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**European Consumer Preferences for U.S. and Domestic Beef:
Willingness to Pay for Source Verification, Hormone-Free, and
Genetically Modified Organism-Free Beef**

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Abstract

The European Union (EU) ban on the production and importation of meat derived from animals treated with growth-promoting hormones has spurred considerable debate. However, relatively little research has considered how EU consumers have been affected or how they feel about the ban. The purpose of this research is to determine beef product preferences of EU consumers and to elicit how much, if anything, these consumers are willing to pay for their preferred attributes. More specifically, this study uses a non-hypothetical choice experiment to evaluate how EU consumers value beef steaks from animals produced using growth hormones, fed genetically modified feeds, and from U.S. origin relative to their typical, domestically produced steaks. Results reveal that consumers in London, England; Frankfurt, Germany; and Paris, France are on average willing to pay a premium (\$8.75/lb, \$3.25/lb, and \$0.98/lb, respectively) for a “USDA Choice No Hormones or GMOs” steak as opposed to their “Domestic Typical” steak. Additionally, these consumers indicated a willingness to pay a premium for both U.S. produced hormone-free beef (\$0.86/lb in London, \$1.93/lb in Frankfurt, and \$0.30/lb in Paris) and for U.S. produced beef free of genetically modified organisms (\$8.88/lb in London, \$2.55/ lb in Frankfurt, and \$2.79/lb in Paris) relative to USDA Choice beef.

Introduction

On January 1, 1989 the European Union (EU) enacted a ban on the production and importation of meat derived from animals treated with growth-promoting hormones. Since the implementation of this ban, much debate and research has been conducted on the issue. Growth-promoting hormones are widely used in several meat-producing countries for beef production as they increase efficiency and produce a leaner carcass, leading to more bottom-line profit for the producer. The EU hormone ban is based on the premise that there are adverse health effects on humans who consume beef produced utilizing growth hormones. Numerous scientific studies that have been conducted find no adverse human health resulting from consumption of beef raised with growth hormones. In fact, hormone levels (in estradiol equivalents) in beef are much less than those found in eggs (U.S. Mission to EU 1999). The current EU ban is inconsistent with the Uruguay Round Agreement on Health and Safety Measures used to restrict imports as ruled by the World Trade Organization's (WTO) dispute settlement panels.

The majority of slaughter cattle in the United States are administered growth-promoting hormones; and as a result U.S. beef producers have effectively been shut out of the potential European beef market. The European Union, with a population of over 375 million, gross domestic product of over \$7.5 trillion, and a possible expansion from the current 15 to 27 countries over the next decade represents a vast economic market in which American beef producers are currently excluded. Estimates range from \$100 to

over \$200 million dollars in lost U.S. exports as a result of the current EU ban (Ahearn 2002).

Many have questioned the motivations behind the EU ban. Hanrahan (2000) contends that by 1985 beef surpluses within the European Union were so extensive that policy makers were supportive of just about any policy, which would limit beef imports that were “interfering” with the operation of the Common Agricultural Policy. European beef producers have been supportive of the ban as it limits their competition and strengthens the EU’s ability to maintain domestic beef prices, which are in excess of prevailing world prices. Few studies however have been done to determine how European consumers feel about the ban or about beef produced using synthetic growth hormones. Consumers may be adversely affected by the EU ban since it results in an absence of choice between “hormone-free beef” and cheaper beef products (Bureau, Marette, and Schiavina 1998).

A better understanding of EU consumer preferences regarding meat products is important for policy makers negotiating trade relations, associations developing global markets for beef, and meat producers affected by the EU ban. The objective of this study is to determine beef product preferences of consumers within the EU using a non-hypothetical research methodology designed to illicit how much consumers are willing to pay to avoid certain meat attributes or to obtain other particular product characteristics. More specifically, this study evaluates how consumers in London, England; Frankfurt, Germany; and Paris, France value beef steaks from animals administered growth hormones, fed genetically modified feeds, and from different countries of origin relative to their typical, domestically produced steak products.

Previous Research

The primary areas of research regarding the current EU ban on hormone-treated beef have consisted of numerous scientific studies examining the human health effects resulting from consuming beef raised with growth hormones and/or the use of genetically modified organisms. While this is obviously a worthwhile area of study, comparatively little research has been done which specifically evaluates the European consumer and the effect that the current beef ban may have on them.

