

The Relative Importance of Preferences for Country-of-origin in China, France, Niger and the United States

Authors

Mariah Tanner Ehmke
Assistant Professor
Agricultural and Applied Economics
Department 3354
University of Wyoming
1000 E. University Ave.
Laramie, WY 82070
e-mail: mtannere@uwyo.edu
Phone: (307) 766-5373
Fax: (307) 766-5544

Jayson Lusk
Professor and Sparks Endowed Chair
Department of Agricultural Economics
Oklahoma State University
511 Ag Hall
Stillwater, OK 74078
e-mail: jayson.lusk@okstat.edu
Phone: (405) 744-7465
Fax: (405) 744-8210

Wallace Tyner
Professor
Department of Agricultural Economics
Purdue University
403 W. State St.
West Lafayette, IN 47907-2056
e-mail: wtyner@purdue.edu
Phone: (765) 494-0199

Contributed paper prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006

Copyright 2006 by Mariah Tanner Ehmke, Jayson Lusk, and Wallace Tyner. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Abstract

Country-of-origin (COO) is an increasingly politicized credence attribute in the globalizing food system. While international policy development in this area is geographically far-reaching, the benefits of country-of-origin labels (COOL) to producers and consumers from countries in different locations and levels of economic development are not clear. Previous work investigates the importance of COO to consumers, but is typically limited in scope to consumers in one nation. In addition, little is known about the importance of COO information relative to other credence attributes, especially in non-meat food products. This study measures the benefits of COOL to an internationally diverse set of consumers (in developed and developing countries) and estimates their priority rank in policy development. The paper draws upon research in the management literature suggesting consumer information needs are not based on quality alone, but also relate to affective (emotional) and normative (social acceptance) needs. A conjoint experiment is conducted in China, France, Niger and the United States to elicit consumer preferences for COO information, organic production, and genetic modification. The results indicate COO information is not as important as genetically modified content information (France, the United States, and Niger) or organic production information (China). Findings reveal individuals with quality and food safety information needs place higher importance on genetically modified and organic food information than COO information.

JEL Classifications: Q13 Agricultural Markets and Marketing; Q18 Agricultural Policy, Food Policy; Q17 Agriculture in International Trade

Key Words: country-of-origin, genetic modification, organic, conjoint, onion, information, food policy

The Relative Importance of Preferences for Country-of-origin in China, France, Niger and the United States

Consumers cannot easily observe many food characteristics such as origin, means of production, or taste. That is to say many food attributes are credence and experience attributes, which creates a problem of asymmetric information problem potentially resulting in market failure (e.g., Akerlof 1970, Caswell and Mojduszka 1996, Caswell and Padberg 1992). Providing information disclosures via food labels turns experience and credence attributes into search attributes. With credible labels, the consumer is able to make a more informed decision that better matches her preference (Caswell and Mojduska 1996). Country-of-origin is one of many credence attributes with emerging international policy interest. Recently, the European Union adopted the Product Designation of Origin, which covers a very broad range of differentiated and less differentiated goods (EUROPA 2006). In addition, the United States is now adopting mandatory country-of-origin labeling for a wider variety of foods including meats, seafood, and fresh fruits and vegetables (Krissof et al. 2004).

This is an important time to study country-of-origin labeling given its current international policy relevance and potential influence on consumer, firm, and government behavior. Past research shows that increased government involvement in credence attribute labeling influences consumers' knowledge of food, purchasing practices, and food utilization. Labeling regimes also affect food manufacturers' overall product offerings and marketing practices (Caswell and Mojduska 1996). Further, the implementation of country-of-origin labeling policies in domestic or regional markets (e.g., in the European Union) may lead to international trade conflicts. These may include concerns about country-of-origin labels serving

as non-tariff trade barriers. Also, it is not clear that products of a designated origin in one country are protected in another. For example, is Parma Ham bought in the U.S. guaranteed to be from Parma, Italy?

In order to effectively evaluate current country-of-origin policies and future challenges to those policies, it is important to understand the effect of country-of-origin labeling on consumer preferences across broad groups in developed and developing countries. While much of today's country-of-origin labeling occurs in the developed world, labeling regimes may have spill-over effects beyond the developed world due to the globalization in the food industry. One step to understanding the global effects of country-of-origin labeling on consumers' welfare includes measuring geographically and economically diverse consumer preferences and willingness-to-pay for country-of-origin information. It is also important to determine the *relative* importance of origin information in comparison to other credence attributes of international import, mainly genetic modification and organic production.

This research compares consumer preferences for food-product origin in several internationally distinct locations including developed and developing countries and investigates how preferences for origin compare to preferences for other credence attributes. Our primary finding is that regardless of citizenship, individuals most prefer products from their own country; the French most prefer French products, the Chinese most prefer Chinese products, etc. However, the relative importance of country of origin is not as great as consumers' preferences for the other credence attributes. Findings from this research should be valuable in private market initiatives to "brand" on the basis of origin and in developing public policies related to origin. In the next section, we provide background on labeling initiatives related to origin,

genetic modification, and organic production. We then describe our methods, empirical results, and conclusions.

