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# Non-Adoption of Best Management Practices: Demographics and Adoption Constraints of Oklahoma Cattle Producers

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## Introduction

Research and anecdotal evidence both suggest that preconditioning and other management practices yield market premiums for feeder calves (e.g. Avent, Ward, Lalman, 2004; Bulut and Lawrence, 2007; Crawford, 2008; Dhuyvetter, Bryant, and Blasi, 2005; King et al., 2006; Lalman and Smith, 2001; Turner et al., 1992; Ward and Lalman, 2003; Ward, Ratcliff, and Lalman, 2003; Zimmerman, 2010). However, many cow-calf producers do not adopt certain calf management and marketing practices, in spite of the evidence. For example, only 4.3 percent of the 1.9 million calves in Oklahoma were eligible to be marketed as value-added in 2009 (McKinney, 2009; U.S. Department of Agriculture, 2010). While numerous studies examine the implementation of new practices in agriculture, only a few studies have focused on the cattle industry. Little information identifies non-adopters in the beef cattle industry, limiting efforts to provide them with educational support (Gillespie, Kim, and Paudel, 2007). Do non-adopters have common characteristics? Why are cow-calf producers not adopting management and marketing practices that have been shown to bring premiums (or deter discounts) at market?

Many value-added programs were designed and implemented to aid producers in choosing the right management and marketing practices. However, if calves are then not marketed in a way that captures the added value, the value-added traits are worthless (Smith, 2007). Frequently, producers market their cattle with value-added characteristics but without a formal certification from a program. Even with a plethora of opportunities, many producers are uninformed and unaccustomed to these programs and the common practices they entail. In fact, only 11.9 percent of Oklahoma producers used a value-added program in 2007 to market their cattle (McKinney, 2007). Multiple studies examine producer adoption of management and

production practices, but in the context of conservation and environmental management or in other segments of the beef supply chain (Johnson et al., 2010; Kim, Gillespie, and Paudel, 2005; Rahelizatovo and Gillespie, 2004; and Ward et al., 2008). This study looks specifically at the cow-calf segment and examines non-adoption of commonly recommended value-added management and marketing practices. Using data from a survey of Oklahoma cow-calf producers, a binomial logit model is employed to estimate the probability of non-adoption of a specific management or marketing practice based on producers' demographics. Thirteen individual management and marketing practices are examined. Additional logit models examine the relationship between characteristics of non-adopters and reasons given for non-adoption.

**Data**

In Fall 2009, the Departments of Agricultural Economics and Animal Science at Oklahoma State University, along with the Oklahoma Cooperative Extension Service funded and conducted a Beef Management and Marketing Survey with the assistance of the National Agricultural Statistics Service. The National Agricultural Statistics Service's office in Oklahoma City was in charge of sampling, mailing, receiving, and accumulating the data from the surveys. The survey was issued via mail and was sent to 17,511 of the 34,652 cow-calf producers in Oklahoma. A cover letter was sent along with the survey to explain the purpose of the survey and to encourage participation. 1,861 of the surveys were returned, yielding a 12.1 percent response rate. When a survey was not completed in a section of interest, the observation was deleted, leaving 1,453 usable observations.. Producers were asked a variety of questions about management and marketing practices. This study focuses on survey responses regarding producer's choice of non-adoption, demographic background and perceived constraints to adoption.

**Model**

A binomial logit model is used to estimate the probability of non-adoption of a specific management or marketing practice based on producers' demographics. The probability of non-adoption can be modeled as follows:

(1) $$Prob(\text{Producer } i \text{ is a non} - \text{adopter}) = \frac{e^Z}{1+e^Z},$$

where Prob (Producer i does not adopt a practice) is the probability of producer i choosing not to adopting each management or marketing practice and $e$ is the base of the natural logarithm and is a constant, equaling roughly 2.718281828. $Z$ is

(2)

$$Z = \alpha + \sum_{j=1}^{4} \beta_1 \, HerdSize + \sum_{j=1}^{4} \beta_2 \, Region + \sum_{j=1}^{4} \beta_3 \, AEClass + \sum_{j=1}^{4} \beta_4 \, Education + \sum_{j=1}^{5} \beta_5 \, Income + \sum_{j=1}^{4} \beta_6 \, FarmIncome + \sum_{j=1}^{2} \beta_7 \, Training$$

where *HerdSiz*e represents the number of cows in a producer's herd with categories of 1 to 4, *Region* is the region of Oklahoma in which the producer resides with categories from 1 to 4, *AE Class* is the combination of the age and experience of the producer and is classified into categories ranging from 1 to 4, *Education* is the highest level of education the producer has obtained with categories from 1 to 4, *Income* is the total income of the producer with categories from 1 to 5, *FarmIncome* is the percent of a producer's income from beef cattle production with categories from 1 to 4, and *Training* is whether the producer has participated in either the Master Cattlemen Program or Quality Assurance Training with 1 indicating a producer has received

training and 0 indicating a producer has not received training. Non-adoption of a specific practice is represented by 1, while adoption of a practice is indicated by 0. Dependent variables include castrating, dehorning, weaning for 45 days, administering 2 respiratory vaccinations, deworming, accustoming calves to feed bunks, implanting, administering no antibiotics, keeping vaccination, medical, and/or birthday records, individually identifying calves, and age and source verification.

The AE Class is an index of age and experience. Former studies have included either age or experience but have rarely included both due to the high correlation among the two (Levy and Sharma, 1994). The AE Class was created to exhibit the idea that the blend of age and experience and the proportion of the blend is a stronger indicator of adoption rather than age or experience alone. The index is created by multiplying a producer's age category by the producer's experience category. Age is simply the age of the producer with categories ranging from 1 to 5, and experience is the number of years of experience a producer has in the cattle industry with categories ranging from 1 to 4. For instance, when evaluating age independently, one might predict younger producers to be more likely to adopt a practice. However, when analyzing age and experience simultaneously, a younger producer with more experience may be less likely to adopt a particular practice than initially expected because he may be opposed to change or may already be aware of the practice but has chosen to not adopt it.

Producers who did not implement a practice were then evaluated to determine the probability of the constraint categories hindering adoption. Four logit models based on Equation 1 were evaluated for each practice. The dependent variables were the four constraint categories: doubt returns/premiums, technical education, marketing education, and management, which are further described in Table 3. The independent variables were the same as Equation 2. The

dependent variable takes on a value of 1 if the producer indicates that the constraint category hinders adoption and a value of 0 if it does not.

**Results**

Table 1 shows non-adoption rates by practice. Country-of-Origin-Labeling exhibits the highest rate of non-adoption, likely since, in practicality, producers have little involvement with COOL. Age and source verification, with a 61% non-adoption rate, was the second most non-adopted practice. Only 27% of respondents indicated that they do not castrate.

Table 2 summarizes producer demographics as reported in the survey. A majority of respondents have fewer than 50 head of cattle, followed closely by producers who have between 50 and 99 head of cattle. This is similar to Vestal et al. (2007) who found 68% of commercial producers to own less than 100 head and to the 2007 Census of Agriculture which stated 86% of the cow-calf producers in Oklahoma have 100 head of cattle or less (USDA). Region also plays a vital role in describing the respondents, as 64% percent of these producers live in the Southeast or Northeast regions of the state of Oklahoma,and the smallest percentage of respondents reside in the Northwest or Panhandle regions.

The aging of agricultural producers is a current concern in the agricultural industry. The age distribution of producers in this study clearly supports this concern, since approximately 40% of the respondents are 65 or older and roughly 40% of respondents are between the ages of 51 and 64, meaning a significant share of producers are near or at retirement. The age distribution of this research is similar to the 2007 Census of Agriculture which found approximately 48% of Oklahoma cow-calf producers to be over the age of 65 (USDA). Moreover, the high number of older producers corresponds with the results of the experience

classes. Producers who stated they have over 25 years of experience comprise 68% of the respondents, and only 1% of respondents claim to have less than 5 years of experience. Educational attainment has been shown to influence adoption rates in other studies. The bulk of survey respondents have a high school education or less, which coincides with the fact that most producers are older and have more than 16 years of experience. Full-time agricultural production comprised a larger percentage of employment several decades ago (Dimitri, Effland, and Conklin), and thus, many producers began a career in farming and ranching after they finished high school or dropped out of school to start an agricultural vocation. Accordingly, fewer respondents have a vocational education, a Bachelor's degree, or a Graduate or Professional degree.

Regarding household net income, 55% of producers have a household income of $30,000 to $59,000 or $60,000 to $89,999, and a significantly large portion of respondents stated farm income makes up less than 20% of their income while very few indicated farm income comprised more than 61% of their income. The percentage of farm income distribution in this research is also similar to Vestal et al. (2007) who discovered that 76% of cow-calf producers depended on cattle production for less than 40% of their household income. These results correspond with the notion that fewer people are involved with full-time agricultural and more producers consider their operation as a hobby. In fact, the United States Department of Agriculture Economic Research Service has shown off farm employment to increase from 54% of households in the United States in 1970 to 93% in 2002 (Dimitri, Effland, and Conklin). Furthermore, respondents who have not had Master Cattlemen training or Beef Quality Assurance training far exceed those who have had training.

