

Survey of veterinary involvement in management decisions on Mississippi cow-calf operations

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Abstract

The objective of this study was to describe veterinary involvement in management decisions on Mississippi cow-calf operations. Anonymous surveys were mailed to 1,275 members of the Mississippi Cattlemen's Association. Multi-variable logistic regression using manual forward variable selection was used to test demographic and management factors for association with veterinary involvement outcomes. Significance was defined at $\alpha=0.05$. Three-hundred eight surveys (24%) were returned, with 292 (95%) respondents being active in cow-calf production. Fifty-three (18%) of 289 respondents were located in a county contained in a rural area food animal medicine shortage area designated by the USDA-NIFA in 2020. One-hundred seventeen of 285 (41%) indicated regular veterinary involvement in management decisions on their operation. Of these 117, 56 (48%) said their veterinarian uses their cattle health and production records to provide management recommendations. Seventy-five (27%) of 283 respondents indicated they would consider paying their veterinarian to provide cattle health and production record management services. Factors associated with regular veterinary involvement in management decisions on cow-calf operations were regularly recording of antibiotic treatments (OR=3.2) and herd size (50-99 head: OR= 1.6; ≥ 100 head: OR=2.5, compared to 1-49 head). Opportunity exists for veterinarians to be more involved in management decisions on Mississippi cow-calf operations.

Key words: beef, cow-calf, communication, shortage, record-keeping, data, health

Introduction

Cow-calf producers depend on veterinarians for a variety of services. These services range from occasional emergency use to extensive consultation and involvement in management decisions. Perhaps the most common expectations that cow-calf producers have of their veterinarians are providing technical expertise in pregnancy diagnosis,⁶ over-

sight of herd health decisions such as vaccine selection or treatment protocols³, and emergency services. The benefits of a veterinary-client-patient relationship (VCPR) to the cow-calf producer go beyond vaccine selection and pregnancy diagnosis. The bovine practitioner can offer their client services and expertise in nutrition, anticipation and prevention of production losses due to disease, collection and analysis of animal health data to aid in herd health and management decision, establishment of protocols that promote the production of a safe and wholesome beef product, and overall cost-reduction and operational efficiency.^{1,6,7,10,12,13} Although a well-developed VCPR can add value to a cow-calf operation, many producers may not have an established VCPR. A 1996 survey found that cow-calf producers failed to adopt beneficial management practices related to bull management, infectious disease control, nutrition, and individual-animal record keeping.¹¹ All of these are areas where a veterinarian can provide assistance in improving productivity and efficiency while being paid for their services. Over 20 years later, these opportunities appear to still be available to both cow-calf producers and veterinarians. The 2017 United States Department of Agriculture (USDA) National Animal Health Monitoring System (NAHMS) Beef Study found that 37.3% of cow-calf operations in the US, regardless of size, had consulted a veterinarian within the previous 12 months regarding disease diagnosis or treatment.¹⁶ Furthermore, a small percentage of all cow-calf operations in the US regardless of size reported that they had consulted a veterinarian for disease prevention (34%), information on nutrition (13.9%), information on production management practices other than health (9.2%), and production or financial analysis such as Standardized Performance Analysis (SPA) (1.5%).¹⁶ Although these may not represent all reasons for veterinary involvement in cow-calf operations, cow-calf producers appear to be either consulting veterinarians for reasons not previously mentioned, or there may be many producers who do not have veterinary involvement in their operation.

Increased veterinary involvement in management decisions on cow-calf operations may help identify and mitigate

potential risk factors for disease. Risk factors for disease or decreased production are often determined by the collection of objective individual or herd-level data. Analysis of this data may then support or refute the hypothesis of the practitioner regarding the association between the disease or decrease in production and specific risk factors.⁴ Lowering the risk of disease and improving the health of cattle on cow-calf operations can result in healthier animals as they move throughout the production chain. Cattle that are healthy are less likely to require antibiotic treatments, therefore lowering the risk of carcass residues or defects, and antimicrobial resistance.² Societal concerns for antimicrobial stewardship increase the need for veterinary involvement in cow-calf operations in order to ensure antimicrobials are used appropriately and preserve their availability to producers. The reasons why producers do not utilize veterinarians more often in production and management decisions are not well understood. The objective of this study was to identify characteristics of cow-calf producer members of the Mississippi Cattlemen's Association (MCA) that are associated with veterinary involvement in management decisions on their cow-calf operations.

