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Willingness to Pay for Tennessee Beef among Tennessee Consumers^a

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Abstract

This study examines willingness to pay among consumers in five metropolitan areas in Tennessee for steaks and ground beef produced in Tennessee. Consumers are willing to pay a positive premium for Tennessee beef. The choice of shopping outlets for Tennessee beef is also examined. Demographics, prior shopping patterns, and product preferences influence shopping outlet choices.

Key words: willingness to pay, local, beef, shopping outlets, survey

JEL Classification: Q130, D120

Willingness to Pay for Tennessee Beef among Tennessee Consumers

Introduction

Tennessee's beef cattle industry is important to the state's economy. The industry generates the largest share of receipts from all farm commodities (TDA 2013). If Tennessee farmers could finish and slaughter their cattle in-state and market directly to consumers, they could potentially capture the value-added. The impacts of the beef cattle industry on the state's economy could also be larger if more finishing and slaughter activities occurred in Tennessee. However, little is currently known about consumer willingness to pay (WTP) for beef products raised and slaughtered in Tennessee ("Tennessee beef"). Similarly, little is known about the types of shopping outlets where Tennessee consumers might expect to purchase Tennessee beef. Because it can be difficult for small volume beef producers to obtain product placement in retail groceries, big box stores, and supermarkets, the focus of this study is on farmers markets, butcher shops, gourmet food stores, and farmer direct outlets.

The objectives of this research are to: 1) estimate consumer WTP for two types of Tennessee beef (85%/15% ground beef and ribeye steak); 2) identify the demographic characteristics, consumer attitudes, and socioeconomic factors influencing WTP for Tennessee ground beef and ribeye steak; 3) determine the retail outlet locations where Tennessee beef consumers expect to purchase beef produced in Tennessee; and 4) ascertain demographic characteristics, attitudes, and socioeconomic factors influencing locations where consumers would expect to purchase Tennessee beef products.

Previous Research

Demographic and Socioeconomic Characteristics and WTP for Food Produced Locally

Several studies find that older consumers are less likely to perceive locally produced food favorably or to purchase locally produced food (Adalja et al. 2013; Willis et al. 2013; Hu, Woods,

and Bastin 2009; Nganje, Hughner, and Lee 2011). Exceptions include James, Rickard, and Rossman's (2009), who found that consumers over sixty years old were more likely to purchase locally-produced applesauce.

Individuals with more education are more likely to purchase local foods (Brown 2003; Mennecke et al. 2006; Willis et al. 2013; Govindasamy et al. 2012; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee 2011). However, other studies do not find a positive correlation between educational attainment and WTP for local food (Loureiro and Hine 2002; Brooker et al. 1988; Jekanowski, Williams, and Schiek 2000).

Higher income households are willing to pay more for local food (Willis et al. 2013; Brown 2003; Nganje, Hughner, and Lee 2011). However, Loureiro and Hine (2002) found that wealthier consumers were not willing to pay a premium for locally grown potatoes, and Hu, Woods, and Bastin (2009) found that lower income consumers were more likely to be willing to pay a premium for locally produced blueberry jam.

Research suggests that females are more likely to purchase local food (Willis et al. 2013; Adams and Adams 2008; James, Rickard, and Rossman 2009; Jekanowski, Williams, and Schiek 2000). However, other studies found no significant differences between men and women's WTP for local food (Hannagriff, Rhoades, and Wilmeth 2008; Loureiro and Hine 2002). Hannagriff, Rhoades, and Wilmeth (2008) found no significant difference in the values males and females placed on locally-produced beef.

Some studies indicate that the retail venue where consumers purchase food affects WTP for local food (Darby et al. 2006; Adalja et al. 2013; Maynard, Burdine, and Meyer 2003). Local foods tend to be more readily available in local independent retail stores than in larger supermarkets or wholesale chains (Abatekassa and Peterson 2011). Darby et al. (2006) found

that consumers intercepted in a grocery store were willing to pay a premium for local berries, while individuals intercepted in direct markets (e.g., a farmers market) were willing to pay higher premiums than for berry purchases in grocery stores. In contrast, Jekanowski, Williams, and Schiek (2000) found that the number of visits to farmers markets did not impact consumer purchases of locally produced agricultural products. Similarly, Maynard, Burdine, and Meyer (2003) reported that consumers who shopped in specialty meat stores were more likely pay a premium for local meats, but farmer market participation was not associated with WTP. Adalja et al. (2013) found that grocery shoppers were willing to pay more for local food products, but respondents tended to view local production and favorable production methods (e.g., grass-fed) as substitutes, while consumers who were members of a buying club were not willing to pay as much for local foods.