When assessing how producer demographics influence the non-adoption of value-added marketing and management practices, the results from the first set of logit models show similar patterns of significance for comparable practices. Table 4 reports these results. For this study, the threshold of significance is considered to be a p-vale of 0.1 or smaller. These marginal effects provide an easy interpretation of the effect of demographics on non-adoption of a practice. For example, the marginal effect of herd size 2 on the probability of a producer not using castration is -0.041 meaning that the probability of not castrating is 4.1 percent less for producers with herds of 50-99 cows compared to herds of less than 50 cows (herd size 1). In general, for hands-on practices like castration, dehorning, weaning, accustoming calves to feed bunks, and individually identifying calves, herd size 3 (100-499 cows) has a significant influence on all but one of these practices (individual id) and reduces the probability of non-adoption by 9.8-11.8%. This outcome may be attributed to the idea that producers do not see "hands-on" practices being worthwhile for less than 100 head of cattle or for hobby-type producers, but a herd size of 500 head or more of cattle may not be feasible for these practices either, as more labor would be required. Region plays a role in reducing the probability of non-adoption in most of these "hands-on" practices except accustoming calves to feed bunks when compared to the base region (Southeast). The most outstanding regional effect occurs from Northwest region in castration which reduces the probability of non-adoption by almost 18%. Due to the traditional, commercial ranching operations, Northwest producers are less likely to not adopt dehorning and weaning than Northeast and Southwest producers. Moreover, the only AE class that has a significant effect in reducing non-adoption of these hands-on practices is AE class 4 on familiarizing calves to feed bunks. This result exhibits the idea that older and more experienced producers precondition their calves with the next stage of production in mind. Similarly, a

graduate or professional degree is the only education class that lowers the probability of non-adoption of accustoming calves to feed bunks and individually identifying cattle. Income has a significant effect in reducing the probability of non-adoption in castration and dehorning, but there is not always a higher reduction in the probability of non-adoption as a producer receives more income. Furthermore, for all of the "hands-on" practices, the probability of non-adoption is reduced by at least one of the farm income classes. Generally, as the percent of farm income increases, the likelihood of non-adoption decreases. Training reduces the probability of non-adoption for all of the "hands-on" practices, especially for weaning, accustoming calves to feed bunks, and individual identification which reduces the probability by 15%, 16%, and 22%, respectively.

Of the fourteen practices listed, respiratory vaccinations, deworming, and implanting can be considered health related practices. Having a herd of 100 to 499 cows reduces the probability of not adopting respiratory vaccinations and deworming by 12.6-14.7%. Again, this may be due to the notion that hobby type producers do not see it worthwhile to implement heath-related practices on fewer than 100 head or are not familiar these practices, and giving respiratory vaccinations, deworming, and implanting may not be feasible for 500 head or more of cattle. Producers who live in Southwest and Northwest regions are less likely to not-adopt deworming and implanting. When compared to AE class 1, AE class 3 and 4 reduce the possibility of non-adoption only for implanting. However, educational level plays an interesting and opposite role in these health related practices than expected. For respiratory vaccinations, producers with a vocational education or higher significantly increase the probability of non-adoption, and producers with a vocational education or higher raise the likelihood of non-adoption of implanting as well. Hobby-type producers may also be influencing these results because they are

likely more formally educated and thus have off farm income. Producers who obtain 21% or more of their income from the farm have a reduced chance of not adopting respiratory vaccinations and implanting from 10 to 25% but do not have a significant effect on deworming. Moreover, training decreases the probability of non-adoption for all health related practices, especially for respiratory vaccination which is reduced by approximately 23%.

Because using no antibiotics (for natural programs) has not existed for a long period of time and can be viewed as a marketing tool, the practice of not using antibiotics can be considered a niche sector in the beef industry. Producers in the Northeast and Southwest regions have a reduced probability of not implementing "no antibiotics" or natural beef along with AE class 3 and 4. Even though producers who fall into AE class 3 and 4 are older and often "set in their ways," these producers may realize the value of natural beef and its niche market. On the other hand, producers holding a Bachelor's degree or higher have an increased likelihood of not using "no antibiotics." It is noteworthy that training is not significant for this practice.

The models for record keeping, which consists of vaccination records, medical records, and birth date records, yield mixed results. Producers with 100 to 499 head of cows are less likely to not keep vaccination records or medical records, but having 100 to 499 head of cows does not significantly affect the probability of keeping birth date records. Moreover, a producer is 7% less likely to not keep birth date records when he falls into AE class 2 and is 9% less likely when falls into AE class 4. Producers of a younger age and experience category may see the importance in keeping birth date records, while older producers with more experience may see the value in keeping birth date records as well. AE class 4 also decreases the likelihood of not keeping vaccination records. The probability of not keeping birth date records is also notably influenced by and increased by holding a Graduate or professional degree, meaning the most

educated producers may not realize its value or have the time to document birth dates if earning off farm income consumes a majority of their time. Higher levels of household net farm income only decrease the likelihood of not adopting medical records, and training significantly diminishes the probability of not adopting all three of the record keeping practices.

For more recently introduced practices such as age and source verification and country-of-origin labeling mixed results were found. The probability of not adopting age and source verification is reduced by owning 100 to 499 head of cows, even though the likelihood of not adopting COOL is decreased when a producer owns between 50 and 499 head of cows. Perhaps having a herd size of 100 to 499 head is optimal for age and source verification as with many other practices. AE class 4 significantly diminishes the probability of not adopting both age and source verification and COOL. Moreover, producers holding a vocational education or higher affect both practices but increase the likelihood of non-adoption rather than reducing the likelihood. Because one might suspect that more formally educated producers would be well informed on current industry affairs, these results are contrary to intuitive conclusions. Again, these results coincide with the notion that educated producers are more concerned with off farm income and may be considered hobby farmers, meaning they are not always progressive. Producers earning a net household income of $30,000 to $89,999 and $120,000 or more have an increased probability of non-adoption of age and source verification, and earning a household net income of $60,000 to $89,999 and $120,000 or more increases the likelihood of not participating in COOL. Furthermore, producers who receive 41% to 60% of their income from the farm have a reduced likelihood of not adopting age and source verification and COOL. Training, however, reduces the likelihood of not adopting age and source verification by 17.3% and of not participating in COOL by 18.6%.

When analyzing the impacts of producer demographics on these practices, it is notable that training is significant for all practices except for no antibiotics, indicating extension efforts are effective. Owning 100 to 499 head significantly reduces the likelihood of non-adoption for ten of the fourteen practices. This result for this herd size may indicate implementing these practices is most advantageous for 100 to 499 head of cattle. At least one farm income class diminishes the probability of non-adoption for ten of the practices and by as much as 25%. Education as a whole affects eight of the practices but increases the probability of non-adoption rather than decreasing the probability. Both Region and AE classes have an impact on reducing the likelihood of non-adoption for 7 practices. Additionally, income significantly reduces the probability of non-adoption for castration and dehorning but increases the probability of non-adoption for implants, age and source verification, and COOL.

*Demographic Impacts on Constraint*

After evaluating the effects of demographics on producers who did not implement the value-added management and marketing practices, an additional set of logit models were estimated to determine the effect of producer demographics on the probability that various constraints were likely to be listed as reasons for non-adoption. Results are reported for selected practices, including castration, dehorning, weaning, and on-farm respiratory vaccinations. Table 5 reports results for non-adoption of castration of bull calves. For producers who do not castrate, producers owning 50 to 499 head have lower likelihoods of listing technical education and management issues as constraints by 4.3% to 6.4%. In the Northwest region the likelihood of a producer who did not castrate decreases to list three of the four categories (doubt returns/premiums, technical education, and management) as a constraint, while the Southwest region decreases the probability of a non-castrating producer describing management as a

limitation. AE class 4 is the only AE class to have a significant impact on technical education, and AE class 4 increases the likelihood of a non-castrating producer listing technical education as a constraint. Producers with a household net income of $60,000 to $119,999 have a reduced probability of a non-castrating producer stating doubt returns/premiums, technical education, or management as a deterrent to castration. Moreover, producers who do not castrate are less likely to state technical education as an obstacle when they receive 21% to 40%, 41% to 60%, and 61% to 100% of their income from the farm by 4.9%, 7.6%, and 10.5%. Training does not significantly influence any of the 4 constraint categories for non-castrating producers. Furthermore, 7 of the producer demographics in technical education significantly influence the probability of a producer stating technical education as a constraint to castration, while management has 6 significant producer demographics.

The impacts of producer demographics on constraints to dehorning are reported in Table 6. Owning 100 to 499 head reduces the probability of a producer who does not dehorn listing management as a constraint. Additionally, owning 500 head or more significantly increases the probability of a non-dehorning producer to list marketing education as a constraint by 28%. The probability of a producer listing marketing education or management as a constraint to dehorning is significantly reduced by producers in the Northwest region. It is also noteworthy that producers holding a vocational education will have an increased likelihood of stating management as an issue for dehorning. For producers who do not dehorn, the odds of them stating technical education as a restriction is diminished if they have a household net income of $60,000 or more and if they make 21% to 60% or their income from the farm. As with the producers who do not castrate, none of the constraint categories for producers who do not dehorn

are influenced by training programs, and technical education and management had more significant demographics than doubt returns/premiums and marketing education.