Materials and Methods

Data for this project was collected as part of a survey of cattle health and production record-keeping methods of members of the Mississippi Cattlemen's Association.⁸ Questions regarding veterinary involvement made up 1 of 4 sections of the survey. Only data related to veterinary involvement in cow-calf operations is reported here.

Sample – The target population of the producer survey was members of the MCA actively involved in cow-calf production in Mississippi who are familiar with cattle health and production record-keeping. Survey recipients ($n=1,275$) were selected from the membership mailing list of the MCA using computer-generated random numbers. Commercial businesses were excluded from the mailing list.

Questionnaire development – Development of the questionnaire used to gather information included in this study is discussed elsewhere.⁸ The survey packet included a 1-page letter of introduction and a 2-page questionnaire. The questionnaire was piloted on 6 cow-calf producers, and edits were made prior to beginning of the study. Questions regarding level of veterinary involvement in the cow-calf operation made up 1 section of the questionnaire, with 3 other sections being: 1) producer demographics, 2) record-keeping methods, and 3) current data collected by the producer.

Survey implementation – Surveys were mailed during the week of February 11, 2019 by standard bulk rate, and responses were collected for 2 months after mailing. Recipients of the questionnaire could respond by either: 1) completing the paper copy of the questionnaire and returning it in the included self-addressed, postage-paid envelope, 2) completing the survey electronically using a web address

(URL), or 3) using their smartphone to scan a quick response (QR) code. Authors believed the risk of non-response was greater than the risk of a respondent willingly completing more than 1 method of the survey, so no further efforts were made to prevent duplication of responses. No reminders or incentives for completion of the questionnaire were used due to budget constraints. Sample size calculations are discussed in detail elsewhere; however, a power analysis indicated that 255 responses would be sufficient to provide 95% confidence, $\pm 4\%$, in an estimate of 10% prevalence of a producer characteristic.⁸

Outcomes – Outcomes of interest in this study included the following: 1) whether or not a veterinarian is regularly involved in management decisions on the cow-calf operation, and 2) whether or not a veterinarian uses cattle health and production records to make management recommendations. Only surveys from respondents who indicated that a veterinarian was regularly involved in management decisions on their cow-calf operation were eligible for inclusion in the analysis of outcome 2. Each of these outcomes was tested for association with the following categorical explanatory variables: 1) type of cow-calf production (seedstock, commercial, both seedstock and commercial), 2) if the cow-calf operation was greater than 50% of total producer income, 3) size of cow-calf operation, 4) age of producer, 5) gender of producer, 6) number of years of experience in cow-calf production, 7) highest level of education obtained by producer, 8) use of any form of individual animal identification, 9) whether or not they regularly record antibiotic treatments, and 10) based on the county that producers listed as the primary location of their cattle, whether or not the producer is located in an area designated by the United States Department of Agriculture National Institute of Food and Agriculture (USDA-NIFA) as a Type II rural food animal medicine shortage area in 2020.¹⁵

Statistical analysis – Data compilation, as well as descriptive and inferential statistics were performed using tools and methods previously described.⁸ Briefly, logistic regression using manual forward variable selection was used to build multivariable models for each outcome of interest. Tukey's test was used to assess differences among variable levels for explanatory variables with more than 2 levels (i.e. herd size, level of education, producer age, and years of experience). Following initial univariable analysis, the multiple-choice questions for herd size, level of education, producer age, and years of experience were collapsed to dichotomous variables to eliminate variable levels with few or no responses and to improve model fit. Variables were collapsed as follows: age of producer was collapsed to ≤ 55 years and > 55 years, years of experience in cow-calf production was collapsed to ≤ 25 years and > 25 years, level of education was collapsed to less than a Bachelor's degree and Bachelor's degree or greater, and herd size was collapsed to ≤ 49 head, 50 to 99 head, ≥ 100 head. For all analyses, statistical significance was set *a priori* at $\alpha = 0.05$.