Background

Country-of-origin Labeling of Agricultural Products

Previous studies have identified country-of-origin as both a credence and extrinsic attribute. The latter is an attribute that is not integrated into the physical product in the same way as an intrinsic attributes (e.g., color and fat content). The majority of recent studies in the agricultural context focus on the United States and Western Europe. The primary product considered in these studies is beef. This has stemmed, in part, from concern in the 1990s over Bovine Spongiform Encephalopath (BSE). In general, these studies show consumers prefer own country-of-origin in meat products (e.g., Schupp and Gillespie 2001, Glitsch 2000). Those studies that measure consumer willingness-to-pay (WTP) for own country-of-origin also report most consumers have a positive willingness-to-pay for own country of origin meat products (e.g., Hoffman 2000, Umberger et al. 2002, Loureriro and Umberger 2003, and Umberger et al. 2004).

Relative Importance of Credence Attributes

Some studies have requested participants to rank country-of-origin in importance relative to other product attributes. Often, country-of-origin is compared to intrinsic meat product attributes including meat color, tenderness and leanness. Little research has considered the importance of origin in comparison to other credence attributes. In general, findings reveal that the importance of origin and the value of country-of-origin labels depend on the other product attributes the consumer considers, the timing of the study, and the location of the customer. Hoffman (2000) finds that Swedish customers have a high regard for own country-of-origin

meat. This reflects certain animal welfare restrictions Sweden enforces which other European countries do not. Following the BSE out-break in Scotland in the 1990s, Davidson et al. (2003) found that 77 percent of Scottish consumers considered origin the most important product attribute. In Umberger et al. (2004), consumers ranked origin behind tenderness and traceability in importance. In Loureiro and Umberger (2003) country-of-origin was very important along with food safety.

In addition to product origin, we consider two additional credence attributes: genetic modification and organic production. Labeling practices for both of these attributes have received international attention from government, industry, and academia (Food and Agriculture Organization 2005a and 2005b, Reynolds 2004, Geier 2005, Thompson 1998, Grunert and Jørn Juhl 1995, Fulton and Giannakas 2004, Noussair et al. 2004, Lusk 2003, Lusk et al. 2003, Lusk et al. 2004, Schmitz 2004, and The Economist 2005). Despite their prominence in international policy discussions, very few other studies specifically consider the value of GM and organic production relative to each other or own country-of-origin. Two studies that do are focused, again, primarily on beef consumption. Umberger et al. (2003) found United States consumers ranked country-of-origin above organic, but behind food safety inspection importance. Lusk et al. (2003), estimated consumer valuation of hormone treated beef and beef that had been fed genetically modified feed in France, Germany, the United Kingdom, and the United States. Their findings indicate that British and American consumers place relatively higher value on hormone free beef compared to GM feed free beef. Both French and German consumers, however, have high valuations of both product attributes.

In another study, Burton et al. (2001) analyze British consumers' combined preferences for organic and GM-free food in general. They used the frequency of organic food purchases to

predict the likelihood a consumer will buy GM-free food. They find there is a committed group of organic consumers willing to pay from 352 percent (men) to 472 percent (women) more than the conventional market price to have a diet free of genetically modified food. The authors' comments do point out that the reality of this result is improbable. A more probable, but less substantial finding is that infrequent consumers will pay 26 percent (men) and 49 percent (female) more for food that is free of genetic modification over conventional food. The infrequent organic purchaser group is also willing to pay 13 percent more to decrease chemical use in food production by 10 percent and is willing to pay 5 percent more for food with 10 percent fewer food miles. They find WTP for GM-free food is further complicated by the consumer's gender and whether the genetically modified food contains just plant or plant and animal genetic modifications. All consumers are less tolerant of food that contains genetically modified plant and animal material rather than just genetically modified animal material.

Other Literature on Country-of-origin

The variability in the importance of country-of-origin relative to other food attributes reflects similar findings in the business literature. Verlegh and Steenkamp (1999) find that the value of country-of-origin information tends to decrease as information is provided about other product attributes. In addition, the business marketing literature has gone further in investigating why consumers value own country-of-origin over a variety of products. In their meta-analysis of country-of-origin studies, Verlaugh and Steenkamp also find that in addition to cognitive, quality related information, COOLS also provide affective and normative information. Affective information has symbolic and emotional value to consumers. This information is important for consumers with emotional and patriotic connections to their country. Normative information

provides information to consumers relating to their social norms and personal beliefs. Further, Shimp and Sharma (1987) identify several social and psychological factors influencing country-of-origin preferences which are largely ignored in food industry studies. Country-of-origin orientation is influenced by consumers' ethnocentric tendencies, price-value perceptions, self-interest concerns, reciprocity norms, rationalization-of-choice, restrictions-mentality, and freedom-of-choice views (Shimp & Sharma 1987).

