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Tennessee Beef Producers' Willingness to Participate in a Tennessee Branded Beef Program

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Tennessee Beef Producers' Willingness to Participate in a Tennessee Branded Beef Program

A Thesis Presented for the
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Degree
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Elizabeth Mae McLeod
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ABSTRACT

Tennessee beef industry participants have expressed a growing interest in producing cattle to be harvested locally to capture additional value. This study measures Tennessee cattle producer willingness to supply cattle to a federally inspected slaughter (FIS) facility and a Tennessee branded beef (TBB) program. Data from a 2016 survey of Tennessee beef cattle producers were used to estimate interest in participating in the FIS program and TBB program as well as the live cattle weight that interested producers would supply. Of those who responded, 76.6 percent were interested in participating in the FIS program and 70.5 percent were interested in the TBB program. Interest in the program was influenced by age, income, production practices used, and risk attitudes. The average liveweight of cattle to be supplied to the FIS program was 68,863 pounds per year and 58,597 pounds per year for the TBB program. Liveweight supply was influenced by producer age, animal units, production practices, and perceived barriers. Among producers interested in participating either program, respondents appear to prefer to finish cattle on a combination of grass/grain on their farm.

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CHAPTER I

INTRODUCTION AND BACKGROUND

In 2014, Tennessee had $825.1 million in cash receipts from cattle and calves accounting for 19.6 percent of all agricultural cash receipts that year (TDA 2016). Beef cattle are the highest grossing agricultural commodity in the state in terms of cash receipts. In 2016, Tennessee ranked twelfth in terms of the number of beef cattle nationally and fifteenth in terms of all cattle and calves. As of January 1, 2017, there were a total of 909,000 head of beef cattle in Tennessee (U.S. Department of Agriculture-National Agricultural Statistics Service 2017).

Most Tennessee beef operations are cow-calf operations that market calves at the time of weaning, but Tennessee is not limited to cow-calf production. Other production practices include weaning, preconditioning, and backgrounding calves prior to marketing them as feeder cattle to feedlots, custom feeding cattle through a retained ownership agreement in out-of-state facilities such as those in the Midwest or Great Plains, or finishing on-farm and marketing them as local beef. Many cow-calf producers market calves weighing less than 600 pounds to backgrounding operations in either Tennessee or to operations outside the state (U.S. Department of Agriculture-Agricultural Marketing Service 2017). Calves remaining in Tennessee to be backgrounded will then be marketed to a feedlot outside of the state or custom fed outside of the state through a retained ownership agreement. While finishing on farm is not widely practiced within the state at this time, some producers in Tennessee use this marketing method.

Traditional marketing methods offer producers several options by which to market their cattle, but alternative marketing methods are gaining popularity due to growing preferences for

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local beef as a part of the larger local foods movement. Cattle producers have a potential opportunity to capture more of the value-added process by supplying to these emerging markets by finishing their cattle in the state or on site. Finishing, however, adds to production costs meaning a producer would need to receive a high enough premium to make the finishing process profitable.

Prices could be increased on finished cattle if consumers are willing to pay an additional premium for beef branded as Tennessee produced. However, even if consumers were willing to pay a premium, producers would have to be willing to supply cattle to such a program. Participation might be influenced not only by premium levels, but by the producer's ability to finish cattle and deliver them to slaughter facilities given their resources, desire to participate in a program, willingness to participate in a new market channel, and other factors.

In 2015, just over 50 million pounds of cattle, on a liveweight basis, were slaughtered in commercial operations in Tennessee (USDA NASS 2016.) As of 2012, there were a total of 50 operations with cattle on feed for slaughter in the state (USDA/NASS 2012.) As of March 2016, 13 federally inspected livestock slaughter facilities in Tennessee were listed as possibilities for producers who want to have livestock slaughtered and processed under USDA inspection (Pepper, Leffew and Holland 2016).

Several state branding programs exist with strict program standards and associated labels. Iowa-80 Beef, Nebraska Cornfed beef, and South Dakota Certified are all programs designed to differentiate beef products based on geographic indications. Each aforementioned program experienced difficulty due to a lack of federally inspected small to medium size packing facilities which would be best suited to handle the segregated cattle and beef products of such programs

(Babcock and Clemens 2005). Babcock and Clemens (2005) mention that the beef packing industry is classified as highly concentrated by the Federal Trade Commission's definition. This presents two major difficulties for branded beef programs. The first difficulty is packers are driven by maximizing throughput because money is made by moving large numbers of animals through packinghouses quickly and efficiently (Babcock and Clemens 2005). The need to stop or slow production for a small batch of animals in order to segregate them for labeling purposes runs counter to this method of operation. Secondly, a traceable and auditable system (i.e. one that can be audited by a third party) requires close coordination between all participants in a value chain. This system can often break down because of just one participant. Economic realities of livestock processing favor the continued consolidation of packers (Babcock and Clemens 2005). However, if a federally inspected slaughter (FIS) facility can be shown a profitable return from coordinating with a state branded beef program and a state branded beef program maintains a traceable and auditable production system, these problems can be avoided.

Many studies have examined consumer willingness to pay for branded products (Martinez 2011). Studies have also been conducted to show premiums garnered by products that are advertised as local (Maynard et al. 2003). There is even a study which examine consumer preferences for Tennessee beef (Jensen et al. 2014).

However no known study has been conducted examining factors such as price premiums, producer demographics, farm characteristics, or perceptions about supplying cattle to a FIS facility or subsequently participating in a branded program that may influence Tennessee beef cattle producers' willingness to participate in a Tennessee branded beef (TBB) program. In addition, no studies have been conducted examining cattle producers' preferred marketing

structure if participating in a TBB program. Therefore, this research examines producer interest and willingness to supply finished cattle to an in-state FIS facility and/or to a TBB program. In addition, the effect of farm characteristics, farmer demographics, location factors, as well as premiums are examined for the finishing of cattle for the FIS facility and TBB program participation decision.

CHAPTER II

STUDY OBJECTIVES

There are two primary objectives of this study. The first objective is to ascertain Tennessee cattle producers' willingness to finish cattle in-state and supply these cattle to an in-state FIS facility. The second objective is to ascertain Tennessee cattle producers' willingness to participate in a TBB program.

The secondary objectives under each main objective are to a) measure Tennessee cattle producers' willingness to participate, b) ascertain factors influencing interest in participation and c) determine those factors (e.g., premiums, producer demographics, farm characteristics, risk attitudes) influencing the amount of beef (measured on a liveweight basis) they would supply. The study also seeks to provide information about preferred marketing structures of producers participating in a TBB program, preferred methods of finishing, and program fees producers are willing to pay for a TBB program.

CHAPTER III

LITERATURE REVIEW

Retained Ownership and Marketing Arrangements

In addition to traditional marketing methods, several studies have been conducted on producer choice of alternative methods such as retained ownership and use of strategic alliances. In one case study of six selected beef strategic alliances, it was determined that alliances reduced transaction costs and increased information flow among industry segments although they did not specifically reduce risk or increase access to capital (Gillespie et al. 2006). Reasons mentioned in the case study as to why producers might not participate in an alliance included producers who simply farm as a hobby may not wish to devote more time and effort to change management practices, an unwillingness to give up autonomy, an unwillingness to abide by group marketing decisions, and a concern for only reducing risk and gaining access to capital. Gillespie et al. (2004) found younger producers were more likely to use private treaties and retained ownership than their older counterparts suggesting new and younger producers may make greater use of alternative marketing methods.

Other factors in deciding the type of marketing channels include farm experience, diversification, farm size, production system, and production region (Gillespie et al. 2016). The more experienced producers were less likely to use more modern marketing channels such as the internet (Gillespie et al. 2016). More specialized farms on a larger scale were found to use more marketing channels while those smaller and more diverse used fewer. Certified organic producers were more likely to sell via a farmers market rather than a broker or meat packer.

Southern producers were more likely to use a greater number of marketing channels than Midwestern producers

Supply chain alliances are one way to ensure consumer demand for quality beef is met through branded beef products. Cow-calf producers are one of the most crucial elements in providing almost all of the desirable attributes in a branded beef product. Brocklebank and Hobbs (2004) asked Canadian producers at the 2003 Western Stock Growers Association Annual meeting to indicate how likely they would be willing to participate in a hypothetical supply chain alliance based on a set of four characteristics related to amounts of asset specific investment, price uncertainty in both quality variability and number of buyers, and premiums received. Using conjoint analysis it was determined cow-calf producers were willing to make specific asset investments up to a certain point, but as the degree of investment required increased, willingness decreased. Cow-calf producers in this study appeared to be more concerned with the balance between premiums received and costs of required investments, but were less concerned about the number of buyers and the pricing method used.

Lacy, Hudson and Little (2003) conducted a study on Mississippi beef producers' willingness to participate in a marketing cooperative and how much capital they were willing to invest on a per head marketing basis using a contingent valuation framework. The research found the majority of the participants were willing to permanently identify all cows and calves, implement a specific pre-weaning health management program, and vaccinate and pre-condition calves 30-60 days past weaning. This willingness to permanently identify all cows and calves could indicate a higher level of management and/or a desire to improve the cow herd. Many respondents also stated they would be willing to change the breed of the bull used. The authors

also noted producers who indicated they had attended educational events would be willing to pay more and more experienced producers were willing to pay less. On average, respondents stated they would be willing to pay $1.66 per head marketed.

Several studies have investigated profitability potential of retained ownership (Lewis et al. 2015; Pope et al. 2011; Franken et al. 2010), but many producers are hesitant to use it as a marketing strategy. Lewis et al. (2015), conducted a study evaluating how animal characteristics, carcass quality, and a supplemental prepartum feeding program for cows would impact net returns for retained ownership of calves through finishing. OLS regression indicated feed to gain ratio, average daily gain, dressing percentage, and quality grade significantly impact net returns. Standardized beta coefficients indicated feed to gain ratio and quality grade had the largest impact in explaining retained ownership profitability.

Pope et al. (2011), suggested a producers' risk aversion affected whether or not they would use retained ownership. Using an ordered probit model, the study asked participants to choose from five ordinal choices of *1) never, 2) seldom, 3) sometimes, 4) often and 5) always* to describe what they do with a calf after weaning which included the choices of 1) sell steers at weaning, 2) background steers, then sell them, or 3) retain steers through finishing. It was found that the probability a producer would sell a calf immediately after weaning decreased with greater risk tolerance. Producers who were the most risk averse had about a 60 percent probability they would *often* or *always* sell calves after weaning as opposed to the most risk-tolerant which only had a 15 percent probability they would sell calves at weaning. It was also shown that the share of gross farm income was significantly related to retaining ownership.

Franken et al. (2010), used structural equation modeling to trace the path effects of different producer characteristics on interest in and actual use of retained ownership. They found cattle quality, as measured by ownership of registered cattle, led to a significant increase in interest in retained ownership. Additionally, a producer's interest in performance-based management, as measured by interest in feedlot and carcass data, was significantly associated with interest in retained ownership.

In a study conducted by Babcock et al. (2007), the authors created a pilot program to market high quality beef using a certification mark and the USDA Process Verification Process Program to create a geographical indicator for Iowa-80 Beef. The authors hypothesized a program to differentiate and market very high quality beef produced in Iowa would allow producers to take greater advantage of price premiums. It was concluded stringent or unique production and/or processing criteria are needed to differentiate beef and other high value agricultural products. Bedoin, Kristensen and Noe (2009) also concluded an institutionally based certification was a way to formalize the relationship between the values created in a food network.

