Consumer Willingness to Pay for Tennessee Beef

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Abstract

This study examines willingness to pay (WTP) for beef produced in Tennessee among consumers in five metropolitan areas. Consumers who prefer grain-fed, flavorful beef are willing to pay more for Tennessee beef steaks, while price conscious consumers and those who shop at big box stores are willing to pay less. Consumers who value freshness, safety, and natural products are willing to pay more for Tennessee ground beef. Preferences for grass-fed beef, lower prices, and ease of preparation influence the types of outlets where consumers anticipate purchasing Tennessee beef products.

Keywords: willingness to pay, local, beef, shopping outlets

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Introduction

The beef cattle industry generates more cash receipts than any other farm commodity in Tennessee (Tennessee Department of Agriculture 2015). However, most beef cattle in Tennessee leave the state to be finished (Lewis et al. 2015). If Tennessee farmers could finish and harvest their cattle in the state and market directly to consumers, they could capture some of the value-added from these activities. Additional finishing and harvesting activities in Tennessee could also positively impact the state's economy. However, finishing cattle in the state can be relatively costly. Hence, farmers wishing to sell beef finished and harvested in Tennessee would likely need a price premium for this product to be profitable. Consumer willingness to pay (WTP) a premium for beef products raised and harvested in Tennessee ("Tennessee beef") is unknown. Similarly, little is understood about the types of retail outlets where Tennessee consumers would anticipate purchasing Tennessee beef. Prior research of consumer preferences and willingness to pay for local beef in other geographic areas provides important insights for this study. On the other hand, research examining the types of outlets where consumers might anticipate purchasing local beef and factors influencing these perceptions is sparse. A better understanding of consumer expectations is important, in part, because obtaining product placement in retail groceries, big box stores, and supermarkets may be problematic for small volume beef producers.

The focus of this study is on consumer preferences for Tennessee beef and the retail channels through which consumers would expect to purchase Tennessee beef. More specifically, the objectives of this research are to: 1) estimate consumer willingness-to-pay (WTP) for two Tennessee beef products (ground beef and ribeye steak); 2) identify demographic characteristics, consumer attitudes, and socioeconomic factors influencing WTP for these products; 3) determine the types of retail locations where Tennessee beef consumers would expect to purchase Tennessee beef; and 4) ascertain demographic characteristics, attitudes, and socioeconomic factors associated with these expectations.

Previous Research

Studies of Willingness to Pay for Locally Produced Beef

While there are no recent analyses of consumer preferences for Tennessee beef, there are a number of studies examining consumer preferences for locally produced beef products. For example, Mennecke et al. (2007) used a contingent choice experiment to estimate the preferences of a national sample of respondents for a number of beef steak attributes, including local production. They found that the region of origin, was the most important attribute, followed by animal breed, traceability, animal feed and beef quality. The least important attributes were the use of growth promoters, the cost of the cut, farm ownership and whether or not the steak was guaranteed tender. Chang et al. (2013) used a contingent choice experiment to find WTP a premium of $0.48 per pound for locally produced ground beef among consumers in northern South Dakota.

Adalja et al. (2015) used hypothetical and non-hypothetical contingent choice analysis of Maryland residents to estimate WTP a premium of $2.72 per pound for beef raised within 100

miles and $2.39 per pound for beef raised within 400 miles. Adalja et al. noted that respondents view local and grass-fed beef products as substitutes. They also found that buying club shoppers were willing to pay less for locally produced ground beef than other consumers. Evans et al. (2011) also found a link between preferences for grass-fed and locally produced beef. They used an in-store experimental auction to estimate WTP for grass-fed beef in the Appalachian region and found that local production increased WTP for grass-fed beef. They also found that participants who ranked "locally produced" had stronger preferences for grass-fed beef.

Maynard, Burdine, and Meyer (2003) conducted a sensory evaluation and contingent valuation exercise to estimate WTP for locally produced meat products in Kentucky. They found that 64% of respondents were willing to pay a premium of 20% for locally produced ground beef, while 52% were willing to pay a premium of 20% for steak. They found that respondent perceptions of the convenience and quality of locally produced meat, WTP for source verification, shopping at a specialty meat store, and whether the household had at least one member older than twenty-four influenced WTP a premium for local ground beef. Respondent willingness to make an extra stop for local beef, having purchased food directly from a farmer, number of household members younger than six years old, and being single had a positive influence on WTP a premium for local steak. Maynard, Burdine, and Meyer's results suggest that the influence of demographics, shopping habits, and attitudes on WTP a premium for locally produced beef can be quite different for ground beef or steak.

Froehlich, Carlberg, and Ward (2009) found positive WTP among Canadian consumers for a hypothetical local brand of steak and that WTP for the locally branded steaks was higher among males. Wolf and Thulin (2000) evaluated purchase interest to predict the consumer profiles of individuals who would purchase a locally branded beef product in California. Their study found that the target consumers for locally branded beef were older, married, higher dual-income households.

Perkins (2012) found that, while consumers in the Southeastern United States interpreted "locally produced" beef to mean anything from being produced within twenty-five miles to being produced in the United States, the definition most commonly chosen (25% of the respondents), was that the product originated in their own state. Perkins also found that respondents who considered no added growth hormones and supporting local producers to be important and who believed that locally produced food is superior in reduced transportation and environmental sustainability were willing to pay more for locally produced beef. Females and those who believed food safety concerns to be exaggerated were less willing to pay for local beef.

Demographic and Socioeconomic Characteristics and WTP for Locally Produced Foods

The broader literature examining consumer preferences for local foods provides insight into the likely influence of consumer demographics on demand for locally produced beef products. However, given the wide range of products studied, it is perhaps not surprising that the evidence is inconsistent and sometimes contradictory. For example, while older consumers have been found to be less likely to perceive locally produced food favorably or to purchase locally produced food (Willis et al. 2013; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee

2011), James, Rickard, and Rossman (2009) find that consumers over sixty years old were more likely to purchase locally produced applesauce.

A number of studies establish a positive relationship between educational attainment and preferences for local foods (Brown 2003; Willis et al. 2013; Govindasamy et al. 2012; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee 2011). However, other studies find no association between education and WTP for local food (Loureiro and Hine 2002; Brooker et al. 1988; Jekanowski, Williams, and Schiek 2000).

Some research concludes that higher income households are willing to pay more for local foods (Willis et al. 2013; Brown 2003; Nganje, Hughner, and Lee 2011). On the other hand, 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 pay a premium for locally produced blueberry jam.

Some 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 gender and WTP for local food (Hanagriff, Rhoades, and Wilmeth 2008; Loureiro and Hine 2002).