Shimp and Sharma (1987) recognize the affective and normative elements of country-of-origin information in their development of consumer ethnocentrism. Consumer ethnocentrism is fed in part by one's concept of self. If one's national identity is closely tied to his or her concept of self, then he or she is likely to be a more ethnocentric consumer. The importance of national identity in self varies across individuals. Their empirical investigation reveals product country-of-origin is most important to individuals whose economic livelihood is "threatened" by foreign competition. Upper-lower and working class consumers in certain geographic and industrial areas, such as the automobile sector in Detroit, are more likely to have own country-of-origin preferences. Consumer ethnocentrism is also driven by individuals' desires to purchase own country goods as a means to achieve group belonging.

Experiment Design and Data Collection

In order to measure consumers' WTP for GM content reduction, organic production, and origin, a conjoint experiment eliciting subjects' valuation for these attributes is employed. White onions are used as the evaluation good because they are commonly consumed across all countries of interest in this study (China, France, Niger, and the United States). Although other food products (e.g., tomatoes, meat products, and dairy products) were considered for this study,

onions were selected because they are one of the only obvious food products commonly consumed across the various study locations. In addition, white onions are not highly differentiated by location like higher-value products such as wine, seafood, and cheese. Thus, our a priori expectation is that preferences for onion origin are unlikely to be attributable to differences in product characteristics.

The methodology used to measure consumer WTP for the onions is derived from Lancaster's (1991) approach to consumer theory. One of the most useful aspects of this theory is that a good, *per se*, does not give direct utility to the consumer. Rather, it possesses a bundle of characteristics and it is these characteristics which give utility to the consumer. In this conjoint experiment, the good, an onion, has J different characteristics or attributes which are explicitly defined for the subject or potential consumer. More precisely, J=4, and the product attributes specify whether or not a bag of onions contains onions with varying degrees of genetic modification, are organic, and are from one's home or another country-of-origin. The fourth attribute is the price per unit of onion. Each bag of onions, x_i , contains a different combination of J attributes. The product attribute matrix $A = [a_{ij}]$ relates the amount of attribute j in product x_i . Consumers prefer product x_1 at price p_1 to maximize their utility over the J attributes, considering their alternative product and price options, $x = \{x_2, \dots, x_I\}$ and $p = \{p_2, \dots, p_I\}$.

Consumers receive K consumption services from the combination of products and their relating attributes, which may be expressed as $s = s_k(x_1, a_1, x, A)$ where $k = 1, \dots, K$.

The consumers' utility is a function of the consumption services or $U = u(s_1, \dots, s_k)$ (Ladd 1982).

Subject to the budget constraint $p_1 x_1 + p'x \leq m$. The resulting indirect utility function is

$v = (p_1, a_1 p, A, m)$. The consumer chooses attribute levels to maximize his or her utility, U

(Baker and Burnham 2001).

The conjoint experiment allows product valuation based on the four product characteristics discussed above. Three of the four product attributes have four different levels. These include genetic modification, price, and country-of-origin. The fourth attribute, organic, has two levels: either the product was produced organically (without pesticides) or the product was produced using pesticides (see table 1). The market price was determined using the price for yellow onions on peapod.com. The price at level one or \$0.60 per pound of onions was slightly below the current market price (\$1.99 per three pound bag or \$0.66 per one pound bag of onions) at the time that this study was initiated.¹

The remaining price levels are \$0.90, \$1.20, and \$1.50 per pound. The range of prices is selected to reflect current range of market price premiums for organic production and reduced GM food content for food items in the United States. Country-of-origin varied according to the countries included in this study and the country levels were assigned alphabetically. The tolerance ranges for genetic modification were chosen to reflect European labeling requirements for products containing genetically modified food. The four different GM categories include 0%, <1%, $1\% \leq$ and <5%, and >5% GM content.

Five percent is chosen as a level of tolerance where indifferent consumers will consume genetically modified food. The quantity of onions included in the bag was fixed across locations.

An orthogonal fractional factorial design was used to generate 16 conjoint experiment profiles, which were randomly ordered in the survey. The final conjoint experiment is presented in the Appendix.

¹ The prices in the Chinese, French, and Nigerian surveys were derived using purchasing power parity conversion factors. According to the World Bank (2003), \$US 1 is equivalent to 1Euro, 144 French African Francs, and 1.9 Yuan using purchasing power parity. Prices are converted to correspond to the four different US price levels. Unit conversions were also made from pounds (in the United States) to kilograms in the locations abroad.