Table 7 reports non-adopters' demographic impact on constraints to weaning calves on farm with delayed marketing. The constraint categories entailed with weaning show more concise results than many of the other practices. Owning 50 to 99 head reduces the probability of a non-weaning producer stating management is an obstruction to weaning but increases the probability of the producer doubting the returns/premiums. For non-weaning producers, owning 100 to 499 head significantly reduces the likelihood of technical education being a constraint hindering weaning. Producers in the Northeast, Southwest, and Northwest regions have a diminished probability of a producer who does not wean his calves to say management is an issue, while producers in the Southwest and Northwest regions have a reduced likelihood of technical education being an obstacle to weaning. Producers who receive 21% to 40% and 41% to 60% of their income from the farm will have a 5.7% and 11.5% reduced likelihood of stating technical education as a constraint to weaning. Additionally, producers earning 61% to 100% of their income from the farm have a reduced chance of stating management as a constraint. Doubting returns/premiums and technical education are 6.7% and 11.6% less likely to be limitations to weaning when producers have had training. Overall, technical education and management had the most number of significant demographics, and marketing education did not have any significant demographics.

Non-adopters' demographic impact on perceived constraints to respiratory vaccinations are presented in Table 8. It is noteworthy that none of the herd size classes influence the four constraint categories. The Northeast and Southwest regions both reduce the chance that a producer who does not give respiratory vaccinations will cite management factors as an issue by

approximately 3.9%. Moreover, the odds of listing technical education as a hindrance to respiratory vaccinations are reduced by 6.9% if a producer lives in the Northwest. Holding a Bachelor's degree diminishes the likelihood of a producer stating marketing education is a constraint to giving respiratory vaccinations, while a producer holding a Bachelor's degree or higher has an increased likelihood of being obstructed by technical education. A producer is more probable to doubt returns/premiums when holding a Graduate or Profession degree and has a household net income of $30,000 to $89,999. On the other hand, producers are less likely to state technical education as an issue when they have a household net income of $60,000 or more. When a producer receives 21% to 60% of income from the farm, the probability of doubting returns/premiums and technical education being issues in giving respiratory vaccination is diminished. Furthermore, training decreases the odds of doubting returns/premiums, technical education, and management being constraints to administering respiratory vaccinations. Technical education had the most significant demographics, followed by the doubt returns/premiums constraint category.

## Conclusion

The distribution of the demographic variables gives one a good idea of the type of respondents and producers in Oklahoma. Most producers have fewer than 99 cows, are at least 51 years of age, have 16 or more years of experience, have 20% or less of their income come from the farm, and have not had training. Thus, many of producers are older and are at or near retirement age, meaning they may not want to adopt practices because they will be retiring soon, and the older producers may be downsizing as well. Furthermore, the large percentage of small herd sizes and large percentage of producers who earn less than 20% of their income from the farm indicates most producers are now hobby-type producers. This likely contributes to the large

portion of producers who have not had Master Cattleman or Beef Quality Assurance training, as training for beef production would not be as important when beef production does not comprise the majority of a producer's income.

The initial probabilities of non-adopted practices in Table 12 corresponded with the frequencies of the practices not adopted in Table 2. For instance, as a whole Oklahoma beef producers are 25% likely to not adopt castration, 29% likely to not adopt dehorning, 45% likely to not adopt weaning, 50% likely to not give respiratory vaccinations, and 57% are likely to not adopt implants.

When determining which producer demographics significantly affect the non-adopted practices, herd size 3 reduces the probability of non-adoption in ten of the fourteen practices, meaning owning 100 to 499 head positively influences for adoption. Region also plays a role in determining who adopts some of the hands-on practices such as castrating, dehorning, weaning, deworming, and implanting. Furthermore, the practices just mentioned are usually less likely to not be adopted when producers are in the Southwest or Northwest regions of Oklahoma. The AE classes that were created are a new contributing initiative, and the AE classes show how the combination of age and experience influences and reduces the likelihood of non-adoption of practices that can be considered beyond the basic preconditioning practices like implanting, using no antibiotics, keeping vaccination and birthday records, implementing age and source verification, and participating in COOL. Thus, as producers become older and have more experience, they are more likely to adopt supplemental value-added management and marketing practices. At least one of the education classes is significant in eight of the fourteen practices. However, education is shown to increase the probability of non-adoption rather than decreasing it. Moreover, a producer with a higher education level is more likely to have a job off of the

farm, have a smaller percentage of income from the farm, and have a smaller percentage of income derived from cattle in Table 11 in the Appendix. As mentioned earlier, higher levels of household income reduce the likelihood of non-adoption of castration and dehorning, but income increases the probability of non-adoption for implants, age and source verification, and COOL. Perhaps the practices that have a heightened likelihood of non-adoption based on income stems from the notion that producers are less concerned with added-value when they reach a higher income level. At least one of the percentage of farm income classes is statistically significant in ten of the fourteen practices, and generally speaking, the probability of non-adoption decreases as the percentage of farm income increases. This is to be expected, as higher dependence on the income from cattle production increases the likelihood of a producer being progressive and adopting practices that add value. Furthermore, training was significant in all of the practices except using no antibiotics, signifying the effectiveness of extension efforts.

The second set of logit models identifies the producer demographics that statistically influence reasons hindering implementation for non-adopting producers. These results show the most frequent determinant of producers who doubt returns/premiums is education class 4, suggesting that when a producer has a graduate or professional degree, he or she is more likely to be uncertain about the financial return of these practices. Moreover, a producer who states technical education as an obstruction is most identifiable by training status, income, and percent of farm income. The most frequent significant class of demographics in determining marketing education constraints are the AE classes. Additionally, producers who are more likely to cite management as an obstruction to implementation are most easily identifiable by their herd size, region, and percentage of farm income.

Overall, these results show Oklahoma beef producers are older with more experience and/or receive a majority of their income off of the farm, meaning being a progressive producer is not always a priority. Smaller herd sizes are also the norm, indicating many producers raise cattle as a hobby or to maintain an agricultural lifestyle. While the training that producers have received is effective, future extension efforts will mostly be needed to educate producers on how to implement practices and the value of the practices.

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Table 1. Percentage of Non-Adopting Producers by Practice

| Practice | Percent |
|---|---|
| Castrate | 0.27 |
| Dehorn | 0.31 |
| Wean | 0.46 |
| Respiratory Vaccinations | 0.51 |
| Deworm | 0.28 |
| Feed Bunks | 0.35 |
| Implant | 0.57 |
| No Antibiotics | 0.40 |
| Vaccination Records | 0.44 |
| Medical Records | 0.45 |
| Birth Date Records | 0.29 |
| Individual ID | 0.50 |
| Age & Source Verification | 0.61 |
| Country-of-Origin Labeling | 0.63 |

**Table 2. Distribution of Survey Respondents across Demographic Variables**

| Characteristic | Category | Variable | % of Respondents |
|---|---|---|---|
| Herd size | 1 to 49 cows | HERDSIZE1 | 0.44 |
| | 50 to 99 cows | HERDSIZE2 | 0.33 |
| | 100 to 499 cows | HERDSIZE3 | 0.22 |
| | 500 + cows | HERDSIZE4 | 0.01 |
| Region | Southeast | REGION1 | 0.33 |
| | Northeast | REGION2 | 0.31 |
| | Southwest | REGION3 | 0.20 |
| | Northwest and Panhandle | REGION4 | 0.16 |
| Age | Under 30 years of age | AGE1 | 0.00 |
| | 31 to 40 years of age | AGE2 | 0.04 |
| | 41 to 50 years of age | AGE3 | 0.13 |
| | 51 to 64 years of age | AGE4 | 0.40 |
| | 65 + years of age | AGE5 | 0.42 |
| Experience | Less than 5 years of experience | EXPERIENCE1 | 0.01 |
| | 5 to 15 years of experience | EXPERIENCE2 | 0.12 |
| | 16 to 25 years of experience | EXPERIENCE3 | 0.19 |
| | Over 25 years of experience | EXPERIENCE4 | 0.68 |
| AE Class | Age x Experience = 1-8 | AECLASS1 | 0.12 |
| | Age x Experience = 9-12 | AECLASS2 | 0.22 |
| | Age x Experience = 13-16 | AECLASS3 | 0.32 |
| | Age x Experience = 17-20 | AECLASS4 | 0.34 |
| Education | High School graduate or Less | EDUCATION1 | 0.39 |
| | Vocational education | EDUCATION2 | 0.18 |
| | Bachelor's degree | EDUCATION3 | 0.24 |
| | Graduate or Professional degree | EDUCATION4 | 0.19 |
| Household Income | Net income of less than $30,000 | INCOME1 | 0.13 |
| | Net income of $30,000 to $59,999 | INCOME2 | 0.28 |
| | Nett income of $60,000 to $89,999 | INCOME3 | 0.27 |
| | Net income of $90,000 to $119,999 | INCOME4 | 0.15 |
| | Net income of $120,000 + | INCOME5 | 0.17 |
| Farm Income | 0% to 20% | FARMINCOME1 | 0.59 |
| | 21% to 40% | FARMINCOME2 | 0.22 |
| | 41% to 60% | FARMINCOME3 | 0.11 |
| | 61% to 100% | FARMINCOME4 | 0.07 |
| Training | No Master Cattleman or Beef Quality Assurance training | TRAINING0 | 0.91 |
| | Master Cattleman or Beef Quality Assurance training | TRAINING1 | 0.09 |

*Please note age and experience are not included individually in the logit models but are included as a combined class.