Evidence on the relationship between household size and households with children on WTP for local food is also mixed. Willis et al. (2013) found that WTP for locally produced food was lower in larger households. However, results from Jekanowski, Williams, and Schiek (2000) found no 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 correlation between WTP for local potatoes and households with children.

Brown (2003) reported that respondents with a background in farming were more likely to pay a premium for local food. In contrast, James, Rickard, and Rossman (2009) found that increased knowledge about agriculture decreased WTP for local food. Studies have failed to find a rural-urban distinction in consumer preferences for locally produced foods (Jekanowski, Williams, and Schiek 2000; Brown 2003).

Consumer Attitudes and WTP for Locally Produced Foods

Consumers may be more willing to pay a premium for locally produced 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 influence WTP for local foods, and that 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 consumers have increased their consumption 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 Outlets for Beef

Previous studies have examined consumer choice of shopping outlets for beef (Lusk and Cevellos 2004; Grannis, Thilmany, and Sparling 2001; Medina and Ward 1999). In a study of consumer perceptions of purchasing natural beef from a producer-owned outlet, Lusk and Cevallos (2004) found that high prices at specialty shops decreased the likelihood of shopping at these outlets. On the other hand, Medina and Ward (1999) found that price had very little impact on outlet choice. Similarly, evidence regarding the impact of gender on specialty store shopping is mixed. Lusk and Cevellos (2004) found that women were more likely to shop for beef at specialty stores, while 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. Grannnis, Thilmany, and Sparling (2001) found that respondents placing greater importance on local production were more likely to shop at natural food stores. Rossini et al. (2014) found that the likelihood that an Argentine beef consumer shops at a supermarket or a butcher is influenced by a number of factors, including age and educational attainment of the head of the household, amount of beef purchased by the household, and preferred payment method.

Several studies found that where a consumer shops may influence their purchase of local foods and willingness to pay a premium for these products. Local foods tend to be more readily available in 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 farmer markets was not associated with consumer purchases of locally produced agricultural products.

Conceptual Framework

Previous studies provide insight into consumer preferences for locally produced foods, including beef, and the types of retail outlets where consumers purchase beef. However, analyzing the existence of a potential market for Tennessee beef would seem to require estimating WTP a premium for Tennessee beef, identifying consumer characteristics associated with a preference for Tennessee beef for targeted marketing efforts, and, given the possibility of limited access of small-volume beef producers to certain types of retail outlets, consumer characteristics associated with differences in willingness to shop for locally produced beef across outlet types. Two models are developed to address these issues, the first estimates WTP for Tennessee beef and the effects of various consumer characteristics on WTP and the second examines factors influencing where those who are willing to purchase Tennessee beef anticipate shopping for it.

Beef Purchase Choices

Respondents were asked to choose between two products, one of which was described as being produced in Tennessee while the other was not. 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 the place where the product was produced. Respondents were also given the option to select neither product. In the contingent valuation approach used, the prices of the base and Tennessee beef products are provided to respondents, who select either or neither product (Hanemann 1984). Responses are structured as a binary variable, with respondents who chose the base product being counted as zeroes, and those who chose the Tennessee product counted as ones. Respondents indicating they would choose neither product were excluded from the choice modeling between the Tennessee and base beef products. While each respondent was offered a single price for both the base and Tennessee products, there were four price levels for each (steak and ground beef) of the Tennessee products, with the price levels randomly distributed across the sample.

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. In this case, respondents chose between purchasing a beef product with no information on where the product was produced or paying a premium to purchase a Tennessee beef product. Let U_{iTN} represent the *ith* consumer's utility from choosing the Tennessee beef alternative (*TN*) and U_{iC} be the utility from choosing conventional beef or the base product. The *ith* consumer will choose *TN* if

(1) $U_{iTN} > U_{iC}$.

If consumer preferences are influenced by demographic and other non-price factors (X_i) as well as price (*P*), then the decision in (1) is

(2) $U_{iTN}(X_i, P) > U_{iC}(X_i, P)$.

The probability of choosing the alternative, in our case, Tennessee beef (*TN* = 1), is therefore (Greene 2011)

(3) $\Pr[TN_i = 1] = \Phi\left(\alpha + \boldsymbol{\beta'X_i} + \beta_p P_i\right),$

where α and β_P are parameters, $\boldsymbol{\beta}$ is a vector of parameters on non-price variables, X_i is a matrix of demographic and other non-price variables, and Φ is the standard normal cumulative distribution function. WTP for the Tennessee beef product by the *ith* individual is

(4) $\widehat{WTP}_{iTN} = -\dfrac{\alpha + \boldsymbol{\beta'X_i}}{\beta_p}.$

The labels and descriptions of the explanatory variables that constitute X_i are summarized in Table 1 (see Appendix). These variables include demographic characteristics, prior shopping

patterns, respondent rankings of importance of product attributes, and price of the Tennessee beef product.

Outlet Choices

Consumers also have preferences over the outlets where they shop. Respondents who chose Tennessee beef in the contingent valuation question were asked if they would "likely shop for Tennessee beef" at a variety of retail outlets (grocery store, big box store, warehouse store, gourmet/organic market, butcher shop, farmer's market, farmer, mail order service, and other). Respondents answered "yes", "no", or "don't know" for each type of outlet. Thus, respondents could indicate that they would shop for Tennessee beef at none, one, or more than one of these outlets. Because it can be difficult for small volume producers to enter into large supermarket chain or big box market channels, we focus on farmer's markets (*FMMKT*), direct from farmer (*FARMER*), butcher shops (*BUTCHER*), and gourmet shops (*GOURMET*).

Consumer *i* shops for Tennessee beef at outlet *m* (*GOURMET, BUTCHER, FMMKT, FARMER*) if the utility from doing so exceeds the utility of not shopping at that particular type of outlet for Tennessee beef. The outlets where consumers would shop for Tennessee beef is assumed to contribute to consumer *i*'s utility, as

$$(5) \ \ U_{iM} = f(\boldsymbol{\psi}'Z_{im}), \ \ m = 1, \dots, M$$

where consumer *i* will choose alternative *m* if

$$(6) \ \ U_{im} \geq U_{in}.$$

The utility derived from shopping for Tennessee beef at a selected outlet is U_m. U_n is the utility derived from not shopping for Tennessee beef at that outlet. The explanatory variables $(\boldsymbol{Z_m})$ hypothesized to influence shopping location include respondent demographics, past shopping patterns, attitudes about products, as well as preferred product form (i.e., frozen or thawed) (Table 2 in Appendix).