Local Branding

Several studies have been conducted regarding consumer preferences for local meat and produce as well as their willingness to pay a premium for such products. A study conducted by Jensen et al.(2014) indicated Tennessee consumers in metro areas were willing to pay a premium for beef produced and harvested in-state. A survey of a random sampling of consumers from counties in and around Memphis, Nashville, Chattanooga, Knoxville, and the Tri-Cities were asked about their preferences and willingness to pay for Tennessee beef. Respondents who

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indicated they would be willing to purchase Tennessee beef over a base product viewed the Tennessee beef to be fresher and safer than out of state beef. Humane treatment of animals was the most important characteristic to be identified on a product label, followed closely by naturally raised and locally produced. The research suggested future marketing programs, such as a Tennessee Beef label, should emphasize freshness, food safety, support of local farms, and support of local economies as these attributes were considered most important in choosing such a product by consumers. While Jensen et al. (2014) provided important information about consumer willingness to pay (WTP), it did not address premiums required, program provisions, or other factors influencing farmers' decision to participate. Research conducted by Maynard, Burndine and Meyer (2003) also suggested a large portion of consumers were willing to pay a premium for local meat products. Even with growing demand, very few beef producers participate in local retail markets. A study conducted by Velandia et al. (2014) found farmer participation in a state-sponsored marketing program could be associated with farm income, use of extension resources, and fresh produce sales. The research also found there to be a perception among producers surveyed that the state-sponsored marketing program was for larger operations and did not apply to smaller operations. Dalton, Holland and Hubbs (2015) conducted a study of USDA inspected livestock slaughter facilities in Tennessee. They found 90 percent of these facilities slaughter cattle and they all were operating well under capacity. All slaughter facilities in the study that were inspected for slaughtering were also inspected for processing.

Brand premiums can provide incentives needed for sourcing higher quality and more consistent cattle and can provide opportunities for increased revenues to be allocated across the supply chain (Martinez 2011). Martinez (2011) used Nielsen Homescan data to estimate the

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effect of observable beef product attributes on retail beef prices. It was concluded most random-weight beef brands contained in the data received premiums compared to unbranded products, but premiums varied widely across brands. The highest premiums were paid to brands with specific production quality requirements. Brands with the highest premiums also relied on alternative marketing methods such as alliances and cooperatives. Martinez suggested the higher premiums would incentivize producers and processors to enter into such arrangements in order to have more control over coordination and quality.

Technology Adoption and Tobit Model

Studies estimating the adoption of new technologies can be used as a proxy to estimate factors affecting willingness to participate in a new marketing program as well as the intensity of participation in such a program. Tobit models are often used in estimating the effects of variables upon crop and/or livestock technologies or management practices adoption (Adesina 1996; Baidu-Forson 1999; Foltz and Chang 2001; Jensen et al. 2007; Qualls et al. 2012; Rajasekharan and Verraputhran 2002; Ransom, Paudyal and Adhikari 2003). Foltz and Chang (2001) conducted a study of the adoption and profitability of using rbST on Connecticut dairy farms. The researchers used a Tobit model to estimate the rbST adoption intensity on milk production and farm profitability. They concluded younger, more educated farmers who own larger farms are significantly more likely to use rbST. Fernandez-Cornejo et al. (2001) contrasted the relationship between farm size and adoption for genetically engineered (GE) crops and precision farming. The analysis of the study was done using an extension of the McDonald and Moffit decomposition for the two-limit Tobit model. Adoption of precision farming technologies was

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found to be more likely on larger farms, but not for GE crops. The researchers also concluded operators with more formal education were more likely to adopt both technologies.

Cho et al. (2008) compared an ordered probit model and a Tobit model to estimate the willingness to pay (WTP) for conservation easements in North Carolina. They concluded both income and knowledge are positive and significant factors. In analyzing factors that would influence producer interest in producing switchgrass and determining the share of farmland interested producers would be willing to convert to switchgrass, Qualls et al. (2012) used a probit model to find the probability of interest in switchgrass and a Tobit model to estimate the land share interested producers would change to the crop. The researchers concluded interest in producing was tempered by concerns about potential conflicts with other crops, sufficient capacity to introduce a new crop, and introducing a new crop onto rented land. They also stated the results suggested larger farms would be willing to adopt a smaller share.

Consequentiality

Several studies have examined the effects of consequentiality, or beliefs that survey responses might influence some outcome (Carson, Groves and List 2014; Interis et al. 2014; Interis and Petrolia 2014; Vossler and Evans 2009; Herriges, Kling and Tobias 2010; Lewis et al., 2016; Li et al. 2016; Vossler and Evans 2009; Interis et al. 2014; Interis and Petrolia 2014; Herriges, Kling, and Tobias 2010) and found evidence that consequentiality reduced hypothetical bias in stated preferences surveys. Hence, if a consumer considered their survey responses consequential to influencing policy, then hypothetical bias was reduced in their stated preference willingness to pay estimates. Given the potential for hypothetical bias in our study, we also examine the impact of consequentiality on producer willingness to supply a TBB program.

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CHAPTER IV

METHODS AND DATA

Data Collection and Survey

Data for this study were obtained through a survey of beef cattle producers who

participated in the Tennessee Agricultural Enhancement Program (TAEP)[1]. The producers in this

program are spread across the state, with a total of 5,454 beef cattle producers in the sample. An

initial pretest was emailed to 25 producers in June 2016. A second pretest was emailed to 250

producers. Based on pretests, revisions were made to the survey before distributing the full

survey. The full survey was sent out in August 2016, to 5,179 producers. A follow up email was

sent a week after the initial email, a second reminder email was sent two to three weeks after

that. All surveys were collected by mid-September, 2016. The pretests and full survey were

distributed by email, the surveys were fielded, and responses collected through Qualtrics. A total

of 4,661 producers were included in the sample for the study with 989 producers responding to

the survey. This number is smaller than the total number of surveys emailed due to undeliverable

emails. The survey is available in Appendix B.

The survey was divided into five sections. The first section titled "About Your Cattle

Operation," asked if the participant had raised cattle in 2015 and if the participant was the

primary decision maker of the cattle operation. If a participant answered "no" to either of these

questions they were directed to the end of the survey or asked to forward the survey to the

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[1] Tennessee Agricultural Enhancement Program is a cost share program for Tennessee's Agricultural community.
Participation allows producers to maximize farm profits, adapt to changing market situations, improve operation
safety, increase farm efficiency and make a positive economic impact in their communities. (TDA/TAEP 2017).

primary decision maker. These questions were used to eliminate potential participants who were not primary decision makers or who did not produce cattle recently.

The second section, "Finishing and Marketing Cattle," began by asking respondents to provide the number of head of cattle they managed and marketed in the following activities in 2015: producing calves for immediate sale at weaning, pre-conditioning (<90 days), backgrounding (>=90 days), retaining ownership in a custom feedlot, or finishing cattle. If a respondent did not have any cattle in retained ownership or finishing, then they were asked if they would be willing to finish cattle and then sell those cattle to an in-state FIS facility if such a change was profitable. The respondents who already retained ownership and/or finished cattle were asked if they would be willing to sell to an in-state FIS facility if it was profitable. Respondents who answered yes to either question were then given a premium level they would receive above a representative market price for supplying to the in-state FIS facility and asked if they would supply at this premium level. If a participant answered yes to this question, they were then asked how many head a year they could supply, the average liveweight in pounds per head, and how the cattle would be finished (i.e. grass-fed on farm, grass and grain-fed on farm, feedlot in state, feedlot out of state, or other). Respondents answering no were asked to choose a minimum premium level at which they would be willing to sell to an in-state FIS facility.

The "Tennessee Branded Beef Program" section began by informing the respondent about a hypothetical TBB program and listed the possible benefits and requirements of the program. This section was designed to examine the potential for such a program and what premiums producers expected as well as what changes they would be willing to make to their current management practices. Participants were asked if they would be willing to participate in

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such a program given the first list of hypothetical requirements. Respondents who answered yes were then given a premium level above the standard market price and asked if they would still be willing to sell their cattle through the program. If a participant answered yes to this question, they were then asked how many head a year they could supply, the average liveweight in pounds per head, and how the cattle would be finished (i.e. grass-fed on farm, grass and grain-fed on farm, feedlot in state, or other). Respondents answering no were asked to choose a minimum premium level at which they would be willing to sell through the branded program. Participants were also asked how much they would be willing to pay to cover costs of administering the program, their attitudes about various changes in management practices, and how they would want to sell the animals in the program (ex. a producer marketing cooperative of which they would be a member that markets the beef to a third party). The final part of this section gave a summary of the Advanced Master Beef Producer Program (AMBPP) and the Beef Quality Assurance (BQA) program. They were then asked if they are AMBPP and/or BQA certified.

The next section, "About Your Farm," asked respondents questions concerning the characteristics of the operation they managed such as the county in which the operation is located, number of head of cattle on the operation, breeds of sires, marketing methods used, and acres farmed. The final section, "About You," was designed to gain information about the respondent such as age, education level, and income in order to understand and quantify the respondents' cattle operation as well as their own personal demographics. The survey also included questions about respondents' attitudes toward risk. In order to measure any effects of consequentiality, respondents were asked whether or not they think their answers to the survey have an impact on the outcome of the TBB program.

There were five different versions of the survey. Each version was the same in every aspect except for the hypothetical premiums for selling to a FIS facility and through the TBB program. The hypothetical premium levels for participating in the branded program were $1, $3, $5, $7, and $9 per hundredweight. The hypothetical premium levels for participating in the branded program were $3, $5, $7, $9, and $11 per hundredweight. These premiums were added on a base price of $130 per hundredweight assuming the animal graded choice. The price per hundredweight of $130 was based on weekly weighted average price for finished cattle from May 2016 according to USDA-AMS report LM-CT150 (2016). The premium levels were based off of premiums received by producers who participate in the Certified Angus Beef Program (Tatum 2016; Anderson 2016). The sample was randomly divided equally among the premium levels.

Economic Modeling

As noted earlier, Tobit models can be used in estimating the effects of variables on crop and/or livestock technologies or management practices adoption (Adesina 1996; Baidu-Forson 1999; Foltz and Chang 2001; Jensen, Clark et al. 2007; Qualls et al. 2012; Rajasekharan and Verraputhran 2002; Ransom, Paudyal and Adhikari 2003). However in this study, a producer's decision regarding program enrollment is divided into stages. The first stage is interest in supplying cattle to a program (FIS, TBB) (*INTEREST*) given producer demographics, farm characteristics, and producer attitudes. Among those interested, the second decision is the amount of cattle liveweight to supply per year to the program (*WEIGHT*) given different premium levels, producer demographics, farm characteristics, and producer attitudes.

Therefore, this study assumes if a producer indicates they would not supply cattle to either of the two programs (FIS, TBB) it is resultant from two decision points, either they are not interested in supplying regardless of profitability or they are interested, but not at the premium level offered to them. This response pattern follows a Tobit specification with a binary sample selection rule (Cho et al. 2008; Qualls et al. 2012). The binary sample selection rule is used to model the interest/no interest in supplying to the program (FIS, TBB), while the Tobit model is used to estimate the liveweight of cattle given interest in program participation. The outcomes for *INTEREST* take on a value of one if the producer is interested, and zero if not. If the producer indicates interest (*INTEREST*=1), then the value for cattle liveweight they would supply into a facility is *WEIGHT*, which ranges in value from zero (if they do not accept the premium offered) to some positive value.

In the absence of a premium, a cattle farmer is assumed to show interest in the program when the utility (*U*) gained from participation (*p*) is at least as great as the producer's utility without participating. This relationship is shown as:

1) $U_p(1; x) \geq U_p(0; x)$

where zero denotes lack of interest in the program and one participation and x represents a vector of operator characteristics, such as age and education, and farm attributes, such as farm income, affecting a farmer's interest in the program.