**Table 3. Descsription of Constraint Categories**

| **Finance** | |
|---|---|
| 1 | Hesitant to ask for financing to pay for the upfront costs |
| **2** | My lender says no to financing the upfront costs |
| **Doubt Returns/Premiums** | |
| 3 | Other cattlemen tried it and it did not pay |
| 4 | Buyers don't pay any premium for it |
| 5 | Buyers don't pay enough premium to cover the cost |
| 6 | Haven't done it in the past and have done okay |
| **Technical Education** | |
| 7 | I am not familiar with this practice |
| 8 | I am familiar with this practice but don't use it on my ranch |
| 9 | Don't really know what it requires or value it adds |
| 10 | Thought about it but need help with specifics of how to implement it on my ranch |
| **Marketing Education** | |
| 11 | I use this practice, but don't know how to use it in marketing my cattle |
| 12 | Don't know where/how to market these cattle |
| **Marketing** | |
| 13 | I market my claves to sellers based on this practice |
| 14 | Don't want to commit to selling calves through a specific company or group |
| **Management** | |
| 15 | Requires too much labor |
| 16 | Didn't have enough calves to mess with it |
| 17 | My buyers do it themselves once they have the cattle |

**Table 4. Effect of Producer Demographics on Non-Adopted Practices**

| | | | Castrate | | | Dehorn | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | Coefficient | P-Value | Marginal Effect | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | 0.459* | 0.083 | | 0.293 | 0.253 | |
| **Herd size** | **Herdsize 2** | 50 to 99 cows | -0.211 | 0.176 | -0.041 | -0.158 | 0.289 | -0.034 |
| | **Herdsize 3** | 100 to 499 cows | -0.673* | 0.003 | -0.118 | -0.492* | 0.020 | -0.098 |
| | **Herdsize 4** | 500 + cows | -0.734 | 0.508 | -0.126 | 0.024 | 0.977 | 0.005 |
| **Region** | **Region 2** | Northeast | -0.412* | 0.010 | -0.083 | -0.104 | 0.500 | -0.023 |
| | **Region 3** | Southwest | -0.481* | 0.009 | -0.096 | -0.433* | 0.016 | -0.089 |
| | **Region 4** | Northwest and Panhandle | -1.032* | <.0001 | -0.179 | -0.560* | 0.006 | -0.112 |
| **AE Class** | **AECLASS 2** | Age x Experience = 9-12 | -0.216 | 0.344 | -0.041 | -0.300 | 0.169 | -0.063 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.338 | 0.122 | -0.063 | -0.275 | 0.185 | -0.058 |
| | **AECLASS 4** | Age x Experience = 17-20 | -0.033 | 0.879 | -0.007 | -0.147 | 0.484 | -0.032 |
| **Education** | **Education 2** | Vocational education | -0.045 | 0.814 | -0.008 | 0.189 | 0.295 | 0.040 |
| | **Education 3** | Bachelor's degree | -0.182 | 0.325 | -0.033 | -0.050 | 0.774 | -0.010 |
| | **Education 4** | Graduate or Professional degree | -0.013 | 0.947 | -0.002 | 0.161 | 0.379 | 0.034 |
| **Income** | **Income 2** | $30,000 to $59,999 | -0.437* | 0.036 | -0.091 | -0.300 | 0.139 | -0.068 |
| | **Income 3** | $60,000 to $89,999 | -0.546* | 0.012 | -0.111 | -0.474* | 0.024 | -0.104 |
| | **Income 4** | $90,000 to $119,999 | -0.832* | 0.002 | -0.159 | -0.488* | 0.046 | -0.107 |
| | **Income 5** | $120,000 + | -0.497* | 0.056 | -0.102 | -0.615* | 0.015 | -0.131 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.237 | 0.173 | -0.046 | -0.270* | 0.102 | -0.058 |
| | **FarmIncome 3** | 41% to 60% | -0.750* | 0.007 | -0.128 | -0.738* | 0.004 | -0.142 |
| | **FarmIncome 4** | 61% to 100% | -1.067* | 0.007 | -0.166 | -0.904* | 0.009 | -0.167 |
| **Training** | **Training** | MC or BQA Training | -0.552* | 0.053 | -0.090 | -0.598* | 0.025 | -0.110 |

*Asterisk denotes significance of 0.1 or better.

**Table 4. Continued**

| | | | Wean | | | Respiratory Vaccinations | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-Value** | **Marginal Effect** | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | 0.439* | 0.077 | | 0.342 | 0.172 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.084 | 0.551 | -0.021 | -0.149 | 0.296 | -0.037 |
| | **HerdSize 3** | 100 to 499 cows | -0.418* | 0.024 | -0.102 | -0.511* | 0.006 | -0.127 |
| | **HerdSize 4** | 500 + cows | 0.279 | 0.693 | 0.070 | -0.988 | 0.240 | -0.237 |
| **Region** | **Region 2** | Northeast | -0.098 | 0.502 | -0.024 | -0.143 | 0.336 | -0.036 |
| | **Region 3** | Southwest | -0.443* | 0.008 | -0.109 | -0.205 | 0.220 | -0.051 |
| | **Region 4** | Northwest and Panhandle | -0.588* | 0.001 | -0.144 | -0.240 | 0.186 | -0.060 |
| **AE Class** | **AECLASS 2** | Age x Experience = 9-12 | -0.087 | 0.672 | -0.022 | -0.181 | 0.389 | -0.045 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.074 | 0.708 | -0.018 | -0.090 | 0.654 | -0.022 |
| | **AECLASS 4** | Age x Experience = 17-20 | -0.120 | 0.550 | -0.030 | -0.166 | 0.415 | -0.041 |
| **Education** | **Education 2** | Vocational education | 0.002 | 0.989 | 0.001 | 0.373* | 0.029 | 0.093 |
| | **Education 3** | Bachelor's degree | 0.190 | 0.230 | 0.047 | 0.646* | <.0001 | 0.160 |
| | **Education 4** | Graduate or Professional degree | 0.263 | 0.124 | 0.065 | 0.571* | 0.001 | 0.142 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.092 | 0.642 | 0.023 | 0.285 | 0.151 | 0.071 |
| | **Income 3** | $60,000 to $89,999 | 0.017 | 0.934 | 0.004 | 0.155 | 0.448 | 0.039 |
| | **Income 4** | $90,000 to $119,999 | -0.337 | 0.149 | -0.082 | -0.178 | 0.445 | -0.044 |
| | **Income 5** | $120,000 + | -0.176 | 0.451 | -0.044 | -0.056 | 0.813 | -0.014 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.291* | 0.055 | -0.072 | -0.475* | 0.002 | -0.118 |
| | **FarmIncome 3** | 41% to 60% | -0.610* | 0.005 | -0.148 | -0.800* | 0.000 | -0.196 |
| | **FarmIncome 4** | 61% to 100% | -0.872* | 0.002 | -0.206 | -0.541* | 0.043 | -0.134 |
| **Training** | **Training** | MC or BQA Training | -0.642* | 0.005 | -0.151 | -0.965* | <.0001 | -0.229 |

*Asterisk denotes significance of 0.1 or better.

**Table 4. Continued**

| | | | Deworm | | | Feed Bunks | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-Value** | **Marginal Effect** | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | -0.506* | 0.061 | | 0.017 | 0.948 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.203 | 0.187 | -0.042 | -0.060 | 0.681 | -0.014 |
| | **HerdSize 3** | 100 to 499 cows | -0.825* | 0.000 | -0.147 | -0.464* | 0.020 | -0.099 |
| | **HerdSize 4** | 500 + cows | -0.258 | 0.762 | -0.053 | 0.465 | 0.540 | 0.113 |
| **Region** | **Region 2** | Northeast | -0.174 | 0.274 | -0.035 | -0.049 | 0.747 | -0.011 |
| | **Region 3** | Southwest | -0.410* | 0.028 | -0.078 | 0.152 | 0.370 | 0.035 |
| | **Region 4** | Northwest and Panhandle | -0.269 | 0.181 | -0.053 | -0.252 | 0.192 | -0.054 |
| **AE Class** | **AECLASS 2** | Age x Experience = 9-12 | -0.131 | 0.571 | -0.024 | -0.306 | 0.148 | -0.070 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.139 | 0.529 | -0.026 | -0.159 | 0.427 | -0.037 |
| | **AECLASS 4** | Age x Experience = 17-20 | 0.300 | 0.172 | 0.061 | -0.369* | 0.073 | -0.084 |
| **Education** | **Education 2** | Vocational education | 0.222 | 0.236 | 0.043 | 0.032 | 0.858 | 0.007 |
| | **Education 3** | Bachelor's degree | 0.108 | 0.548 | 0.020 | 0.148 | 0.372 | 0.033 |
| | **Education 4** | Graduate or Professional degree | 0.294 | 0.114 | 0.058 | 0.333* | 0.059 | 0.075 |
| **Income** | **Income 2** | $30,000 to $59,999 | -0.034 | 0.875 | -0.007 | -0.069 | 0.735 | -0.016 |
| | **Income 3** | $60,000 to $89,999 | -0.017 | 0.940 | -0.003 | -0.153 | 0.465 | -0.035 |
| | **Income 4** | $90,000 to $119,999 | -0.226 | 0.379 | -0.043 | -0.282 | 0.244 | -0.063 |
| | **Income 5** | $120,000 + | -0.062 | 0.811 | -0.012 | -0.184 | 0.451 | -0.042 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.256 | 0.137 | -0.050 | -0.248 | 0.119 | -0.057 |
| | **FarmIncome 3** | 41% to 60% | -0.365 | 0.147 | -0.069 | -0.661* | 0.006 | -0.140 |
| | **FarmIncome 4** | 61% to 100% | -0.503 | 0.139 | -0.092 | -1.122* | 0.001 | -0.215 |
| **Training** | **Training** | MC or BQA Training | -0.536* | 0.053 | -0.093 | -0.830* | 0.002 | -0.160 |

*Asterisk denotes significance of 0.1 or better.