Research finds the relationship between household size and households with children on WTP for local food is mixed. Willis et al. (2013) found that WTP for locally produced food was lower in larger households. However, Jekanowski, Williams, and Schiek (2000) found no significant relationship between household and WTP for local food. Maynard, Burdine, and Meyer (2003) found a higher WTP for local food in households with children. In contrast, Loureiro and Hine (2002) found no significant correlation between WTP for local potatoes and households with children.

Brown (2003) reported that respondents with a background in farming (i.e., lived on a farm as a child or parents were farmers) were more likely to be willing to pay a premium for local food. In contrast, James, Rickard, and Rossman (2009) found that increased knowledge of agriculture decreased WTP for local food. There does not appear to be a significant difference

between rural and urban respondents' WTP for locally produced foods (Jekanowski, Williams, and Schiek 2000; Brown 2003).

Consumer Attitudes and WTP for Locally-Produced Foods

Several studies have investigated why people choose to purchase locally-produced food. Consumers may be more willing to pay a premium for local food if they are concerned about food miles, food quality, or because they want to support local farmers and businesses. Martinez et al. (2010) found that perceived quality and freshness benefits influence WTP for local foods, and consumers are more likely to be willing to pay a premium for local foods if they perceive these products are of higher quality, have less environmental impact, or provide more support for local farmers. Govindasamy et al. (2012) found that ethnic consumers have increased their purchases of locally produced specialty greens or herbs due to concerns over food miles.

Some studies conclude that opinions about the quality of local foods affect WTP for local food products (Brooker et al 1988; Jekanowski, Williams, and Schiek 2000). Respondents in a consumer intercept survey conducted by Darby et al. (2006) stated that the freshness of local berries was the main reason for preferring locally produced berries. Valuing support of local businesses may also motivate consumers to purchase local foods (Darby et al. 2006; Carpio and Isengildina-Massa 2013).

Consumer Selection of Retail Outlet

Choice of shopping outlets for beef has been examined in previous studies; for example, Lusk and Cevallos (2004), Grannis, Thilmany, and Sparling (2001), and Medina and Ward (1999). Each of these studies found that prices, demographic, and attitudinal factors may influence shopping outlet choices. Lusk and Cevallos (2004) found that the prices of beef at differing outlets had a significant effect on shopping outlet choice, with high prices at specialty

shops decreasing the likelihood of shopping at that outlet. Medina and Ward (1999) found that price had very little impact on outlet choice. Study results differed regarding the impact of gender on specialty store shopping. Lusk and Cevallos (2004) found that women were more likely to shop at specialty stores. Grannis, Thilmany, and Sparling (2001) found that males were more likely to shop at specialty meat shops or natural food stores. Grannis, Thilmany, and Sparling (2001) and Medina and Ward (1999) found that respondents with higher incomes were more likely to shop for meat products at specialty stores.

Medina and Ward (1999) found that most beef was purchased at supermarkets followed by butchers, warehouse stores, supercenters, and other outlets (i.e., neighborhood shops selling beef, convenience stores, and cooperative outlets). They also found consumers buying steaks were less likely to shop at a supermarket. Demographics did not have much influence on outlet choice except within differing purchase sizes. For example, the likelihood a consumer shops somewhere other than a supermarket is not influenced by demographic variables when household beef purchases are relatively small. However, as beef purchases increase, demographics may play an important role in outlet choice. Medina and Ward concluded that older females with relatively more time constraints were more likely to buy beef in supermarkets. Consumers with higher incomes were more likely to shop for beef at outlets other than supermarkets. Prices played a relatively minor role in outlet choice for all beef purchase quantities.

Conceptual Framework

Steak or Ground Beef Choice

Respondents were asked to choose between two products, one of which was described as being produced in Tennessee while the other was not. Thus, the hypothetical decision facing respondents was between a base product (boneless ribeye steak or a package of 85%/15% ground

beef) at a base price and a Tennessee produced version of the same product at a higher price. Text preceding the hypothetical choice question informed respondents that the base and Tennessee beef products were identical in all respects except for the price and that one was produced in Tennessee while the other was not. Respondents were also given the option to select neither product. The question was structured as a binary variable, with those saying they would buy the base product or neither counted as 0's, those who would purchase the Tennessee product as 1's.