## Methods and Procedures

Data Collection

The survey was conducted by telephone in June and July 2013.[1] A random sample of individuals with landline or wireless phones was drawn from selected counties in five Combined Statistical Areas in Tennessee (Memphis, Nashville, Chattanooga, Knoxville, and Tri-Cities) (Figure 1a). The landline sample consists of telephone numbers for households in the five metropolitan areas. The wireless sample consists of wireless customers whose contracts are based in the study areas. The counties respondents stated they actually resided in are shown in Figure 1(b). A total of 1,209 surveys were completed. Using American Association of Public Opinion formulas, the response rate overall was 28.7 % and 23.3 % for the landline and wireless

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[1] Enumerators trained to read from telephone scripts were employed through the UT Human Dimensions Laboratory.

sampling frames, respectively. The cooperation rate for the landline-sampling frame was 68.2 %, and the wireless cooperation rate was 54.3 %. It should be noted that of the 1,209 surveys completed, 931 of these respondents indicated they or others in their household consume beef.
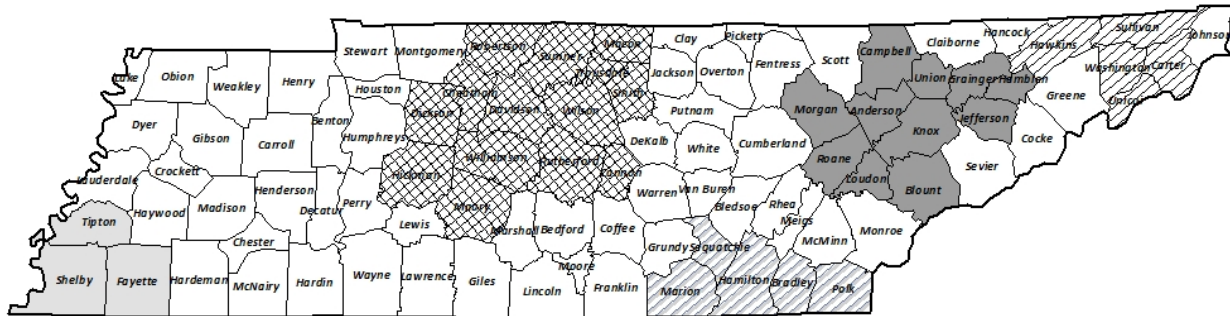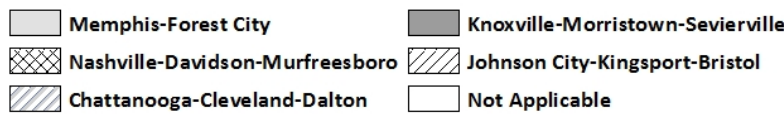
(a) Targeted Combined Statistical Areas, Tennessee
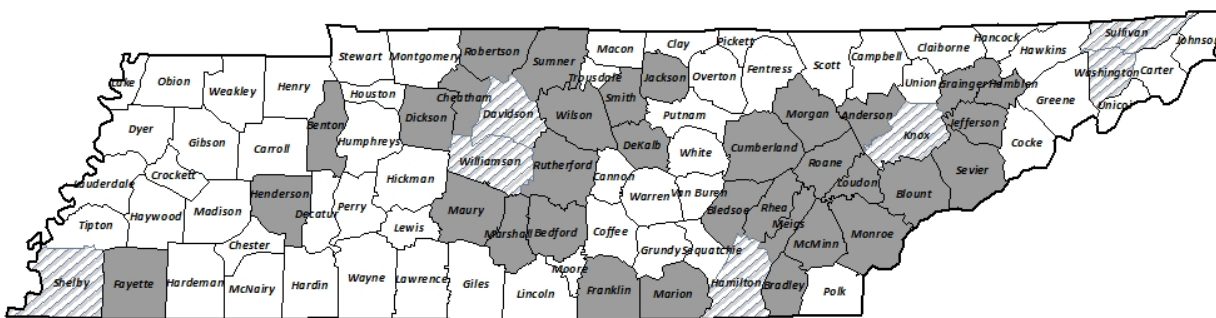
b) Counties of Residence Indicated by Respondents

Figure 1. Targeted and Response Areas for Tennessee Beef Survey (2013).

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 screened to ensure that only Tennessee households were included in the survey.

A comparison of demographic characteristics between the survey respondents and US Census Bureau estimates for 2012 at the state and county levels revealed some notable differences (Census Bureau 2012). These include gender, with 59.0% females among the respondents compared with 51.3% for the State and a range of 51.1% in Washington County to 52.3% in Shelby County. Also education level, with a higher percentage of respondents holding Bachelor's degrees (41.0% compared to 24.3% for Tennessee and a range of 27.8 % in Hamilton County to 35.0% in Davidson County). The percent of survey respondents 65 and older (31.2 %) is considerably higher than the Census data for the state (14.2 %) and the selected counties (ranged from 10.8 % in Shelby County to 16.0 % in Washington County). To adjust for these differences, observations are weighted with ω_i= 1/median county age. Many households contacted were unwilling to reveal their income level (68.4%). Missing income values were imputed with 2012 county median household income values from the Census Bureau's American Community Survey (Census Bureau 2012). 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, including questions 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, steak, and other cuts of beef in the past month. Non-beef consuming households (i.e., those that did not have a household member who consumed beef or did not consume ground beef, steak or another beef cut at home within the past month) were excluded from the choice experiment.

Of the 931 beef consuming households, 702 responded to questions about steak, ground beef, or other beef cuts consumption. If the respondent indicated that his or her household consumed steak but not ground beef in the past month, they were asked a set of questions regarding steak. If they indicated that their household consumed ground beef but not steak, they were directed to questions about ground beef. If the respondent indicated that the household consumed other cuts of beef in the past month but not ground beef or steak or if they consumed both products, then they were randomly assigned to either the steak or ground beef choice question (see Figure 2). A total of 676 responded to the choice questions for steak or for ground beef, with 362 answering the steak choice question and 314 answering the ground beef choice question.

Beef-consuming household respondents were subsequently 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 humane treatment of the animal and whether the animal was naturally raised, locally produced, and grass- or grain-fed.