**Table 4. Continued**

| | | | Implant | | | No Antibiotics | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-Value** | **Marginal Effect** | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | 0.520* | 0.040 | | -0.123 | 0.625 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.067 | 0.647 | -0.016 | -0.058 | 0.684 | -0.014 |
| | **HerdSize 3** | 100 to 499 cows | -0.244 | 0.190 | -0.060 | -0.076 | 0.683 | -0.018 |
| | **HerdSize 4** | 500 + cows | -0.919 | 0.282 | -0.225 | 0.246 | 0.725 | 0.060 |
| **Region** | **Region 2** | Northeast | 0.037 | 0.805 | 0.009 | -0.252* | 0.086 | -0.061 |
| | **Region 3** | Southwest | -0.419* | 0.012 | -0.103 | -0.348* | 0.037 | -0.083 |
| | **Region 4** | Northwest and Panhandle | -0.498* | 0.006 | -0.123 | -0.084 | 0.638 | -0.020 |
| **AE Class** | **AECLASS 2** | Age x Experience = 9-12 | -0.087 | 0.686 | -0.020 | -0.175 | 0.388 | -0.043 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.412* | 0.042 | -0.100 | -0.544* | 0.005 | -0.132 |
| | **AECLASS 4** | Age x Experience = 17-20 | -0.351* | 0.089 | -0.084 | -0.568* | 0.004 | -0.138 |
| **Education** | **Education 2** | Vocational education | 0.395* | 0.022 | 0.096 | 0.096 | 0.576 | 0.022 |
| | **Education 3** | Bachelor's degree | 0.188 | 0.237 | 0.047 | 0.325* | 0.040 | 0.077 |
| | **Education 4** | Graduate or Professional degree | 0.367* | 0.035 | 0.090 | 0.607* | 0.000 | 0.146 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.552* | 0.006 | 0.136 | 0.244 | 0.232 | 0.058 |
| | **Income 3** | $60,000 to $89,999 | 0.474* | 0.021 | 0.117 | 0.150 | 0.474 | 0.035 |
| | **Income 4** | $90,000 to $119,999 | 0.277 | 0.235 | 0.069 | 0.172 | 0.465 | 0.040 |
| | **Income 5** | $120,000 + | 0.261 | 0.265 | 0.065 | 0.198 | 0.405 | 0.046 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.418* | 0.006 | -0.102 | -0.073 | 0.634 | -0.018 |
| | **FarmIncome 3** | 41% to 60% | -0.620* | 0.003 | -0.152 | -0.315 | 0.149 | -0.074 |
| | **FarmIncome 4** | 61% to 100% | -1.032* | 0.000 | -0.252 | -0.262 | 0.340 | -0.062 |
| **Training** | **Training** | MC or BQA Training | -0.524* | 0.016 | -0.130 | -0.168 | 0.435 | -0.039 |

*Asterisk denotes significance of 0.1 or better.

**Table 4. Continued**

| | | | Vaccination Records | | | Medical Records | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-Value** | **Marginal Effect** | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | 0.287 | 0.250 | | 0.097 | 0.696 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.025 | 0.864 | -0.006 | -0.095 | 0.500 | -0.024 |
| | **HerdSize 3** | 100 to 499 cows | -0.498* | 0.009 | -0.120 | -0.482* | 0.010 | -0.117 |
| | **HerdSize 4** | 500 + cows | -1.559 | 0.158 | -0.313 | -0.956 | 0.259 | -0.218 |
| **Region** | **Region 2** | Northeast | -0.089 | 0.551 | -0.022 | -0.176 | 0.228 | -0.044 |
| | **Region 3** | Southwest | -0.216 | 0.200 | -0.053 | -0.215 | 0.192 | -0.053 |
| | **Region 4** | Northwest and Panhandle | -0.143 | 0.438 | -0.035 | -0.052 | 0.771 | -0.013 |
| **AE Class** | **AECLASS 2** | Age x Experience = 9-12 | -0.073 | 0.727 | -0.018 | 0.033 | 0.873 | 0.008 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.311 | 0.117 | -0.077 | -0.256 | 0.194 | -0.063 |
| | **AECLASS 4** | Age x Experience = 17-20 | -0.345* | 0.088 | -0.085 | -0.196 | 0.326 | -0.049 |
| **Education** | **Education 2** | Vocational education | -0.037 | 0.832 | -0.009 | 0.038 | 0.824 | 0.009 |
| | **Education 3** | Bachelor's degree | 0.146 | 0.366 | 0.036 | 0.256 | 0.106 | 0.063 |
| | **Education 4** | Graduate or Professional degree | 0.222 | 0.206 | 0.055 | 0.157 | 0.358 | 0.039 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.063 | 0.752 | 0.016 | 0.162 | 0.413 | 0.040 |
| | **Income 3** | $60,000 to $89,999 | -0.099 | 0.631 | -0.024 | 0.097 | 0.632 | 0.024 |
| | **Income 4** | $90,000 to $119,999 | -0.178 | 0.446 | -0.044 | 0.066 | 0.774 | 0.016 |
| | **Income 5** | $120,000 + | -0.065 | 0.784 | -0.016 | 0.140 | 0.548 | 0.034 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | 0.171 | 0.273 | 0.043 | 0.096 | 0.530 | 0.024 |
| | **FarmIncome 3** | 41% to 60% | -0.320 | 0.156 | -0.077 | -0.468* | 0.032 | -0.112 |
| | **FarmIncome 4** | 61% to 100% | -0.359 | 0.214 | -0.086 | -0.236 | 0.390 | -0.058 |
| **Training** | **Training** | MC or BQA Training | -0.930* | 0.000 | -0.208 | -0.915* | 0.000 | -0.207 |

*Asterisk denotes significance of 0.1 or better.

**Table 4. Continued**

| | | | Birthday Records | | | Individually Id | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-Value** | **Marginal Effect** | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | -0.418 | 0.120 | | 0.296 | 0.232 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.167 | 0.282 | -0.034 | -0.041 | 0.770 | -0.010 |
| | **HerdSize 3** | 100 to 499 cows | -0.102 | 0.612 | -0.021 | 0.090 | 0.627 | 0.022 |
| | **HerdSize 4** | 500 + cows | -13.711 | 0.977 | -0.310 | -0.364 | 0.645 | -0.090 |
| **Region** | **Region 2** | Northeast | -0.032 | 0.841 | -0.006 | -0.194 | 0.181 | -0.048 |
| | **Region 3** | Southwest | -0.185 | 0.307 | -0.036 | -0.332* | 0.041 | -0.083 |
| | **Region 4** | Northwest and Panhandle | 0.069 | 0.718 | 0.014 | -0.231 | 0.192 | -0.058 |
| **AE Class** | **AECLASS 2** | Age x Experience s= 9-12 | -0.369* | 0.097 | -0.077 | -0.214 | 0.299 | -0.053 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.294 | 0.160 | -0.062 | -0.289 | 0.140 | -0.072 |
| | **AECLASS 4** | Age x Experience = 17-20 | -0.413* | 0.055 | -0.086 | -0.301 | 0.133 | -0.075 |
| **Education** | **Education 2** | Vocational education | 0.162 | 0.376 | 0.032 | 0.176 | 0.290 | 0.044 |
| | **Education 3** | Bachelor's degree | 0.032 | 0.854 | 0.006 | 0.136 | 0.385 | 0.034 |
| | **Education 4** | Graduate or Professional degree | 0.340* | 0.064 | 0.069 | 0.333* | 0.050 | 0.083 |
| **Income** | **Income 2** | $30,000 to $59,999 | -0.043 | 0.842 | -0.009 | 0.213 | 0.278 | 0.053 |
| | **Income 3** | $60,000 to $89,999 | -0.113 | 0.607 | -0.023 | 0.042 | 0.833 | 0.011 |
| | **Income 4** | $90,000 to $119,999 | -0.101 | 0.685 | -0.020 | -0.037 | 0.871 | -0.009 |
| | **Income 5** | $120,000 + | -0.058 | 0.820 | -0.012 | 0.135 | 0.558 | 0.034 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | 0.040 | 0.814 | 0.008 | 0.063 | 0.678 | 0.016 |
| | **FarmIncome 3** | 41% to 60% | -0.236 | 0.328 | -0.044 | -0.442* | 0.038 | -0.109 |
| | **FarmIncome 4** | 61% to 100% | 0.111 | 0.700 | 0.023 | -0.153 | 0.558 | -0.038 |
| **Training** | **Training** | MC or BQA Training | -0.635* | 0.016 | -0.110 | -0.915* | <.0001 | -0.217 |

*Asterisk denotes significance of 0.1 or better.