Burton et al. (2001) conducted a survey to evaluate the attitude of consumers in the United Kingdom regarding the use of genetically modified organisms in their food. Bureau, Marette, and Schiavina (1998) compared three hypothetical trade situations: 1) autarky, 2) free trade without identification of the quality of product, and 3) free trade with the identification of a product's quality, to compare the possible effects on consumers of allowing/not allowing the use of growth hormones in the beef available for their purchase. The Burton et al. and Bureau, Marette, and Schiavina studies did not incorporate willingness to pay estimates or binding research aspects (non-hypothetical research techniques) in their consumer preference studies.

Clemens and Babcock (2002) provide an analysis of the additional costs that producers may face if they were to switch to producing only non-hormone treated beef. They present an estimate between \$15 and \$40 per animal for the additional costs associated with raising cattle without the use of growth hormones. This information is one important component of determining the feasibility of producing such beef.

However, there has been relatively little research to compare these estimates with estimates of what European consumer willingness to pay for hormone-free beef.

Lusk, Roosen, and Fox (2003) estimated consumer willingness to pay (WTP) for beef produced without the use of growth hormones or genetically modified organisms. They mailed surveys to consumers in the United States, France, Germany, and the United Kingdom. Consumers in all four countries were willing to pay premiums for hormone-free as well as GMO-free beef. One potential shortcoming in these WTP estimates is that they were developed using hypothetical (non-binding) shopping scenarios which could bias their estimates upward.

Alfnes and Rickertsen (2003) conducted second price auctions in Norway and found WTP estimates for hormone-free beef that were significantly lower than those found by Lusk, Roosen, and Fox. This study utilized a non-hypothetical methodology to develop WTP estimates and therefore should reflect what consumers are actually willing to pay for hormone-free beef.

Experimental Design

To determine EU consumer beef preferences we used a combination of a survey and a choice experiment. The survey was designed to obtain demographic information about the EU participants and to acquire a sense for how the participant felt about various purchasing and safety issues related to meat consumption. The choice experiment was chosen to estimate what, if anything, European consumers are willing to pay to avoid having growth hormones and or genetically modified organisms used in the production of their beef. The choice experiment method has been found to be accurate in eliciting such willingness to pay estimates, and it is considered a closer simulation to real-life

purchasing situations than traditional survey methods (Lusk et al. 1999). In the choice experiment consumers were presented with a set of 16 different orthogonal purchasing scenarios for five different steaks. Table 1 provides descriptions of the five steaks. The five types chosen for this study were 1) *USDA Choice* steak, 2) *USDA Choice No Hormones* steak, 3) *USDA Choice No Hormone or GMOs* steak, 4) *Domestic Typical* steak, and 5) *Domestic Source Verified* steak. Consumers were informed that one of the shopping scenarios would be randomly selected as binding and real steak and actual money would be exchanged, so they were told that it was important they answer each scenario with the idea that it could be binding.

The data were collected from August 5, 2002 to August 15, 2002 in the London, England; Frankfurt, Germany; and Paris, France areas. Overall, 248 people (121, 65, and 62 in London, Frankfurt, and Paris, respectively) participated in the study. Consumers who chose to participate were paid ten pounds (approximately \$16 US) in England or twenty Euro dollars (approximately \$20 US) in Germany and France for the 20 to 30 minutes that we estimated it would take to complete the study. All participants were informed that they would pay the price of the steak they chose in one shopping scenario that was randomly selected and they would receive the respective steak that they selected in that particular scenario. To practice and further demonstrate to the participants that we were serious, first each person participated in a short shopping scenario using candy bars. One of the scenarios was binding and the participant paid the price and received the candy bar that they selected.

After the surveys and choice experiments were completed, it was explained to the participants that although our instructions indicated they would have to purchase a steak

from us, we were unable to actually sell them one. This is because it is illegal to have U.S. beef in the European Union as a result of the current beef ban. It was extremely important to maintain the guise with each participant that the steak was actually going to be purchased in order to obtain the most reliable of results.

A summary of the demographics of the participants is provided in Table 2. Survey participants were about equally split between males and females overall with some variation across different countries. The average age was 36 years and most participants had some college education, lived in households of two or three people, and had an annual household income equivalent of \$30,000 to \$50,000. Nearly three-fourths of those surveyed did not currently have children under the age of twelve living at home. Additional tables summarizing the results of the survey are available from the authors upon request.

Choice Experiment Results

We utilized a choice experiment to evaluate consumer willingness to pay for, or to avoid certain steak attributes. In the choice experiment consumers were presented with a set of 16 different purchasing scenarios for five different steaks. The five steak types were 1) *USDA Choice* steak, 2) *USDA Choice No Hormones* steak, 3) *USDA Choice No Hormone or GMOs* steak, 4) *Domestic Typical* steak, and 5) *Domestic Source Verified* steak. Consumers were informed that one of 16 shopping scenarios would be randomly selected as binding and that actual steak and money would be exchanged, so they were aware of the importance in answering each scenario with the idea that it could be binding.

