and older people tend to evaluate foreign products more favorably than do

younger people. Education has been indicated as the most influential demographic variable. Most studies revealed that people with a high level of education are more in favor of foreign products than those with limited education. Consumers tend to look for COO on fresh beef products and use it as a quality cue in purchasing decisions.

Data Description and Survey Procedures

Data collection for this research was conducted between May and December 2002 in Santiago, Chile. This country was chosen because it had a long standing COO requirement on its beef imports. In addition, it is an important potential market for Uruguayan beef. Chile is the main beef importer in South America and Latin America, with an annual growth rate of 11 percent for the period 1998 to 2002. Imports represented 40 percent of total beef consumption in 2002 and there has been strong competition between Brazilian, Argentinian, and Uruguayan suppliers in the past few years.

Two sets of interviews were completed. Initially, 31 interviews were conducted with the main importers, distributors, retailers, official authorities, suppliers, and brokers who purchased beef from various countries, including Uruguay. Then 400 consumers were surveyed. A copy of the survey instruments are presented in Perez. Only the consumer surveys are used in this analysis. Summary statistics of consumer demographic and other characteristics are presented in Table 1.

Beef consumers, men and women who were head of the household and responsible for buying beef were chosen as the target population. The ESOMAR (European Society for Opinion and Marketing Research) social grades were used to categorize education, age, and occupation of the main income earner (see Hasting). Three levels of income were specified which corresponded to low to medium, medium to high, and high. These levels were based on confidential data and actual income levels were not provided to the authors. The survey respondents included people between 25 and 60 years old living in the metropolitan area of Santiago (Chile). Personal interviews were done at the homes of all 400 interviewees.

The Uruguayan National Meat Institute (INAC) hired a professional local company in Santiago to execute the survey. The company used a probability sampling procedure for selecting the sample homes. The questionnaire and training of the staff were completed in October 2002. The survey was carried out in the first two weeks of November 2002. A pre-test was made, and then personal at-home interviews were conducted for collecting the data.

Table 1. Means and Standard Deviations of Survey Variables

	Mean	Standard Deviation
Importance of COO[a]	3.75	0.69
Consumer of Uruguayan beef[b]	0.20	0.99
Age, years	40.70	7.60
Gender[c]	0.86	0.50
Education[d]	3.01	0.57
Number of children	2.50	0.92
Number of beef purchases [e]	0.71	0.80
Average household size	4.30	1.50
Socioeconomic group[f]	1.01	0.35
Multiple country buyers[g]	0.47	0.29
Principal decisionmaker for meal selection[h]	0.91	1.21

[a]COO is a discrete variable where 1 = not important, . . . , 5 = very important.
[b]Uruguayan beef buyer is a binary variable where 1 = Uruguayan buyer and 0 = otherwise.
[c]Gender is a binary variable where male = 0 and female = 1.
[d]Education is a binary variable where some high school = 1; high school = 2; technical school = 3; university = 4; and graduate school = 5.
[e]Number of beef purchases is a binary variable where consumers that purchase beef more (less) than once a week = 0 (1).
[f]Socioeconomic group = 0 for high income, 1 = medium to high income, and 2 = low to medium income.
[g]Multiple country buyers is a binary variable where consumers that bought beef from Chile only in the last 30 days = 0 and those that bought beef from multiple countries = 1.
[h]This is a binary variable where homemaker = 0 and 1 = otherwise.

The questionnaire was structured in five parts. The first had filter questions to separate non-beef consumers, identify people who make the purchasing decision and were between the ages desired (25 to 60 years). The second part was designed to assess whether consumers were familiar with country of origin of beef they consume, and why they like or dislike beef from different countries. The third part had questions regarding trends in meat consumption (e.g: where they eat, where they buy from, and eating frequency), factors underlying beef purchasing decisions, importance of extrinsic and intrinsic attributes of meat, and quality cues when buying meat. The fourth part elicited the beef perceptions from different countries using a scale with semantic bipolar adjective. Finally, socio-economic characteristics of respondents were determined.