Results

Of the 1,275 producers who were mailed a survey, 308 (24%) responded, with 292 (95%) meeting the study inclusion criteria of being actively involved in cow-calf production. Of the 308 total responses, 283 (92%) were by paper response, while 4 (1%) and 21 (7%) were by QR code and URL response, respectively. Table 1 displays producer responses for questions relating to veterinary involvement in their cow-calf operations. One-hundred seventeen of 285 (41%) respondents said they had regular veterinary involvement in management decisions, and 65 of 280 (23%) respondents said their veterinarian uses cattle health and production records to provide management recommendations. Seventy-five of 283 (27%) respondents said they would consider paying a veterinarian to provide cattle health and production record management services. Additional descriptive statistics for the demographics of respondents are reported elsewhere.⁸ Overall, 53 of 289 (18.3%) producers were located in a county that was designated by the USDA-NIFA as a Type II rural food animal medicine shortage area. Of the 168 producers who indicated “No” to regular veterinary involvement in their cow-calf operation, 37 (22%) were located in a USDA-NIFA Type II rural food animal medicine shortage area. Figure 1 displays number of cows and calves per county as of January 1, 2020 in Mississippi, with USDA-NIFA Type II rural food animal medicine shortage area identified. Figure 2 displays how often producers with and without veterinary involvement in management decisions communicated with their veterinarian. Age distribution of producers with and without regular involvement of a veterinarian in management decisions on

their cow-calf operation is displayed in Figure 3. Herd size of producers with and without regular involvement of a veterinarian in management decisions on their cow-calf operation is displayed in Figure 4.

Significant univariable logistic regression model results are displayed in Table 2. The multivariable logistic regression model for the outcome of regular veterinary involvement in management decisions on the cow-calf operation is provided in Table 3. The explanatory variables of regularly recording antibiotic treatments (OR=3.2, 95%CI=1.9 to 5.3), and herd size (≥ 100 head: OR=2.5, 95%CI=1.3 to 4.5; 50-99 head: OR=1.6, 95%CI=0.9 to 2.9, compared to ≤ 49 head) were included in the final model of regular veterinary involvement in management decisions on the cow-calf operation (Table 3). No multivariable models for veterinary use of cattle health and production records were identified, however 2 univariable models including the explanatory variables use of individual animal identification (OR=9.5, 95%CI=1.2 to 77.8) and regularly recording antibiotic treatments (OR=3.4, 95%CI=1.4 to 8.2) were identified (Table 2). Akaike’s Information Criterion (AIC) was lower for “regularly records antibiotic treatments” (157.9) than for “use of individual animal identification” (158.8), indicating that the explanatory variable of “regularly records antibiotic treatments” produced a model with better fit. No significant 2-way interactions were detected among those tested for either model.

Discussion

The results of this study describe veterinary involvement in MCA member cow-calf operations, and therefore may

Table 1. Descriptive statistics for survey of veterinary involvement in Mississippi cow-calf operations.

Question	Number of responses	Percent
Regular veterinary involvement in management decisions?	285	
Yes	117	41.1
No	168	58.9
Does your veterinarian use cattle health and production records to provide management recommendations?	280	
Yes	65	23.2
No	215	76.8
How often does communication with a veterinarian occur concerning the cow-calf operation?*	285	
Weekly	15	5.3
Monthly	55	19.3
Yearly	48	16.8
Emergency basis only	97	34.0
As needed for pharmaceuticals	96	33.7
Never	9	3.2
Would you consider paying your veterinarian to provide cattle health and production record management services?	283	
Yes	75	26.5
No	208	73.5
Cow-calf operation located in a county that is within a rural food animal medicine shortage area designated by USDA-NIFA	289	
Yes	53	18.3
No	236	81.7