Results of the choice experiment are presented in Table 3 and corresponding prices for each scenario are provided in Table 4. The percentage of participants who

chose each steak in each shopping scenario is provided. It is noteworthy that the most popular steak selected by Paris participants was the *Domestic Source Verified* steak over the other four steaks in all 16 shopping scenarios. In fact, only in scenarios # 4 and #10 did less than 50% of the Paris participants choose the *Domestic Source Verified* steak. Furthermore, a higher percentage of London participants chose the *USDA Choice* and *USDA Choice No Hormones or GMOs* steaks in all 16 scenarios than did their Frankfurt and Paris counterparts.

Scenario #11 was designed such that all five steaks were the same price (table 4). For this scenario, the *USDA Choice No Hormone or GMOs* steak was the most popular among the London and Frankfurt participants (table 3). The Paris participants maintained their notable preference for the *Domestic Source Verified* steak. When presented with equivalent prices for all five steaks, less than 14% of the participants in each country chose the *Domestic Typical* steak. This is somewhat surprising, but it suggests that U.S. produced beef without the use of growth hormones or GMO grains has appeal to European consumers. Perhaps EU consumer concerns regarding BSE in European beef has made them leery of their typical domestic product relative to U.S. beef where BSE is not present.

To determine how much consumers were willing to pay for the various steaks relative to each other we estimated a multinomial logit model. Following Swait and Louviere (1993) the data for each country was scaled prior to estimating this model to allow for heterogeneity of preferences by consumers in each country¹. Results of this model estimation are provided in Table 5. As expected, the parameter estimates indicate

¹ We treated the London data as the reference group so it was scaled by 1.0, while Frankfurt and Paris data were scaled by 1.06 and 1.41, respectively.

a negative relationship between the price of a given steak and the utility the consumer obtains from consuming that steak. From our price parameter estimate we can also see that Paris consumers are least concerned with price, followed by London participants, and finally Frankfurt consumers appear to be most concerned with price. Our parameter estimates allow us to rank the five available steaks in order of overall preference for each of the three surveyed groups (table 6). London and Frankfurt participants both rank *USDA Choice No Hormones or GMOs* steak as most preferred, *Domestic Source Verified* steak second with the *USDA Choice* steak least preferred. In contrast, Paris participants ranked *Domestic Source Verified* steak as most preferred, *USDA Choice No Hormones or GMOs* steak as second, and consistent with the consumers in the other countries had *USDA Choice* steak as the least preferred of the five alternatives.

From our parameter estimates, we were able to estimate the value that our surveyed consumers place on the various steak attributes. To develop these estimates, we calculate the price increase that must occur to an observed, preferable steak in order to make it equally desirable to the originally less-preferred steak. Or described differently, we adjust the price of one steak until the utility of consuming both steaks is equal. Once this price adjustment is derived, we can interpret the price difference as the average consumer's willingness to pay to avoid/obtain the steak attribute at hand.

These calculations were made to develop willingness to pay estimates on all three consumer groups for the various steaks. Table 7 presents a summary of these estimations. Our estimation results were highly varied over the three countries surveyed. Paris participants were willing to pay on average a \$0.30/lb premium for a *Hormone-Free* steak, while the Frankfurt estimate was \$1.93/lb and the London estimate was \$0.86/lb.

Lusk, Roosen, and Fox (2003) surveyed consumers by mail and estimated the premiums for hormone-free steak to be \$9.94/lb, \$7.29/lb, and \$7.39/lb for France, Germany, and the United Kingdom respectively. Alfnes and Rickertsen (2003) used second-price auctions in a study conducted among Norwegian consumers and estimated consumer willingness to pay for hormone-free steak to be \$1.39/lb. One possible explanation for the higher premium estimates made by Lusk, Roosen, and Fox is that they used a hypothetical research approach without any binding attributes whereas, this study and the work of Alfnes and Rickertsen incorporated non-hypothetical techniques in which the consumer believed there would be actual exchange of money for goods.

The participants' willingness to pay for *GMO-Free* steak in our study was relatively higher than their willingness to pay for Hormone-Free steak. Paris participants indicated an average willingness to pay of \$2.79/lb, Frankfurt participants provided a premium estimate of \$2.55/lb, and London consumers indicated a surprisingly large premium of \$8.88/lb. Lusk, Roosen, and Fox estimated the premiums for GMO-free steak to be \$9.32/lb, \$7.67/lb, and \$6.31/lb for consumers in France, Germany, and the United Kingdom respectively.