Before asking the contingent valuation question about the choice to purchase Tennessee beef, survey enumerators 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.
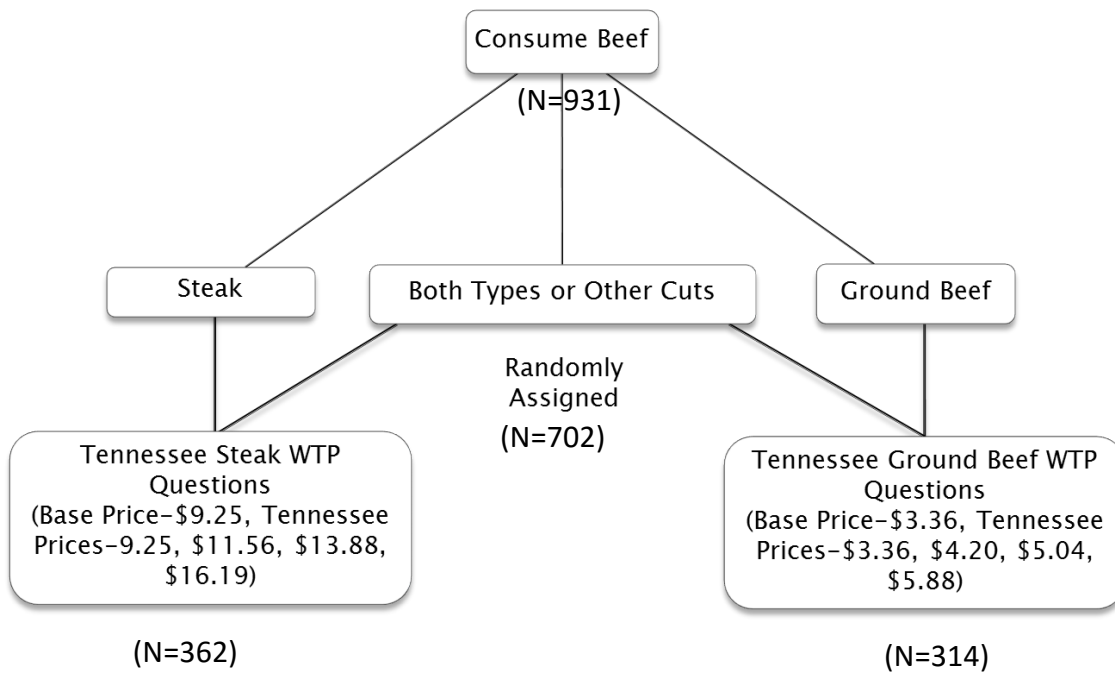
Figure 2. Assignment of respondents to steak or ground beef questions

A similar description was read for the 85% lean /15% fat ground beef option, 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. The base ground beef price was $3.36 per pound. 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 on 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 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.

Willingness to Pay Model Estimation

The WTP probit regression is estimated with maximum likelihood. For continuous variables, the marginal effect of variable *k* on the purchase decision is

(7) $\quad \dfrac{\partial \Pr[TN_i=1]}{\partial X_k} = \phi(\alpha + \boldsymbol{\beta'X}_i + \beta_p P_i)\beta_k,$

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

(8) $\quad \dfrac{\partial \Pr[TN_i=1]}{\partial X_k} = \Pr[TN_i = 1|X, X_k = 1] - \Pr[TN_i = 1|X, X_k = 0].$

Outlet Model Estimation

The choice to shop at a particular outlet is estimated by multiple equations allowing correlation between the disturbances. For an *m*-equation multivariate probit model:

(9) $\quad y_{im}^* = \psi'Z_{im} + \epsilon_{im}, \quad m = 1, ..., M$

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

The random disturbances $\boldsymbol{\epsilon_{im}}$, $m =1,...,M$ are error terms distributed as multivariate normal, each with a mean of zero and covariance matrix $\boldsymbol{V}$. The method of estimation is by simulated maximum likelihood (Cappellari and Jenkins 2003). In the case where $M = 4$, the log-likelihood function for a sample of N independent observations of the multivariate probit is

(11) $\quad \ln L = \sum_{i=1}^{N} \omega_i \ln\Phi_4[\boldsymbol{K_{i1}\psi_1'Z_{i1}}, ... , \boldsymbol{K_{i4}\psi_4'Z_{i4_i}} \mid \boldsymbol{V}]$

where ω_i is a weight for observation $i = 1, . . . ,N$, and $\Phi_4(\bullet)$ is the quadrivariate standard normal distribution, and $\boldsymbol{V_{mn}} = 1$ if *m=n* or $\boldsymbol{K_{im}K_{in}} \, \boldsymbol{\rho_{mn}}$ otherwise. Note that $\boldsymbol{K_{ik}} = 2y_{ik} - 1$ for each *i, k*=1,…,4. The marginal probability of shopping at a particular outlet is calculated as $\Pr(y_1) = \Pr(\epsilon_1 < \boldsymbol{\psi_1'Z_{i1}}) = \Phi_1(\boldsymbol{\psi_1'Z_{i1}})$. The joint probability that all the values are 1 (e.g., the consumer would purchase Tennessee beef at any one of the four retail outlets) is

(12)
$$
\begin{aligned}
\Pr(y_1, y_2, y_3 , y_4) &= \Pr(\epsilon_1 < \boldsymbol{\psi_1'Z_1}, \epsilon_2 < \boldsymbol{\psi_2'Z_2}, \epsilon_3 < \boldsymbol{\psi_3'Z_3}, \epsilon_4 < \boldsymbol{\psi_4'Z_4}) \\
&= \Pr(\epsilon_4 < \boldsymbol{\psi_4'Z_4}|\epsilon_3 < \boldsymbol{\psi_3'Z_3}, \epsilon_2 < \boldsymbol{\psi_2'Z_2}, \epsilon_1 < \boldsymbol{\psi_1'Z_1}) \\
&\quad \times \Pr(\epsilon_3 < \boldsymbol{\psi_3'Z_3}|\epsilon_2 < \boldsymbol{\psi_2'Z_2}, \epsilon_1 < \boldsymbol{\psi_1'Z_1}) \\
&\quad \times \Pr(\epsilon_2 < \boldsymbol{\psi_2'Z_2}|\epsilon_1 < \boldsymbol{\psi_1'Z_1}) \times \Pr(\epsilon_1 < \boldsymbol{\psi_1'Z_1}).
\end{aligned}
$$

Results

About 22% of the respondents indicated they were not in beef consuming households. These individuals were excluded from the analysis. The most commonly cited reasons for not being a beef consumer were health concerns, followed by being vegetarian, and taste (Table 3).

Of the 362 who answered the steak choice question, a total of 264 provided responses to all the questions needed to estimate the steak probit model. Of the 314 who answered the ground beef choice question, a total of 245 provided responses to all the questions needed to estimate the ground beef probit model. About 42.4% of consumers were willing to pay the premium to purchase the Tennessee steak, while 36.3% were willing to pay a premium for Tennessee ground beef (Table 1). Figure 3 shows the response to price levels for Tennessee beef. Probit regression estimates for Tennessee steak and ground beef are shown in Table 4 (see Appendix). Both models are significant overall (LR test H_0: $\beta=0$ for all covariates, p<.0001). The steak model correctly classifies 77.7% of the observations. The ground beef model correctly classifies 80% of the respondent choices. The pseudo-R^2 is 0.338 for the steak choice model and 0.343 for the ground beef choice model.