Relative Importance of Intrinsic and Extrinsic Attributes

For eliciting attribute importance, consumers were asked to indicate how important each factor was in their purchasing decision on a Likert-type scale, where one (1) was not important and five (5) very important. Intrinsic attributes were color, fat

content, tenderness, freshness, and taste while the extrinsic attributes were price, country of origin, place of purchase, naturally produced (e.g., no growth hormones) and presentation in the case package.

The order of rankings for each variable are listed as well as their respective Likert scale ranking in parentheses. On average, the interviewees ranked these attributes in this order: freshness (4.78), tenderness (4.68), taste (4.67), naturally produced (4.63), fat content (4.61), color (4.55), place of purchase (4.34), price (4.31), and country of origin (3.72).

Chilean Perceptions and Buying Behavior Towards Uruguayan Beef

Interviewees were asked whether they knew the origin of beef that was available for consumption in retail supermarkets in Chile. If so, they were asked to identify the country. A total of 1,042 responses were collected with Argentina (32 percent), Chile (22 percent), and Uruguay (20 percent) being the most prevalent answers. Other countries cited in the interviews included Brazil and Paraguay. Remaining countries represented less than one percent. Note that the number of responses is greater than the 400 respondents because respondents could list more than one country.

The interviewees were asked to identify what countries they had purchased beef from in the past. A total of 1,076 responses were obtained with Chile (35 percent), Argentina (28 percent), and Uruguay (19 percent) being the most prevalent. This question was followed up with a question asking the country of origin for beef that had been purchased in the past 30 days. Chile (60 percent), Uruguay (13 percent), and Argentina (11 percent) were the most prevalent for the 556 responses to this question.

Finally, beef perceptions for Argentina, Brazil, Chile, and Uruguay were assessed through a multi attribute scale. A 7-point semantic differential scale accompanied the attributes with end point associated with bipolar labels. The semantic differential scale is an itemized rating scale and requires the interviewee to position his or her answer between two opposite poles which have a semantic meaning (Verbeke and Viaene). For example, paired attributes included tender vs. tough, fat vs. lean, safe vs. not as safe, low price vs. high price, good quality (as measured by case presentation) vs. poor quality, bad taste vs. good taste, and hard to find (accessibility) vs. easy to find. Chilean beef was reported to have the highest taste, quality, accessibility, and taste. Argentina had the highest rating in tenderness, taste, and quality among imported beef. Uruguayan and Argentinean beef were perceived to be very similar. In general, Brazilian beef ranked lower in almost every category relative to the other countries.

Econometric Models

Roosen, Lusk, and Fox used an ordered probit model to determine the influence of several consumers' characteristics in explaining the level of importance they place on specific attributes and country of origin. Consumers' perceptions regarding statements like "How important are the attributes country of origin or natural produced in your purchasing decision" have an ordinal rank. The ordered probit model described in Roosen, Lusk, and Fox is summarized here.

In ordered dependent variable models, the observed Y_i denotes outcomes representing ordered or ranked categories. The dependent variable takes ordinal values that reflect categories of arbitrary width. The ordered probit model considers a latent variable y_i^* that depends linearly on the explanatory variables x_i where β is a vector of parameter estimates and ε is the error term:

$$y_i^* = x'_i \beta + \varepsilon_i$$

Two models were estimated using data collected in this study. The first model was used to determine the marginal effects of various independent variables on how an interviewee viewed COO label on beef. The second model was used to determine the marginal effect of various independent variables on an interviewee's decision to purchase Uruguayan beef. The first model is:

$$COO_{ji} = \beta_o + \beta_1 AGE_i + S_k \beta_{2k} INCOME_{ki} + S_l \beta_{3l} EDUCATION_{li} + \beta_4 CHILDREN_i + \beta_5 HOMEMAKER_i + \beta_6 FREQUENCY_i + \beta_7 MULTIPLE_i + m_i$$

