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Abstract

There is considerable farmer interest in finishing cattle and selling them through a Tennessee Certified Beef (TCB) Program. Given this level of interest, it is helpful to better understand how beef cattle farmers might prefer to sell their TCB cattle (e.g., private contracts, marketing cooperative, processing cooperative). This study uses a multinomial logit model and data from a 2016 beef cattle farmer survey to estimate influences on the probability of selecting a particular marketing arrangement. The most commonly selected marketing arrangement was a processing cooperative (42.99 percent), followed by a marketing cooperative (38.55 percent), and private contracting (18.46 percent).

Keywords: Multinomial logit, Beef Cattle Farmer Survey, Local Beef

JEL Code: Q13

Tennessee Beef Cattle Farmers Preferences Regarding Marketing Tennessee Certified Beef

Background

Most Tennessee beef operations are cow-calf operations. Other operating methods include weaning, preconditioning, and backgrounding calves prior to marketing them as feeder cattle to feedlots, custom feeding them 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 will market calves weighing less than 600 pounds to backgrounding operations in either Tennessee or to operations outside the state. 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. In general, more than 90 percent of cattle originating in Tennessee are harvested out-of-state (USDA, 2017a; USDA, 2017b).

The local foods movement in Tennessee bringing additional demands for locally produced beef and findings from studies have suggested that Tennessee beef consumers would pay a premium for locally produced beef (Merritt (2017); Dobbs (2014)). While finishing on farm is not widely practiced within the state at this time, findings from a recent study suggests considerable farmer interest in finishing cattle and selling them through a Tennessee Certified Beef (TCB) Program (McLeod 2017). Given cattle farmer interest in the TCB Program, it is of interest to determine what business arrangement would be preferred by the beef cattle farmers. Examples of business arrangements might include marketing and/or processing cooperatives or private contracts. However in 2015, Tennessee only had three marketing cooperatives (USDA Rural Development 2017). While Tennessee has traditionally not had many marketing cooperatives, McLeod (2017) found that many beef cattle farmers who were interested in finishing and selling TCB would be interested in participating in a cooperative to market and/or process this branded beef.

Study Objectives

The objectives of this study are a) to ascertain what type of business arrangements beef cattle farmers prefer (third party by contract, farmer owned marketing cooperative, farmer owned processing cooperative) among those interested in supplying TCB, b) to ascertain what factors (farm characteristics, farmer demographics, and farmer attitudes) may influence preferences among regarding business arrangements, and c) to provide measures of the amounts of TCB that might be sold through the various marketing arrangements.

Previous Research

Cooperative participation

Several studies have examined factors influencing cooperative membership or interest in participating in a cooperative (Kilmer, et al. 1994; Jensen, et al. 2010; Jensen, et al. 2011; Pace and Robinson 2012; Puaha 2003; Wachenheim, deHillerin, and Dumler 2001). Kilmer et al. (1994) found through a survey of dairy farmers in the Southeast that while larger herds had a negative effect on cooperative membership, more years dairy farming had a positive effect on membership. Wachenheim et al. (2001) examined farmers’ perceptions about hog marketing cooperatives. Unlike Kilmer et al. (1994), their results suggested that independent farmers tended to be older, less educated, and marketed fewer hogs than cooperative members. Puaha (2003) examined factors influencing membership in a value-added wheat products New Generation Cooperative. Similar to Wachenheim et al. (2001), Puaha (2003) found that cooperative members planted more wheat, were more highly educated, were younger, and had a higher share of their income from wheat than non-members.

In 2010, Pace and Robinson (2012) surveyed Kansas, Oklahoma, and Texas cotton farmers regarding their cotton marketing outlet choices. They found the strongest predictor of cooperative pool usage was previous use. Beliefs about pre-harvest pricing and higher prices influenced farmers to choose forward contracting over cooperative pooling. However, farmers willing to accept a lower price were more likely to choose cash marketing over cooperative pooling. Farmers with larger acreages were more likely to choose merchant pool contracting over cooperative contracting. Higher levels of education negatively influenced the likelihood of choosing merchant pools over cooperative contracting. Farmers who were more willing to accept risk were more likely to use the cash option than cooperative contracting.

Jensen et al. (2010) used data from a survey of Tennessee poultry farmers to evaluate interest in supplying poultry litter for energy conversion and interest in an energy conversion cooperative. Their results showed the positive effects were for the farmer being a college graduate, already selling poultry litter, and being a cooperative member. The variables with negative effects were for having broilers, acres farmed, moderate farm income, and high debt.