A random utility model, as developed by McFadden, is often applied in literature about the adoption of technology to explain the systematic (observable) component of utility as a function of the measurable covariates, x (McFadden, 1974). For example:

2) $U_p^j = x\beta^j + \varepsilon_p^j$

where j=1 if interested and j=0 if not interested; $x\beta^j$ are observable causes of participation; and

ε_p^j are unobservable causes of interest in participation. A producer will be interested in

participating in the program when the latent variable $\bar{U}_p = U_p^1 - U_p^0$ is positive. For the purpose

of this model let $INTEREST^* = U_p$. The observed indicator of $INTEREST^*$ is represented by

the binary variable *INTEREST*. Hence, the variable *INTEREST* takes on the value of 0, 1 where:

3) $INTEREST = \begin{cases} 1, \beta'x + \varepsilon > 0 \\ 0, \beta'x + \varepsilon \leq 0 \end{cases}$.

where x is a vector of explanatory variables including farm characteristics, producer

demographics, and producer attitudes, β is a vector of parameters, and ε is a random error term

　　Given interest in the program, then the producers were asked to indicate whether or not

they would accept the premium offered to them and if so, how many head and average

liveweight of cattle they would supply. Hence, the liveweight of cattle they would enroll in the

program if they were interested can be modeled as a censored regression conditional upon

INTEREST=1. The liveweight (*WEIGHT*) is then expressed as:

4) $WEIGHT = \gamma'z + u \quad\quad if\ WEIGHT > 0, INTEREST > 0$

$\quad\quad WEIGHT = 0 \quad\quad\quad\quad if\ WEIGHT \leq 0, INTEREST > 0$

$\quad\quad unobserved \quad\quad\quad\quad if\ INTEREST \leq 0,$

where z is a vector of explanatory variables (premium, producer demographics, farm

characteristics, and producer attitudes), γ is a vector of parameters, and u is a random error term.

Variable names, sample means, and descriptions of the dependent and explanatory variables

comprising z and x are provided in Table 1 and Table 2 respectively.

The error terms (ε, u) are assumed to be distributed as bivariate normal with mean of zero, variance of $(1, \sigma^2)$ and a correlation of ρ. If the error terms u and ε are independent such that $\rho = 0$, then the two sets of parameters (β and γ, σ) are separable and the decisions can be modeled separately as a probit on *INTEREST* (using the whole sample) and a Tobit on *WEIGHT* (using the sample of only those interested in FIS or TBB). However, if there is correlation between the interest and liveweight decisions ($\rho \neq 0$), then the two equations should be estimated jointly by maximizing the sample likelihood function (Cho et al. 2008). In this case, the likelihood function becomes:

$$5) = \prod_{INTEREST=0}[1 - \Phi_1\beta'x)] \times \prod_{INTEREST=1,WEIGHT=0} \Phi_2(\beta'x, -\frac{\gamma'z}{\sigma}, -\rho) \times$$

$$\prod_{INTEREST=1,WEIGHT>0} \frac{1}{\sigma}\phi_1\left(\frac{WEIGHT-\gamma'z}{\sigma}\right)\Phi_1\left(\frac{\beta'x+\rho(WEIGHT-\gamma'z)/\sigma}{(1-\rho^2)^{1/2}}\right),$$

where ϕ_1 and Φ_1 are the univariate standard normal probability density function and cumulative distribution function (cdf), respectively, and Φ_2 is the bivariate standard normal cdf. Hence, the likelihood function encompasses three parts, the probability that a producer is interested in participating in either FIS or TBB, the probability that a producer is interested, but not at the premium level offered, and the density function of the non-zero amount of cattle liveweight the producer would supply to the FIS facility given interest in that program (*WEIGHT*>0).

The probability of the ith producer being interested is then

$$7) \; Pr(INTEREST = 1) = \Phi_1(\beta'x).$$

The probability of accepting the premium offered, given interest is:

$$8) \; Pr(INTEREST = 1, WEIGHT > 0) = \Phi_2(\beta'x, \frac{\gamma'z}{\sigma}, \rho)/\Phi_1(\beta'x).$$

The expected value for *WEIGHT* given interest and acceptance of the premium offered is:

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9) $E(WEIGHT|INTEREST_i = 1, WEIGHT > 0) = \gamma'z + \sigma \; \Phi_2(\beta'x, \frac{\gamma'z}{\sigma}, \rho)/ \Phi_1(\beta'x).$

The unconditional expected value of WEIGHT (liveweight across all producers) is found by multiplying (7) and (9).

Marginal Effects

Marginal effects for the jth explanatory variable for the probit models are calculated as:

10) $\frac{\partial \Phi(\beta'x_i)}{\partial x_{ij}} = \phi(\beta'x)\beta_j$

Marginal effects for the kth explanatory variable for the Tobit models is calculated as:

11) $\dfrac{\partial WEIGHT_i \big|_z}{\partial z_k} = \gamma_k \left(\dfrac{\gamma'z}{\sigma} \right)$

Factor Analysis

Several risk attitude questions were asked. In order to identify underlying risk attitude factors among the potentially correlated risk attitudes, principal factor analysis was used. Factor analysis finds a set of common underlying factors (q) that linearly construct the original set of p variables,

12) $y_{ij} = a_{i1}f_{1j} + a_{i2}f_{2j}, + \cdots, + a_{iq}f_{qj} + \epsilon_{ij},$

where y_{ij} is the value of ith observation for the jth variable, a_{ik} is the ith observation on the kth common factor, f_{kj} is the set of factor loadings, and ϵ_{ij} is the jth variable's uniqueness. An eigenvalue of one was used to determine the number of factors to retain. An orthogonal rotation was used and factor loadings of 0.7 or greater were used to identify variables that loaded onto common factors.

Independent Variables and Anticipated results

There are many factors which can affect the likelihood a farmer will be interested and participate in the hypothetical programs as well as how many cattle they indicate they would be willing to supply to the programs. These factors can be separated into the broad categories of farmer demographics (e.g., age, education), farm characteristics (e.g., farm size, farm structure), and farmer attitudes (e.g., risk averse).

The independent variables chosen to represent farmer demographics were age, education, household income, and percentage of income from farming. These variables have all been mentioned in previous literature to have an effect on adoption of new technologies and management techniques (Gillespie, Basarir and Schupp 2004, Lacy et al. 2003, Foltz and Chang 2001, Fernandez-Cornejo et al. 2001). Farm size, current marketing and management techniques, and the business structure of the farm represent individual farm characteristics. Previous studies have also stated several of these variables can effect adoption (Foltz and Chang 2001, Fernandez-Cornejo et al. 2001, Gillespie et al. 2006, Qualls et al. 2012). Farmer attitudes were measured by risk factors related to finance, management and marketing techniques, and willingness to retain ownership (Pope et al. 2011, Fraken et al. 2010). A variable for premium level was also included in both models (Martinez 2011). Additional variables included in the models related specifically to the TBB program included a consequentiality variable as well as variables related to perceived barriers to participating such as requirements to change current practices.

Variables anticipated to have a positive influence include education (Fernandez-Cornejo et al. 2001), household income (Cho et al. 2008), percentage income from farming, farm size

(Fernandez-Cornejo et al. 2001, Gillespie et al. 2006, Velandia et al. 2014), and premium level

(Martinez 2011). Negative influences are expected to come from age (Gillespie, Basarir and

Schupp 2004, Lacy et al. 2003) and risk averseness (Pope et al. 2011, Franken et al. 2010).

CHAPTER V

RESULTS FOR FEDERALLY INSPECTED IN-STATE SLAUGHTER FACILITY

A map of the survey respondents is provided in Figure 1, along with a table of the five counties with the largest cattle inventory for the state. The three most represented counties in terms of survey respondents were Wilson, Lincoln, and Obion. Comparatively, the three largest counties in terms of cattle inventory are Greene, Lincoln, and Giles. A total of 569 survey respondents responded to questions necessary for analyzing FIS program interest while 332 survey participants responded to the questions needed for analyzing the quantity of liveweight cattle producers would be willing to supply to the FIS program given interest in the program. The average respondent age was 53, while the average age of a farmer in Tennessee is 59 (UT Extension 2017).

Summary statistics are provided for each of the variables in Appendix A. Table 1 contains means of the variables used in the probit model on *INTEREST* and Table 2 contains the means of the variables used in the Tobit analysis of *WEIGHT*. Of those who responded, 76.6 percent expressed interest in the FIS program if it was profitable. On average, the liveweight of cattle per farm that producers indicated they would supply was 68,863 pounds per year. Assuming an average liveweight of 1,300 pounds, this works out to about 56 head of cattle per farm per year or about 18,592 head total per year in Tennessee. Taking a cumulative total weight across respondents, this sums to 24,169,600 pounds. By comparison, according to USDA statistics, the state slaughtered about 50,985 head in federally inspected facilities in 2015 (USDA/NASS 2016). The estimated liveweight from the FIS program would constitute a fourfold increase above current slaughter in the state.

The results of the factor analysis to find underlying risk attitude factors are shown in Table 3. Overall financial matters and financial matters related to the beef cattle business loaded onto a factor (RISKATTTFIN). Adopting new herd management practices and technologies and finding new market outlets loaded onto a factor (RISKATTTMGT).The question regarding risk perceptions of retaining cattle did not load onto either of the factors, so it was entered separately into the probit model of *INTEREST* as the variable *RISKATTITRETAIN*.

The models for INTEREST and WEIGHT were initially estimated jointly as a Tobit with sample selection. However, the estimated correlation coefficient on the error terms between the two equations was not significantly different from zero, so the models were estimated separately as probit and Tobit models. The estimated coefficients, standard errors, as well as the marginal effects, and their associated standard errors are presented in Table 4, for the probit model of *INTEREST* and in Table 5, for the Tobit model of *WEIGHT*.

Probit Model of Interest in FIS

Shown in Table 4, the Likelihood Ratio test against an intercept only model indicated the probit model was significant overall. The model correctly classified 77.68 percent of the observations for *INTEREST*. While being over the age of 65 (AGEGT65) had a negative effect (7.2 percent), being under the age of 35 (AGEGT35) had a positive effect (14 percent) on producer interest. These results are consistent with previous studies about the effect of age on adoption of technology (Gillespie, Basarir and Schupp 2004, Lacy et al. 2003). Unexpectedly, being a college graduate (COLLGRAD) had a negative effect, with college graduates being 7.1 percent less likely to be interested. This result is contrary to most literature about the effect of education of the adoption of management techniques and technology (Fernandez-Cornejo et al.

2001). Household income (HHINC) had a significant and positive influence on being interested (for each $10,000 in income, probability increased by 0.04 percent). This result is consistent with previous studies done on the adoption of technology (Cho et al. 2008). In terms of marketing, if a producer backgrounded cattle, the probability of interest increased by 6.1 percent. If a producer was already finishing cattle, there was also a positive and significant effect on interest (24.3 percent). Producers who were more willing to take a risk by retaining ownership (RISKATTRETAIN) were 3.3 percent more likely to show interest in the program.

Variables that did not have significant influences on *INTEREST* included being located in Middle Tennessee (where most beef cattle are located, MIDDLE), being located in a county near a federally inspected Slaughter (NRFISLTR), sole proprietorship (*SOLE*), being a full time producer (FULLTIME), the share of farm income from beef (FIBEEF), retaining animals in custom feedlots (RETAIN), number of types of marketing outlets used (MKTOUTLETS), risk attitudes toward overall financial matters (RISKATTFIN), risk attitude towards production and marketing (RISKATTMGT), and being Master Beef or Beef Quality Assurance certified (MASTERBQA).

Tobit Model of Liveweight Supplied to a FIS Program

The Likelihood Ratio test, seen in Table 5, shows the overall fit of the Tobit model to be significant overall. The percent of non-zero observations for *WEIGHT* correctly classified was 77.41 percent. The correlation between the predicted value for *WEIGHT* and actual value for *WEIGHT* was 0.6313.

The estimated coefficient and marginal effects on the premium (PREMIUMFIS) were not significantly different from zero. The variables that had a significant positive effect on

WEIGHT were *SOLE*, *ANIMALUNITS*, *BACKGROUND*, and *RETAIN*. The positive sign on

ANIMALUNITS suggests, for every additional animal unit, a producer would supply 497 more

pounds to the FIS program. The variable of *ANIMALUNITS* was used as a proxy for farm size

and the positive sign on the variable was consistent with results from previous studies

(Fernandez-Cornejo et al. 2001, Velandia et al. 2014). Among the dummy variables for

production practices, *RETAIN* has the largest effect with an increase of 45,291 pounds supplied

to the program if a producer already retains ownership of cattle. Negative effects were *FINISH*

(15,552 pound decrease) and *PASTAC* (67 pound decrease). Variables that were not found to be

statistically significant included *AGEGT65*, *AGELT35*, *MIDDLE*, *NRFISLTR*, *SHRPAST*,

FULLTIME, *FIBEEF*, *NUMKTOUTLETS*, and *MASTERBQA*. Among producers interested in

the program, 79 percent want to finish cattle on their farms in a combination of grass and grain

fed (Figure 2).