where COO_{ji} is a discrete variable measuring how the interviewee viewed country of origin labeling [j = 1 (not important), . . . 5 (very important)] for interviewee i; AGE is a continuous variable measuring age of the interviewee; $INCOME_k$ is a discrete variable denoting the socioeconomic income level of the interviewee [k = 0 (high income), 1 (medium to high income), 2 (low to medium income)]; $EDUCATION_l$ is a discrete variable denoting the terminal degree attained by an interviewee [l = 0 (primary school), 1 (high school), 2 (technical school), and 3 (college)]; $CHILDREN$ is a continuous variable corresponding to the number of children in the interviewee's family; $HOMEMAKER$ is a binary variable denoting whether the interviewee is a homemaker with primary decisionmaking responsibility for meal selection (0 = homemaker, 1 = otherwise); $FREQUENCY$ is a binary variable denoting whether the interviewee, on average, purchased beef more than once a week (0 = more than once a week, 1 = once a week or less); $MULTIPLE$ is a binary variable denoting whether the interviewee had purchased beef from only Chile in the last 30 days (0 = purchased only Chilean beef in the last 30 days, 1 = purchased beef from multiple countries in the last 30 days); and the β's are the parameters to be estimated in the ordered probit model (β_o is the intercept term).

The second model had a dependent variable that was binary and a binomial logit model was used to predict the probability the interviewee would buy beef from Uruguay. The second model is

$$\text{Ln} \left[URUGUAY_i / (1 - URUGUAY_i) \right] = a_0 + a_1 AGE_i + S_k\, a_{2k} INCOME_{ki}$$
$$+ S_l\, a_{3l}\, EDUCATION_{li} + a_4\, CHILDREN_i + a_5\, HOMEMAKER_i$$
$$+ a_6\, FREQUENCY_i + a_7\, MULTIPLE_i + u_i$$

where $URUGUAY_i$ is the dependent variable for interviewees who had purchased beef from Uruguay ($URUGUAY$ is the probability that an individual will buy beef of Uruguayan origin), ln is the logarithmic operator, u_i is the error term, *a's* are parameters to be estimated (a_0 = intercept term), and the independent variables were defined in the previous model.

Results

The first model was estimated with Eviews 3.1 using the maximum likelihood estimation procedure (Studenmund). The sign of β shows the direction of the change in the probability of falling in the endpoint rankings when the independent variables change. The marginal effect on the dependent variable is given by the derivative of the parameter estimates. Binary variables do not have defined derivatives, thus probabilities for these variables are calculated by comparing the probabilities of the variable at its two different values, zero and one, and holding all other variables at their means. The probabilities for a base model and marginal effects were calculated. As the base model, we used a low to medium income individual of 40.7 years of age with less than a high school terminal degree with two children at home who purchases beef less than once a week and is not a homemaker (Table 2).

AGE and HOMEMAKER exert a positive effect on the probability that a consumer will place a higher importance on COO. For example, as AGE increases the probability that an interviewee would select 1, 2, or 3 decreases and increases for a 4 or 5. This indicates that older people place more importance on COO. In contrast, the number of children at home (CHILDREN) and those interviewees that purchase beef from multiple sources (MULTIPLE) exert a negative influence on the probability that a consumer will place a greater importance on COO. For example, as CHILDREN decreases, the probability that an interviewee selects 1, 2, or 3 increases and decreases for 4 or 5.

Table 2. Ordered Probit Estimates of Response to Importance of Country of Origin

	Parameter[a]	Standard Error	Probabilities for the Survey Response				
			1	2	3	4	5
			0.0890[b]	0.1540	0.2037	0.3789	0.1737
$INCOME_0$	-0.057	0.158	0.0990	0.1628	0.2082	0.3704	0.1593
$INCOME_1$	-0.076	0.140	0.1020	0.1655	0.2095	0.3675	0.1549
$EDUCATION_1$	0.401	0.360	0.0400	0.0960	0.1602	0.4080	0.2952
$EDUCATION_2$	0.463	0.349	0.0350	0.0880	0.1523	0.4074	0.3169
$EDUCATION_3$	0.349	0.339	0.0450	0.1029	0.1667	0.4075	0.2776
HOMEMAKER	0.353*	0.200	0.0440	0.1024	0.1662	0.4076	0.2790
MULTIPLE	-0.285*	0.107	0.1450	0.1961	0.2197	0.3289	0.1103
FREQUENCY	0.169	0.122	0.0650	0.1285	0.1876	0.3980	0.2208
			Marginal Probabilities[c]				
AGE	0.025*	0.006	-0.0034	-0.0038	-0.0021	0.0034	0.0065
CHILDREN	-0.084*	0.052	0.0151	0.0128	0.0068	-0.0128	-0.0208

[a]* Denotes statistical significance at the 0.10 level.
[b]This row is the base model.
[c]A one unit increase in CHILDREN for survey response 1, 2, 3, 4, and 5 is 0.1041, 0.1668, 0.2105, 0.3662, and 0.1529. A one unit increase in AGE is 0.0856, 0.1502, 0.2016, 0.3824, and 0.1803, respectively.