McFadden's (1974) random utility model is used to quantify the utility a consumer receives from choosing to purchase an item or choosing to forgo its purchase. The decision to purchase a product is a discrete choice. The probability of choosing Tennessee beef ($TNBEEF=1$) is modeled using probit regression;

$$\Pr [TNBEEF_i = 1] = \Phi (\alpha + \boldsymbol{\beta}'\mathbf{X}_i + \beta_p P_i), \quad (1)$$

where α and β_p are parameters, $\boldsymbol{\beta}$ is a vector of parameters on non-price variables, \mathbf{X}_i is a matrix of demographic and other non-price variables, and Φ is the standard normal cumulative distribution function. The willingness to pay for the Tennessee beef product by the i th individual is:

$$WTP_{iTN} = - \frac{\alpha + \boldsymbol{\beta}'\mathbf{X}_i}{\beta_p}. \quad (2)$$

For a continuous variables, the marginal effects are calculated as:

$$\frac{\partial \Pr[TNBEEF_i=1]}{\partial X_k} = \phi(\alpha + \boldsymbol{\beta}'\mathbf{X}_i + \beta_p P_i) \beta_k \quad (3)$$

where ϕ is the standard normal density function. For binary explanatory variables, the marginal effect for X_k is calculated as:

$$\frac{\partial \Pr[TNBEEF_i=1]}{\partial X_k} = \Pr[TNBEEF_i = 1 | X, X_k = 1] - \Pr[TNBEEF_i = 1 | X, X_k = 0] \quad (4)$$

Outlet Choices

Consumers are also assumed to derive utility from the outlets where they shop for Tennessee beef. Consumer i is assumed to shop for Tennessee beef at outlet m if the utility from doing so exceeds the utility of not purchasing in that particular type of outlet. The choice to shop at a particular outlet ($M = GOURMET, BUTCHER, FMMKT, FARMER$) is estimated by multiple equations allowing correlation between the disturbances (Cappellari and Jenkins 2003). For an m -equation multivariate probit model:

$$y_{im}^* = \boldsymbol{\psi}'\mathbf{Z}_{im} + \epsilon_{im}, \quad m = 1, \dots, M \quad (5)$$

$$y_{im} = 1 \text{ if } y_{im}^* > 0 \text{ and } 0 \text{ otherwise.} \quad (6)$$

The explanatory variables, \mathbf{Z}_m are comprised of respondent demographics, attitudes, past purchase patterns, and other variables (Table 2), and $\epsilon_{im}, m=1, \dots, M$ are error terms distributed as multivariate normal, each with a mean of zero, and covariance matrix V . The method of estimation is by simulated maximum likelihood. Using the multivariate probit case where $M = 4$, the log-likelihood function for a sample of N independent observations is given by

$$L = \sum_{i=1}^N \omega_i \log \Phi_4 \boldsymbol{\mu}_i ; \boldsymbol{\Omega} \quad (7)$$

where ω_i is a weight for observation $i = 1, \dots, N$, and $\Phi_4(\bullet)$ is the quadrivariate standard normal distribution.

The marginal probability of shopping at a particular outlet is calculated as $\Pr(y_1) = \Pr(\epsilon_1 < \boldsymbol{\psi}_1' \mathbf{Z}_1) = \Phi_1(\boldsymbol{\psi}_1' \mathbf{Z}_{i1})$. An example of joint probability is that all the values are 1 or the consumer would expect to purchase Tennessee beef at any one of the outlets, so

$$\begin{aligned} \Pr(y_1, y_2, y_3, y_4) &= \Pr(\epsilon_1 < \boldsymbol{\psi}_1' \mathbf{Z}_1, \epsilon_2 < \boldsymbol{\psi}_2' \mathbf{Z}_2, \epsilon_3 < \boldsymbol{\psi}_3' \mathbf{Z}_3, \epsilon_4 < \boldsymbol{\psi}_4' \mathbf{Z}_4) \\ &= \Pr(\epsilon_4 < \boldsymbol{\psi}_4' \mathbf{Z}_4 | \epsilon_3 < \boldsymbol{\psi}_3' \mathbf{Z}_3, \epsilon_2 < \boldsymbol{\psi}_2' \mathbf{Z}_2, \epsilon_1 < \boldsymbol{\psi}_1' \mathbf{Z}_1) \\ &\quad \times \Pr(\epsilon_3 < \boldsymbol{\psi}_3' \mathbf{Z}_3 | \epsilon_2 < \boldsymbol{\psi}_2' \mathbf{Z}_2, \epsilon_1 < \boldsymbol{\psi}_1' \mathbf{Z}_1) \\ &\quad \times \Pr(\epsilon_2 < \boldsymbol{\psi}_2' \mathbf{Z}_2 | \epsilon_1 < \boldsymbol{\psi}_1' \mathbf{Z}_1) \times \Pr(\epsilon_1 < \boldsymbol{\psi}_1' \mathbf{Z}_1). \end{aligned} \quad (9)$$

Methods and Procedures

Data Collection

A random sample of individuals with landline or wireless phones was drawn from five metropolitan areas in Tennessee (Shelby, Davidson, Williamson, Hamilton, Knox, Sullivan, and Washington Counties and surrounding areas). The survey was conducted by telephone, including both land-line telephones and wireless phones in 2013. The land-line sample consists of a random sample of telephone numbers for households in the five metropolitan areas addressed in the study. The wireless sample consists of wireless customers whose contracts are associated with the study areas.