All surveyed groups in our study were willing to make negative premium payments for *Domestic Typical* steak as compared to *USDA Choice No Hormones or GMOs* steak. In other words, the consumers were willing to pay a premium (\$8.75/lb, \$3.25/lb., and \$0.98/lb for London, Frankfurt, and Paris respectively) for *USDA Choice No Hormones or GMOs* steak instead of purchasing *Domestic Typical* steak. This is consistent with steak preference rankings in table 6 where the U.S. steaks produced free of hormones and without use of GMO feed grains had consumer appeal.

All three consumer groups were willing to pay a considerable premium for *Domestic Source Verified* steak instead of purchasing *Domestic Typical Steak* or *USDA Choice* steak. On average, London consumers were willing to pay \$2.66/lb for *Domestic Source Verified* steak over *Typical Domestic* steak, Frankfurt consumers indicated a premium of \$1.99/lb, and Paris participants showed a willingness to pay a \$15.00/lb premium. Furthermore, London surveyors indicated a willingness to pay of \$3.65/lb for *Domestic Source Verified* steak as opposed to *USDA Choice* steak. Frankfurt participants provided a premium estimate of \$3.22/lb and Paris consumers showed a premium of \$17.11/lb.

Each of the consumer groups indicated a willingness to pay for *Domestic Typical* steak over *USDA Choice* steak. These premiums for London, Frankfurt, and Paris were \$0.98/lb, \$1.23/lb, and \$2.11/lb respectively. Finally we observed that the premiums associated with purchasing *Domestic Source Verified* steak rather than *USDA Choice No Hormones or GMOs* steak varied a great deal over the three countries. London and Frankfurt consumers indicated a willingness to pay \$6.09/lb. and \$1.26/lb, respectively, for the ability to purchase *USDA Choice No Hormones or GMOs* steak. Conversely, Paris participants demonstrated a willingness to pay a premium of \$14.02/lb. for *Domestic Source Verified* steak.

Conclusion

The European Union enacted a ban in 1989 on beef produced from animals treated with growth-hormones, despite the lack of scientific evidence supporting the claim that adverse human health effects follow the consumption of such beef. Little

research has been done to evaluate how European consumers feel about this ban nor how they may react if given the opportunity to purchase potentially cheaper beef from the U.S. This study evaluated EU consumer preferences and the willingness of consumers to pay for various beef steaks.

The findings of this study suggest that American cattle producers may be well served to take measures which increase the knowledge possessed by the average European consumer of the U.S. beef quality grading system, the use of growth hormones in meat production, and how genetically modified feeds are utilized in producing beef. As the consumer gains familiarity with why and how these issues affect meat, which is potentially, but not currently available to them, they may begin to demand the right to choose imported, less expensive products over their current, relatively limited set of domestic choices. Additionally, consideration should be given to increasing awareness of the fact that the U.S. has never had a case of Bovine Spongiform Encephalopathy (BSE) detected and has been free of the Foot and Mouth disease since 1929 (Mathews and Buzby 2001). In the mean time, if U.S. beef producers were allowed access to EU consumers, these consumers have demonstrated a strong preference for beef produced without use of growth hormones and GMO feed grains. Further, they have revealed a strong preference for source verification. To the extent the U.S. beef industry could provide products meeting these preferences, likely market share of U.S. product would be enhanced.

Consumers in London, Frankfurt, and Paris are on average willing to pay a premium (\$8.75/lb, \$3.25/lb, and \$0.98/lb respectively) for a *USDA Choice No Hormones or GMOs* steak as opposed to their *Domestic Typical* steak. These consumers

also indicated a willingness to pay a premium for both U.S. hormone-free beef (\$0.86/lb in London, \$1.93/lb in Frankfurt, and \$0.30/lb in Paris) and for U.S. beef not produced using genetically modified organisms (\$8.88/lb in London, \$2.55/lb in Frankfurt, and \$2.79/lb in Paris) relative to U.S. Choice beef. Based on these estimates it appears that London consumers are the most worried about genetically modified feed usage while Frankfurt consumers are the most concerned with the use of growth hormones. Additionally we observe that our Paris participants have stronger preferences for their domestic beef than their counterparts in London or Frankfurt.