A maximum-likelihood estimation procedure is used to estimate the second model and the derivatives of the parameters are used to predict the probabilities that an interviewee will have purchased Uruguayan beef. Positive values of *ß* imply that increasing X_i will increase the probability of the response while negative values imply the opposite. However, when interpreting the parameters, they represent the impact of a one-unit increase in the independent variable, holding the other explanatory variables constant, on the log of the odds of a given choice, not on the probability itself of the dependent variable. The marginal effect on the dependent variable is given by the derivative.

The logistic regression procedure shows that *AGE, INCOME_0* and *INCOME_1, HOMEMAKER*, and high frequency beef buyers (*FREQUENCY*) are statistically significant at the 90% interval (Table 3). The expectation prediction table in Eviews resulted in a total of 60.5% of correct and 39.5% of incorrect (cut off value of 0.5). The value of the log likelihood was -260.4 which was significant at 0.001. The antilog (exponential function) of the regression coefficients was performed in order to predict the effects of a unit change in each independent term on the probability that a person will purchase Uruguayan beef.

Table 3. Logit Regression Results and Probabilities for Interviewees that Would Purchase Uruguayan-Labeled Beef

Variable	Parameter Estimate[a]	Standard Error	Probability[b]
Intercept	-6.060	2.260	
AGE	*0.280	0.106	0.026
$INCOME_0$	*1.060	0.312	0.249
$INCOME_1$	*0.791	0.275	0.182
$EDUCATION_1$	-0.909	0.696	
$EDUCATION_2$	-0.367	0.673	
$EDUCATION_3$	-0.797	0.655	
HOMEMAKER	*0.724	0.402	0.166
CHILDREN	-0.023	0.105	
FREQUENCY	*0.642	0.241	0.145

[a]*Denotes statistical significance at the 0.10 level.
[b]Denotes probabilities that a consumer will purchase Uruguayan beef resulting from a one unit increase in the statistically significant independent variables.

To estimate and report these changes, a base model was constructed using the minimum age and the default dummy variables. The base probability was of 0.28 for the default respondent (25 years, high income, less than a high school education, not the head of a household, and a low frequency beef buyer). *AGE*, low to medium income and medium to high income (*INCOME_0*, and *INCOME_1*) were the variables with major impact on the probability that a consumer will purchase Uruguayan beef. The probability that a respondent belonging to the low income group would purchase Uruguayan labeled beef is 24.9% higher than the probability of the high income group, all else equal. In the same way, *HOMEMAKER* and those who purchased beef more than once a week (*FREQUENCY*) increased the probability by 16.6% and 14.5%, respectively.

Implications

The results suggest that age, number of children at home, whether the interviewee was the primary person responsible for meal selection, and whether interviewees purchased beef from different countries were significant determinants of whether a Chilean interviewee regarded COO as important. Age, income level, beef purchase frequency, and homemaker were significant determinants of whether an interviewee would purchase COO-labeled beef from Uruguay. Age, children, and homemaker (which is typically a woman in this data) are variables that have been found to be significant in other studies. Uruguayan beef was more likely to be purchased by consumers in the low income category, which suggests that it is price competitive with beef from other countries.

Beef is Uruguay's most valuable export and INAC is trying to increase the marketing of beef in countries such as Chile. These results suggest that COO is not a particularly important variable to consumers surveyed in this study. Chile has not had any major food safety problems in recent years, which might explain why COO was not as significant in fresh beef as was the case for studies conducted in EU countries. However, the results suggest that consumers do not discriminate

based on COO labeling. Rather, continued focus on differentiation and quality are important for improving beef exports.

Footnotes

[1]Uruguay has long had a system whereby individual animals are tracked form birth to slaughter. Marshall et al. (2002) summarizes the dicose system.

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