Table 3. Reasons provided for household members not eating beef

Reason	Percent Indicating Reason (N=266)
Health Concerns	45.86%
Vegetarian	34.59%
Taste	15.79%
Cost	7.52%
Safety Concerns	7.52%
Religious	3.01%

The coefficients on price and the marginal effects of price are negative and significant. For each $1/pound increase in price, the probability of choosing Tennessee steak declines by 0.085. The probability of choosing Tennessee ground beef declines by 0.192 for each $1/pound increase in price.

Older consumers are less likely to choose Tennessee steak. This result is contrary to Wolf and Thulin (2000), but consistent with studies finding that older consumers are less likely to perceive local foods favorably (Willis et al. 2013; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee 2011). For each year increase in age, the likelihood of choosing Tennessee steak decreases by 0.005. Age does not influence the likelihood of choosing Tennessee ground beef. Unlike several prior studies (Froelich, Carlberg, and Ward 2013; Perkin 2012; Willis et al. 2013; Adams and Adams 2008; James, Rickard, and Rossman 2009; Jekanowski, Williams, and Schiek 2000), gender was not found to influence the likelihood of choosing Tennessee beef. Hannagriff, Rhoades, and Wilmeth (2008) also found no significant differences in attribute values placed on local beef. While multiple studies have linked education level and preferences for 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; Perkins 2012), education was not found to influence the likelihood of choosing Tennessee beef. Neither household size, farm background,

nor frequency of meals serving beef influence the likelihood of choosing Tennessee beef products.

Though several studies found that higher incomes positively influenced WTP a premium for local foods (Willis et al. 2013; Brown 2003; Nganje, Hughner, and Lee 2011), the results from this study suggest non-linear effects of income on the likelihood of choosing Tennessee beef. Specifically, moderate household incomes (INC3 —between $50,000 and $70,000 — negatively influence the likelihood of choosing the Tennessee steak product.

Households with children aged less than six are more likely to choose Tennessee ground beef. However, these households are no more or less likely to choose Tennessee steak than those without children in this age range.

Households that shop for beef at large retail stores and butcher shops are less likely to choose Tennessee steak. However households that shopped for beef at a butcher shop in the previous year are more likely to choose Tennessee ground beef. Households that shop for beef at farmers markets or directly from a farmer are no more or less likely to choose Tennessee beef than those households that do not. Consumers who place greater value on freshness, natural production, and food safety are more likely to choose Tennessee ground beef. Consumers who place greater value on tenderness and lower price are less likely to choose Tennessee steak. Consumers who place greater value on flavor and grain-fed beef products are more likely to choose Tennessee steak.

The mean estimated WTP for Tennessee steak is $14.31, a premium of 54.7% ($5.06 above the base of $9.25). The mean estimated WTP for Tennessee ground beef is $5.02, a premium of 49.4% ($1.66 per pound above the base of $3.36). T-tests indicate that each of these premiums are different from zero. Adjala et al. (2012) found a willingness to pay of $2.71 per pound for ground beef raised within 100 miles. Lim and Hu (2013) concluded that consumers would pay a $2.48 per pound premium (above a base price of $21.00 per pound) for steak with a Canadian provincial label. Chang et al. (2013) found a $0.71 to $1.29 premium when moving from Omaha Steaks to South Dakota Certified. Maynard, Burdine, and Meyer found a $1.20 per pound premium for a regional brand (Prairie Prime) and a $1.12 premium for Canada AAA steak above the $8.49 price for a generic steak.

Maynard, Burdine, and Meyer (2003) found that 64% would pay a 20% premium for ground beef but only 15% would pay a 40% premium for local ground beef, while 52% would pay a 20% premium for steak but only 20% would pay a 40% premium for locally produced steak. As shown in Figure 3, 31% of respondents are willing to pay a 25 % premium for Tennessee ground beef but only 7.8 % are willing to pay a 50% premium. For Tennessee steak, 38 % would pay a 25% premium, while 31 % would pay a 50% premium.
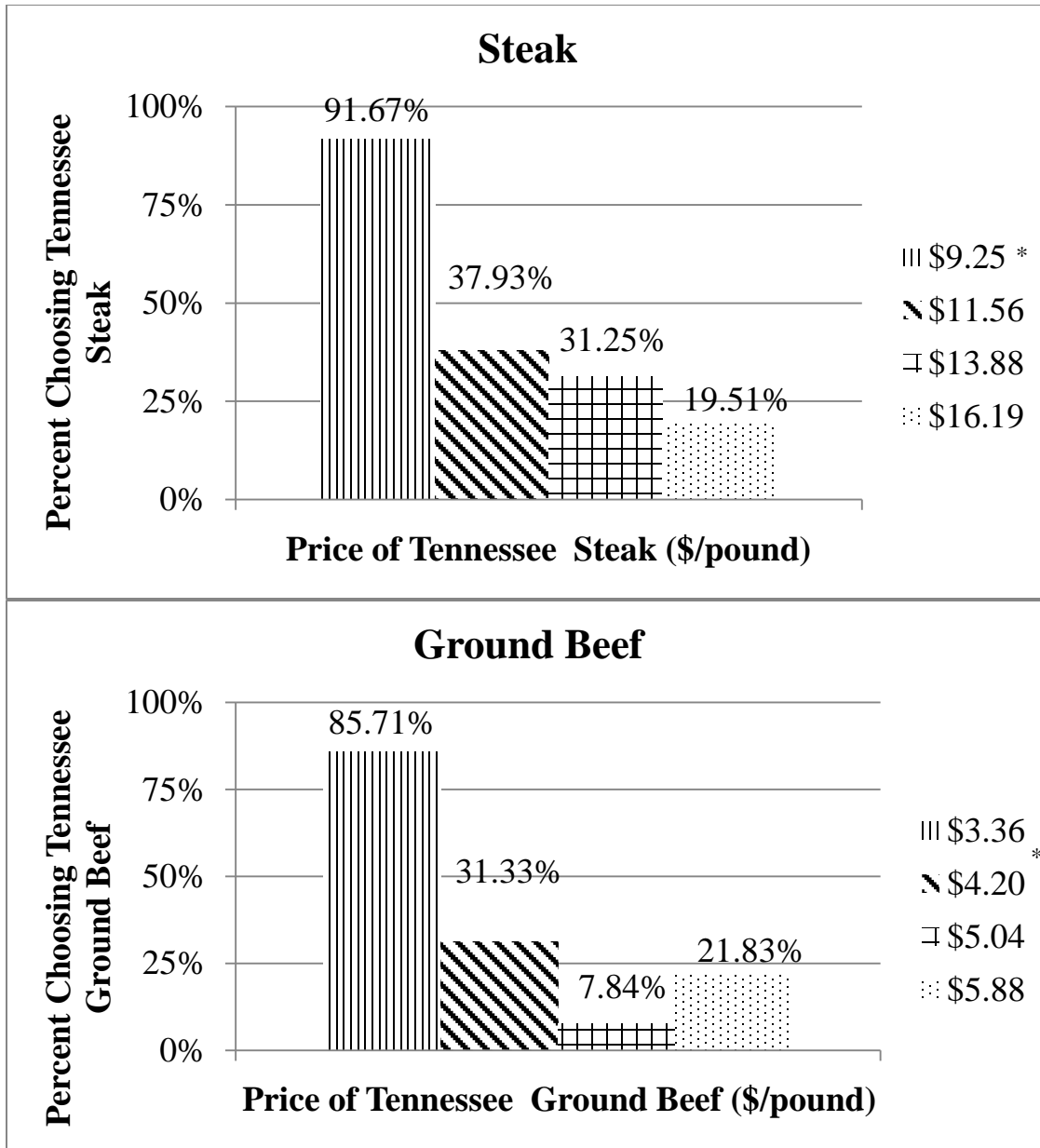
Figure 3. Choice of Tennessee Beef Across Varying Prices
Note. *=Price of Base Product