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Table 1. Description of Steaks Used in Choice Experiment^a

Steak Name	Steak Description
<i>USDA Choice</i>	Steak produced in the U.S. under typical U.S. production practices. <i>USDA Choice</i> label denotes that the United States Department of Agriculture (USDA) has inspected this steak and given its second highest quality grade.
<i>USDA Choice No Hormones</i>	Steak produced in the U.S. under typical U.S. production practices, but is guaranteed to not have been administered any synthetic growth hormones or antibiotics during production.
<i>USDA Choice No Hormones or GMOs</i>	Steak produced in the U.S. without added hormones, was not fed antibiotics, and was not fed genetically modified crops.
<i>Domestic Typical</i>	Steak produced under typical production conditions and regulations within the country being studied (e.g. England, Germany, or France). Beyond the fact that the steak has been inspected, no other guarantees about meat quality are provided.
<i>Domestic Source Verified</i>	Steak produced within the country being studied. Production practices and name of the farmer/feeder who raised the animal are provided. Besides government inspection, no other quality guarantees are provided.

^aAll steaks were described as being equal in weight (0.35kg or 12 oz.), packaging, and freshness.

Table 2. Demographic Variables and Summary Statistics of European Consumer Participants

Biographical Data	London	Frankfurt	Paris	Overall
<i>Number of Participants</i>				
1 = Male	53	41	33	127
2 = Female	68	24	29	121
Total Participants	121	65	62	248
<i>Gender of participant</i>				
1 = Male	43.80%	63.08%	53.23%	51.21%
2 = Female	56.20%	36.92%	46.77%	48.79%
<i>Age of participant</i>				
1 = Under 25	30.58%	30.77%	23.81%	28.94%
2 = 25-34	23.97%	26.15%	41.27%	28.87%
3 = 35-44	14.05%	27.69%	14.29%	17.68%
4 = 45-54	8.26%	7.69%	12.70%	9.22%
5 = 55-64	10.74%	3.08%	4.76%	7.24%
6 = Over 64 years	12.40%	4.62%	3.17%	8.05%
Average age (years)	38.43	33.43	33.43	35.87
<i>Average # of individuals in household</i>				
1 = 1	22.31%	27.69%	25.40%	24.49%
2 = 2	24.79%	27.69%	28.57%	26.50%
3 = 3	19.83%	18.46%	12.70%	17.69%
4 = 4	21.49%	16.92%	15.87%	18.89%
5 = 5 or more	11.57%	9.23%	17.46%	12.43%
Average (number)	2.88	2.91	2.81	2.87
<i>Children under age 12</i>				
1 = Yes	32.50%	15.63%	23.81%	25.90%
2 = No	67.50%	84.38%	76.19%	74.10%
Average (number)	1.68	1.84	1.76	1.74
<i>Educational Background</i>				
1 = High School Diploma	22.31%	36.92%	19.05%	25.33%
2 = Some College	29.75%	4.62%	7.94%	17.71%
3 = Technical School Diploma	5.79%	3.08%	7.94%	5.61%
4 = Associate's Degree	2.48%	6.15%	7.94%	4.81%
5 = Bachelor's Degree	19.83%	6.15%	6.35%	12.88%
6 = Master's Degree	3.31%	18.46%	39.68%	16.37%
7 = Juris Doctrate	0.00%	9.23%	4.76%	3.61%
8 = Doctrate	2.48%	15.38%	6.35%	6.83%
9 = Other	14.05%	0.00%	0.00%	6.85%

Table 2. Demographic Variables of EU Consumer Participants (continued)

Biographical Data	London	Frankfurt	Paris	Overall
Household Income Level				
1 = Less than \$10,000	15.83%	23.08%	11.11%	16.55%
2 = \$10,000 to \$29,999	28.33%	18.46%	39.68%	28.58%
3 = \$30,000 to \$49,999	25.83%	18.46%	22.22%	23.00%
4 = \$50,000 to \$69,999	10.83%	16.92%	17.46%	14.09%
5 = \$70,000 to \$99,999	10.83%	7.69%	4.76%	8.49%
6 = \$100,000 to \$119,999	5.00%	6.15%	3.17%	4.85%
8 = \$140,000 to \$159,999	0.00%	1.54%	1.59%	0.80%
9 = \$160,000 to \$179,999	2.50%	1.54%	0.00%	1.62%
10 = More than \$180,000	0.83%	4.62%	0.00%	1.62%
Average (level selected)	3.08	3.42	2.83	3.11