Jensen et al. (2011) surveyed farmers in the Southeast regarding interest in growing switchgrass and their interest in participating in a cooperative that harvests, transports, stores, and markets switchgrass. They found that larger farm size, moderate debt, storage facilities on farm, use of custom harvest, higher off-farm income, and potential for creating jobs in their community each had positive effects on interest in marketing switchgrass through a cooperative.

Beef cattle marketing alternatives

Gillespie et al. (2006) conducted a study of six selected beef strategic alliances. Reasons mentioned in the case study regarding why producers might not participate in an alliance included producers who farm as a hobby may not wish to devote more time and effort to change management practices, unwillingness to give up autonomy, unwillingness to abide by group marketing decisions, and a concern for only reducing risk and gaining access to capital. Gillespie et al. (2004) found that younger producers were more likely to use private treaties and retained ownership than their older counterparts. This result suggests new and younger producers may make greater use of alternative marketing methods.

In a study of grass-fed cattle farmers, Gillespie et al. (2016) found that more experienced producers were less likely to use more modern marketing channels such as the internet. More specialized farms of a larger scale were found to use more marketing channels while those smaller, more diversified farms used fewer. Certified organic producers were more likely to sell via a farmers market rather than a broker or meat packer. They also found 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. 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 specificity of investment, uncertainty in both quality variability and number of buyers, and premiums received. Using conjoint analysis it was found that cow-calf producers were willing to make asset specific investments up to a certain point, but as the degree of investment required increases, willingness decreases. Cow-calf producers in this study tended to be more concerned with both 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 that 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.

Methods and Data

Data Collection and Survey

Data for this study were obtained through an online survey of beef cattle producers who participated in the Tennessee Agricultural Enhancement Program (TAEP). There are 5,500 beef cattle producers in this program spread across the state. 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 which was sent out in August 2016. A follow up email was sent a week after the initial email, a second reminder email was sent 2 to 3 weeks after that. All surveys were collected by mid-September. The survey responses were collected through Qualtrics. A copy of the survey is available from the authors upon request.

The survey was divided into five sections. The first section asked farmers about their cattle operations, and the second section asked whether they finished cattle and how they marketed cattle, as well as their possible interest in supplying finished cattle to a federally inspected slaughter facility. In the third section, farmers were introduced to the hypothetical TCB Program and asked about their interest in participation in such a program. In this section, if the farmer was interested in the TCB Program, they were asked how they would prefer to sell their animals in the program (private contract, a producer marketing cooperative of which they would be a member that markets the beef to a third party, or a producer owned processing cooperative). The fourth section asked about farm characteristics, while the fifth section asked about farmer demographics and attitudes.

Economic Model

Following McFadden (1974), a farmer *i* is hypothesized to prefer the *qth* marketing arrangement if the utility ($U_{i,q}^{*}$) exceeds the utility of choosing a different type of marketing arrangement for the branded beef ($U_{i,j}^{*}$), where *J*=1,2,3 (1 = *Private Contract*, 2 = *Marketing Cooperative*, 3=*Processing Cooperative*) and $q \neq j$. Hence, farmer *i* will choose alternative *q* if

(1) $U_{i,q}^{*} \geq U_{i,j}^{*}$.

The probability of choosing the qth market arrangement ($\mathrm{MA}_{i,q}$) is

(2) Prob $[\mathrm{MA}_{i,q}] = \mathrm{Prob}[U_{i,q}^{*} \geq U_{i,j}^{*}, j = 1, \ldots, J, j \neq q]$ (Greene 2012).

Assuming a multinomial logit, then the probability of selecting the qth marketing arrangement becomes:

$$(3) \qquad \text{Prob } [\text{MA}_{i,q}] = \frac{\exp\left(\boldsymbol{\beta}_j'\boldsymbol{X}_i\right)}{\sum_j^J exp(\boldsymbol{\beta}_j'\boldsymbol{X}_i)}.$$

The vector of explanatory variables for individual i ($\boldsymbol{X}_i$) are hypothesized to influence the selection of a marketing arrangement for branded beef include farmer demographics, farm characteristics, and farmer attitudes (See Table 1) and $\boldsymbol{\beta}_j$ is the vector of estimated coefficients associated with the explanatory variables.