Prior to filling out the questionnaire the subjects were given the following information and instructions:

Below you are asked about your preferences for 16 different bags of onions containing one pound of onions each. Each of the 16 bags of onions is described by four attributes: a) whether any of the onions are genetically modified, b) price (dollars per pound), c) whether pesticides were used in the production process, and d) the country where the onion was grown.

The subjects were provided with the following, brief description of each of the attributes:

Genetic Modification involves new methods that make it possible for scientists to create new plants and animals by taking parts of genes of one plant or animal and inserting them into the cells of another plant or animal. These onions come from one of four different types of farms where varying proportions of genetically modified onion seeds were planted to grow onions. Price refers to the price of a one-pound bag of onions. Pesticides are substances used to destroy, repel, or mitigate pests that may damage crops or harm humans. The term refers to fungicides, insecticides, herbicides, or any other substance used to control pests, especially insects. Country of origin refers to the country where the onions were grown and may include China, France, Niger, or the United States. Please indicate whether or not you prefer the following onion options presented under each scenario by circling the number corresponding to your preference (1 = Less Desirable and 7 = Very Desirable).

The subjects completed the survey at the end of an experimental session in which they participated in a hypothetical bias experiment, ultimatum bargain experiment, risk preference experiment, time preference experiment, and voluntary contribution mechanism. Each subject had completed a total of four experimental exercises at the time of the survey. They filled out the survey containing the conjoint question just prior to receiving their total earnings for the five previous experiments.

The data for this project were collected using the hypothetical conjoint experiment in West Lafayette, Indiana; Manhattan, Kansas; Hangzhou, China; Niamey, Niger; and Grenoble, France in the spring of 2004. There were the following numbers of student subjects at each location: 63 in West Lafayette, Indiana; 57 in Manhattan, Kansas; 96 in Hangzhou, China; 60 in

Niamey, Niger; and 70 in Grenoble, France.² The completion time for the experiments and the survey ranged from 60 to 75 minutes in each location.

Two important details of the experiment method are worthy of further discussion. The first is the use of student subjects and the second is the hypothetical nature of the experiment. Student subjects were used to decrease the heterogeneity within the populations at each site. Thus, it is easier to attribute valuation differences across groups to geographic and cultural differences rather than individual differences such as age, education, or income. Second, the hypothetical nature of the experiment does open the door to possible hypothetical bias problems. The implication of possible hypothetical bias is diminished due to the fact that analysis focuses on marginal, not total values, for product attributes (Lusk and Schroeder 2004).

The four different locations were chosen because of their agricultural policy importance and cultural heterogeneity. China, France, and the United States all have major agricultural markets, and Niger is a representative food aid recipient in Africa. Kansas is included as a control site. We expect more commonality in consumer preferences in Kansas and Indiana than between Indiana and the other foreign sites. The survey was translated into French and Chinese for the experiments in China, France, and Niger. Back translation was used in the translation process to ensure translation accuracy.³

Results

An ordered probit model is used to predict the influence of each onion attribute on the indirect utility derived from the onion. The dependent variable in the ordered probit model is

² Previous studies reveal there is not a significant difference between student sample valuations and “representative consumer” valuations in country of origin studies (Verlegh and Steenkemp 1999).

³ Back translation is a method by which one person translates the writing into the foreign language. Then, another person translates the foreign translation back into the original writing.

subjects' rating for an onion with a given attribute combination. The prices used in the model are the United States dollar purchasing power parity equivalents of the prices used in each location's survey. The ordered probit model was selected for the analysis because discrete choice models, such as the multinomial logit model, will not account for the ordered nature of the dependent variable. An ordinary least squares regression, on the other hand, would have treated the dependent variable as a continuous, cardinal variable (Greene 2003). The ordered probit coefficients can be interpreted using the overall direction of the coefficient, either positive or negative, to define the relationship between the independent variable of interest and the dependent variable. Direct comparisons of coefficient values can be made within, but not across, models. In table 2, ordered probit model coefficient estimates are presented across all groups and for groups at each of the locations.

The test of the null hypothesis that subjects do not prefer their own country of origin over other countries of origin is rejected ($p < 0.05$) at every location. On average, subjects in each location prefer onions from their country to onions produced anywhere else. The results also indicate that subjects prefer onions free of genetic modification in each location. The subjects do not prefer organic production in every location. Subjects in Niger display disutility from organic onions.

Comparison of subject group preferences are made using the relative importance of key ordered probit coefficients in table 3. Key independent variable coefficient variables of interest are subjects' preferences for GM-free food, price, organic production, and own country-of-origin. The coefficient relative importance measures are used to determine whether own country-of-origin information is a higher priority for the subjects in each location. In all countries, own country-of-origin is preferred, but it is not as important as other food attributes. In fact, either

GM content or price is the most important product attribute for subjects in every location. The locations where own country-of-origin has the greatest relative importance are in Indiana and Kansas. Subjects there prefer own country-of-origin more than organic production, but less than GM-free food and price. Own country-of-origin is least important to subjects in France.