Table 3. Choice Experiment Results For Each Shopping Scenario By Country

	London	Frankfurt	Paris	Overall
<i>Shopping Scenario #1</i>				
1 = USDA Choice	11.86%	4.92%	1.64%	7.49%
2 = USDA Choice No Hormones	8.47%	9.84%	3.28%	7.53%
3 = USDA Choice No Hormones or GMOs	43.22%	39.34%	27.87%	38.37%
4 = Domestic Typical	9.32%	9.84%	8.20%	9.18%
5 = Domestic Source Verified	27.12%	36.07%	59.02%	37.44%
<i>Shopping Scenario #2</i>				
1 = USDA Choice	9.24%	6.67%	1.67%	6.67%
2 = USDA Choice No Hormones	9.24%	10.00%	6.67%	8.80%
3 = USDA Choice No Hormones or GMOs	35.29%	16.67%	11.67%	24.51%
4 = Domestic Typical	15.13%	18.33%	13.33%	15.52%
5 = Domestic Source Verified	31.09%	48.33%	66.67%	44.50%
<i>Shopping Scenario #3</i>				
1 = USDA Choice	9.32%	6.67%	3.39%	7.14%
2 = USDA Choice No Hormones	18.64%	38.33%	11.86%	22.11%
3 = USDA Choice No Hormones or GMOs	33.05%	18.33%	10.17%	23.47%
4 = Domestic Typical	14.41%	8.33%	5.08%	10.48%
5 = Domestic Source Verified	24.58%	28.33%	69.49%	36.79%
<i>Shopping Scenario #4</i>				
1 = USDA Choice	8.47%	6.56%	0.00%	5.85%
2 = USDA Choice No Hormones	22.03%	24.59%	3.33%	18.03%
3 = USDA Choice No Hormones or GMOs	36.44%	34.43%	23.33%	32.64%
4 = Domestic Typical	18.64%	16.39%	26.67%	20.06%
5 = Domestic Source Verified	14.41%	18.03%	46.67%	23.42%
<i>Shopping Scenario #5</i>				
1 = USDA Choice	9.24%	6.56%	5.00%	7.48%
2 = USDA Choice No Hormones	10.92%	9.84%	1.67%	8.32%
3 = USDA Choice No Hormones or GMOs	37.82%	37.70%	16.67%	32.50%
4 = Domestic Typical	13.45%	8.20%	11.67%	11.63%
5 = Domestic Source Verified	28.57%	37.70%	65.00%	40.07%

Table 3. Choice Experiment Results For Each Shopping Scenario By Country (continued)

	London	Frankfurt	Paris	Overall
Shopping Scenario #6				
1 = USDA Choice	11.86%	5.00%	3.33%	7.93%
2 = USDA Choice No Hormones	14.41%	21.67%	5.00%	13.96%
3 = USDA Choice No Hormones or GMOs	31.36%	16.67%	10.00%	22.17%
4 = Domestic Typical	19.49%	26.67%	23.33%	22.33%
5 = Domestic Source Verified	22.88%	30.00%	58.33%	33.61%
Shopping Scenario #7				
1 = USDA Choice	8.47%	5.00%	1.67%	5.86%
2 = USDA Choice No Hormones	21.19%	38.33%	8.33%	22.47%
3 = USDA Choice No Hormones or GMOs	43.22%	26.67%	23.33%	33.91%
4 = Domestic Typical	10.17%	8.33%	6.67%	8.81%
5 = Domestic Source Verified	16.95%	21.67%	60.00%	28.95%
Shopping Scenario #8				
1 = USDA Choice	10.08%	5.00%	0.00%	6.23%
2 = USDA Choice No Hormones	10.08%	18.33%	0.00%	9.73%
3 = USDA Choice No Hormones or GMOs	47.90%	38.33%	31.67%	41.33%
4 = Domestic Typical	14.29%	20.00%	18.33%	16.80%
5 = Domestic Source Verified	17.65%	18.33%	50.00%	25.92%
Shopping Scenario #9				
1 = USDA Choice	11.76%	10.00%	3.33%	9.19%
2 = USDA Choice No Hormones	10.92%	5.00%	1.67%	7.06%
3 = USDA Choice No Hormones or GMOs	36.97%	35.00%	13.33%	30.55%
4 = Domestic Typical	20.17%	31.67%	28.33%	25.22%
5 = Domestic Source Verified	20.17%	18.33%	53.33%	27.98%
Shopping Scenario #10				
1 = USDA Choice	10.08%	8.33%	5.00%	8.35%
2 = USDA Choice No Hormones	10.92%	11.67%	3.33%	9.22%
3 = USDA Choice No Hormones or GMOs	52.10%	50.00%	31.67%	46.44%
4 = Domestic Typical	14.29%	13.33%	20.00%	15.46%
5 = Domestic Source Verified	12.61%	16.67%	40.00%	20.52%

Table 3. Choice Experiment Results For Each Shopping Scenario By Country (continued)