When comparing the results of this study to previous studies, it is important to note that 22 % of the respondents were excluded from the choice experiment because their household did not either (i) have at least one person who consumed beef or (ii) purchase either steak, ground beef, or other cuts of beef in the past month. If those respondents are included, and their WTP a premium for Tennessee beef is assumed to be equal to $0, mean WTP becomes $11.16 (a $1.91 or 21% premium) for Tennessee steak and $3.92 (a $0.56 or 17% premium) for Tennessee ground beef.

The number of respondents who chose Tennessee beef and answered all of the questions needed for the multivariate probit analysis is 189. Of the respondents who would choose Tennessee beef, about 44% would shop for the product at a gourmet store, 41.8 % at a butcher shop, 35.5% at a farmer's market, and 44.9% directly from a farmer (Table 2, see Appendix). These estimates are interesting in light of the numbers of these respondents who had purchased beef at these outlets in the past year (30 % from a gourmet store; 12.7% from a butcher; 7.6% from a farmers market; and 8.2% directly from a farmer). These results suggest that these outlets could potentially increase the numbers of consumers shopping for beef and even beef sales volumes, by stocking Tennessee beef products.

The results of the multivariate probit regression of respondent expectations about the types of retail outlets at which they would shop for Tennessee beef are presented in Table 5 (see Appendix). Unlike previous studies (Lusk and Cevellos 2004; Grannis, Thilmany, and Sparling, 2001) gender was not found to influence likelihood of shopping for Tennessee beef at any of the four types of retail outlets studied. Similarly, age and education were not found to influence the probability of shopping for Tennessee beef at the outlet types. Households with moderate incomes (*INC2, INC3*) are not more or less likely to shop for Tennessee beef at any of the outlet types. However, lower income households (*INC1*) are more likely to shop for Tennessee beef at farmers markets. These results are contrary to Medina and Ward (1999), who found that higher incomes were associated with shopping for beef at specialty stores. Respondents from rural areas or small towns (*URB1*) are more likely to expect to shop for Tennessee beef at gourmet stores. Respondents who have previously shopped for beef at a particular type of outlet were more likely to anticipate shopping for Tennessee beef at that type of outlet, with the direct-from-farmer outlet having the strongest association.

Respondents who place greater importance on product (*PRICE*) are less likely to anticipate shopping at gourmet stores. This result mirrors the finding by Lusk and Cevallos (2004) that high prices at specialty shops decreased the likelihood of shopping at these outlets. Respondents who value grass-fed beef (*GRASS*) are more likely to shop for Tennessee beef at butcher shops, farmers markets, and directly from farmers. Respondents who place a greater priority on ease of preparation (*EASE*) are less likely to shop for Tennessee beef at gourmet markets, farmer's markets and directly from farmers. Respondents who consider it more important to help support farm incomes than to keep food prices low (*FARMERINC*) are more likely to anticipate shopping for Tennessee beef directly from a farmer. The importance respondents placed on humane treatment of cattle (*HUMANE*), freshness of the product (*FRESH*), or the product being natural (*NATURAL*) is not associated with the likelihood of shopping for Tennessee beef at any of the outlets. Respondents who are willing to purchase frozen beef (*FROZEN*) are more likely to shop for Tennessee beef at gourmet stores, while respondents who are willing to purchase thawed beef (*THAW*) are more likely to shop for Tennessee beef at butcher shops, farmers markets, and directly from farmers.

The predicted probability of anticipating shopping for Tennessee beef at all outlets is 0.194, while the probability of shopping for Tennessee beef at none of the four outlets is 0.337. The marginal probability of anticipating shopping for Tennessee beef at a gourmet market is 0.422, 0.417 at a butcher, 0.361 at a farmers market, and 0.445 directly from a farmer.

Conclusions

In states such as Tennessee, where finishing beef can be cost prohibitive, increasing the number of cattle that are finished in state may depend upon the extent to which consumers are willing to pay a premium for locally produced beef. The results of this study suggest that Tennessee consumers are willing to pay premiums for steak and ground beef from cattle raised and finished in Tennessee. Price conscious shoppers who purchase beef at low cost retailers (i.e., big box stores) are less willing to choose Tennessee steak over a non-branded alternative. However, consumers who value grain-fed, flavorful beef products are more likely to choose Tennessee steak, suggesting that one possible motivation for consuming a Tennessee steak would be a preference for flavorful, grain-fed beef. Consumers who value freshness, safety, and natural production are more likely to choose Tennessee ground beef than a non-branded alternative. 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. Hence, a one size fits all marketing approach might not be as effective as separately targeting consumers of each beef product.

While some studies have examined where consumers might purchase beef, little research has focused on the demographic and attitudinal factors that may influence where shoppers would expect to purchase locally produced beef. Knowledge of where target consumers might anticipate purchasing Tennessee beef is important given that barriers to entry for locally produced beef can be quite high in large grocery and supermarket chains and that a relatively small percentage of consumers shop at farmers markets or directly from farmers relative to gourmet markets or butcher shops.