The relative importance of each attribute is also reflected in the subjects' WTP premium estimates for the different attributes. Subjects' WTP premium estimates are calculated for each attribute j using the coefficients from the ordered probit model where $WTP_j = -\frac{\beta_j}{\beta_{Price}}$ (see WTP premium estimates in table 4). The WTP premiums for own country-of-origin are different across locations. Subjects in Kansas are WTP the highest premium for own country-of-origin, \$US 0.49 per pound of onions. Own country-of-origin has the least value to Chinese subjects. They are only willing to pay a premium of \$US 0.31 per pound of onions for own country-of-origin. The relative value of the attribute WTP premium to one another in each location is most pertinent to the following comparisons.

Own Country-of-Origin compared to GM content WTP Premiums

Subjects in every country except China are willing-to-pay more for 0 percent GM content than they are for own country-of-origin. French consumers place a high premium on ensuring their onions are 99 percent to 100 percent free of GM content. They are WTP a premium of 223 percent or \$US 0.89 per pound more for 0 percent GM content than for own country-of-origin. Their WTP premium for GM food with less than 1 percent GM content is 123 percent higher than the WTP for own country-of-origin. The French subjects' WTP for GM content reduction does decrease by nearly half as the GM content increases from less than one percent to between 1 and 5 percent. The Nigerien subjects also display a high WTP premium for 0 percent GM

content. While this reflects a high concern over GM food by Nigerien subjects, it is doubtful that this WTP would be realized due to the low income of most Nigeriens.

Organic production compared to Own Country-of-Origin WTP premiums

Chinese subjects display a very high valuation for organic production relative to own country-of-origin. They are willing to pay a premium of \$US 0.76 per pound or 145 percent more for organic production compared to their WTP premium for own country-of-origin. Coupled with their lower WTP premium for reduced GM content this indicates Chinese subjects consider organic to be the most important credence attribute, substantially reducing their search cost over other types of credence attributes included in this study. The French subjects have the second highest WTP premium for organic production, \$US 0.44 per pound. This is only 10 percent more than their average WTP premium for own country-of-origin.

Organic production compared to GM content WTP premiums

Chinese subjects are the only subjects who value organic production greater than 0 percent GM content. They are WTP a premium of \$US 0.51 or 204 percent more for organic production than for 0 percent GM content. Zero percent GM content holds greater value than organic production for subjects in France, Indiana, Kansas, and Niger. The value of the GM food content becomes less important than organic production as the percent of GM content increases above 1 percent in every location but France. Subjects there still consider GM food content reduction more valuable than organic production.

Discussion

The inclusion of GM content and organic production attributes along with country-of-origin allows discussion of whether quality, affective, or normative attributes are the most important to subjects in the different locations and the possible driving factors behind the subjects' valuation patterns. We begin this discussion with the observation that French subjects appear to place the highest value on food quality. Their preferences are based less on price and more GM content and organic production. Thus, French subjects are willing to pay food produced in a safe and natural manner. While this finding is not new, pairing it with French subjects' own country-of-origin preferences is. They place the least relative value on own country-of-origin.

The subjects with the highest values for own country-of-origin relative to other product attributes are those in the United States and China. Subjects in these two groups have higher valuation of own country-of-origin, but these valuations may have different motivation across subject groups. The American subjects are likely to have affective needs reflecting a strong sense of patriotism, especially after terrorist attacks in 2001 and on-going wars (Lusk et al. 2005). Chinese subjects, on the other hand, are from a more collective and hierarchical culture. Thus, subjects' attribute preferences are more likely to have normative roots. Chinese subjects' valuations are strongly in line with the Chinese government's food policies, supporting more organic and GM food production (The Economist 2005).

There are strong literature-based reasons pointing to the attribute demand patterns in terms of quality, normative, or affective needs in France, the United States, and China. Subject demand motivation is more difficult to identify in Niger. Although the overall price coefficient is in the expected direction (i.e. negative) for Nigerien subjects, its small size indicates subjects

may have misunderstood the survey scale or not seriously considered it. It is possible that Nigerian subjects GM food preferences reflect a society-wide disapproval of GM food led by Islamic clerics and French media in the region (Kushwaha 2004). Similarly, their preference for non-organic food may reflect their understanding that chemical applications are scarce in Niger and farmers' will benefit from increased fertilizer, pesticide, and herbicide applications.

Conclusions

A conjoint experiment is used to measure consumers' willingness to pay for country-of-origin labeling, organic production, and GM free food in this paper. This allows analysis of how these three issues are viewed across different countries and the importance of the issues relative to each other in each location. The null hypotheses that subjects do not prefer own country-of-origin above foreign countries of origin is rejected in every location. Subjects do prefer food from their own country, but the importance of own country-of-origin relative to other product attributes is not consistent across locations.