CHAPTER VI

RESULTS FOR TENNESSEE BRANDED BEEF PROGRAM

A total of 516 survey participants responded to all questions needed for the analysis of interest in the TBB program and a total 364 participants answered the questions needed for the analysis of liveweight of cattle they would be willing to supply to a TBB program given interest. The average age of those who responded was 52, while the average age of a farmer in Tennessee is 59 (UT Extension 2017).

Summary statistics are provided for each of the variables. Table 6 contains means of the variables used in the probit model of *INTEREST*, and Table 7 contains means of the variables used in the Tobit analysis of *WEIGHT*. Notably, 70.5 percent of respondents expressed interest in participating in a TBB program if it was profitable. On average, the liveweight per farm producers indicated they would supply was 58,598 pounds per year. Assuming an average liveweight of 1,300 pounds per head, this works out to about an average of 45 head per farm per year or about 16,380 head per year. Taking a cumulative total weight across respondents, this sums to 21,295,795 pounds. By comparison, according to USDA statistics, the state currently slaughters about 50,985 head in federally inspected facilities in a year (USDA/NASS 2016). The estimated liveweight from the TBB program would be over a 400 percent increase over current slaughter in the state.

The models for INTEREST and WEIGHT were initially estimated jointly as a Tobit with sample selection. However, the estimated correlation coefficient on the error terms between the two equations was not significantly different from zero, so the models were estimated separately as Probit and Tobit models. The estimated coefficients, standard errors, as well as the marginal

effects, and their associated standard errors are presented in Table 8, for the probit model of *INTEREST* and in Table 9, for the Tobit model of *WEIGHT*.

Probit Model of Interest in a TBB Program

Shown in Table 8, the Likelihood Ratio test against an intercept only model indicated the probit model was significant overall. The model correctly classified 71.71 percent of the observations for *INTEREST*. While being over 65 (AGEGT65) had a negative influence on probability of program interest (6.9 percent), being under 35 (AGELT35) had a positive influence (17.2 percent). These results are consistent with previous studies about the effect of age on adoption of technology (Gillespie, Basarir and Schupp 2004, Lacy et al. 2003). Unexpectedly, being a college graduate had a negative influence, with college graduates being 6.7 percent less likely to express interest. This result is contrary to most literature about the effect of education of the adoption of management techniques and technology (Fernandez-Cornejo et al. 2001). Household income had a significant and positive influence on probability of being interested (for each $10,000 in income, probability increased by 0.4 percent). This result is consistent with previous studies done on the adoption of technology (Cho et al. 2008). Backgrounding cattle had a positive influence (7.5 percent increase) on probability of interest as did finishing cattle (17.7 percent increase). Producers who viewed themselves as more risk takers in production and marketing (RISKATTMGT) matters as well as retaining animals (RISKATTRETAIN) were more likely to be interested in TBB program participation. These results were consistent with studies done on the effects of risk attitudes on participating in new marketing outlets (Pope et al. 2011, Franken et al. 2010). Those producers who were Master Beef and Beef Quality Assurance Certified (MASTERBQA) were 9.7 percent more likely to be interested. Participation in

programs to improve management skills such as Master Beef were shown to also positively

influence participation in new marketing channels in previous studies (Lacy et al. 2003).

Variables that did not have significant influences on *INTEREST* included being located in

Middle Tennessee (where most beef cattle are located, MIDDLE), being located in a county near

federally inspected slaughter (NRFISLTR), sole proprietorship (SOLE), being a full time

producer (FULLTIME), the share of farm income from beef (FIBEEF), retaining animals in

custom feedlots (RETAIN), number of types of marketing outlets used (MKTOUTLETS), risk

attitudes toward overall financial matters (RISKATTFIN), and belief in influence of the survey

responses on a TBB program (SURVOUTCOME).

Tobit Model of Liveweight Supplied to the TBB Program

As can be seen in Table 9, with regards to the overall fit of the Tobit model, the

Likelihood Ratio test of the Tobit model revealed the model to be significant overall. The

percent of non-zero observations for *WEIGHT* correctly classified was 60.99 percent. The

correlation between the predicted value for *WEIGHT* and actual value for *WEIGHT* was 0.6538.

The estimated coefficient and marginal effect on the premium (PREMIUMTBB) were

not significantly different from zero. However, variables with positive influences on *WEIGHT*

were *SOLE, ANIMALUNITS, BACKGROUND, RETAIN*, and unexpectedly

BARRIERCOMINGLE. The marginal effects suggest for each additional animal unit on the farm,

the added weight the farm indicated they would supply through a branded program was 472

pounds. Among the dummy variables for production practices, a farmer already retaining

animals (RETAIN) had the largest marginal effect at 43,677 pounds. Variables with significant

negative effects on *WEIGHT* included A*GELT35* (23,250 pound decrease)*, PASTAC* (108

pounds less per pasture acre), *FINISH* (11,666 pounds less if finish)*, BARRIERCHGBULLS* (decrease of 6,180 pounds with each additional increase in level of concern as a barrier), and *BARRIERFWDCON* (decrease of 7,326 pounds with each increase in level of concern as a barrier). Variables with no significant influence included *AGEEGT65, COLLGRAD, MIDDLE, NRIFISLTR, SHRPAST, FULLTIME, FIBEEF, MKTOUTLETS, MASTERBQA,* and *SURVOUTCOME.*

Analysis of preferred finishing method, fees, and marketing methods

Among producers interested in the program, it appears over 80 percent would prefer to finish the cattle on a mix of grass/grain on their farms (Figure 3). With respect to program administration fees, cumulatively, over 82 percent would pay $50 per year for program administration, while nearly 42 percent would pay $100 per year (Figure 4). Above $100 per year, the percentage of people willing to pay drops markedly to around 11 percent. As shown in Figure 5, those interested in participating in a TBB Program expressed a strong preference for selling through a producer owned cooperative, either farmer-owned cooperative processing facility (42.33 percent) or a farmer-owned marketing cooperative (36.07 percent).

CHAPTER VII

CONCLUSIONS

In general, the results suggest a relatively high degree of interest among beef cattle producers to supply a FIS facility and/or participating in a TBB Program for beef. Producers with higher incomes and greater herd sizes are more likely to be interested and willing to supply more liveweight to a program. While it might be anticipated the middle region of the state or proximity to a federally inspected facility would positively influence interest, these location factors did not. Hence, interest appears to be fairly constant across location, though locating closer to the concentration of beef operations in the state would be a good starting location for a program.

When comparing the interest of respondents to the different programs, 5.26 percent of respondents were interested in FIS but not in the TBB program. The results from this study suggest cattle producers may view branding as riskier than the FIS program. Overall the FIS program and the TBB program models were very similar regarding the variables the models shared. The main difference between the two probit models was the variable related to risk attitudes about production and management practices (*RISKATTMGT*). In the FIS probit model, this variable was not significant, while in the TBB probit model it was significant and positive. This difference could suggest respondents view the TBB program as riskier than the FIS program.

Differences in results between the two programs also suggest younger producers may not have the ability to meet the proposed requirements of the TBB program due to capital, time, or other constraints. Notably, when looking at the Tobit models' results, there are only two

variables that differ between the FIS and the TBB models-being younger than 35 (*AGELT35*) and being a college graduate (*COLLGRAD*). In the FIS Tobit, being a college graduate was significant and negative, while it was insignificant in the TBB Tobit model. Being younger than 35 was insignificant in the FIS Tobit model, but it was significant and negative in the TBB Tobit.

Interestingly, neither farming full time (*FULLTIME*) nor the percent of income from beef cattle operations (*FIBEEF*) were significant in either model as more specialized producers were expected to show greater interest and supply more liveweight to the programs. While younger producers were more likely to be interested in both programs, they were more likely to supply less liveweight to the TBB program. Unexpectedly, college graduates were both less likely to be interested in either program and more likely to supply less liveweight to the FIS program. Location factors, such as area of the state or proximity to federally inspected slaughter did not appear to significantly influence interest or liveweight in either program. This lack of significance suggests a high degree of interest regardless of location within the state or distance to a federally inspected slaughter facility. Even though location did not significantly affect interest of liveweight, most respondents were located in Middle Tennessee. This concentration of interested producers could provide a good starting location for launching either program. Wealth and farm size, in terms of household income and animal units respectively, had a positive effect on both interest and liveweight supplied to both programs. Results would suggest the programs would mostly be supplied by larger, wealthier farms. Finding ways to appeal to smaller producers would be important if either of the programs were created.

Types of beef operations, including backgrounding, retaining ownership, and finishing had an effect on both interest and liveweight supplied. Backgrounding had a positive effect on

both interest and liveweight supplied. Producers already retaining ownership were more likely to supply more liveweight to both programs. Interestingly, while farmers who already finished had a higher probability of being interested in both programs, they were more likely to supply less liveweight. This negative sign could be attributed to those farmers that already finish cattle and might be selling through custom slaughter. There was no consequentiality effects found in the TBB models as the variable was not significant. The lack of significance of the premium variable in both programs was unanticipated. The insignificance of the variable may be explained as a type of positive protest meaning so many respondents answered positively to the questions that the premium level appeared to not really matter or the premium levels offered were too high.

The responding cattle producers appear to desire to grass/grain feed on-farm to finish cattle for both the FIS program and the TBB program. Most are willing to pay a $50 a year program management fee for a TBB program. This program fee would only give the TBB program a working budget of around $21,000 which is not a very large budget, but this is an estimate based on respondents of the survey. If producers not included in the survey were also willing to pay the $50 fee, the budget would be larger. There could also be opportunities for grant funding to help support the program. Most respondents also desire to sell their beef through a cooperatively owned mechanism, either a producer-owned processing facility or using a producer-owned marketing cooperative. A cooperative framework could be one way to appeal to smaller producers as they would not have to cover all costs associated with participating in the programs.

Results from this study could be helpful in determining where to site or expand federally inspected slaughter facilities. The results of this research are also helpful in understanding which

farmer segments are most interested and would supply the most liveweight. The results could also be helpful in designing a Tennessee Branded Beef Program which could add value to beef production in the state. Future research might focus on program specifications, possible structure of a farmer's co-op, and more barriers to participation in a branded program. Additional research should also be conducted on how to encourage smaller farmers to participate in the program. Further research could also compare the responses of full-time farmers against part-time farmers to determine if their responses to the various premium levels differ.