**Table 4. Continued**

| | | | Age & Source Verification | | | COOL | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-Value** | **Marginal Effect** | **Coefficient** | **P-Value** | **Marginal Effect** |
| | **Intercept** | | 0.463* | 0.074 | | 0.685* | 0.009 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.154 | 0.296 | -0.036 | -0.249* | 0.097 | -0.056 |
| | **HerdSize 3** | 100 to 499 cows | -0.348* | 0.065 | -0.083 | -0.503* | 0.008 | -0.117 |
| | **HerdSize 4** | 500 + cows | -0.525 | 0.499 | -0.127 | -0.426 | 0.584 | -0.098 |
| **Region** | **Region 2** | Northeast | -0.122 | 0.418 | -0.029 | -0.125 | 0.411 | -0.029 |
| | **Region 3** | Southwest | -0.130 | 0.437 | -0.031 | -0.171 | 0.314 | -0.040 |
| | **Region 4** | Northwest and Panhandle | 0.093 | 0.619 | 0.021 | 0.102 | 0.593 | 0.023 |
| **AE Class** | **AECLASS 2** | Age x Experience = 9-12 | -0.018 | 0.935 | -0.004 | -0.069 | 0.764 | -0.014 |
| | **AECLASS 3** | Age x Experience = 13-16 | -0.224 | 0.287 | -0.050 | -0.319 | 0.141 | -0.069 |
| | **AECLASS 4** | Age x Experience = 17-20 | -0.672* | 0.002 | -0.159 | -0.626* | 0.004 | -0.143 |
| **Education** | **Education 2** | Vocational education | 0.341* | 0.049 | 0.082 | 0.384* | 0.031 | 0.090 |
| | **Education 3** | Bachelor's degree | 0.350* | 0.030 | 0.084 | 0.564* | 0.001 | 0.129 |
| | **Education 4** | Graduate or Professional degree | 0.544* | 0.002 | 0.128 | 0.340* | 0.054 | 0.080 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.347* | 0.082 | 0.085 | 0.324 | 0.107 | 0.077 |
| | **Income 3** | $60,000 to $89,999 | 0.450* | 0.030 | 0.109 | 0.494* | 0.018 | 0.115 |
| | **Income 4** | $90,000 to $119,999 | 0.290 | 0.217 | 0.071 | 0.160 | 0.496 | 0.039 |
| | **Income 5** | $120,000 + | 0.424* | 0.075 | 0.103 | 0.432* | 0.072 | 0.102 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.015 | 0.921 | -0.004 | 0.092 | 0.565 | 0.021 |
| | **FarmIncome 3** | 41% to 60% | -0.368* | 0.081 | -0.089 | -0.386* | 0.066 | -0.092 |
| | **FarmIncome 4** | 61% to 100% | 0.077 | 0.771 | 0.018 | -0.292 | 0.264 | -0.069 |
| **Training** | **Training** | MC or BQA Training | -0.706* | 0.001 | -0.174 | -0.765* | 0.000 | -0.186 |

*Asterisk denotes significance of 0.1 or better.

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**Table 5. Effects of Producer Demographics on Reason Categories for Producers Who Do Not Castrate**

| | | | Doubt Returns/ Premiums | | | Technical Education | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-value** | **Marginal Effects** | **Coefficient** | **P-value** | **Marginal Effects** |
| | **Intercept** | | -1.587* | 0.000 | | -1.005* | 0.004 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | 0.327 | 0.187 | 0.026 | -0.319 | 0.134 | -0.038 |
| | **HerdSize 3** | 100 to 499 cows | -0.384 | 0.333 | -0.023 | -0.602* | 0.063 | -0.064 |
| | **HerdSize 4** | 500 + cows | -12.619 | 0.986 | -0.075 | -12.494 | 0.984 | -0.157 |
| **Region** | **Region 2** | Northeast | -0.162 | 0.532 | -0.012 | -0.338 | 0.116 | -0.041 |
| | **Region 3** | Southwest | -0.239 | 0.431 | -0.018 | -0.330 | 0.179 | -0.040 |
| | **Region 4** | Northwest and Panhandle | -0.813* | 0.046 | -0.048 | -0.814* | 0.012 | -0.083 |
| **AE Class** | **AECLASS 2** | Age Class x Experience Class= 9-12 | -0.216 | 0.558 | -0.017 | 0.088 | 0.789 | 0.009 |
| | **AECLASS 3** | Age Class x Experience Class= 13-16 | -0.398 | 0.268 | -0.030 | 0.017 | 0.957 | 0.002 |
| | **AECLASS 4** | Age Class x Experience Class= 17-20 | -0.257 | 0.469 | -0.020 | 0.505* | 0.100 | 0.060 |
| **Education** | **Education 2** | Vocational education | 0.212 | 0.461 | 0.018 | -0.076 | 0.765 | -0.009 |
| | **Education 3** | Bachelor's degree | -0.795* | 0.028 | -0.045 | -0.259 | 0.309 | -0.029 |
| | **Education 4** | Graduate or Professional degree | 0.053 | 0.862 | 0.004 | -0.136 | 0.596 | -0.016 |
| **Income** | **Income 2** | $30,000 to $59,999 | -0.176 | 0.587 | -0.015 | -0.418 | 0.111 | -0.054 |
| | **Income 3** | $60,000 to $89,999 | -0.579* | 0.101 | -0.041 | -0.353 | 0.195 | -0.047 |
| | **Income 4** | $90,000 to $119,999 | -0.625 | 0.151 | -0.044 | -0.916* | 0.013 | -0.100 |
| | **Income 5** | $120,000 + | -0.089 | 0.825 | -0.008 | -0.411 | 0.235 | -0.053 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.082 | 0.770 | -0.006 | -0.445* | 0.070 | -0.049 |
| | **FarmIncome 3** | 41% to 60% | -0.598 | 0.204 | -0.035 | -0.774* | 0.047 | -0.076 |
| | **FarmIncome 4** | 61% to 100% | -0.609 | 0.346 | -0.036 | -1.285* | 0.041 | -0.105 |
| **Training** | **Training 1** | MC or BQA Training | -0.964 | 0.112 | -0.048 | -0.574 | 0.194 | -0.054 |

*Asterisk denotes significance of 0.1 or better.

**Table 5. Continued**

| | | | Marketing Education | | | Management | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-value** | **Marginal Effects** | **Coefficient** | **P-value** | **Marginal Effects** |
| | **Intercept** | | -1.313* | 0.001 | | -1.578* | 0.001 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | 0.177 | 0.475 | 0.014 | -0.763* | 0.013 | -0.043 |
| | **HerdSize 3** | 100 to 499 cows | -0.025 | 0.943 | -0.002 | -1.306* | 0.007 | -0.060 |
| | **HerdSize 4** | 500 + cows | 0.747 | 0.525 | 0.075 | -13.592 | 0.987 | -0.085 |
| **Region** | **Region 2** | Northeast | -0.376 | 0.138 | -0.031 | -0.413 | 0.154 | -0.025 |
| | **Region 3** | Southwest | -0.568* | 0.064 | -0.044 | -0.699* | 0.048 | -0.038 |
| | **Region 4** | Northwest and Panhandle | -0.683* | 0.054 | -0.050 | -1.083* | 0.019 | -0.051 |
| **AE Class** | **AECLASS 2** | Age Class x Experience Class= 9-12 | -0.415 | 0.217 | -0.040 | -0.159 | 0.727 | -0.007 |
| | **AECLASS 3** | Age Class x Experience Class= 13-16 | -0.472 | 0.136 | -0.044 | 0.342 | 0.412 | 0.019 |
| | **AECLASS 4** | Age Class x Experience Class= 17-20 | -0.699* | 0.034 | -0.060 | 0.280 | 0.508 | 0.015 |
| **Education** | **Education 2** | Vocational education | -0.379 | 0.251 | -0.026 | 0.076 | 0.818 | 0.005 |
| | **Education 3** | Bachelor's degree | -0.144 | 0.621 | -0.011 | -0.327 | 0.341 | -0.019 |
| | **Education 4** | Graduate or Professional degree | 0.182 | 0.531 | 0.016 | -0.886* | 0.029 | -0.040 |
| **Income** | **Income 2** | $30,000 to $59,999 | -0.328 | 0.340 | -0.027 | -0.337 | 0.334 | -0.020 |
| | **Income 3** | $60,000 to $89,999 | -0.145 | 0.672 | -0.013 | -0.808* | 0.048 | -0.039 |
| | **Income 4** | $90,000 to $119,999 | -0.286 | 0.476 | -0.024 | -0.268 | 0.560 | -0.016 |
| | **Income 5** | $120,000 + | -0.476 | 0.257 | -0.037 | 0.603 | 0.152 | 0.053 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.051 | 0.852 | -0.004 | -0.205 | 0.545 | -0.011 |
| | **FarmIncome 3** | 41% to 60% | -0.651 | 0.169 | -0.040 | -0.574 | 0.310 | -0.026 |
| | **FarmIncome 4** | 61% to 100% | -0.585 | 0.325 | -0.037 | -0.649 | 0.408 | -0.029 |
| **Training** | **Training 1** | MC or BQA Training | -0.513 | 0.251 | -0.033 | -0.827 | 0.263 | -0.032 |
| | | | HL: 0.0332 | | | | | |

*Asterisk denotes significance of 0.1 or better.