* = respondents could select more than one answer choice

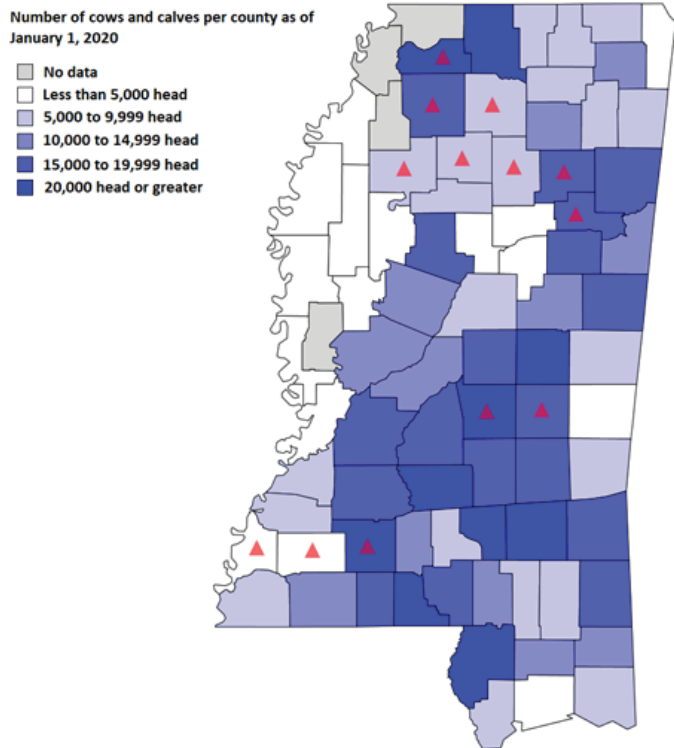


Figure 1. Choropleth map of the state of Mississippi showing the density of total cows and calves by county according to the United States Department of Agriculture National Agricultural Statistics Service (USDA-NASS) as of January 1, 2020. Red triangles represent those counties located in Type II rural area food animal medicine shortage areas designated by the USDA-NIFA. Map produced by: Epi Info 7.2.2.6, CDC, 2018.

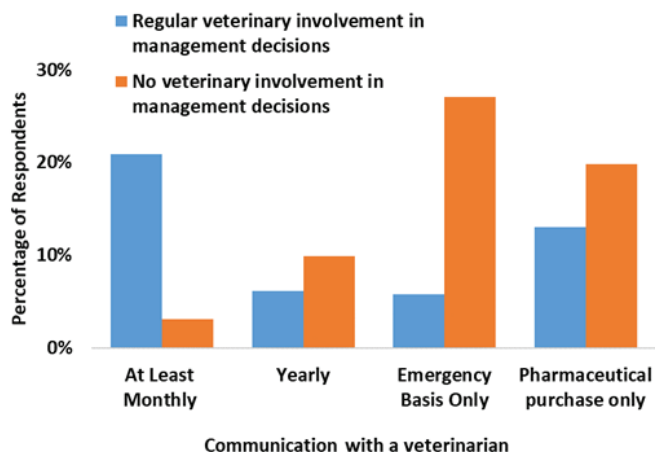


Figure 2. Frequency of communication with a veterinarian by cow-calf producers in Mississippi who indicated they had regular veterinary involvement in management decisions on their operations. Producers could select more than one option.

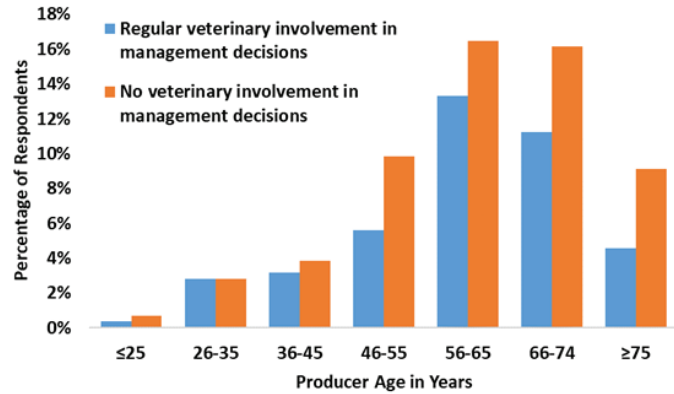


Figure 3. Percentage of cow-calf producer respondents in Mississippi by age who indicated they did or did not have regular veterinary involvement in decisions on their operations.

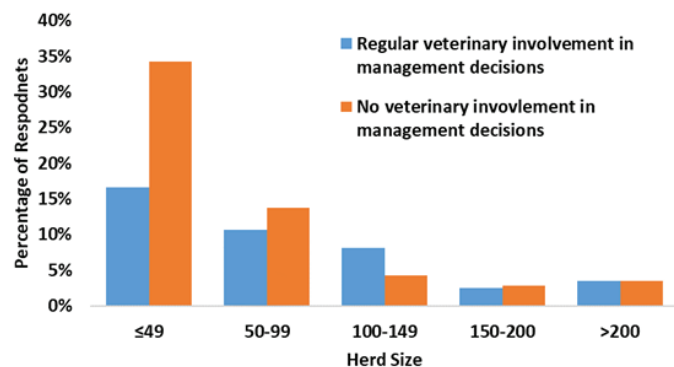


Figure 4. Percentage of cow-calf producer respondents in Mississippi by herd size who indicated they did or did not have regular veterinary involvement in management decisions on their operations. Herd size represents the number of mature cows or heifers that have calved as of January 1, 2019.

not be representative of other cow-calf producers who are not members of the MCA. The authors speculate that members of the MCA may be more likely than non-members to have a working relationship with a veterinarian, so the opinions of MCA members regarding veterinary involvement in their operations was of interest in this study.