The marginal effects of the variables must be calculated from the estimated coefficients. The marginal effect of the probability of market arrangements with respect to the kth explanatory variable $X_{i,k}$ are (Greene 2012):

$$(4) \qquad \frac{\partial Pr(MA=1|\boldsymbol{X}_i}{\partial X_{i,k}} = \Pr\,(MA=1|\boldsymbol{X}_i)\left[-\frac{\beta_{2k}\,exp(\boldsymbol{\beta}_2'\boldsymbol{X}_i)+\beta_{3k}exp(\boldsymbol{\beta}_3'\boldsymbol{X}_i)}{1+exp(\boldsymbol{\beta}_2'\boldsymbol{X}_i)+exp(\boldsymbol{\beta}_3'\boldsymbol{X}_i)}\right],$$

$$(5) \qquad \frac{\partial Pr(MA=2|\boldsymbol{X}_i}{\partial X_{i,k}} = \Pr\,(MA=2|\boldsymbol{X}_i)\left[\beta_{2k} - \frac{\beta_{2k}\,exp(\boldsymbol{\beta}_2'\boldsymbol{X}_i)+\beta_{3k}exp(\boldsymbol{\beta}_3'\boldsymbol{X}_i)}{1+exp(\boldsymbol{\beta}_2'\boldsymbol{X}_i)+exp(\boldsymbol{\beta}_3'\boldsymbol{X}_i)}\right], \text{ and}$$

$$(6) \qquad \frac{\partial Pr(MA=3|\boldsymbol{X}_i}{\partial X_{i,k}} = \Pr\,(MA=3|X_i)\left[\beta_{3k} - \frac{\beta_{2k}\,exp(\boldsymbol{\beta}_2'\boldsymbol{X}_i)+\beta_{3k}exp(\boldsymbol{\beta}_3'\boldsymbol{X}_i)}{1+exp(\boldsymbol{\beta}_2'\boldsymbol{X}_i)+exp(\boldsymbol{\beta}_3'\boldsymbol{X}_i)}\right].$$

The standard errors around the marginal effects are calculated using the Delta method.

Results

Multinomial Logit of Preferred Marketing Arrangements

A total of 876 beef cattle farmers responded to the survey. Among the responding beef cattle farmers, 70.14 percent (N=710) were interested in participating in a branded beef program if profitable. A total of 428 farmers responded to the questions needed for the analysis of farmers' preferred marketing arrangement for cattle in a branded beef program.

The means of each of the variables is provided in Table 1. Among the marketing arrangements (*Preferred Marketing Arrangement*), 42.99 percent would prefer to market TCB through a processing cooperative of which they would be a member or investor, 38.55 percent though a marketing cooperative of which they would be a member, and 18.46 percent through a private contract with a private party or corporation. The average age of the responding farmers was nearly 52 years old and nearly 58 percent were college graduates. The average household income (including farm and non-farm income) was $131,565. About 8.4 percent already sold freezer beef through a private treaty or sold directly to a packer. On average, the number of beef cattle animal units managed and marketed (*ANIMAL UNITS*) was 107.62.[1] About 31.1 percent of the respondents were located in East Tennessee, while 19.6 percent were located in West Tennessee, and the rest (49.3 percent) were located in Middle Tennessee. Just under 46 percent were located in counties having or bordering a county with a federally inspected slaughter facility (*FEDINSPECT*). About14 percent were in a county in East Tennessee with proximity to a federally inspected slaughter facility (*FEDINSPECT*EAST*), while about 11.9 were located in West Tennessee counties with proximity to a federally inspected slaughter facility (*FEDINSPECT*WEST*). Nearly 80 percent of the respondents were sole proprietors and 17.1 percent derived at least half of their household income from their beef cattle enterprises (*FULLTIMEBEEF*). The mean of the interaction term between *FULLTIMEBEEF* and

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[1] 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 (Source: http://extension.usu.edu/files/publications/publication/NR_RM_04.pdf)

HHINCTHOUSDOL as 17.523. On a scale of 1 to 10 regarding willingness to take risks in finding new market outlets for beef (1=not at all, …, 10=very willing), the average was 7.794 for *RISKNEWMKT.* Both potential barriers of having to use cash forward contracting (*BARRIERCASHFORW)* or having to accept a price negotiated by a cooperative or marketing alliance (*BARRIERCOOPPRICE*) were considered moderate barriers with values of just over 2 on a scale of 1=not at all to 5=complete barrier-would not participate. The farmers were in agreement with the statements that consumers would pay a premium for TCB (*CONSPREMTCB*) and that the survey could influence a TCB program (*SURVEOUTCOME*).