	London	Frankfurt	Paris	Overall
Shopping Scenario #11				
1 = USDA Choice	8.55%	1.67%	1.67%	5.02%
2 = USDA Choice No Hormones	11.11%	15.00%	3.33%	10.19%
3 = USDA Choice No Hormones or GMOs	41.03%	46.67%	21.67%	37.66%
4 = Domestic Typical	13.68%	11.67%	5.00%	10.98%
5 = Domestic Source Verified	25.64%	25.00%	68.33%	36.15%
Shopping Scenario #12				
1 = USDA Choice	5.93%	5.00%	3.33%	5.04%
2 = USDA Choice No Hormones	22.03%	26.67%	6.67%	19.41%
3 = USDA Choice No Hormones or GMOs	32.20%	16.67%	8.33%	22.16%
4 = Domestic Typical	10.17%	13.33%	11.67%	11.37%
5 = Domestic Source Verified	29.66%	38.33%	70.00%	42.02%
Shopping Scenario #13				
1 = USDA Choice	16.10%	13.33%	6.67%	13.02%
2 = USDA Choice No Hormones	7.63%	10.00%	1.67%	6.76%
3 = USDA Choice No Hormones or GMOs	36.44%	35.00%	13.33%	30.29%
4 = Domestic Typical	20.34%	25.00%	28.33%	23.56%
5 = Domestic Source Verified	19.49%	16.67%	50.00%	26.38%
Shopping Scenario #14				
1 = USDA Choice	14.41%	14.75%	6.67%	12.56%
2 = USDA Choice No Hormones	8.47%	11.48%	5.00%	8.39%
3 = USDA Choice No Hormones or GMOs	43.22%	45.90%	28.33%	40.20%
4 = Domestic Typical	10.17%	6.56%	5.00%	7.93%
5 = Domestic Source Verified	23.73%	21.31%	55.00%	30.91%
Shopping Scenario #15				
1 = USDA Choice	10.26%	5.00%	0.00%	6.31%
2 = USDA Choice No Hormones	11.11%	15.00%	3.33%	10.19%
3 = USDA Choice No Hormones or GMOs	40.17%	43.33%	21.67%	36.37%
4 = Domestic Typical	11.11%	6.67%	8.33%	9.25%
5 = Domestic Source Verified	27.35%	30.00%	66.67%	37.87%
Shopping Scenario #16				
1 = USDA Choice	13.56%	6.56%	1.69%	8.76%
2 = USDA Choice No Hormones	20.34%	34.43%	8.47%	21.07%
3 = USDA Choice No Hormones or GMOs	31.36%	18.03%	11.86%	22.99%
4 = Domestic Typical	10.17%	11.48%	6.78%	9.66%
5 = Domestic Source Verified	24.58%	29.51%	71.19%	37.52%

Table 4. Choice Experiment Shopping Scenarios*

Shopping Scenario Number	Price of USDA Choice	Price of USDA Choice No Hormones	Price of USDA Choice No Hormones or GMOs	Price of Domestic Typical	Price of Domestic Source Verified
<i>Shopping Scenario #1</i>	\$10.50	\$10.50	\$6.75	\$10.50	\$8.00
<i>Shopping Scenario #2</i>	\$10.50	\$9.25	\$9.25	\$8.00	\$6.75
<i>Shopping Scenario #3</i>	\$10.50	\$8.00	\$10.50	\$9.25	\$9.25
<i>Shopping Scenario #4</i>	\$10.50	\$6.75	\$8.00	\$6.75	\$10.50
<i>Shopping Scenario #5</i>	\$9.25	\$10.50	\$8.00	\$9.25	\$6.75
<i>Shopping Scenario #6</i>	\$9.25	\$9.25	\$10.50	\$6.75	\$8.00
<i>Shopping Scenario #7</i>	\$9.25	\$8.00	\$9.25	\$10.50	\$10.50
<i>Shopping Scenario #8</i>	\$9.25	\$6.75	\$6.75	\$8.00	\$9.25
<i>Shopping Scenario #9</i>	\$8.00	\$10.50	\$9.25	\$6.75	\$9.25
<i>Shopping Scenario #10</i>	\$8.00	\$9.25	\$6.75	\$9.25	\$10.50
<i>Shopping Scenario #11</i>	\$8.00	\$8.00	\$8.00	\$8.00	\$8.00
<i>Shopping Scenario #12</i>	\$8.00	\$6.75	\$10.50	\$10.50	\$6.75
<i>Shopping Scenario #13</i>	\$6.75	\$10.50	\$10.50	\$8.00	\$10.50
<i>Shopping Scenario #14</i>	\$6.75	\$9.25	\$8.00	\$10.50	\$9.25
<i>Shopping Scenario #15</i>	\$6.75	\$8.00	\$6.75	\$6.75	\$6.75
<i>Shopping Scenario #16</i>	\$6.75	\$6.75	\$9.25	\$9.25	\$8.00

* Prices are U.S. Dollar equivalent for steaks with the same weight (12 oz., 0.35kg), packaging, and freshness.