French subjects have the lowest relative value for own country-of-origin compared to other subject groups. They are most concerned with GM food content. The French subjects value reduced GM food content more than organic production and value organic production above own country-of-origin. American subjects valued own country-of-origin more relative to subjects in other locations. This is likely to be driven by consumers' affective needs. American subjects may have more patriotic tendencies than subjects in other areas because of national security concerns among other factors. Still, the American subjects valued GM-free food more than own country-of-origin attributes. Chinese subjects have the most non-credence, price-driven demand of all of the subject groups. However, they place a higher value on organic production than either GM

content or country-of-origin. Their preferences are largely in accordance with government food policy and likely to have normative motivation.

Previous food industry research overlooks both the relative importance of COOLS and their use across multiple types of food products. Based on these findings and discussion, future investigations into cross-cultural preferences for credence attributes such as origin need to directly measure individual's knowledge of government food policies regarding credence attributes, the role of religion in individual food consumption, and normative and affective attitudes and beliefs consumers hold which may affect their food consumption. These measurements can be used to test the relationship between deeper social and psychological characteristics and individuals' demand for origin and other food attributes. This will further our understanding of consumer's needs for policies which effect producers and firms around the world.

References

- Akerlof, George A. 1970. The Market for “Lemons”: Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics* 84 (3):488-500.
- Baker, Gregory A. and Thomas A. Burnham. 2001. Consumer Response to Genetically Modified Foods: market Segment Analysis and Implications for Producers and Policy Makers. *Journal of Agricultural and Resource Economics* 26(2): 387-403.
- Burton, Michael, Dan Rigby, Trevor Young, and Sallie James. 2001. Consumer Attitudes to Genetically Modified Organisms in Food in the UK. *European Review of Agricultural Economics* 28 (4): 479-498.
- Caswell, Julie A. and Eliza M. Mojduszka. 1996. Using Informational Labeling to Influence the Market for Quality in Food Products. *American Journal of Agricultural Economics* 78 (December): 1248-1253.
- Caswell, Julie A. and Daniel I. Padberg. 1992. Toward a More Comprehensive Theory of Food Labels. *American Journal of Agricultural Economics* (May): 460-468.
- Davidson, Amy, Monika J. A. Schroder, and John A. Bower. 2003. The Importance of Origin as a Quality Attribute for Beef: Results from a Scottish Consumer Survey. *International Journal of Consumer Studies* 27 (2): 91-98.
- EUROPA. 2006. *Agriculture and Food*. Retrieved from <http://europa.eu.int/comm/agriculture/foodqual/quali1_en.htm> on April 11, 2006.
- Food and Agriculture Organization. 2005a. World Markets for Organic Fruits and Vegetables. Retrieved from <http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/004/Y1669E/Y1669E00.HTM> on March 22, 2005.

- Food and Agriculture Organization. 2005b. Organic Agriculture. Retrieved from <<http://www.fao.org/ag/AGP/AGPC/doc/themes/5b.html>> on June 23, 2005.
- Fulton, Murry, and Konstantinos Giannakas. 2004. Inserting GM Products into the Food Chain: The Market and Welfare Effects of Different Labeling and Regulatory Regimes. *American Journal of Agricultural Economics* 86 (1): 42-60
- Geier, Bernward. 2005. *An overview of Facts on Worldwide Organic Agriculture*. Retrieved from <<http://www.ifoam.org/orgagri/over&factsoa.html>> on March 22, 2005.
- Glitsch, Kristina. 2000. Consumer Perceptions of Fresh Meat Quality: Cross-National Comparison. *British Food Journal* 102 (3): 177-194.
- Greene, William H. 2003. *Econometric Analysis*. New Jersey: Prentice-Hall, Inc.
- Grunert, Suzanne C. and Hans Jørn Juhl. 1995. Values, environmental attitudes, and buying of organic foods. *Journal of Economic Psychology* 16: 39-62.
- Hoffman, Ruben. 2000. Country of origin—a consumer perception perspective of fresh meat. *British Food Journal* (3): 211-229.
- Krissof, Barry, Fred Kuchler, Kenneth Nelson, Janet Perry, and Agapi Somwaru. 2004. *Country-of-Origin Labeling: Fact and Observation*. U.S. Department of Agriculture: Economic Research Service. 2004.
- Kushwaha, Saket, A.S. Musa, James Lowenberg-DeBoer, and Joan Fulton. 2004. Consumer Acceptance of GMO Cowpeas in Sub-Sahara Africa. Long Paper #119265, presented at the American Agricultural Economics Association Annual Meeting. Denver, Colorado.
- Ladd, George W. 1982. Survey of Promising Developments in Demand Analysis: Economics of Product Characteristics. In *New Directions in Econometric Modeling and Forecasting in U.S. Agriculture*. New York: North-Holland.