Method of response was not tested as an outcome, or for association with any outcomes in this study. The large discrepancy in the number of electronic responses relative to paper responses raised concerns for the validity of inferential statistics using method of response as an outcome or explanatory variable.

Involving a veterinarian in management decisions on a cow-calf operation requires a well-developed VCPR. A VCPR is developed over time by the veterinarian providing emergency and scheduled herd health services, while

Table 2. Significant univariable logistic regression model for each veterinary involvement outcome.

Model Information	Responses	Variable Level	Parameter	Standard Error	Odds Ratio	95% CI		P-value
Regular veterinary involvement in management decisions								
Operation type	68	Seedstock	0.64	0.28	1.9	1.1	3.3	0.0234
	217	Commercial	Ref.	Ref.	1.0	Ref.		
Herd size	70	≥100 head	1.01	0.30	2.8	1.5	5.0	0.0031
	69	50-99 head	0.46	0.30	1.6	0.9	2.9	
Gender of producer	144	≤49 head	Ref.	Ref.	1.0	Ref.		
	21	Female	1.14	0.48	3.1	1.2	8.0	0.0175
Individual animal ID use	264	Male	Ref.	Ref.	1.0	Ref.		
	242	Yes	0.93	0.38	2.5	1.2	5.4	0.0156
Records antibiotic use	42	No	Ref.	Ref.	1.0	Ref.		
	156	Yes	1.20	0.26	3.3	2.0	5.5	<.0001
USDA-NIFA designated area of rural food animal medicine shortage	127	No	Ref.	Ref.	1.0	Ref.		
	51	Yes	-0.70	0.13	0.5	0.3	1.0	0.0394
231	No	Ref.	Ref.	1.0	Ref.			
Veterinary use of cattle health and production records to make management recommendations*								
Individual animal ID use	107	Yes	2.25	1.07	9.5	1.2	77.8	0.0355
	10	No	Ref.	Ref.	1.0	Ref.		
Records antibiotic use	84	Yes	1.22	0.45	3.4	1.4	8.2	0.0065
	33	No	Ref.	Ref.	1.0	Ref.		

* = model data was limited to producers so said “Yes” to regular veterinary involvement in the management decisions for their operations.

Table 3. Multivariable logistic regression model for the outcome of regular veterinary involvement in management decisions on cow-calf operations in Mississippi.

Variable	Variable Level	Responses*	Parameter	Standard Error	Odds Ratio	95% CI		P-value
Intercept			-1.36	0.25				
Records antibiotic use	Yes	155	1.16	0.26	3.2	1.9	5.3	<.0001
	No	126	Ref.	Ref.	1.0	Ref.		
Herd size	≥100 head ^b	142	0.90	0.31	2.5	1.3	4.5	0.0139
	50-99 head ^{ab}	69	0.47	0.31	1.6	0.9	2.9	
	≤49 head ^a	70	Ref.	Ref.	1.0	Ref.		

* = 281 total responses used by this model

^{a,b} = Tukey adjustment for multiple comparisons among variable levels; differences in letters between levels indicate statistical differences.

also becoming familiar with the resources and goals of the cow-calf operation. As the producer develops trust in their veterinarian and as the veterinarian demonstrates their value to the operation as an asset, rather than simply a cost, the producer may be more likely to involve the veterinarian in management decisions. The authors speculate that the 41% of producers who said that a veterinarian was regularly involved in management decisions likely have a well-developed VCPR. A nationwide beef producer survey found that 85% of respondents said they used veterinary services regularly; however, only 23% of respondents in that study had written documentation of a VCPR.⁹ Cow-calf producers may use veterinary services regularly and develop a successful VCPR with their veterinarian without allowing the veterinarian to influence management decisions. The present study did not question producers about written documentation of a VCPR, and results of producers who have veterinary involvement in management decisions may have been different if written documentation of a VCPR had been included in the question.