Not surprisingly, where consumers currently or have previously shopped for beef is a key predictor of where consumers anticipate shopping for Tennessee beef. Along these same lines, price-conscious consumers are less likely to shop for Tennessee beef at gourmet markets. There appears to be a link between a desire for a grass-fed product and retail outlet, as those with a preference for grass-fed beef are more likely to shop for Tennessee beef at butcher shops, farmers markets, and directly from farmers. Respondents who place greater weight on ease of preparation are less likely to shop for Tennessee beef at gourmet markets, farmer's markets and directly from farmers. This result suggests that the extra effort required to shop at a retail outlet different from the outlet where the consumer purchases the bulk of their groceries may present a hurdle for marketing locally produced beef products. However, the percentage of respondents asserting that they would shop for Tennessee beef at gourmet stores, butcher shops, farmers markets, and directly from farmers is greater than the percentage who had actually shopped for beef at these types of outlets in the past year, suggesting that consumers might be willing to change their shopping patterns to purchase Tennessee beef. Future research might examine factors that could influence consumers to switch or supplement shopping outlets to obtain local beef, including the types of marketing efforts needed to increase product awareness and purchase convenience by consumers. Neither concerns about humane treatment of animals, natural products, nor freshness influence the type of outlet where consumers would anticipate purchasing Tennessee beef. However, those who are concerned about supporting farmer incomes are more likely to shop for Tennessee beef directly from farmers. Interestingly, the product form that consumers would be willing to purchase Tennessee beef in also influences the types of retail

outlets at which consumers would anticipate shopping for Tennessee beef. While a frozen product might sell well at gourmet stores, a thawed product might sell better at butcher shops and farmers markets.

This study has several limitations that could be addressed in future research. First, Tennessee has a lengthy border with three of its metropolitan areas being near those borders (Memphis, Chattanooga, and Tri-Cities). Given the proximity of these metro areas to the state's borders, further research should examine the effect of labeling locally produced beef as Tennessee beef on consumers from neighboring states. Second, additional product attributes, such as humane treatment, natural, or grass-fed certification, could be included to examine the relative importance of, and possible interactions between, a Tennessee beef label and other beef certification and labeling programs. A third way in which this research could be extended is to include demand by institutional markets for Tennessee branded beef, particularly restaurants focusing on locally sourced foods.

Acknowledgement

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Appendix

Table 1. Names, definitions, 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			
STK or GBCHOICE	1 if choose TN steak or TN ground beef, 0 otherwise	0.424	0.363
Explanatory Variables			
STK or GBPRICE	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
AGE	Age of respondent in years	52.918	51.796
FEMALE	1 if female, 0 otherwise	0.524	0.611
COLLEGE	1 if respondent graduated from college, 0 if not	0.501	0.394
INC1-INC4	*INC1*=1 if household income in 2012 ≤$40K, 0 otherwise	0.102	0.135
	INC2=1 if household income in 2012 is $40K-$50K, 0 otherwise	0.484	0.532
	INC3= if household income in 2012 is $50K-$70K, 0 otherwise	0.090	0.087
	INC4= 1 if household income in 2012>$70K, 0 otherwise (omitted category)	0.324	0.246
DUMMYINC	1 if observ. based on county median household income, 0 otherwise	0.491	0.546
URB1-URB3	*URB1* =1 if 1 rural/small town, 0 otherwise	0.343	0.334
	URB2=1 if suburban, 0 otherwise	0.427	0.410
	URB3=1 if metro, 0 otherwise (omitted category)	0.230	0.255
HHSIZE	Household size	2.980	2.652
CHLDLT6	1 if child< 6 years of age in household, 0 otherwise	0.096	0.129
FRMBK	1 if from farm background, 0 otherwise	0.400	0.359
BEEFMEALS	1 if beef served at home>3 times/week, 0 otherwise	0.449	0.335
WAREH	1 if shopped for beef at warehouse in past yr, 0 otherwise	0.367	0.260
BIGBOX	" " at big box store, " "	0.477	0.411
GOURM	" " at gourmet store, " "	0.255	0.213
BUTCH	" " at butcher, " "	0.133	0.099
FMMKT	" " at farmers' market, " "	0.059	0.067
FARMER	" " directly from farmer, " "	0.055	0.043
LEAN	Importance of leanness when purchasing 1=not, …,3=very	2.450	2.611
FRESH	Importance of freshness "…"	2.899	2.925
TEND/TEXT	Importance of tenderness /texture " "	2.797	2.421
JUICY	Importance of juiciness "…"	2.720	2.480
FLAV	Importance of flavor "…"	2.902	2.848
COLOR	Importance of color "…"	2.696	2.776
PRICE	Importance of price "…"	2.458	2.444
NATUR	Importance of natural label "…"	2.331	2.347
GRASS	Importance of grass-fed label "…"	1.938	1.872
GRAIN	Importance of grain fed label "…"	1.917	1.839
HUMANE	Importance of humanely treated label "…"	2.489	2.506
SAFE	Importance of keeping food prices low vs safety/nutrition,1=food prices, 2=same, 3=safety /nutrition	2.405	2.429
WTAGE	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 types of outlets where respondent would shop for Tennessee beef

Variable Name	Variable Definition	Mean (N=189)
GOURMET	1 if would anticipate purchasing Tennessee beef at gourmet stores, 0 otherwise	0.435
BUTCHER	1 if would " " at butcher shops, 0 otherwise	0.418
FARMMKT	1 if would " " at farmers markets, 0 otherwise	0.355
FARMER	1 if would " " at farms directly, 0 otherwise	0.449
AGE	Age of respondent in years	50.393
FEMALE	1 if female, 0 otherwise	0.556
COLLEGE	1 if respondent graduated from college education, 0 if not	0.434
INC1-INC4	*INC1*=1 if household income in 2012 ≤$40K, 0 otherwise	0.092
	INC2=1 if household income in 2012 is $40K-$50K, 0 otherwise	0.511
	INC3= if household income in 2012 is $50K-$70K, 0 otherwise	0.075
	INC4= 1 if household income in 2012>$70K, 0 otherwise (omitted category)	0.321
DUMMYINC	1 if observ. based on county median household income, 0 otherwise	
URB –URB3	*URB1* =1 if 1 if rural or small town, 0 otherwise	0.343
	URB2=1 if suburban, 0 otherwise	0.405
	URB3=1 if metro, otherwise (omitted category)	0.251
OUTLET$_j$	1 if purchase beef at outlet type *j* in past year, 0 otherwise, j=Gourmet stores	0.302
	Butcher shops	0.127
	Farmers markets	0.076
	Farm direct	0.082
FRESH	Importance of freshness "…"	2.933
PRICE	Importance of price when purchasing beef, 1=not, 2=somewhat, 3=very	2.372
NATUR	Importance of natural label "…"	2.530
EASE	Importance of ease of preparation "…"	2.279
GRASS	Importance of grass-fed label "…"	2.113
HUMANE	Importance of humanely treated label "…"	2.628
FARMERINC	1 if consider supporting farmer incomes more important than keeping food prices low, 0 otherwise	0.446
FROZEN	1 if would purchase Tennessee beef if frozen, 0 otherwise	0.633
THAW	1 if would purchase Tennessee beef if frozen then thawed, 0 otherwise	0.309
WTAGE	1/median age of household in the county	0.026

Table 4. Estimated probit models for steak and ground beef choice (ME = marginal effect)