Insert Table 1 about here

The estimated multivariate logit model is shown in Table 2. Note that private contracting is the base outcome that was excluded. As can be seen in Table 2, the LLR test shows that the model is significant overall at the 95 percent confidence level. The model correctly predicts just over 53 percent of the observations. Farmer age is positive and significant in both the processing cooperative and marketing cooperative equations. The coefficient on household income (*HHINCTHOUSDOL*) is negative and significant in the marketing cooperative equation. The estimated coefficient on already selling freezer beef through a private treaty or selling cattle directly to a packer (*PRIVTREATY/PACKER)* was negative and significant in both the processing cooperative and marketing cooperative equations. The estimated coefficient on *ANIMAL UNITS* was negative and significant in the marketing cooperative equation. The estimated coefficients on *FEDINSPECT*EAST* were negative and significant in both cooperative equations. While the estimated coefficient on *FULLTIMEBEEF* was negative and significant in the processing cooperative equation, the coefficient on *FULLTIMEBEEF*HHINCTHOUSDOL* in this equation was positive. For the variable representing taking on new market risks, *RISKNEWMKT,* the estimated coefficient was significant and positive in the processing cooperative equation. Belief that consumers would pay a premium for TCB (*CONSPREMTCB*) had significant and positive coefficient in the processing cooperative equation.

Insert Table 2 about here

The estimated marginal effects are shown in Table 3. For private contracting, the marginal effect on farmer age (*AGE*) is negative and significant as is beliefs that consumers will pay a premium for TCB (*CONSPREMTCB*). For each year in age, the probability of selecting a private contract decreases by .4 percent. Variables with significant positive marginal effects on probability of choosing private contracting include already selling freezer beef through a private treaty or beef directly to a packer (*PRIVTREATY/PACKER*), *ANIMAL UNITS*, being located in an East Tennessee county with proximity to federally inspected slaughter (*FEDINSPECTEAST*), and deriving at least half of household income from the beef enterprise (*FULLTIMEBEEF*). For each 100 animal units, the probability of selecting a private contract increases by 2 percent. If the marginal effects on *EAST* and *FEDINSPECT* and *FEDINSPECT*EAST* are used to calculate an overall effect, the effect is -0.052-0.039+0.183=0.092 or an increase of 9.2 percent. If the overall effect from household income and deriving a least half of household income from beef enterprises (*HHINCTHOUSDOL*, *FULLTIMEBEEF,* and *FULLTIMEBEEF* HHINCTHOUSDOL*) is calculated at the mean of household income, the overall effect is 0.210+0.0003*131.565-0.002*131.565=.013 or an increase of 1.3 percent. It can be noted that the effects of greater household income and being fulltime beef farmers are positive up to $140.2K (calculate at 0.210/(-0.002+0.0003)).

Being a college graduate (*COLLEGE*) had a negative and significant marginal effect on probability of choosing a processing cooperative, with college graduates being 10.2 percent less likely to choose a processing cooperative. Deriving at least half of household income from the beef enterprise (*FULLTIMEBEEF*) had a negative marginal effect, however, the interaction *FULLTIMEBEEF*HHINCTHOUSDOL* had a significant and positive marginal effect. If the overall effect of *FULLTIMEBEEF, HHINCTHOUSDOL,* and *FULLTIMEBEEF* HHINCTHOUSDOL* is calculated, the value is -0.259 +0.0002*131.565+ 0.002*131.565=0.075 or a 7.5 percent increase in probability of choosing a processing cooperative. The negative effects of full time are offset by positive effects of household income at just over $102K. Being willing to take on risks to find new markets (*RISKNEWMKT*) had a significant and positive marginal effect on probability of choosing a processing cooperative. If a person who is very willing to take on such risks (a value of 10), this increases the probability of choosing a processing cooperative by 46 percent.

Both older age (*AGE*) and being a college graduate (*COLLEGE*) had positive marginal effects on a choosing a marketing cooperative while household income (*HHINCTHOUSDOL*) and being willing to take on risks to find new markets (*RISKNEWMKT*) had significant and negative marginal effects on probability of choosing a marketing cooperative. Each year of age increases the probability by 0.4 percent, while being a college graduate increases the probability by 8.2 percent. Each thousand dollars of income deceases the probability of choosing a marketing cooperative .05 percent. A person who is highly willing to take on risks of finding new market outlets (*RISKNEWMKT*=10) is 31 percent less likely to choose a marketing cooperative.

Sole proprietorship and the potential barriers of having to use forward contracting or accepting a negotiated price did not have significant marginal effects on the probability of choosing any of the marketing arrangements. Beliefs in survey outcome influencing a TCB also did not have any significant marginal effects.