**Table 6. Effects of Producer Demographics on Reason Categories for Producers Who Do Not Dehorn**

| | | | Doubt Returns/ Premiums | | | Technical Education | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-value** | **Marginal Effects** | **Coefficient** | **P-value** | **Marginal Effects** |
| | **Intercept** | | -1.9669* | <.0001 | | -0.9012* | 0.0036 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | 0.186 | 0.457 | 0.014 | -0.020 | 0.913 | -0.003 |
| | **HerdSize 3** | 100 to 499 cows | -0.286 | 0.447 | -0.018 | -0.374 | 0.173 | -0.049 |
| | **HerdSize 4** | 500 + cows | -12.748 | 0.986 | -0.077 | -12.560 | 0.982 | -0.180 |
| **Region** | **Region 2** | Northeast | -0.171 | 0.499 | -0.013 | 0.056 | 0.774 | 0.008 |
| | **Region 3** | Southwest | -0.757* | 0.027 | -0.047 | -0.075 | 0.740 | -0.010 |
| | **Region 4** | Northwest and Panhandle | -0.464 | 0.183 | -0.032 | -0.037 | 0.884 | -0.005 |
| **AE Class** | **AECLASS 2** | Age Class x Experience Class= 9-12 | -0.271 | 0.481 | -0.018 | -0.112 | 0.683 | -0.015 |
| | **AECLASS 3** | Age Class x Experience Class= 13-16 | 0.086 | 0.807 | 0.007 | -0.171 | 0.517 | -0.022 |
| | **AECLASS 4** | Age Class x Experience Class= 17-20 | -0.162 | 0.657 | -0.011 | 0.166 | 0.525 | 0.024 |
| **Education** | **Education 2** | Vocational education | 0.160 | 0.595 | 0.012 | 0.275 | 0.205 | 0.040 |
| | **Education 3** | Bachelor's degree | -0.273 | 0.388 | -0.017 | -0.122 | 0.587 | -0.016 |
| | **Education 4** | Graduate or Professional degree | 0.171 | 0.570 | 0.012 | 0.023 | 0.921 | 0.003 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.003 | 0.994 | 0.000 | -0.324 | 0.168 | -0.053 |
| | **Income 3** | $60,000 to $89,999 | -0.025 | 0.944 | -0.002 | -0.674* | 0.007 | -0.099 |
| | **Income 4** | $90,000 to $119,999 | -0.462 | 0.306 | -0.028 | -0.547* | 0.064 | -0.083 |
| | **Income 5** | $120,000 + | 0.075 | 0.859 | 0.006 | -0.693* | 0.025 | -0.101 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.217 | 0.445 | -0.015 | -0.426* | 0.044 | -0.057 |
| | **FarmIncome 3** | 41% to 60% | -0.593 | 0.207 | -0.035 | -1.064* | 0.004 | -0.114 |
| | **FarmIncome 4** | 61% to 100% | -0.660 | 0.308 | -0.038 | -0.679 | 0.106 | -0.083 |
| **Training** | **Training** | MC or BQA Training | -0.731 | 0.170 | -0.038 | -0.444 | 0.207 | -0.053 |

*Asterisk denotes significance of 0.1 or better.

**Table 6. Continued**

| | | | Marketing Education | | | Management | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-value** | **Marginal Effects** | **Coefficient** | **P-value** | **Marginal Effects** |
| | **Intercept** | | -2.0341* | <.0001 | | -1.5276* | 0.0003 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | 0.205 | 0.489 | 0.011 | -0.452* | 0.103 | -0.030 |
| | **HerdSize 3** | 100 to 499 cows | 0.235 | 0.548 | 0.012 | -0.847* | 0.050 | -0.048 |
| | **HerdSize 4** | 500 + cows | 2.242* | 0.026 | 0.281 | -13.060 | 0.987 | -0.087 |
| **Region** | **Region 2** | Northeast | -0.297 | 0.307 | -0.018 | -0.251 | 0.354 | -0.017 |
| | **Region 3** | Southwest | -0.482 | 0.172 | -0.026 | -0.463 | 0.154 | -0.029 |
| | **Region 4** | Northwest and Panhandle | -0.951* | 0.039 | -0.043 | -0.939* | 0.029 | -0.049 |
| **AE Class** | **AECLASS 2** | Age Class x Experience Class= 9-12 | -0.151 | 0.704 | -0.010 | -0.571 | 0.154 | -0.033 |
| | **AECLASS 3** | Age Class x Experience Class= 13-16 | -0.372 | 0.332 | -0.022 | -0.110 | 0.756 | -0.008 |
| | **AECLASS 4** | Age Class x Experience Class= 17-20 | -0.521 | 0.190 | -0.029 | -0.173 | 0.633 | -0.012 |
| **Education** | **Education 2** | Vocational education | -0.155 | 0.693 | -0.007 | 0.662* | 0.027 | 0.048 |
| | **Education 3** | Bachelor's degree | 0.050 | 0.886 | 0.002 | -0.015 | 0.965 | -0.001 |
| | **Education 4** | Graduate or Professional degree | 0.534 | 0.109 | 0.033 | -0.008 | 0.981 | 0.000 |
| **Income** | **Income 2** | $30,000 to $59,999 | -0.414 | 0.312 | -0.024 | -0.346 | 0.302 | -0.025 |
| | **Income 3** | $60,000 to $89,999 | -0.294 | 0.472 | -0.018 | -0.603* | 0.094 | -0.039 |
| | **Income 4** | $90,000 to $119,999 | -0.610 | 0.216 | -0.033 | -0.550 | 0.208 | -0.036 |
| | **Income 5** | $120,000 + | -0.329 | 0.486 | -0.020 | -0.117 | 0.783 | -0.009 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | 0.055 | 0.861 | 0.003 | -0.026 | 0.931 | -0.002 |
| | **FarmIncome 3** | 41% to 60% | -0.183 | 0.700 | -0.009 | -0.984 | 0.118 | -0.043 |
| | **FarmIncome 4** | 61% to 100% | -1.361 | 0.113 | -0.042 | -0.336 | 0.612 | -0.019 |
| **Training** | **Training** | MC or BQA Training | -0.376 | 0.443 | -0.017 | -0.663 | 0.277 | -0.031 |

*Asterisk denotes significance of 0.1 or better.

**Table 7. Effects of Producer Demographics on Reason Categories for Producers Who Do Not Wean**

| | | | Doubt Returns/ Premiums | | | Technical Education | | |
|---|---|---|---|---|---|---|---|---|
| | Variable | Description | Coefficient | P-value | Marginal Effects | Coefficient | P-value | Marginal Effects |
| | Intercept | | -1.8498* | <.0001 | | -0.5162* | 0.0577 | |
| Herd Size | HerdSize 2 | 50 to 99 cows | 0.329* | 0.080 | 0.044 | -0.072 | 0.649 | -0.014 |
| | HerdSize 3 | 100 to 499 cows | 0.374 | 0.122 | 0.051 | -0.422* | 0.058 | -0.076 |
| | HerdSize 4 | 500 + cows | -12.808 | 0.981 | -0.139 | 1.007 | 0.163 | 0.234 |
| Region | Region 2 | Northeast | 0.250 | 0.185 | 0.034 | -0.125 | 0.440 | -0.025 |
| | Region 3 | Southwest | -0.113 | 0.615 | -0.014 | -0.355* | 0.062 | -0.068 |
| | Region 4 | Northwest and Panhandle | -0.302 | 0.240 | -0.034 | -0.451* | 0.035 | -0.084 |
| AE Class | AECLASS 2 | Age Class x Experience Class= 9-12 | 0.023 | 0.933 | 0.003 | 0.023 | 0.921 | 0.004 |
| | AECLASS 3 | Age Class x Experience Class= 13-16 | 0.000 | 0.999 | 0.000 | -0.118 | 0.596 | -0.022 |
| | AECLASS 4 | Age Class x Experience Class= 17-20 | -0.049 | 0.857 | -0.006 | 0.048 | 0.829 | 0.009 |
| Education | Education 2 | Vocational education | -0.270 | 0.242 | -0.033 | 0.067 | 0.731 | 0.012 |
| | Education 3 | Bachelor's degree | -0.195 | 0.356 | -0.025 | 0.171 | 0.345 | 0.033 |
| | Education 4 | Graduate or Professional degree | 0.059 | 0.789 | 0.008 | 0.209 | 0.276 | 0.040 |
| Income | Income 2 | $30,000 to $59,999 | 0.288 | 0.296 | 0.035 | -0.251 | 0.246 | -0.050 |
| | Income 3 | $60,000 to $89,999 | 0.344 | 0.219 | 0.042 | -0.116 | 0.597 | -0.024 |
| | Income 4 | $90,000 to $119,999 | -0.041 | 0.901 | -0.004 | -0.404 | 0.124 | -0.077 |
| | Income 5 | $120,000 + | 0.242 | 0.449 | 0.029 | -0.281 | 0.283 | -0.055 |
| Farm Income | FarmIncome 2 | 21% to 40% | -0.231 | 0.260 | -0.029 | -0.303* | 0.088 | -0.058 |
| | FarmIncome 3 | 41% to 60% | -0.163 | 0.556 | -0.021 | -0.667* | 0.015 | -0.115 |
| | FarmIncome 4 | 61% to 100% | -0.557 | 0.148 | -0.062 | -0.346 | 0.288 | -0.065 |
| Training | Training | MC or BQA Training | -0.643* | 0.056 | -0.067 | -0.717* | 0.015 | -0.116 |

*Asterisk denotes significance of 0.1 or better.