Variable	Steak (N=264)				Ground Beef (N=245)				
	Coeff	SE	ME	SE	Coeff	SE	ME	SE	
INTERCEPT	5.719	1.832***			-2.201	1.535			
STK or GBPRICE	-0.335	0.043***	-0.085	0.007***	-0.795	0.130***	-0.192	0.024	***
AGE	-0.020	0.008**	-0.005	0.002**	0.004	0.008	0.001	0.002	
FEMALE	-0.143	0.202	-0.036	0.051	0.179	0.228	0.043	0.055	
COLLEGE	-0.089	0.205	-0.023	0.052	-0.024	0.269	-0.006	0.065	
INC1	0.021	0.410	0.005	0.104	-0.192	0.400	-0.046	0.096	
INC2	0.216	0.357	0.055	0.091	0.458	0.443	0.111	0.107	
INC3	-0.605	0.353*	-0.154	0.088*	0.322	0.425	0.078	0.103	
DUMMYINC	-0.084	0.314	-0.021	0.080	-0.436	0.395	-0.105	0.095	
URB1	0.116	0.266	0.029	0.068	0.181	0.269	0.044	0.065	
URB2	-0.170	0.262	-0.043	0.066	-0.185	0.257	-0.045	0.062	
HHSIZE	-0.053	0.082	-0.013	0.021	-0.093	0.103	-0.022	0.025	
CHLDLT6	-0.054	0.425	-0.014	0.108	0.834	0.389**	0.201	0.092	*
FRMBK	0.254	0.213	0.065	0.054	0.157	0.217	0.038	0.052	
BEEFMEALS	0.120	0.203	0.030	0.052	0.002	0.221	0.001	0.053	
WAREH	-0.034	0.234	-0.009	0.059	-0.206	0.256	-0.050	0.062	
BIGBOX	-0.373	0.225*	-0.095	0.056*	-0.328	0.224	-0.079	0.054	
GOURM	0.322	0.258	0.082	0.065	0.183	0.292	0.044	0.070	
BUTCH	-0.587	0.288**	-0.149	0.073**	0.670	0.344*	0.162	0.082	*
FMMKT	-0.403	0.422	-0.102	0.106	0.349	0.459	0.084	0.111	
FARMER	0.305	0.426	0.078	0.107	0.048	0.574	0.012	0.139	
LEAN	-0.076	0.158	-0.019	0.040	-0.022	0.181	-0.005	0.044	
FRESH	-0.452	0.306	-0.115	0.077	0.884	0.425**	0.214	0.101	**
EASE	-0.109	0.136	-0.028	0.035	0.012	0.151	0.003	0.036	
TEND	-0.448	0.273	-0.114	0.069	0.054	0.174	0.013	0.042	
JUICY	0.321	0.238	0.082	0.060	0.042	0.188	0.010	0.045	
FLAV	0.525	0.307*	0.133	0.077*	0.163	0.307	0.039	0.074	
COLOR	-0.089	0.191	-0.023	0.049	-0.250	0.207	-0.060	0.049	
PRICE	-0.379	0.158**	-0.096	0.039	-0.156	0.181	-0.038	0.043	
NATUR	0.097	0.155	0.025	0.039	0.356	0.178**	0.086	0.042	**
GRASS	-0.039	0.200	-0.010	0.051	0.184	0.212	0.044	0.051	
GRAIN	0.474	0.205**	0.120	0.052**	0.096	0.209	0.023	0.050	
HUMANE	0.248	0.157	0.063	0.040	0.238	0.174	0.057	0.042	
SAFE	-0.075	0.167	-0.019	0.042	0.405	0.181**	0.098	0.043	**
LLR Test (33 df)	100.06***				88.78***				
% Correctly Class.	77.65%				80.00%				
Pseudo R^2	0.338				0.343				

[a] *** Indicates significant at 99%, ** at 95%, and * at 90% confidence levels.

Table 5. Multivariate probit parameter estimates for choice of outlets where would likely purchase Tennessee Beef

Variable	Gourmet Stores Coef.	Std. Err.	Butcher Shops Coef.	Std. Err.	Farmers Markets Coef.	Std. Err.	Farmer Direct Coef.	Std. Err.
INTERCEPT	-2.325	1.285 *	-1.252	1.137	-0.803	1.191	-0.943	1.225
AGE	-0.004	0.007	0.002	0.280	0.0005	0.006	0.001	0.006
FEMALE	0.046	0.225	-0.095	0.216	-0.067	0.236	-0.136	0.208
COLLEGE	0.068	0.221	-0.023	0.215	-0.270	0.220	0.129	0.206
URB1	0.840	0.304 ***	-0.192	0.280	-0.068	0.258	0.125	0.281
URB2	0.442	0.280	0.053	0.255	0.201	0.265	0.351	0.257
INC1	0.700	0.437	0.643	0.387 *	0.828	0.341 **	0.365	0.327
INC2	0.518	0.393	-0.416	0.420	-0.177	0.410	-0.078	0.402
INC3	0.650	0.483	-1.120	0.445 **	-0.556	0.515	-0.141	0.389
DUMMYINC	-0.436	0.377	0.320	0.387	-0.019	0.388	-0.030	0.368
$OUTLET_M$	1.288	0.248 ***	1.397	0.292 ***	1.105	0.327 ***	1.589	0.356 ***
PRICE	-0.277	0.149 *	0.104	0.155	0.076	0.154	-0.104	0.151
GRASS	0.167	0.142	0.262	0.140 *	0.261	0.145 *	0.222	0.118 *
EASE	-0.251	0.111 **	-0.113	0.087	-0.346	0.114 ***	-0.169	0.086 **
FARMERINC	0.078	0.219	0.249	0.209	0.261	0.213	0.381	0.203 *
HUMANE	0.137	0.210	-0.114	0.178	-0.114	0.188	-0.006	0.174
NATURAL	0.071	0.199	-0.132	0.181	0.019	0.196	0.269	0.180
FRESH	0.315	0.318	0.210	0.309	0.032	0.300	-0.137	0.344
FROZEN	0.889	0.265 ***	0.192	0.228	0.366	0.252	0.207	0.231
THAW	-0.002	0.231	0.576	0.223 **	0.898	0.239 ***	0.395	0.219 *
ρ_{21}	0.826	0.061 ***						
ρ_{31}	0.787	0.088 ***						
ρ_{41}	0.695	0.088 ***						
ρ_{32}	0.666	0.083 ***						
ρ_{42}	0.788	0.053 ***						
ρ_{43}	0.838	0.055 ***						
LLR[b] Test (H0: β_1=0=β_2=0…) w/76 df	242.03 ***							
LLR Test (H0: ρ_{21}=0= ρ_{22}=0…) w/6 df	768.18 ***							
N=189								

Note. [a] *** Indicates significant at 99%, ** at 95%, and * at 90% confidence levels.
[b] LLR=Likelihood Ratio Test.