- Lancaster, Kelvin. 1991. *Modern Consumer Theory*. Vermont: Edward Elgar.
- Loureiro, Maria L. and Wendy J. Umberger. 2003. Estimating Consumer Willingness to Pay for Country-of-Origin Labeling. *Journal of Agricultural and Resource Economics* 28 (2): 287-301.
- Lusk, Jayson. 2003. Effects of Cheap Talk on Consumer Willingness-to-Pay for Golden Rice. *American Journal of Agricultural Economics* 85(4): 840-856.
- Lusk, Jayson L., Jutta Roosen, and John A. Fox 2003. Demand for Beef from Cattle Administered Growth Hormones or Fed Genetically Modified Corn: A Comparison of Consumers in France, Germany, the United Kingdom, and the United States. *American Journal of Agricultural Economics* 85(1):16-29.
- Lusk, Jayson L., Lisa O. House, Carlotta Valli, Sara R. Jaeger, Melissa Moore, J.L. Morrow, and W. Bruce Traill. 2004. Effect of information about benefits of biotechnology on consumer acceptance of genetically modified food: evidence from experimental auctions in the United States, England, and France. *European Review of Agricultural Economics* 31(July):179-204.
- Lusk, Jayson L., and Ted C. Schroeder. 2004. Are Choice Experiments Incentive Compatible? A Test with Quality Differentiated Beef Steaks. *American Journal of Agricultural Economics* 86(2): 467-482.
- Lusk, Jayson, Jason Brown, Tyler Mark, Ildir Proseku, Rachel Thompson, and Jody Welsh. 2005. Consumer Behavior and Country of Origin Labeling. Working Paper, Department of Agricultural Economics, Oklahoma State University.
- Noussair, Charles, Stéphane Robin, and Bernard Ruffieux. 2002. Do consumers not care about biotech foods or do they just not read the labels? *Economic Letters* 75: 47-53.

- Noussair, Charles, Stéphane Robin, and Bernard Ruffieux. 2004. Do Consumers Really Refuse to Buy Genetically Modified Food? *The Economic Journal* 114 (January): 102-120.
- Raynolds, Laura T. 2004. The Globalization of Organic Agro-Food Networks. *World Development* 32 (5): 725-743.
- Schmitz, Andrew. 2004. Controversies over the Adoption of Genetically Modified Organisms: An Overview of the Special Issue. *Journal of Agricultural and Food Industrial Organization* 2: 1-8.
- Schupp, Alvin and Jeffrey Gillespie. 2001. Consumer Attitudes Toward Potential Country-of-Origin Labeling of Fresh and Frozen Beef. *Journal of Food Distribution Research* (July): 34-44.
- Shimp, Terence A. and Subjhash Sharma. 1987. Consumer Ethnocentrism: Construction and Validation of the CETSCALE. *Journal of Marketing Research* XXIV (August): 280-289.
- The Economist. 2005. A Sweet Rice Pudding. *The Economist* 375 (8424): 77.
- Thompson, Gary D. 1998. Consumer Demand for Organic Foods: What We Know and What We Need to Know. *American Journal of Agricultural Economics* 80 (5): 1113-1118.
- Umberger, Wendy J., Dillon M. Feuz, Chris R. Calkins, and Karen Killinger-Mann. 2002. U.S. Consumer Preference and Willingness-to-Pay for Domestic Corn-Fed Beef Versus International Grass-Fed Beef Measured Through an Experimental Auction. *Agribusiness* 18 (4): 491-504.
- Umberger, Wendy J., Dillon M. Feuz, Chris R. Calkins, and Bethany M. Sitz. 2003. Country-of-Origin Labeling of Beef Products: U.S. Consumers' Perceptions. *Journal of Food Distribution Research* 34 (3): 103-116.

- Umberger, Wendy J. 2004. Will Consumers Pay a Premium for Country-of-Origin Labeled Meat? *Choices* 19 (4). Retrieved from <http://www.choicesmagazine.org> March 16, 2006.
- Verlegh, P.W.J., J.-B.E.M. Steenkamp. 1999. A Review of Meta-Analysis of Country-of-Origin Research. *Journal of Economic Psychology* 20: 521-546.
- World Bank. 2003. *World Development Indicators*. Washington, D.C.