Table 5. Parameter Estimates from Multinomial Logit Model^a*Results over all 248 respondents (19,840 observations^b)*

	Parameter Estimate	Standard Error	Chi- Square	Pr > ChiSq	Hazard Ratio
USDA Choice	-0.058	0.02253	6.6706	0.0098	0.943
USDA Choice No Hormones	-0.044	0.02255	3.8446	0.0499	0.957
USDA Choice No Hormones or GMOs	0.0839	0.0228	13.5293	0.0002	1.087
Domestic Typical	-0.042	0.02256	3.4864	0.0619	0.959
Domestic Source Verified	0	.	.	.	.
PRICE	-0.015	0.00572	6.8724	0.0088	0.985

Results over 121 London respondents (9,680 observations)

USDA Choice	-0.119	0.03263	13.2346	0.0003	0.888
USDA Choice No Hormones	-0.091	0.0327	7.6946	0.0055	0.913
USDA Choice No Hormones or GMOs	0.1982	0.03377	34.4674	<.0001	1.219
Domestic Typical	-0.087	0.03271	7.0297	0.008	0.917
Domestic Source Verified	0	.	.	.	.
PRICE	-0.033	0.00835	15.2051	<.0001	0.968

Results over 65 Frankfurt respondents (5,200 observations)

USDA Choice	-0.178	0.04435	16.0314	<.0001	0.837
USDA Choice No Hormones	-0.071	0.04478	2.5451	0.1106	0.931
USDA Choice No Hormones or GMOs	0.0693	0.04548	2.3226	0.1275	1.072
Domestic Typical	-0.11	0.04448	6.0447	0.0139	0.896
Domestic Source Verified	0	.	.	.	.
PRICE	-0.055	0.01135	23.5906	<.0001	0.946

Results over 62 Paris respondents (4,960 observations)

USDA Choice	-0.739	0.04826	234.6623	<.0001	0.477
USDA Choice No Hormones	-0.726	0.04839	225.3595	<.0001	0.484
USDA Choice No Hormones or GMOs	-0.606	0.04949	149.8665	<.0001	0.546
Domestic Typical	-0.648	0.04906	174.6388	<.0001	0.523
"Domestic Source Verified"	0	.	.	.	.
PRICE	-0.043	0.01175	13.5241	0.0002	0.958

Table 6. Steak Preference Rankings For Each City

Preference Rankings

Most Preferred
2nd Most Preferred
3rd Most Preferred
4th Most Preferred
Least Preferred

London

USDA Choice No Hormones or GMOs
Domestic Source Verified
Domestic Typical
USDA Choice No Hormones
USDA Choice

Preference Rankings

Most Preferred
2nd Most Preferred
3rd Most Preferred
4th Most Preferred
Least Preferred

Frankfurt

USDA Choice No Hormones or GMOs
Domestic Source Verified
USDA Choice No Hormones
Domestic Typical
USDA Choice

Preference Rankings

Most Preferred
2nd Most Preferred
3rd Most Preferred
4th Most Preferred
Least Preferred

Paris

Domestic Source Verified
USDA Choice No Hormones or GMOs
Domestic Typical
USDA Choice No Hormones
USDA Choice

Table 7. Average Willingness to Pay Estimates for Various Beef Steak Attributes

Steak Attribute	Willingness to Pay Estimate			
	London	Frankfurt	Paris	Overall
Hormone-Free (USDA Choice)	\$0.86	\$1.93	\$0.30	\$0.93
GMO Free (USDA Choice)	\$8.88	\$2.55	\$2.79	\$8.53
Domestic Typical steak rather than USDA Choice No Hormones or GMOs steak	-\$8.75	-\$3.25	-\$0.98	-\$8.39
Domestic Typical steak rather than USDA Choice	\$0.98	\$1.23	\$2.11	\$1.07
Domestic Source Verified steak rather than Domestic Typical steak	\$2.66	\$1.99	\$15.00	\$2.81
Domestic Source Verified steak rather than USDA Choice steak	\$3.65	\$3.22	\$17.11	\$3.88
Domestic Source Verified steak rather than USDA Choice No Hormones or GMOs steak	-\$6.09	-\$1.26	\$14.02	-\$5.59