Respondents were screened to verify that they were at least 18 years old and involved in planning meals or shopping for the household. Initial contacts in the wireless sampling frame were also screened to ensure that only Tennessee households were included in the survey.

A comparison of demographic characteristics between the survey respondents and Census data at the state and county levels revealed some differences. These included gender (more females in respondents) and education level (higher percentage with Bachelor's degree among respondents). Also, the percent of survey respondents 65 and older is considerably higher than the Census data for the state and the selected counties. As a result, 1/median county age was used to weight the data used in the analysis.

Many households contacted were unwilling to reveal their income level. Missing income values were imputed with county median household income values from the 2010 Census. A dummy variable is included in the regression to account for any differences between the actual respondent incomes and imputed values.

Respondents were asked questions about household beef consumption. The non-beef consuming respondents were directed to the end of the survey, where they answered questions

about their household. Beef consuming households were asked about the number of meals served at home per week in which beef was served, where they typically purchased beef, and their consumption of ground beef and steak.

If the respondent indicated that his or her household consumed steak but not ground beef, then they were asked a set of questions regarding steak. If they indicated that their household consumed ground beef but not steak, then they skipped to questions about ground beef. If the respondent indicated that the household consumed other cuts of beef but not ground beef or steak or if they consumed both products, then they were randomly assigned to either the steak or ground beef question set.

The respondents from beef-consuming households were then asked about the importance of various attributes when purchasing steak or ground beef (freshness, flavor, tenderness for steak (texture for ground beef), juiciness, color, leanness, price, and ease of preparation). They were also asked about the importance of whether the animal was treated humanely, naturally raised, locally produced, grass fed, or grain fed.

Before answering questions about their choice to purchase local beef, respondents were read a brief description of the Tennessee beef product. The ribeye steak example is below:

TENNESSEE beef means the animals must have been born, raised, and finished within the borders of the State of Tennessee. I'm now going to ask you to choose between TWO Choice-grade, 12-ounce, Boneless Ribeye Steaks. Before making your decision, consider your household's budget for food, keeping in mind that if you spend more on steak, you'll have less money to spend on other food products. Both steaks are the same weight and have IDENTICAL freshness, cut, color, marbling, meat texture, fat, tenderness, juiciness, and flavor.

A similar description was read for 85%/15% ground beef, with the local and nonlocal products being identical in leanness, freshness, color, meat texture, juiciness, and flavor.

Respondents were then asked to choose between a base product, a Tennessee beef product, or neither. The base ribeye price was \$9.25 per pound, and the base ground beef price was \$3.36 per pound. The respondents were randomly assigned to four price levels for the Tennessee beef product. Steak prices were \$9.25, \$11.56, \$13.88, and \$16.19 per pound. Ground beef prices were \$3.36, \$4.20, \$5.04, and \$5.88 per pound. The price options for each product were based upon USDA Agricultural Marketing Service retail beef price reports, USDA Weekly Retail Beef Feature Activity, at the time the survey was being developed (USDA/AMS 2012). The survey also included a series of questions asking respondents who indicated they would purchase Tennessee beef whether they would shop for Tennessee beef at a series of different outlets and about their product form preferences. The final section of the survey included questions about respondent opinions and demographic characteristics, including gender, age, education, household income, and residence location.

Results

About 42.40% of the consumers are willing to purchase the Tennessee steak, while 36.30% are willing to purchase Tennessee ground beef (Table 1). The estimated probit regressions for Tennessee steak and ground beef are shown in Table 3. As can be seen from the likelihood ratio tests, both models were significant overall. The steak model correctly classifies 78.41% of the observations. The ground beef model correctly classifies 80.41%. The pseudo R^2 is 0.346 for the steak model and 0.339 for the ground beef model.

The coefficients on price and the marginal effects of price are negative and significant. For each \$1/pound price increase, the probability of purchasing the steak would decline by 0.085 while the probability of purchasing ground beef would decline by 0.191.