Appendix

Table A1. Conjoint Experiment Survey Questions

Scenario	Percent of Onions with Genetic Modification	Price	Pesticides	Country of Origin	Less Desirable						More Desirable
1	None	\$ 0.60	No	China	1	2	3	4	5	6	7
2	Greater than 5% GM Content	\$1.50	No	U.S.	1	2	3	4	5	6	7
3	Less than 1% GM Content	\$1.20	No	U.S.	1	2	3	4	5	6	7
4	GM content between 1% and 5%	\$0.60	Yes	U.S.	1	2	3	4	5	6	7
5	Less than 1% GM Content	\$0.90	No	France	1	2	3	4	5	6	7
6	GM Content between 1% and 5%	\$1.20	No	Niger	1	2	3	4	5	6	7
7	None	\$1.20	Yes	France	1	2	3	4	5	6	7
8	None	\$0.90	Yes	U.S.	1	2	3	4	5	6	7
9	None	\$1.50	No	Niger	1	2	3	4	5	6	7
10	Greater than 5% GM Content	\$0.90	Yes	Niger	1	2	3	4	5	6	7
11	Less than 1 %GM Content	\$1.50	Yes	China	1	2	3	4	5	6	7
12	GM Content between 1% and 5%	\$0.90	No	China	1	2	3	4	5	6	7
13	Greater than 5% GM Content	\$0.60	No	France	1	2	3	4	5	6	7
14	Less than 1% GM Content	\$0.60	Yes	Niger	1	2	3	4	5	6	7
15	Greater than 5% GM Content	\$1.20	Yes	China	1	2	3	4	5	6	7
16	GM Content between 1% and 5%	\$1.50	Yes	France	1	2	3	4	5	6	7

Table 1. Onion Attribute Levels Used in the Conjoint Experiment

Attribute	Levels
Percent GM content	No GM Less than 1% GM Between 1% and 5% GM Over 5% GM
Price	\$0.60 \$0.90 \$1.20 \$1.50
Pesticides	None Used Used
Country of Origin	China France Niger United States

Table 2. Ordered Probit Model Coefficient Estimates and Standard Errors

	China	France	Indiana	Kansas	Niger
0% GM Content	0.3680** (0.0805)	1.7114** (0.0996)	0.5473** (0.0963)	0.6730** (0.1012)	0.8870** (0.1060)
Less than 1% GM Content	0.2201** (0.0789)	1.1802** (0.0966)	0.4666** (0.0959)	0.4640** (0.0997)	0.5743** (0.1038)
Between 1% and 5% GM Content	-0.0597 (0.0803)	0.6148** (0.0955)	0.2495** (0.0959)	0.2808** (0.1003)	0.2210** (0.1029)
Price	-1.4846** (0.0923)	-1.3257** (0.1002)	-1.1633** (0.1041)	-1.1740** (0.1084)	-0.3997** (0.1086)
Organic	1.1300** (0.0595)	0.5810** (0.0659)	0.3380** (0.0680)	0.3730** (0.0711)	-0.3885** (0.0737)
United States Origin	-0.2192** (0.0804)	-0.5336** (0.0917)	0.4085** (0.0954)	0.5696** (0.0998)	0.0652 (0.1033)
China Origin	0.4668** (0.0814)	-0.2841** (0.0927)	-0.0630 (0.0959)	0.1095 (0.1000)	0.0283 (0.1029)
Niger Origin	-0.2248** (0.0804)	-0.4317** (0.0910)	-0.2228** (0.0960)	-0.2462** (0.1000)	0.3685** (0.1041)
Restricted Log-Likelihood	-2648	-2010	-1792	-1663	-1597
Unrestricted Log-Likelihood	-2313	-1737	-1682	-1543	-1530
Likelihood Ratio Test	670	546	221	240	134

*=90% significant, **=95% significant

Note: Standard errors are in parentheses under coefficient estimates. Additional intercept coefficients were computed using the ordered probit model. However, only independent variable coefficients are reported in table 3.

Table 3. Ordered Probit Attribute Coefficient Relative Importance Measures

Attribute	China	France	Indiana	Kansas	Niger
	Percent Relative Importance of Attribute Coefficient ^a				
GM Content	12	43	21	23	44
Price	37	30	41	36	18
Organic	32	14	13	13	19
Country-of-origin	19	13	25	28	18
Total	100	100	100	100	100

^aThe Relative Importance of attribute coefficient j in location i (RI_{ij}) is β_{ij} 's percent of the total

value of the coefficients of interest or $RI_{ij} = \frac{\beta_{ijH} - \beta_{ijL}}{\sum_{j=1}^J \beta_{ijH} - \beta_{ijL}} \forall i$.

Table 4. Food Attribute Average Willingness to Pay Premium Estimates

Willingness to pay for	China	France	Indiana	Kansas	Niger
	US Dollars per Pound				
0% GM Content vs. > 0% GM Content	0.25	1.29	0.47	0.57	2.22
< 1% GM Content vs. \geq 1% GM Content	0.15	0.89	0.40	0.40	1.44
Between 1% and 5% GM Content vs. > 5% GM Content	-0.04	0.46	0.21	0.24	0.55
Organic vs. Non-organic	0.76	0.44	0.29	0.32	-0.96
Own Country-of-Origin vs. Other Country-of-Origin	0.31	0.40	0.35	0.49	0.92