**Table 7. Continued**

| | | | Marketing Education | | | Management | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-value** | **Marginal Effects** | **Coefficient** | **P-value** | **Marginal Effects** |
| | **Intercept** | | -2.3232* | <.0001 | | -1.7165* | <.0001 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | 0.184 | 0.537 | 0.009 | -0.595* | 0.017 | -0.047 |
| | **HerdSize 3** | 100 to 499 cows | -0.493 | 0.294 | -0.019 | -0.143 | 0.646 | -0.013 |
| | **HerdSize 4** | 500 + cows | -12.918 | 0.989 | -0.049 | -12.581 | 0.985 | -0.112 |
| **Region** | **Region 2** | Northeast | -0.455 | 0.157 | -0.020 | -0.431* | 0.067 | -0.038 |
| | **Region 3** | Southwest | -0.550 | 0.152 | -0.024 | -0.536* | 0.052 | -0.045 |
| | **Region 4** | Northwest and Panhandle | -0.242 | 0.533 | -0.012 | -0.963* | 0.006 | -0.069 |
| **AE Class** | **AECLASS 2** | Age Class x Experience Class= 9-12 | -0.049 | 0.912 | -0.002 | -0.216 | 0.518 | -0.016 |
| | **AECLASS 3** | Age Class x Experience Class= 13-16 | 0.111 | 0.788 | 0.006 | 0.094 | 0.762 | 0.008 |
| | **AECLASS 4** | Age Class x Experience Class= 17-20 | -0.432 | 0.333 | -0.017 | -0.094 | 0.771 | -0.007 |
| **Education** | **Education 2** | Vocational education | -0.635 | 0.129 | -0.025 | 0.349 | 0.186 | 0.032 |
| | **Education 3** | Bachelor's degree | -0.323 | 0.356 | -0.014 | -0.003 | 0.991 | 0.000 |
| | **Education 4** | Graduate or Professional degree | -0.093 | 0.795 | -0.005 | -0.360 | 0.232 | -0.024 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.228 | 0.600 | 0.010 | 0.294 | 0.387 | 0.021 |
| | **Income 3** | $60,000 to $89,999 | 0.318 | 0.474 | 0.015 | 0.315 | 0.364 | 0.022 |
| | **Income 4** | $90,000 to $119,999 | -0.657 | 0.277 | -0.020 | 0.186 | 0.646 | 0.012 |
| | **Income 5** | $120,000 + | -0.011 | 0.984 | 0.000 | 0.450 | 0.264 | 0.034 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.230 | 0.503 | -0.010 | -0.432 | 0.118 | -0.033 |
| | **FarmIncome 3** | 41% to 60% | -0.836 | 0.189 | -0.028 | -0.516 | 0.198 | -0.038 |
| | **FarmIncome 4** | 61% to 100% | -0.181 | 0.788 | -0.008 | -1.646* | 0.030 | -0.080 |
| **Training** | **Training** | MC or BQA Training | 0.146 | 0.752 | 0.007 | -0.253 | 0.546 | -0.018 |

*Asterisk denotes significance of 0.1 or better.

**Table 8. Effects of Producer Demographics on Reason Categories for Producers Who Do Not Give Respiratory Vaccinations**

| | | | Doubt Returns/ Premiums | | | Technical Education | | |
|---|---|---|---|---|---|---|---|---|
| | Variable | Description | Coefficient | P-value | Marginal Effects | Coefficient | P-value | Marginal Effects |
| | Intercept | | -2.0716* | <.0001 | | -0.5419* | 0.0437 | |
| Herd Size | HerdSize 2 | 50 to 99 cows | 0.247 | 0.162 | 0.038 | -0.048 | 0.754 | -0.010 |
| | HerdSize 3 | 100 to 499 cows | 0.080 | 0.737 | 0.012 | -0.342 | 0.111 | -0.068 |
| | HerdSize 4 | 500 + cows | -12.704 | 0.980 | -0.172 | 0.135 | 0.874 | 0.030 |
| Region | Region 2 | Northeast | -0.055 | 0.769 | -0.008 | -0.081 | 0.612 | -0.017 |
| | Region 3 | Southwest | 0.072 | 0.726 | 0.011 | -0.214 | 0.244 | -0.044 |
| | Region 4 | Northwest and Panhandle | -0.020 | 0.931 | -0.003 | -0.341* | 0.098 | -0.069 |
| AE Class | AECLASS 2 | Age Class x Experience Class= 9-12 | -0.216 | 0.431 | -0.029 | 0.273 | 0.233 | 0.057 |
| | AECLASS 3 | Age Class x Experience Class= 13-16 | 0.193 | 0.439 | 0.029 | 0.088 | 0.691 | 0.017 |
| | AECLASS 4 | Age Class x Experience Class= 17-20 | 0.078 | 0.760 | 0.012 | 0.163 | 0.466 | 0.033 |
| Education | Education 2 | Vocational education | 0.092 | 0.677 | 0.013 | 0.250 | 0.189 | 0.047 |
| | Education 3 | Bachelor's degree | 0.126 | 0.536 | 0.017 | 0.737* | <.0001 | 0.154 |
| | Education 4 | Graduate or Professional degree | 0.547* | 0.008 | 0.086 | 0.402* | 0.036 | 0.079 |
| Income | Income 2 | $30,000 to $59,999 | 0.682* | 0.014 | 0.095 | -0.271 | 0.193 | -0.062 |
| | Income 3 | $60,000 to $89,999 | 0.556* | 0.050 | 0.074 | -0.401* | 0.063 | -0.089 |
| | Income 4 | $90,000 to $119,999 | 0.337 | 0.292 | 0.042 | -0.768* | 0.003 | -0.159 |
| | Income 5 | $120,000 + | 0.123 | 0.709 | 0.014 | -0.618* | 0.016 | -0.132 |
| Farm Income | FarmIncome 2 | 21% to 40% | -0.241 | 0.216 | -0.035 | -0.484* | 0.006 | -0.097 |
| | FarmIncome 3 | 41% to 60% | -0.567* | 0.056 | -0.074 | -0.892* | 0.001 | -0.163 |
| | FarmIncome 4 | 61% to 100% | -0.254 | 0.472 | -0.037 | -0.461 | 0.141 | -0.093 |
| Training | Training | MC or BQA Training | -0.619* | 0.049 | -0.076 | -0.848* | 0.003 | -0.146 |

*Asterisk denotes significance of 0.1 or better.

**Table 8. Continued**

| | | | Marketing Education | | | Management | | |
|---|---|---|---|---|---|---|---|---|
| | **Variable** | **Description** | **Coefficient** | **P-value** | **Marginal Effects** | **Coefficient** | **P-value** | **Marginal Effects** |
| | **Intercept** | | -2.235* | <.0001 | | -1.9726* | <.0001 | |
| **Herd Size** | **HerdSize 2** | 50 to 99 cows | -0.150 | 0.683 | -0.005 | -0.312 | 0.191 | -0.026 |
| | **HerdSize 3** | 100 to 499 cows | -0.008 | 0.986 | 0.000 | -0.224 | 0.470 | -0.019 |
| | **HerdSize 4** | 500 + cows | -13.395 | 0.989 | -0.035 | -12.753 | 0.985 | -0.103 |
| **Region** | **Region 2** | Northeast | -0.140 | 0.703 | -0.004 | -0.463* | 0.059 | -0.039 |
| | **Region 3** | Southwest | -0.335 | 0.450 | -0.010 | -0.472* | 0.089 | -0.039 |
| | **Region 4** | Northwest and Panhandle | 0.164 | 0.695 | 0.006 | -0.312 | 0.278 | -0.028 |
| **AE Class** | **AECLASS 2** | Age Class x Experience Class= 9-12 | -0.541 | 0.216 | -0.024 | 0.004 | 0.990 | 0.000 |
| | **AECLASS 3** | Age Class x Experience Class= 13-16 | -0.405 | 0.321 | -0.019 | 0.116 | 0.716 | 0.010 |
| | **AECLASS 4** | Age Class x Experience Class= 17-20 | -1.285* | 0.008 | -0.043 | -0.004 | 0.991 | 0.000 |
| **Education** | **Education 2** | Vocational education | -0.528 | 0.220 | -0.019 | 0.351 | 0.196 | 0.029 |
| | **Education 3** | Bachelor's degree | -0.740* | 0.075 | -0.024 | 0.302 | 0.248 | 0.025 |
| | **Education 4** | Graduate or Professional degree | -0.454 | 0.287 | -0.016 | -0.066 | 0.824 | -0.005 |
| **Income** | **Income 2** | $30,000 to $59,999 | 0.005 | 0.992 | 0.000 | -0.083 | 0.807 | -0.006 |
| | **Income 3** | $60,000 to $89,999 | 0.387 | 0.443 | 0.013 | 0.127 | 0.708 | 0.010 |
| | **Income 4** | $90,000 to $119,999 | -0.262 | 0.683 | -0.006 | 0.176 | 0.647 | 0.014 |
| | **Income 5** | $120,000 + | 0.374 | 0.514 | 0.012 | 0.411 | 0.282 | 0.036 |
| **Farm Income** | **FarmIncome 2** | 21% to 40% | -0.246 | 0.545 | -0.007 | 0.035 | 0.890 | 0.003 |
| | **FarmIncome 3** | 41% to 60% | -0.927 | 0.233 | -0.021 | -0.167 | 0.657 | -0.013 |
| | **FarmIncome 4** | 61% to 100% | 0.409 | 0.489 | 0.017 | -0.959 | 0.132 | -0.055 |
| **Training** | **Training** | MC or BQA Training | 0.202 | 0.690 | 0.007 | -2.443* | 0.016 | -0.089 |

*Asterisk denotes significance of 0.1 or better.