Older consumers are less willing to purchase the Tennessee steak but age has no significant influence on willingness to purchase the Tennessee ground beef. For each year increase in age, the likelihood of purchasing the Tennessee steak falls by 0.005. Neither gender, education, household size, farm background, nor frequency of meals serving beef has a significant influence on willingness to purchase either Tennessee beef product. Moderate incomes (*INC3*)—between \$50,000 and \$70,000—negatively influence willingness to purchase the Tennessee steak product. Households with children aged less than 6 in the household were more likely to purchase Tennessee ground beef.

Having shopped for beef at large retail stores and butcher shops negatively influences willingness to purchase Tennessee steak. However, having shopped for ground beef at a butcher shop in the last year positively influences willingness to purchase Tennessee ground beef by 0.161. Having shopped for beef at farmers markets or direct from a farmer had no significant influence. Consumers who value freshness, natural production, and safety are more willing to purchase Tennessee ground beef. Consumers who value tenderness and price are less likely to purchase Tennessee steak while those who value flavor and grain fed are more likely.

The mean WTP for steak is \$14.28, a premium of 54.39% or \$5.03 above the base of \$9.25. The mean WTP for Tennessee ground beef is \$5.03, a premium of 49.67% or \$1.67 per pound above the base of \$3.36. T-tests indicate that these premiums are significantly different from zero.

About 43.50% would shop for Tennessee beef at a gourmet store, 41.90% at a butcher shop, 35.5% at farmers market, and 43.8% direct from a farmer (Table 2). These estimates are interesting in light of the fact that 30.2% had purchased beef from a gourmet store in the past year, 13.2% from a butcher, 7% from a farmers market, and 6.8% direct from a farmer. The

multivariate probit regression of shopping outlets is presented in Table 4 and is significant overall with each of the correlation coefficients between equations being significant. Age, gender, and education do not significantly influence probability of shopping for Tennessee beef at the four outlets. However, moderate incomes (*INC2*, *INC3*) both positively influence likelihood of shopping for Tennessee beef at gourmet shops. While lower income, (*INC1*) positively influences likelihood of shopping for Tennessee beef at butcher shops, farmers markets, and farmer direct, moderate income (*INC3*) negatively influences shopping at butcher shops. Respondents from rural areas or small towns (*URB1*) are more likely to anticipate shopping for Tennessee beef at gourmet stores, while those from suburban areas (*URB2*) are more likely to shop for Tennessee beef at gourmet stores and direct from farmers. Prior shopping behavior has a strong positive influence on whether the respondent anticipates shopping for Tennessee beef at each type of outlet, with the largest coefficient being on direct-from-farmer.

Respondents who place greater importance on product price (*PRICE*) are less likely to anticipate shopping at gourmet stores, while those who value grass fed (*GRASS*) are more likely to shop at gourmet stores, as well as farmers markets, and direct from a farmer. Priority on ease of preparation (*EASE*) negatively influences probability of shopping at farmers markets.

Respondents who place greater importance on helping support farmers' incomes relative to keeping food prices low (*FARMERINC*) are more likely to anticipate shopping direct from a farmer. Willingness to purchase frozen beef (*FROZEN*) positively influences shopping at gourmet stores, while willingness to purchase thawed (*THAW*) positively influences shopping at butcher shops and farmers markets. The predicted probability of selecting all outlets is 0.187, while the probability selecting none is 0.337. The marginal probability of anticipating shopping

for Tennessee beef at a gourmet market is 0.415, 0.423 at a butcher, 0.359 at a farmers market, and 0.438 direct from a farmer.

Conclusions

Tennessee consumers are willing to pay premiums for both Tennessee steak and ground beef. Price conscious, big box store shoppers are less willing to pay a premium for Tennessee steak. Consumers who value grain-fed, flavorful beef products are more likely to purchase the Tennessee steak. Consumers who value freshness, safety, and natural production are more likely to purchase Tennessee ground beef. Differences in the effects of demographic and attitudinal variables on willingness to pay a premium for the Tennessee products suggest that target markets for the two products could be quite different.

Prior shopping patterns have a strong influence on where consumers anticipate shopping for Tennessee beef. A desire for a grass-fed product positively influences shopping at gourmet stores, farmers markets, and farmer direct. Price conscious consumers anticipate being less likely to shop for Tennessee beef at gourmet markets, while those placing greater weight on ease of preparation are less likely to shop for it at farmers markets. Interestingly, product form that consumers would be willing to purchase the product in also influence shopping outlet choices. While a frozen product might sell well at gourmet stores, a thawed product might sell better at butcher shops and farmers markets.