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APPENDIX

APPENDIX A

Table 1. Variables in Probit Model for Interest in Participating in the Federally Inspected Slaughter Program (*INTEREST*)

Variable Name	Description	Mean (n=569)
Dependent Variable:		
INTEREST	1 if interested in participating in the FIS program, 0 otherwise	0.766
Explanatory Variables:		
AGEGT65	1 if age of the producer in years>65, 0 otherwise	0.179
AGELT35	1 if age of the producer in years<35, 0 otherwise	0.081
COLLGRAD	1 if college graduate, 0 otherwise	0.564
MIDDLE	1 if middle Tennessee, 0 otherwise	0.503
SOLE	1 if sole proprietor, 0 otherwise	0.810
NRFISLTR	1 if in county or surrounding county of federally inspected slaughter facility, 0 otherwise	0.422
HHINC	2015 Household income (farm and non-farm, thous. dollars)	123.761
FULLTIME	1 if percent of total taxable household income coming from farming>50 percent, 0 otherwise	0.460
FIBEEF	Percent of farm income from beef	52.118%
BACKGROUND	1 if background cattle, 0 otherwise	0.274
RETAIN	1 if retain ownership of cattle in feedlots, 0 otherwise	0.033
FINISH	1 if finish cattle on-farm, 0 otherwise	0.339
MKTOUTLETS	Number of types of market outlets cattle producers use to sell cattle	1.813
RISKATTFIN	Factor representing attitudes toward financial risk taking	0.005
RISKATTMGT	Factor representing attitudes toward management and marketing practices risk taking	0.030
RISKATTRETAIN	Willingness to rake risks regarding retaining ownership (1=not willing at all, …10=very willing to take risks)	5.868
MASTERBQA	1 if Advanced Master Beef Producer and Beef Quality Assurance certified, 0 otherwise	0.898

Table 2. Variables for Tobit Model of Liveweight of Cattle Participants would Supply to a Federally Inspected Slaughter Program Given Interest (*WEIGHT*)

Variable Name	Description	Mean (n=332)
Dependent Variable:		
WEIGHT	Liveweight pounds of cattle would supply to FIS program	68863.25
Explanatory Variables:		
PREMIUMFIS	Premium for FIS Program ($1, $3, $5, $7, $9/cwt)	5.000
AGEGT65	1 if age of the producer in years>65, 0 otherwise	0.145
AGELT35	1 if age of the producer in years<35, 0 otherwise	0.096
COLLGRAD	1 if college graduate, 0 otherwise	0.569
SOLE	1 if sole proprietor, 0 otherwise	0.810
MIDDLE	1 if middle Tennessee, 0 otherwise	0.494
NRFISLTR	1 if in county or surrounding county of federally inspected slaughter facility, 0 otherwise	0.437
*ANIMALUNITS**	Number of animal units	98.243
PASTAC	Pasture acres	168.675
SHRPAST	Share of acres in pasture	0.567
FULLTIME	1 if percent of total taxable household income coming from farming>50 percent, 0 otherwise	0.440
FIBEEF	Percent of farm income from beef	50.663
BACKGROUND	1 if background cattle, 0 otherwise	0.322
RETAIN	1 if retain ownership of cattle in feedlots, 0 otherwise	0.039
FINISH	1 if finish cattle on-farm, 0 otherwise	0.386
MKTOUTLETS	Number of types of market outlets cattle producers use to sell cattle	1.867
MASTERBQA	1 if Advanced Master Beef Producer and Beef Quality Assurance certified, 0 otherwise	0.919

*Animal units are calculated as .92*cows+ .08* calves+ 1.35* bulls+.6*backgrounder calves+ .6*stocker calves+ .92*dairy cows+ .8*replacement heifers +.8*miscellaneous cattle

Table 3. Factor Analysis of Risk Attitude Variables

		Factor Loadings		
Description	Mean	Factor 1	Factor 2	Uniqueness
Overall financial matters	5.475	**0.810**	0.304	0.251
Financial matters related to beef cattle business	5.878	**0.808**	0.355	0.221
Adopting new herd management practices and technologies	7.039	0.422	**0.711**	0.316
Finding new market outlets	7.333	0.351	**0.741**	0.328
Retaining ownership	5.866	0.386	0.460	**0.640**

Table 4. Estimated Probit Model for *INTEREST* for Federally Inspected Slaughter Program

Variable Name	Estimated Coeff.	Std. Err.		Estimated Marginal Effect	Std. Err.	
Intercept	**-0.602**	**0.376**	*			
AGEGT65	**-0.293**	**0.164**	*	**-0.072**	**0.040**	*
AGELT35	**0.566**	**0.285**	**	**0.140**	**0.070**	**
COLLGRAD	**-0.237**	**0.140**	**	**-0.071**	**0.034**	**
MIDDLE	0.185	0.138		0.046	0.034	
NRFISLTR	-0.029	0.138		0.007	0.034	
SOLE	0.060	0.165		0.015	0.041	
HHINC	**0.002**	**0.001**	*	**0.0004**	**0.0002**	*
FULLTIME	0.008	0.139		0.002	0.034	
FIBEEF	-0.003	0.002		-0.001	0.001	
BACKGROUND	**0.246**	**0.164**	*	**0.061**	**0.040**	*
RETAIN	-0.155	0.396		-0.038	0.098	
FINISH	**0.984**	**0.168**	***	**0.243**	**0.038**	***
MKTOUTLETS	0.070	0.088		0.017	0.022	
RISKATTFIN	-0.065	0.085		-0.016	0.021	
RISKATTMGT	0.192	0.097		0.047	0.024	
RISKATTRETAIN	**0.136**	**0.030**	***	**0.033**	**0.007**	***
MASTERBQA	0.221	0.207		0.054	0.051	
N=569						
LR CHISQ(17)	117.28		***			
Pseudo R2	0.1895					
Pct Correctly Classified	77.68%					

***=significant at α=.01, **=significant at α=.05, *=significant at α=.15.

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Table 5. Estimated Tobit Model for *WEIGHT* in the Federally Inspected Slaughter Program Given Interest

Variable Name	Estimated Coeff.	Std. Err.		Estimated Marginal Effect	Std Err.	
Intercept	-70310.53	49864.51				
PREMIUMFIS	-963.476	2953.513		-462.215	1417.105	
AGEGT65	-18791.67	23558.38		-9015.066	11309.58	
AGELT35	-24901.54	27787.0		-11946.2	13338.23	
COLLGRAD	**-25921.86**	**16676.81**	*	**-12435.68**	**8021.219**	*
MIDDLE	-1011.284	17218.21		-485.151	8260.166	
NRFISLTR	-8120.632	17297.66		-3895.77	8300.625	
SOLE	**45949.05**	**21024.38**	**	**22043.47**	**10104.81**	**
ANIMALUNITS	**1035.513**	**120.785**	***	**496.774**	**58.837**	***
PASTAC	**-140.551**	**65.750**	**	**-67.428**	**31.533**	**
SHRPAST	20863.65	36923.44		10009.07	17718.9	
FULLTIME	-394.4927	17359.54		-189.253	8328.32	
FIBEEF	-59.852	244.987		-28.713	117.543	
BACKGROUND	**49565.59**	**18164.09**	***	**23778.46**	**8760.35**	***
RETAIN	**94408.22**	**43348.19**	**	**45291.14**	**20798.11**	**
FINISH	**-32418.8**	**17010.64**	*	**-15552.5**	**8182.085**	*
MKTOUTLETS	10526.53	9943.657		5049.968	4776.32	
MASTERBQA	18200.29	30069.4		8731.355	14429.4	
σ	**144331.6**	**5607.503**	***			
N=332						
LR CHISQ(17)	138.65	***				
Corr	0.6313					
$\widehat{WEIGHT} * WEIGHT$						
Pct Correctly Classified Non-Zero	77.41%					

***=significant at α=.01, **=significant at α=.05, *=significant at α=.15.

Table 6. Variables in Probit Model for Interest in Participating in the Tennessee Branded Beef Program (*INTEREST*)

Variable Name	Description	Mean (n=516)
Dependent Variable:		
INTEREST	1 if interested in participating in the TBB program, 0 otherwise	0.705
Explanatory Variables:		
AGEGT65	1 if age of the producer in years>65, 0 otherwise	0.172
AGELT35	1 if age of the producer in years<35, 0 otherwise	0.089
COLLGRAD	1 if college graduate, 0 otherwise	0.574
MIDDLE	1 if middle Tennessee, 0 otherwise	0.510
SOLE	1 if sole proprietor, 0 otherwise	0.814
NRFISLTR	1 if in county or surrounding county of federally inspected slaughter facility, 0 otherwise	0.422
HHINC	2015 Household income (farm and non-farm, thous. dollars)	122.985
FULLTIME	1 if percent of total taxable household income coming from farming>50 percent, 0 otherwise	0.461
FIBEEF	Percent of farm income from beef	51.667%
BACKGROUND	1 if background cattle, 0 otherwise	0.275
RETAIN	1 if retain ownership of cattle in feedlots, 0 otherwise	0.035
FINISH	1 if finish cattle on-farm, 0 otherwise	0.343
MKTOUTLETS	Number of types of market outlets cattle producers use to sell cattle	1.824
RISKATTFIN	Factor representing attitudes toward financial risk taking	0.010
RISKATTMGT	Factor representing attitudes toward management and marketing practices risk taking	0.019
RISKATTRETAIN	Willingness to rake risks regarding retaining ownership (1=not willing at all, …10=very willing to take risks)	5.866
MASTERBQA	1 if Advanced Master Beef Producer and Beef Quality Assurance certified, 0 otherwise	0.899
SURVOUTCOME	Agreement that responses to survey will influence outcome of a TBB Program (1=strongly disagree,…5=strongly agree)	3.936

Table 7. Variables for Tobit Model of Liveweight of Cattle Particpants would Supply to a Tennessee Branded Beef Program Given Interest (*WEIGHT*)

Variable Name	Description	Mean (n=364)
Dependent Variable:		
WEIGHT	Liveweight pounds of cattle would supply to TBB program	58597.800
Explanatory Variables:		
PREMIUMTBB	Premium for TBB Program ($3, $5, $7, $9, $11/cwt)	6.923
AGEGT65	1 if age of the producer in years>65, 0 otherwise	0.140
AGELT35	1 if age of the producer in years<35, 0 otherwise	0.107
COLLGRAD	1 if college graduate, 0 otherwise	0.571
SOLE	1 if sole proprietor, 0 otherwise	0.810
MIDDLE	1 if middle Tennessee, 0 otherwise	0.511
NRFISLTR	1 if in county or surrounding county of federally inspected slaughter facility, 0 otherwise	0.434
*ANIMALUNITS**	Number of animal units	97.280
PASTAC	Pasture acres	171.764
SHRPAST	Share of acres in pasture	0.552
FULLTIME	1 if percent of total taxable household income coming from farming>50 percent, 0 otherwise	0.462
FIBEEF	Percent of farm income from beef	50.907
BACKGROUND	1 if background cattle, 0 otherwise	0.321
RETAIN	1 if retain ownership of cattle in feedlots, 0 otherwise	0.038
FINISH	1 if finish cattle on-farm, 0 otherwise	0.412
MKTOUTLETS	Number of types of market outlets cattle producers use to sell cattle	1.885

Table 7 cont. Variables for Tobit Model of Liveweight of Cattle Particpants would Supply to a Tennessee Branded Beef Program Given Interest (*WEIGHT*)

Variable Name	Description	Mean (n=364)
BARRIERCHGBULLS	Potential barrier of program if must change breed of bull (1=not a barrier, …5=complete barrier)	2.404
BARRIERCOMINGLE	Potential barrier of program if comingle animals (1=not a barrier, …5=complete barrier) g	2.209
BARRIERFWDCON	Potential barrier of program if must use forward contracts (1=not a barrier, …5=complete barrier)	2.135
MASTERBQA	1 if Advanced Master Beef Producer and Beef Quality Assurance certified, 0 otherwise	0.920
SURVOUTCOME	Agreement that responses to survey will influence outcome of a TBB Program (1=strongly disagree,…5=strongly agree)	4.011

*Animal units are calculated as .92*cows+ .08* calves+ 1.35* bulls+.6*backgrounder calves+ .6*stocker calves+ .92*dairy cows+ .8*replacement heifers +.8*miscellaneous cattle

Table 8. Estimated Probit Model for *INTEREST* for a Tennessee Branded Beef Program

Variable Name	Estimated Coeff.	Std. Err.		Estimated Marginal Effect	Std. Err.	
Intercept	-1.314	0.469	***			
AGEGT65	-0.246	0.166	*	-0.069	0.047	*
AGELT35	0.611	0.266	**	0.172	0.074	**
COLLGRAD	-0.237	0.139	*	-0.067	0.039	*
MIDDLE	0.170	0.137		0.048	0.038	
NRFISLTR	0.029	0.138		0.008	0.039	
SOLE	0.011	0.166		0.003	0.047	
HHINC	0.002	0.001	*	0.0004	0.000	*
FULLTIME	0.047	0.137		0.013	0.039	
FIBEEF	-0.002	0.002		-0.001	0.001	
BACKGROUND	0.266	0.159	*	0.075	0.044	*
RETAIN	-0.075	0.381		-0.021	0.107	
FINISH	0.629	0.149	***	0.177	0.040	***
MKTOUTLETS	0.084	0.086		0.024	0.024	
RISKATTFIN	-0.018	0.083		-0.005	0.023	
RISKATTMGT	0.200	0.097	**	0.056	0.027	**
RISKATTRETAIN	0.122	0.029	***	0.034	0.008	***
MASTERBQA	0.344	0.207	*	0.097	0.058	*
SURVOUTCOME	0.108	0.077		0.030	0.021	
N=516						
LR CHISQ(18)	108.35	***				
Pseudo R2	0.1732					
Pct Correctly Classified	71.71%					