Insert Table 3 about here

Amounts of TCB Farmers Would Supply Across Market Arrangements

Among those farmer interested in selling TCB and who were willing to accept the bids offered, they were asked how much beef they would supply into the TCB. It is of interest to know how the TCB pounds that farmers would supply across the type of marketing outlet they chose. Those selecting private contracts would supply on average 94,887 pounds per farm (N=71) compared with 50,109 for processing cooperatives (N=172), and 52,677 for marketing cooperatives (N=149). Hence, although the majority of farmers would prefer to sell TCB through cooperatives, the amount per farm they would sell is smaller than for those preferring private contracts. T-tests were conducted comparing means per farm across preferred marketing arrangement type. However, when unequal variances across the group were taken into account, no statistical differences across the means were found at the 95 percent confidence level. When the total amounts are calculated for each type of marketing arrangement, about 37.14 of the pounds are estimated to arise from those preferring processing cooperatives, 33.82 percent from those preferring marketing contracts, and 29.03 percent from those preferring private contracting (N=392).

Conclusions

This study examined preferences for market arrangements for selling TCB by Tennessee cattle farmers. While no state branding program is currently available, it is helpful to understand if a branding program were put into place, what type of marketing arrangements cattle farmers might prefer, what influences these preferences, and amounts of TCB that might be supplied through these marketing arrangements. The farmers indicated an interest in marketing branded beef through a cooperative rather than through private contracts, despite the fact that no beef marketing cooperatives exist currently in the state. Private contracts tended to be preferred by younger farmers, with larger herd sizes, deriving the majority of their income from beef enterprises, and who are already selling freezer beef or beef directly to slaughter facilities through private contracts. These results suggest that these farmers may have larger operations and in some cases already be selling into retail or slaughter markets directly. Interest in selling through processing cooperatives versus marketing cooperatives appeared to be influenced by college education and risk taking attitudes, with college educated respondents who are more risk averse to finding new outlets being more likely to select marketing cooperatives rather than processing cooperative.

While this research provides some insights into the types of marketing arrangements that farmers might prefer to sell TCB, many questions remain. For example, a processing cooperative would require significant upfront investment. Additional research that is beyond the scope of this study could examine terms and specifications of contracts and influences on amounts farmers might be willing to invest in a processing cooperative.

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Table 1. Variable Names, Descriptions, and Means for Multivariate Logit Model of Preferred Marketing Arrangement by Tennessee Beef Cattle Farmers for TCB

Variable Name	**Description**	**(N=428)**
		Percent
Preferred Marketing Arrangement	1=contract to third party (private party, corporation, or broker	18.458%
	2=cooperatively owned processing facility of which farmer in member/investor	42.991%
	3=A farmer marketing cooperative of which farmer is a member	38.551%
		Mean
AGE	Farmer age in years	51.895
COLLEGE	1 if college graduate, 0 otherwise	0.579
HHINCTHOUSDOL	Household Income ($1,000)	131.565
PRIVTREATY/PACKER	1 if use private treaty for freezer beef or sell directly to packer, 0 otherwise	0.084
ANIMAL UNITS	Animal units[a]	104.618
EAST	1 if located in east, 0 otherwise	0.311
WEST	1 if located in west, 0 otherwise	0.196
FEDINSPECT	1 if located in county with or adjacent to a county with a federally inspected slaughter facility, 0 otherwise	0.456
FEDINSPECT*EAST	1 if located in county with or adjacent to a county with a federally inspected slaughter facility and in east, 0 otherwise	0.140
FEDINSPECT*WEST	1 if located in county with or adjacent to a county with a federally inspected slaughter facility and in west, 0 otherwise	0.119
SOLE	1 if sole proprietor, 0 otherwise	0.797
FULLTIMEBEEF	1 if greater than 50 percent of household income is from beef operations, 0 otherwise	0.171
FULLTIMEBEEF* HHINCTHOUSDOL	*FULLTIMEBEEF*HHINCTHOUSDOL* interaction	17.523
RISKNEWMKT	Willingness to take risks finding new market outlets (1=not at all, …, 10=very willing)	7.794
BARRIERCASHFORW	Potential barrier of using cash forward contracting (1=not at all, …5=complete barrier-would not participate)	2.098
BARRIERCOOPPRICE	Potential barrier of having to accept a price negotiated by a cooperative or marketing alliance (1=not at all, …5=complete barrier-would not participate)	2.044
CONSPREMTCB	Agreement that consumers would pay a premium for TCB (1=strongly disagree, …5=strongly agree)	3.521
SURVEYOUTCOME	Agreement that survey could influence a TCB program (1=strongly disagree, …, 5=strongly agree)	4.014

[a] 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 (Source: http://extension.usu.edu/files/publications/publication/NR_RM_04.pdf)

[b] Information sources consulted included Extension Service, producer groups, popular press, USDA, Internet sites, other farmers, and other.