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Table 1. Definitions, Expected Signs, and Sample Means for the Variables Included in the Probit Models of Tennessee Steak and Ground Beef Choice

Variable Name	Variable Definition	Mean for Steak (N=264)	Mean for G. Beef (N=245)
Dependent Variables			
<i>STK or GBCHOICE</i>	1 if choose TN steak or TN ground beef, 0 otherwise	0.424	0.363
Explanatory Variables			
<i>STK or GBPRICE</i>	TN steak price/pound, \$9.25, \$11.56, \$13.88, \$16.19; TN ground beef price/pound \$3.36, \$4.20, \$5.04, \$5.88	13.042	4.575
<i>AGE</i>	Age of respondent in years	52.918	51.796
<i>FEMALE</i>	1 if female, 0 otherwise	0.524	0.611
<i>COLLEGE</i>	1 if respondent graduated from college, 0 if not	0.501	0.394
<i>INC1-INC3</i>	<i>INC1</i> =1 if hh inc \leq \$40K, 0 otherwise; <i>INC2</i> = \$40K- \$50K; <i>INC3</i> = \$50K-\$70K; omitted <i>INC4</i> =1 if \geq \$70K, 0 otherwise	0.108, 0.493, 0.079 0.320	0.150,0.518 ,0.087, 0.246
<i>DUMMYINC</i>	1 if observ. based on county median hh inc, 0 otherwise	0.491	0.546
<i>URB1,URB2</i>	<i>URB1</i> =1 if 1 rural/small town, 0 otherwise; <i>URB2</i> =1 if suburban; omitted <i>URB3</i> =1 if metro	0.343, 0.427, 0.230	0.334, 0.410, 0.255
<i>HHSIZE</i>	Household size	2.980	2.652
<i>CHLDLT6</i>	1 if child < 6 years of age in household, 0 otherwise	0.096	0.129
<i>FRMBK</i>	1 if from farm background, 0 otherwise	0.400	0.359
<i>BEEFMEALS</i>	1 if beef served at home >3 times/week, 0 otherwise	0.449	0.335
<i>WAREH</i>	1 if shopped for beef at wrhse in past yr, 0 otherwise	0.367	0.260
<i>BIGBOX</i>	“ ” at big box store, “ ”	0.477	0.411
<i>GOURM</i>	“ ” at gourmet store, “ ”	0.255	0.213
<i>BUTCH</i>	“ ” at butcher, “ ”	0.133	0.099
<i>FMMKT</i>	“ ” at farmers’ market, “ ”	0.059	0.067
<i>FARMER</i>	“ ” directly from farmer, “ ”	0.055	0.043
<i>LEAN</i>	Importance of leanness when purchasing 1=not, ...,3=very	2.450	2.611
<i>FRESH</i>	Importance of freshness “...”	2.899	2.925
<i>TEND/TEXT</i>	Importance of tenderness /texture “ ”	2.797	2.421
<i>JUICY</i>	Importance of juiciness “...”	2.720	2.480
<i>FLAV</i>	Importance of flavor “...”	2.902	2.848
<i>COLOR</i>	Importance of color “...”	2.696	2.776
<i>PRICE</i>	Importance of price “...”	2.458	2.444
<i>NATUR</i>	Importance of natural label “...”	2.331	2.347
<i>GRASS</i>	Importance of grassfed label “...”	1.938	1.872
<i>GRAIN</i>	Importance of grainfed label “...”	1.917	1.839
<i>HUMANE</i>	Importance of humanely treated label “...”	2.489	2.506
<i>SAFE</i>	Importance of keeping food prices low vs safety/nutrition, 1=food prices, 2=same, 3=safety /nutrition	2.405	2.429
<i>WTAGE</i>	1/median age of household in the county	0.026	0.027

Table 2. Definitions and Sample Means for the Variables Included in the Multivariate Probit Model for Choice of Outlets Where Would Likely Purchase Tennessee Beef