***=significant at α=.01, **=significant at α=.05, *=significant at α=.15.

Table 9. Estimated Tobit Model for *WEIGHT* for a Tennessee Branded Beef Program Given Interest

Variable Name	Estimated Coeff.	Std. Err.		Estimated Marginal Effect	Std Err.	
Intercept	**-110216.800**	**71593.340**	*			
PREMIUMTBB	-286.041	3011.975		-121.0418	1274.558	
AGEGT65	-25507.280	25293.470		-10793.74	10709.68	
AGELT35	**-54943.480**	**28984.910**	**	**-23250.05**	**12286.28**	**
COLLGRAD	-5141.047	17529.780		-2175.501	7420.349	
MIDDLE	-1711.796	18147.410		-724.3688	7679.668	
NRFISLTR	-1323.260	18032.830		-559.9547	7631.137	
SOLE	**37745.780**	**22148.280**	*	**15972.62**	**9383.219**	
ANIMALUNITS	**1116.514**	**129.219**	***	**472.4674**	**55.57117**	***
PASTAC	**-254.756**	**69.379**	***	**-107.8034**	**29.41563**	***
SHRPAST	46564.580	38548.440		19704.41	16328.7	
FULLTIME	1449.427	18350.850		613.344	7765.272	
FIBEEF	-19.349	270.016		-8.18767	114.2633	
BACKGROUND	**46972.300**	**19616.120**	**	**19876.94**	**8343.433**	**
RETAIN	**103215.500**	**45648.100**	**	**43676.98**	**19331.14**	**
FINISH	**-27568.530**	**18198.190**	*	**-11665.98**	**7714.628**	*
MKTOUTLETS	14491.310	10498.680		6132.187	4451.395	
BARRIERCHGBULLS	**-14603.250**	**7135.659**	**	**-6179.555**	**3026.928**	**
BARRIERCOMINGLE	**17089.190**	**8250.383**	**	**7231.515**	**3504.822**	**
BARRIERFWDCON	**-17311.570**	**8822.826**	*	**-7325.618**	**3743.808**	**
MASTERBQA	36236.870	32061.450		15334.11	13574.84	
SURVOUTCOME	1804.776	9852.590		763.7145	4169.642	
σ	**153306.600**	**6322.166**	**			
N=364						
LR CHISQ(21)	149.75	***				
Corr	0.6538					
$\widehat{WEIGHT} * WEIGHT$						
Pct Correctly Classified Non-Zero	60.99%					

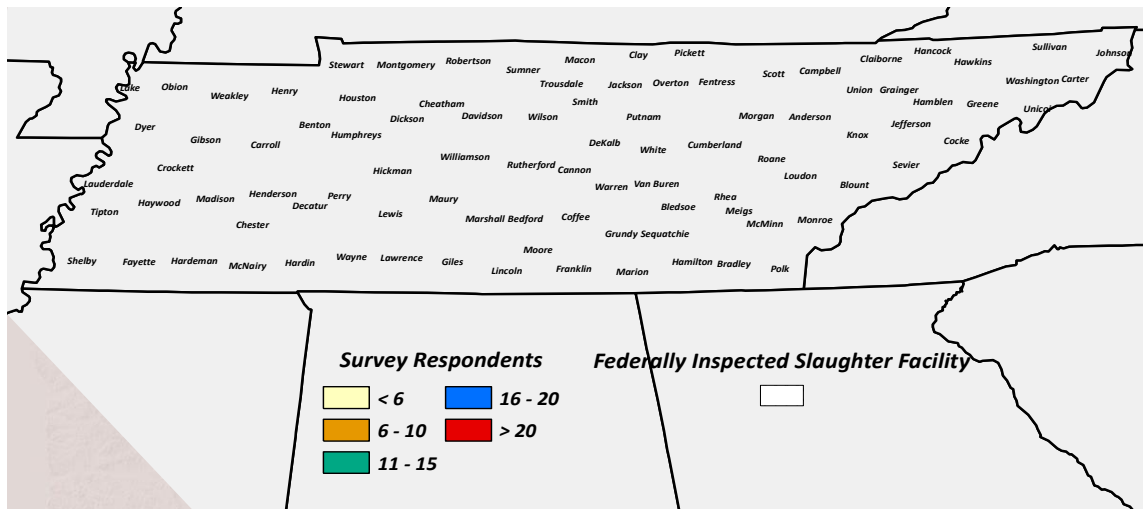***=significant at α=.01, **=significant at α=.05, *=significant at α=.15

Figure 1. Map of Survey Respondents and Federally Inspected Slaughter Facilities, by County and Top TN Cattle Producing Counties
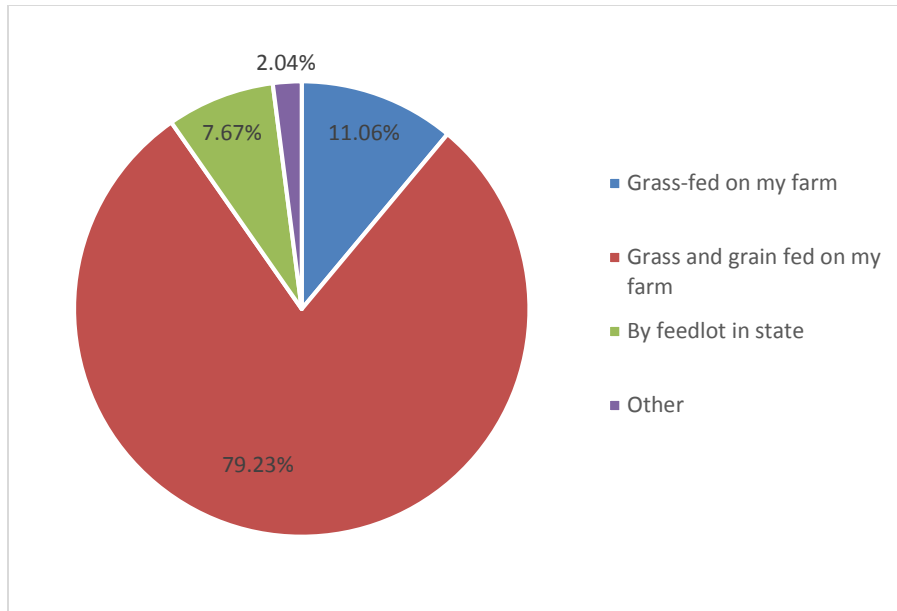
Tennessee's Top Five Counties for Beef Cattle Inventory		
County	Head of Cattle & Calves	Rank
Greene	70,000	1
Lincoln	60,000	2
Giles	58,000	3
Bedford	52,000	4
Maury	51,000	5
Statewide	1,720,00	

Source: USDA/NASS (2016)
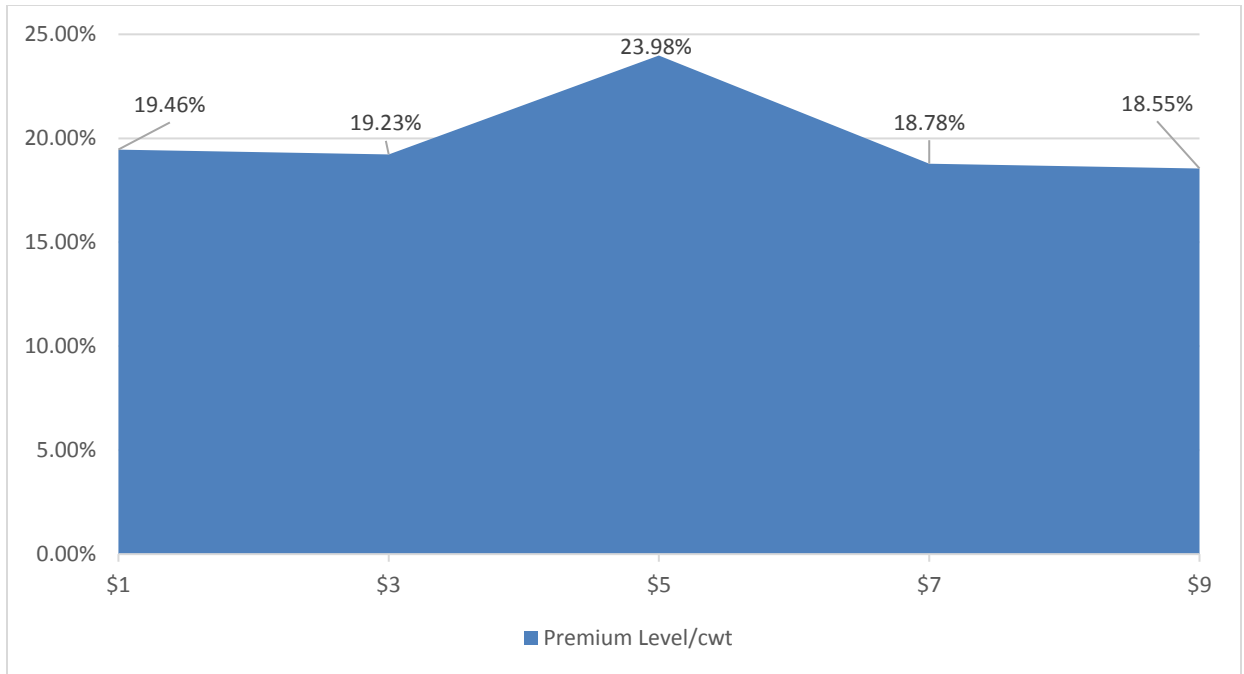
(N=442)

Figure 2. Percent of Respondents Who Accepted Given Premium Levels for Federally Inspected

Slaughter Facility

2.04%

7.67%

11.06%

79.23%

■ Grass-fed on my farm

■ Grass and grain fed on my farm

■ By feedlot in state

■ Other

(N=443)

Figure 3. Preferred Finishing Method by Beef Producers for Federally Inspected Slaughter Program
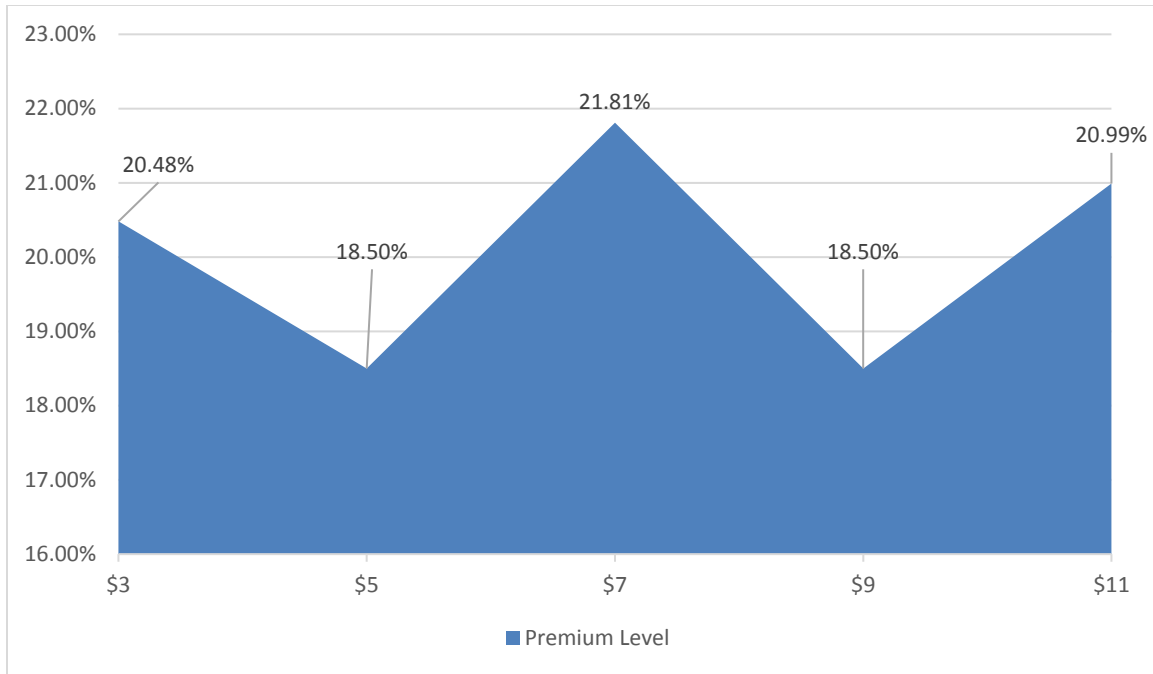
(N=454)