Table 2. Estimated Multinomial Logit Model for Preferred Marketing Arrangement by Tennessee Cattle Farmers For TCB (Private Contract=Base Outcome)

	Processing Cooperative		**Marketing Cooperative**	
	Est Coeff	Std Error	Est Coeff	Std Error
INTERCEPT	**-3.115**	**1.336** **	-2.088	1.339
AGE	**0.028**	**0.012** **	**0.036**	**0.012** ***
COLLEGE	-0.387	0.304	0.094	0.307
HHINCTHOUSDOL	-0.001	0.002	**-0.003**	**0.002** **
PRIVTREATY/PACKER	**-0.904**	**0.464** *	**-0.879**	**0.468** *
ANIMAL UNITS	-0.001	0.001	**-0.002**	**0.001** **
EAST	0.303	0.459	0.476	0.464
WEST	-0.887	0.557	-0.270	0.522
FEDINSPECT	0.268	0.430	0.309	0.435
FEDINSPECT*EAST	**-1.315**	**0.672** **	**-1.403**	**0.677** **
*FEDINSPECT*WEST*	1.219	0.807	0.434	0.790
SOLE	0.370	0.360	-0.083	0.349
FULLTIMEBEEF	**-1.958**	**0.874** **	-1.155	0.849
FULLTIMEBEEF*HHINCTHOUSDOL	**0.017**	**0.009** *	0.010	0.009
RISKNEWMKT	**0.212**	**0.081** ***	0.011	0.079
BARRCASHFORW	0.070	0.146	-0.014	0.148
BARRCOOPPRICE	-0.187	0.161	-0.093	0.162
CONSPREMTCB	**0.357**	**0.177** **	0.262	0.178

Log Likelihood= -411.3987, (N=428)

LLR Test (34 df)=69.38***

Percent Correctly Classified=53.74

*** indicates statistical significance at 99% level, ** at 95% level, and * at 90% level.

Table 3. Marginal Effects of Variables on Preferred Marketing Arrangement by Tennessee Beef Cattle Farmers for TCB

	Private Contract		Processing Cooperative		Marketing Cooperative	
	Marg Effect	Std Error	Marg Effect	Std Error	Marg Effect	Std Error
AGE	**-0.004**	**0.001** ***	0.001	0.002	**0.004**	**0.002** **
COLLEGE	0.020	0.038	**-0.102**	**0.047** **	**0.082**	**0.048** *
HHINCTHOUSDOL	0.0003	0.0002	0.0002	0.0003	**-0.0005**	**0.0003** *
PRIVTREATY/PACKER	**0.120**	**0.054** **	-0.065	0.089	-0.055	0.089
ANIMAL UNITS	**0.0002**	**0.0001** **	0.0001	0.0002	-0.0003	0.0002
EAST	-0.052	0.058	-0.007	0.070	0.059	0.070
WEST	0.078	0.065	-0.157	0.098	0.079	0.093
FEDINSPECT	-0.039	0.054	0.012	0.067	0.027	0.067
FEDINSPECT*EAST	**0.183**	**0.083** **	-0.075	0.108	-0.108	0.108
*FEDINSPECT*WEST*	-0.112	0.098	0.206	0.129	-0.094	0.126
SOLE	-0.019	0.043	0.096	0.061	-0.077	0.059
FULLTIMEBEEF	**0.210**	**0.106** **	**-0.259**	**0.137** *	0.049	0.133
FULLTIMEBEEF*HHINC THOUSDOL	-0.002	0.001	**0.002**	**0.001** *	-0.001	0.001
RISKNEWMKT	-0.015	0.010	**0.046**	**0.013** **	**-0.031**	**0.013** **
BARRCASHFORW	-0.004	0.018	0.018	0.024	-0.014	0.024
BARRCOOPPRICE	0.019	0.020	-0.027	0.027	0.008	0.027
CONSPREMTCB	**-0.042**	**0.022** *	0.039	0.029	0.003	0.029

*** indicates statistical significance at 99% level, ** at 95% level, and * at 90% level.