Variable Name	Variable Definition	Mean (N=189)
<i>GOURMET</i>	1 if would anticipate purchasing Tennessee beef at gourmet stores, 0 otherwise	0.435
<i>BUTCHER</i>	1 if would “ ” at butcher shops, 0 otherwise	0.419
<i>FARMMKT</i>	1 if would “ ” at farmers markets, 0 otherwise	0.355
<i>FARMER</i>	1 if would “ ” at farms directly, 0 otherwise	0.438
<i>AGE</i>	Age of respondent in years	50.435
<i>FEMALE</i>	1 if female, 0 otherwise	0.545
<i>COLLEGE</i>	1 if respondent graduated from college education, 0 if not	0.429
<i>INC1-INC3</i>	<i>INC1</i> =1 if household income \$40K or less, 0 otherwise; <i>INC2</i> =1 if “ ” \$40K to \$50K, 0 otherwise; <i>INC3</i> =1 if “ ” \$50K to \$70K, 0 otherwise; omitted <i>INC4</i> =1 if \$70K or more, 0 otherwise	0.111, 0.518, 0.060, 0.311
<i>DUMMYINC</i>	1 if observation based on county MEDHHINC, 0 if household income reported by respondent	0.515
<i>URB1,URB2</i>	<i>URB1</i> =1 if 1 if rural or small town, 0 otherwise; <i>URB2</i> =1 if suburban, “ ”; <i>URB3</i> =1 if metro, “ ”	0.348, 0.400, 0.252
<i>OUTLET_j</i>	1 if purchase beef at outlet type in past year, 0 otherwise, j=gourmet stores, butcher stops, farmers markets, or farm direct	0.302, 0.132, 0.070, 0.068
<i>PRICE</i>	Importance of price when purchasing beef, 1=not, 2=somewhat, 3=very	2.378
<i>EASE</i>	Importance of ease of preparation “...“	2.229
<i>GRASS</i>	Importance of grassfed label “...“	2.045
<i>FARMERINC</i>	1 if consider supporting farmer incomes more important than keeping food prices low, 0 otherwise	0.441
<i>FROZEN</i>	1 if would purchase Tennessee beef if frozen, 0 otherwise	0.633
<i>THAW</i>	1 if would purchase Tennessee beef if frozen then thawed, 0 otherwise	0.309
<i>WTAGE</i>	1/median age of household in the county	0.026

Table 3. Estimated Probit Models for Steak and Ground Beef Choice

Variable	Steak (N=264)				Ground Beef (N=245)			
	Coeff	SE	ME	SE	Coeff	SE	ME	SE
<i>INTERCEPT</i>	5.798	1.865 ***			-2.244	1.535		
<i>STK or</i>								
<i>GBPRICE</i>	-0.342	0.041 ***	-0.085	0.007 ***	-0.784	0.131 ***	-0.191	0.024 ***
<i>AGE</i>	-0.020	0.008 **	-0.005	0.002 **	0.004	0.008	0.001	0.002
<i>FEMALE</i>	-0.173	0.203	-0.043	0.051	0.181	0.227	0.044	0.055
<i>COLLEGE</i>	-0.100	0.206	-0.025	0.051	-0.016	0.268	-0.004	0.065
<i>INC1</i>	0.222	0.400	0.055	0.100	-0.107	0.396	-0.026	0.096
<i>INC2</i>	0.402	0.366	0.100	0.091	0.266	0.434	0.065	0.106
<i>INC3</i>	-0.881	0.380 *	-0.220	0.093 *	0.295	0.421	0.072	0.103
<i>DUMMYINC</i>	-0.276	0.310	-0.069	0.078	-0.251	0.377	-0.061	0.092
<i>URB1</i>	0.160	0.270	0.040	0.067	0.182	0.271	0.044	0.066
<i>URB2</i>	-0.136	0.270	-0.034	0.067	-0.164	0.255	-0.040	0.062
<i>HHSIZE</i>	-0.068	0.081	-0.017	0.020	-0.095	0.102	-0.023	0.025
<i>CHLDLT6</i>	0.022	0.432	0.006	0.108	0.797	0.392 *	0.194	0.094 *
<i>FRMBK</i>	0.273	0.211	0.068	0.052	0.146	0.215	0.036	0.052
<i>BEEFMEALS</i>	0.125	0.203	0.031	0.051	0.002	0.218	0.001	0.053
<i>WAREH</i>	-0.027	0.232	-0.007	0.058	-0.198	0.257	-0.048	0.063
<i>BIGBOX</i>	-0.356	0.227 *	-0.089	0.056 *	-0.330	0.223	-0.080	0.054
<i>GOURM</i>	0.357	0.263	0.089	0.065	0.179	0.289	0.044	0.070
<i>BUTCH</i>	-0.619	0.288 **	-0.155	0.071 ***	0.662	0.345 *	0.161	0.083 *
<i>FMMKT</i>	-0.465	0.417	-0.116	0.103	0.350	0.446	0.085	0.108
<i>FARMER</i>	0.055	0.452	0.014	0.113	0.088	0.559	0.021	0.136
<i>LEAN</i>	-0.074	0.161	-0.018	0.040	-0.021	0.177	-0.005	0.043
<i>FRESH</i>	-0.419	0.313	-0.105	0.077	0.885	0.421 **	0.216	0.100 **
<i>EASE</i>	-0.117	0.139	-0.029	0.035	0.024	0.151	0.006	0.037
<i>TEND</i>	-0.478	0.278 *	-0.119	0.069 *	0.037	0.173	0.009	0.042
<i>JUICY</i>	0.320	0.244	0.080	0.061	0.058	0.187	0.014	0.046
<i>FLAV</i>	0.541	0.311 **	0.135	0.076 **	0.132	0.304	0.032	0.074
<i>COLOR</i>	-0.082	0.192	-0.020	0.048	-0.230	0.205	-0.056	0.049
<i>PRICE</i>	-0.412	0.161 **	-0.103	0.039 **	-0.164	0.181	-0.040	0.044
<i>NATUR</i>	0.089	0.158	0.022	0.039	0.384	0.181 **	0.093	0.043 **
<i>GRASS</i>	-0.050	0.203	-0.012	0.051	0.147	0.211	0.036	0.051
<i>GRAIN</i>	0.512	0.208 **	0.128	0.052 ***	0.109	0.208	0.027	0.051
<i>HUMANE</i>	0.255	0.159	0.064	0.039	0.229	0.174	0.056	0.042
<i>SAFE</i>	-0.076	0.165	-0.019	0.041	0.410	0.182 **	0.100	0.044 **
LLR Test (33 df)	115.700 ***				86.360 ***			
% Correctly Class.	78.41%				80.41%			
Pseudo R ²	0.346				0.339			