Figure 4. Percent of Respondents Who Accepted Given Premium Levels for Tennessee Branded

Beef

8.18%   1.53%   9.46%

80.82%

■ Grass-fed on my farm

■ Grass and grain-fed on my farm

■ By feedlot in state

■ Other
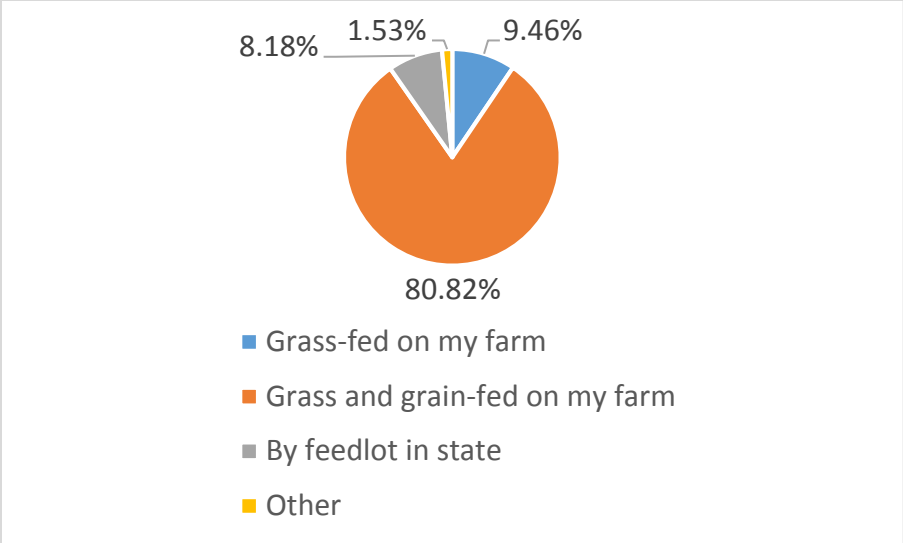
(N=391)

Figure 5. Preferred Finishing Method by Beef Producers for Tennessee Branded Beef Program
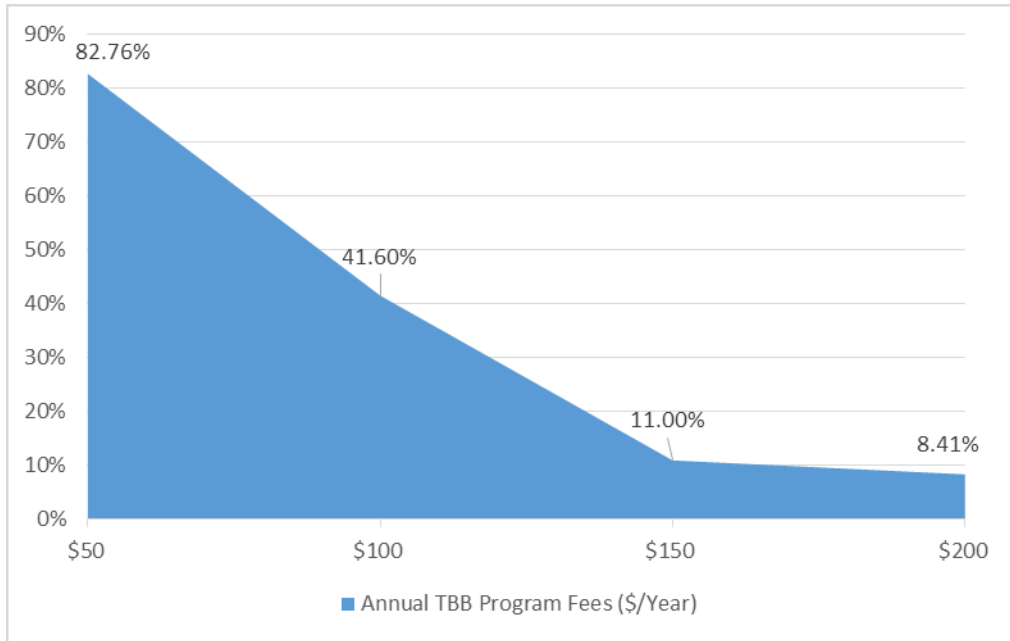
(N=464)

Figure 6. Annual Fee Tennessee Beef Producers Would Pay for Tennessee Branded Beef Program Administration
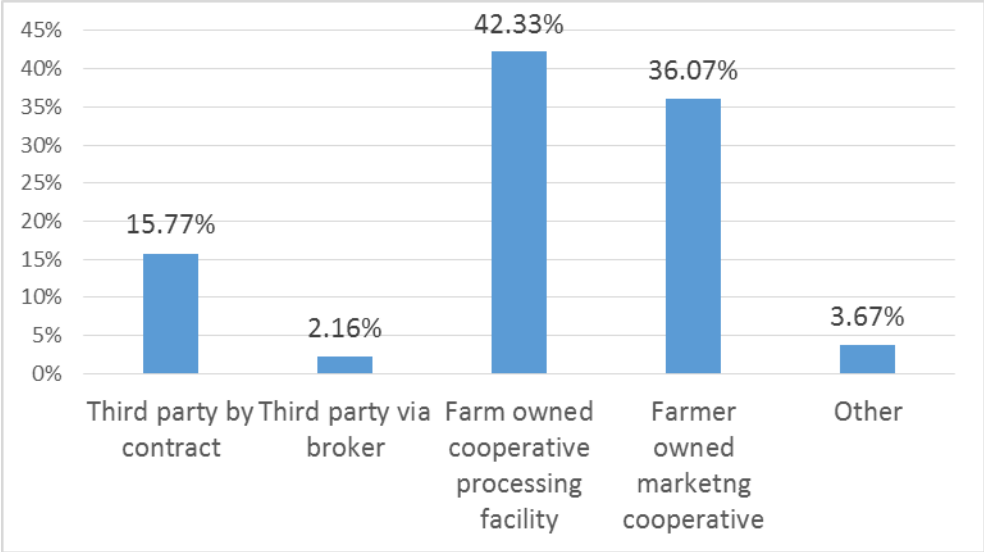
(N=463)

Figure 7. Preferred Marketing Arrangements by Beef Cattle Producers for Tennessee Beef Branded Program

APPENDIX B

A STUDY OF BEEF MARKETING BY TENNESSEE BEEF CATTLE PRODUCERS

Researchers at the University of Tennessee are conducting this survey to measure cattle farmer interest in having cattle slaughtered at an in-state federally inspected slaughter facility and/or participating in a Tennessee produced beef labeling program. We are surveying cattle farmers across the state to assist in making projections about the feasibility of supplying a slaughter facility and a beef labeling program. Your views are important to us.

In order to obtain your views, we invite you take about 20 minutes to complete this survey.

Before You Begin...

We are University of Tennessee researchers conducting a survey to examine Tennessee beef cattle farmers' interest in (1) providing cattle to an in-state Federally Inspected slaughter facility and (2) participating in a Tennessee produced beef labeling program. You are part of a group of beef cattle farmers from across the state being invited to assist us by completing a short survey. The cattle industry has expressed interest in more in-state Federally Inspected facilities as well as value-added beef opportunities. The survey results will help us analyze the feasibility of supplying cattle to an in-state slaughter facility and gauge interest in a "Tennessee produced" beef labeling program. This information will benefit the industry as well as policymakers in identifying value-added opportunities and developing programs to assist the state's beef cattle industry. As an industry participant, your views are important to the study.

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty. If you withdraw from the study before data collection is completed your data will be destroyed.

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Checking the box "Accept" on the next page constitutes your consent to participate. There are no foreseeable risks other than those encountered in everyday life from participation in this study. You can be assured we will take measures to protect the confidentiality of your responses. Data will be stored securely and will be made available only to persons conducting the study. No reference will be made in oral or written reports which could link participants to the study. Your name or other identifying information will not be linked with your responses. University of Tennessee research protocols prohibit the release of your name or personal information to any other agency or individual. The list of those invited to participate in the study will be destroyed after responses are collected. Finally, only summary results from the survey will be publicly reported. Only researchers involved in the study will have access to the survey data.

Please do not hesitate to contact us if you have any questions or concerns. *A self-addressed postage paid envelope is enclosed for your convenience.* Thank you for taking time out of your busy schedule to help us! The survey takes about 20 minutes to complete. If you are interested, a summary of the survey results will be available at www.aimag.ag.utk.edu once we have collected and summarized the data.

If you have questions at any time about the study or the procedures, you may contact the researchers listed below. If you have questions about your rights as a participant, you may contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Research Team

Dr. Andrew Griffith, agriff14@utk.edu

Dr. Kim Jensen, kjensen@utk.edu

Dr. Karen Lewis, klewis39@utk.edu

Department of Agricultural & Resource Economics

The University of Tennessee

Phone: (865) 974-7231

_____

SURVEY CONSENT

- ○ ACCEPT: I consent to continue with the survey.
- ○ REJECT: I do not consent to continue with the survey. (Thank you. Please return the blank survey in the postage paid envelope.)

ABOUT YOUR CATTLE OPERATION

1. Did you raise cattle in 2015?

○ Yes   ○ No (Please return the blank survey in the envelope   provided. Thank you for your participation.)

2. Are you a primary decision maker for the beef cattle operation?

○ Yes   ○ No (Please pass this survey on to the primary decision maker)

FINISHING AND MARKETING CATTLE

3. Please provide the number of head you managed and marketed with the following activities in 2015. (If none, please enter "0")

Produce calves for immediate sale at weaning: _____ head

Pre-condition calves (<90 days):   _____ head

Background (>=90 days):   _____ head

Retain ownership in a custom feedlot: _____ head

Finish cattle on my farm: _____ head

(If you have any cattle in <u>retained ownership</u> or <u>finish cattle</u> on farm, please skip to QUESTION 6)

4. If profitable, would you be willing to finish cattle (either through a custom feedlot or retained ownership and finishing on your farm) and sell your cattle to an in-state Federally Inspected slaughterhouse?

○ Yes (skip to QUESTION 8)

○ No, WILL NOT FINISH cattle (continue to QUESTION 5)

○ No, WILL FINISH, but NOT SELL TO IN-STATE FEDERALLY INSPECTED SLAUGHTERHOUSE (skip to QUESTION 7)

5. Indicate each of the reasons why you are NOT willing to finish cattle (either a custom feedlot or retained ownership on your farm) even if this would increase your profits:

❑ Lack of sufficient cash flow

❑ Lack of relationship with feedlot operators

❑ Prefer not to change my existing cattle marketing plan

❑ Not enough high quality pasture to finish cattle on my farm

❑ Not as familiar with finished cattle markets

❑ Not likely to achieve a high quality finished animal

❑ Concerned about the risks associated with retained ownership (death loss, price decline, etc.)

❑ Too much work to prepare cattle to go to feedlot

❑ Cattle are not my main source of income, so would take up too much of my time

❑ Only raise a small number of animals, so would not likely add much profit

❑ No reliable source of a consistent supplemental feed

❑ Other, please describe: _____

 (Please skip to QUESTION 19)

6. If profitable, would you be willing to sell cattle finished on your farm (or a custom feedlot) to an in-state Federally Inspected slaughterhouse?