^a *** indicates significant at 99%, ** at 95%, and * at 90%.

Table 4. Multivariate Probit Parameter Estimates for Choice of Outlets Where Would Likely Purchase Tennessee Beef

Variable	Gourmet Stores		Butcher Shops		Farmers Markets		Farmer Direct	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<i>INTERCEPT</i>	-1.499	0.698 **	-1.103	0.660 *	-1.139	0.703	-1.055	0.688
<i>AGE</i>	-0.002	0.007	0.001	0.006	-0.002	0.007	0.002	0.006
<i>FEMALE</i>	0.004	0.233	-0.185	0.209	-0.107	0.228	-0.110	0.225
<i>COLLEGE</i>	0.017	0.234	-0.028	0.214	-0.283	0.225	0.112	0.217
<i>URB1</i>	1.016	0.315 ***	-0.072	0.272	0.096	0.285	0.194	0.315
<i>URB2</i>	0.554	0.270 **	0.109	0.249	0.383	0.279	0.494	0.282 *
<i>INC1</i>	0.440	0.438	0.752	0.396 *	0.700	0.365 *	0.572	0.338 *
<i>INC2</i>	0.967	0.425 **	0.289	0.407	0.278	0.445	0.193	0.408
<i>INC3</i>	0.972	0.493 **	-0.931	0.498 *	-0.263	0.517	0.156	0.385
<i>DUMMYINC</i>	-0.863	0.395 **	-0.295	0.363	-0.454	0.391	-0.252	0.343
<i>OUTLET_M</i>	1.426	0.248 ***	1.462	0.349 ***	1.318	0.388 **	3.813	0.420 ***
<i>PRICE</i>	-0.328	0.158 **	0.054	0.181	0.129	0.170	-0.030	0.198
<i>GRASS</i>	0.332	0.150 **	0.188	0.133	0.304	0.147 *	0.286	0.131 **
<i>EASE</i>	-0.218	0.149	-0.071	0.159	-0.383	0.155 *	-0.256	0.165
<i>FARMERINC</i>	0.232	0.219	0.254	0.210	0.268	0.207	0.383	0.215 *
<i>FROZEN</i>	0.932	0.264 ***	0.138	0.229	0.364	0.255	0.242	0.236
<i>THAW</i>	0.092	0.227	0.590	0.226 ***	0.932	0.235 ***	0.414	0.237 *
ρ_{21}	0.781	0.059 ***						
ρ_{31}	0.698	0.088 ***						
ρ_{41}	0.676	0.082 ***						
ρ_{32}	0.704	0.081 ***						
ρ_{42}	0.812	0.061 ***						
ρ_{43}	0.834	0.059 ***						
LLR Test (H0: $\beta_1=0=\beta_2=0\dots$) w/64 df		438.17 ***						
LLR Test (H0: $\rho_{21}=0=$ $\rho_{22}=0\dots$) w/6 df N=189		761.27 ***						

^a *** indicates significant at 99%, ** at 95%, and * at 90%.