○ Yes (skip to QUESTION 8)   ◉   No (continue to QUESTION 7)

7. Indicate each of the reasons **why you would NOT be willing to sell finished cattle through an in-state Federally Inspected slaughterhouse**, even if this would increase your profits:

❑ I prefer to sell finished cattle and let customers have them slaughtered through Custom Packers

❑ I finish cattle outside of the state

❑ The Federally Inspected facility located in Tennessee is located too far away

❑ Concerned there may be lack of local competitiveness due to small number of in-state Federally Inspected facilities in my region

❑ Satisfied with current marketing plan

❑ Unsure of the long-term viability of such a facility

❑ Marketing to this facility could interrupt my current market

❑ Other. Please describe: _____

8. Suppose your finished cattle weigh 1,300 pounds at a price of $130 per hundredweight. Would you be willing to sell your cattle to an in-state Federally Inspected slaughterhouse for a premium of $XX per hundredweight or $XX per head?

○ Yes (Answer questions below)   ◉ No (skip to QUESTION 9)

If yes, how many finished cattle could you supply to the in-state Federally Inspected slaughter facility per year?
Head/Year: _____
What would their average liveweight be in pounds per head? (select one answer)

❑ Less than 1,000

❑ 1,000-1,199

❑ 1,200-1,399

❑ 1,400-1,599

❑ 1,600 to 1,799

❑ 1,800 or More

The cattle supplied to the in-state Federally Inspected slaughter

facility would primarily be finished as (select one answer)

○ Grass-fed on my farm

○ Grass and grain-fed on my farm

○ By a feedlot in state

○ By a feedlot out of state

○ Other, please describe: _____-

9. If you indicated "NO" in QUESTION 8, please select the minimum PREMIUM level per hundredweight at which you would be willing to sell through an in-state Federally Inspected slaughter facility (Circle the answer).

$XX $XX $XX $XX   Greater than $XX

TENNESSEE BRANDED BEEF PROGRAM

We are examining potential for Tennessee branded beef. We have designed a hypothetical TENNESSEE BRANDED BEEF Program. Please read the following information screens about the possible benefits and requirements of this program and then respond regarding your interest in participating in such a program if it were made available.

1. Potential Benefits of the Program

Beef meeting the eligibility for the TENNESSEE BRANDED BEEF program could
- use the TENNESSEE BRANDED BEEF label on packaging
- be listed on the TENNESSEE BRANDED BEEF website, and
- receive brand promotion, such as radio advertisements, billboards, sample recipes at meat counters, and other promotions.

2. Requirements of the Program

A Tennessee Branded Beef program would likely need high quality, uniform cattle from in-state sources in order to obtain potential premiums. Therefore, the hypothetical program has several requirements:

a) Animal identification and recordkeeping
b) Final or processed products only include beef from Tennessee farms (calves to finished animal must be raised in Tennessee)
c) Slaughter occurs at a Federally Inspected facility in Tennessee
d) Beef grades Choice or Prime

10. If profitable, given the requirements listed above, would you be willing to participate in the TENNESSEE BRANDED BEEF Program?

_____Yes (skip to question 12)   _____No (continue to QUESTION 11)

11.   If you indicated "NO" in QUESTION 10, please indicate each of the reasons why you are not interested in participating in a branded beef program.

❑ I don't know much about branded beef markets

❑ I don't produce enough cattle to make it worth it

❑ With my available land, I don't think I could finish my cattle in-state

❑ I don't think I could consistently produce cattle that grade Choice or Prime

❑ I would find having to use an animal ID system invasive to the privacy of my business

❑ I would not want to spend time with detailed recordkeeping

Other, please describe: _____(Skip to QUESTION 19)

12. Suppose your cattle weigh 1,300 pounds at a price of $130 per hundredweight. Would you be willing to sell your cattle through the TENNESSEE BRANDED BEEF PROGRAM for a premium of $XX per hundredweight or $XX per head?

○ Yes (Answer questions below)   ◉ No (Go to QUESTION 13)

If yes, how many finished cattle (finished on your farm or retained
through an in-state custom feedlot) could you supply to the TENNESSEE
BRANDED BEEF program per year?
Head/Year: _____
What would their average liveweight be in pounds per head? (select one answer)
❑ Less than 1,000
❑ 1,000-1,199
❑ 1,200-1,399
❑ 1,400-1,599
❑ 1,600 to 1,799
❑ 1,800 or More

These cattle sold in the TENNESSEE BRANDED BEEF program would
primarily be finished as (select one answer)
○ Grass-fed on my farm
○ Grass and grain-fed on my farm
○ By a feedlot in state
○ Other. Please describe (remember, all options with the
    brandedprogram must be where the cattle are raised in
    Tennessee):_____

(Skip to QUESTION 14)

13. Please select the minimum premium level per hundredweight at which you would be willing to sell through the Tennessee Branded Beef Program (Circle the answer).
    $XX $XX $XX $XX   Greater than $XX

14. If an annual fee was needed to cover the costs of administering the TENNESSEE BRANDED BEEF PROGRAM, how much would you be willing to pay for the program per year? (Circle the answer).
    $0 $50 $100 $150 $200

15. If we were designing a TENNESSEE BRANDED BEEF PROGRAM, how much of a barrier would each of the following practices be for you to participate, if the practice was required?

	Not a barrier	A minor barrier	A moderate barrier	A major barrier	Complete barrier-Would not participate
Individually identify all cows and calves through an animal identification system	○	○	○	○	○
Change breed of bulls	○	○	○	○	○
Vaccinate and pre-condition for 30 to 60 days past weaning	○	○	○	○	○
Co-mingle or pool calves with those of other producers	○	○	○	○	○
Use cash forward contracting	○	○	○	○	○
Retain ownership through an in-state stocker/feedlot	○	○	○	○	○
Accept price negotiated by a cooperative or marketing alliance	○	○	○	○	○
Maintain records on animal health and feeding	○	○	○	○	○
Third party monitoring to verify that animals are raised in-state	○	○	○	○	○
Grass feed cattle under specifications such as American Grassfed Association's requirements	○	○	○	○	○

16. When selling your cattle for slaughter through the TENNESSEE BRANDED BEEF PROGRAM, who would you prefer to sell through? (select one)

○ A third party (for example through a Private Party or Corporation) and I would sell my finished cattle by contract to that third party directly for slaughter

○ A third party (for example through a Private Party or Corporation), and I would sell my finished cattle through a broker to that third party for slaughter

○ A farmer cooperatively owned processing facility of which I would be a member or investor

○ A farmer marketing cooperative of which I would be a member that markets our beef to the third party

○ Other, please describe:_____

PRODUCER PROGRAMS

17. **The Advanced Master Beef Producer Program (AMBPP)** is an educational program designed to provide cattle producers with information to help improve their operation's efficiency and profitability. The AMBPP certification is given to producers who complete the program and enables them to apply for a 50% cost share through the Tennessee Agricultural Enhancement Program (TAEP).

Beef Quality Assurance (BQA) provides producers and consumers with information concerning animal husbandry techniques in tandem with accepted scientific knowledge to produce cattle. Tennessee's BQA program focuses on the importance of injection site selection, animal health, and recordkeeping. Although BQA is a voluntary program, it is required to qualify for a 35% cost share under the Tennessee Agricultural Enhancement Program.

	Yes	No
Are You Master Beef Producer Certified?	○	○
Are You Beef Quality Assurance Certified?	○	○

18. If a product was labeled TENNESSEE BRANDED BEEF along with listing the following certifications, how likely would a consumer be willing to pay a premium over other beef products?

	Not at all Likely	Very Unlikely	Somewhat Likely	Very Likely	Extremely Likely
Tennessee Branded Beef	○	○	○	○	○
Advanced Master Beef	○	○	○	○	○
Beef Quality Assurance	○	○	○	○	○

ABOUT YOUR FARM

19. In what county is your farm located? _____ County

20. How many head of the following types of cattle were in your care on January 1, 2016?

Type

Brood Cows: _____ head

Dairy Replacement Heifers: _____ head

Beef Replacement Heifers: _____ head

Unweaned Calves: _____ head

Home-raised Weaned Calves (preconditioned < 90 days, backgrounders >= 90 days):

_____ head

Bulls (herd sires) : _____ head

Purchased Stockers/Backgrounders: _____ head

Dairy Cows: _____ head

Other: _____ head

Please describe other: _____

21. If you have a cow/calf operation, what breeds are used as sires in your herd? (Select all that apply)

_____Black Angus   _____Hereford
_____Simmental   _____Charolais
_____Crossbred, please describe breeds

_____

_____Other, please describe breeds

_____

22. How did you market your cattle in 2015? Please choose all that apply.

_____Auction barn   _____Private treaty calf and feeder
cattle sales (direct sales)
_____Private treaty freezer beef/retail cuts sales   _____Video auction
_____Graded sales   _____Internet auction
_____Marketing alliance   _____Internet listing service
_____Sell to Packer   _____Other, please describe:

23. How many acres did you farm in 2015?

Pasture: _____ acres

Hay: _____ acres

Other (Cropland, Woodland, etc) : _____ acres

Total: _____ acres

ABOUT YOU

24. In what year were you born? _____

25. Which of the following best describes your farming business?
_____Sole Proprietorship   _____Partnership   _____Corporation
_____Other, please describe: _____

26. What is your highest level of education?
_____Less than High School

_____High School Graduate

_____Some College or Technical School/Associate's Degree

_____College Degree or Higher

27. Which category best reflects your total taxable household income (from both farm and non-farm sources) for 2015? Remember, all financial and other information is held strictly confidential.

_____Less than $10,000   _____$150,000-$199,999

_____$10,000 to $29,999   _____$200,000-$249,999

_____$30,000-$49,999   _____$250,000-$499,999

_____$50,000-$99,999   _____$500,000 or greater

_____$100,000-$149,999

28. What percent of your total taxable household income (both farm and non-farm sources) for 2015 do you estimate came from farming?

_____0% to 9.99%   _____50% to 59.99%

_____10% to 19.99%   _____60% to 69.99%

_____20% to 29.99%   _____70% to 79.99%

_____30% to 39.99%   _____80% to 89.99%

_____40% to 49.99%   _____90% to 100.00%

29. What percent of your 2015 farm income do you estimate came from your beef cattle operations?

_____0% to 9.99%   _____50% to 59.99%

_____10% to 19.99%   _____60% to 69.99%

_____20% to 29.99%   _____70% to 79.99%

_____30% to 39.99%   _____80% to 89.99%

_____40% to 49.99%   _____90% to 100.00%

30. I obtain information used in making my beef cattle business decisions from the following sources (check all that apply):

❑ Extension services (ex: meetings, conferences, and publications)

❑ Producer groups (ex: Tennessee Cattlemen's Association, National Cattlemen's Association, R-CALF)

❑ Popular press articles (ex: Drovers, Beef Magazine, Cattle Today, etc.)

❑ United States Department of Agriculture (NASS, AMS, NRCS, FSA, etc.)

❑ Internet Sites

❑ Other farmers

❑ Other, please describe _____

31. Please indicate the extent to which you disagree or agree with each of the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
a) Producing in-state beef can help the local economy	○	○	○	○	○
b) Producing in-state beef can help Tennessee cattle farmers' incomes	○	○	○	○	○
c) I believe my responses and those from others responding to the survey will influence the outcome of a Tennessee Branded Beef program	○	○	○	○	○

32. What is your willingness to take risks in the following activities with 1 indicating 'not at all willing to take risks' and 10 indicating 'very willing to take risks'? (Please indicate one rating for each activity)

	Not at all willing to take risks 1	2	3	4	5	6	7	8	9	Very willing to take risks 10
a) Overall financial matters	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
b) Financial matters related to the beef cattle business	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
c) Adopting new herd management practices and technologies	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
d) Finding new market outlets	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
e) Retaining ownership	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Please provide any additional comments you may have about this study, beef cattle marketing, or beef cattle industry research needs

END OF SURVEY
Thank you for participating!

VITA

Elizabeth McLeod was born on July 23, 1993, in Columbia, SC. After completing high school in 2011, she went on to attend Clemson University in Clemson, SC. At Clemson, she studied Applied Economics and Statistics with a concentration in Agribusiness and graduated with her B.S. in 2015. She received her M.S. in Agricultural and Resource Economics with a concentration in Agricultural Economics from the University of Tennessee, Knoxville in 2017.