Using cattle health and production data to make objective, evidenced-based recommendations on cattle health and

production topics is 1 way a veterinarian can be involved in management decisions. In this study, few producers indicated that their veterinarian was using their cattle health and production records to make management recommendations for their herds (Table 1). Reasons for this may include 1) veterinarians are not making management recommendations based on analysis of cattle health and production records, or 2) producers fail to recognize or ignore management recommendations made by veterinarians. In order for a producer to grant their veterinarian access to herd health and production records, authors believe that the producer must involve the veterinarian in the cow-calf operation beyond the level of occasional emergency use or pharmaceutical sales. Interestingly, producers with veterinary involvement in management decisions often communicated with a veterinarian at least monthly, while producers without veterinary involvement in management decisions often communicated with a veterinarian for emergencies only. A greater percentage of producers with regular veterinary involvement communicated at least monthly with a veterinarian than those with regular veterinary involvement who used a vet-

erinerian for emergencies only. Also, a smaller percentage of producers without regular veterinary involvement communicated at least monthly with a veterinarian compared to those without regularly veterinary involvement who used veterinarians for emergencies only (Figure 2). The authors speculate that this pattern suggests veterinary involvement in management decisions on a cow-calf operation may stem from frequent conversations between the veterinarian and the producer. This increased frequency of communication between the producer and their veterinarian may lead to fewer emergencies, but data in this study is insufficient to make this determination.

Recording various types of cattle health and production data is useful in investigating outbreaks of disease, monitoring health and production metrics, and improving overall operation efficiency and profitability.^{10,12,13} Veterinarians are equipped to help producers determine which types of cattle health and production data are important, assist in the collection of the data, and perform analysis of data. In this study, over one-quarter (27%) of producers expressed a willingness to pay their veterinarian to provide cattle health and production record management services (Table 1). As previously mentioned, the 2017 NAHMS Beef study found 1.5% of all operations, regardless of size, had contacted a veterinarian for production or financial analysis such as SPA in the 12 months prior to the survey.¹⁶ Reasons for this may include: 1) producers believe their cattle health and production records are private information and do not want their veterinarian to have access to them, 2) they may believe there is no benefit to involving their veterinarian in their cattle health and production record-keeping system, or 3) they may not collect sufficient data on their cattle for SPA analysis. Other studies have found that opportunities exist for veterinarians to help educate cow-calf producers on the benefits of collecting and analyzing individual and herd-level health and production data.¹¹ The present study suggests that potential exists for veterinarians to incorporate data management into the services offered to their cow-calf producer clients, as a sizable portion of respondents indicated a willingness to pay a veterinarian for such services if they were offered (Table 1).

Proximity to veterinary services was hypothesized to be a factor that influenced veterinary involvement in management decisions on cow-calf operations. As of 2020, 13 of the 82 counties in Mississippi were designated as Type II rural food animal medicine shortage areas (Figure 1).¹⁵ These counties accounted for 180,800 (19.7%) of the state's approximately 920,000 total cows and calves in 2020.¹⁷ Although being located in an area of rural area food animal medicine shortage produced a significant univariable model for the outcome of veterinary involvement in management decisions (Table 3), it ultimately did not influence that outcome after accounting for whether the producer records antibiotic treatments, indicating that veterinary shortage area was a confounder with whether the producer records antibiotic

treatments. This likely indicates that veterinary involvement in management decisions is less dependent on proximity to a veterinarian, and more dependent on producer willingness to record information. Producers who are recording antibiotic treatments may represent a desire to capture and record data on their cattle, and this desire may translate well to veterinary involvement in their operation. These producers may also be those who are willing to follow the direction of a veterinarian to record antibiotic treatments, and therefore are willing to allow a veterinarian influence in management decisions. As future Food and Drug Administration (FDA) regulations eliminate the availability of over-the-counter (OTC) antibiotics to beef producers, veterinary involvement in cow-calf operations will become even more important. Future FDA regulations will require any antibiotic used in beef production to be obtained by prescription through a veterinarian. This oversight will force producers who previously had little to no veterinary involvement in their operations to involve a veterinarian in order to obtain antibiotics. Authors speculate that this may create new opportunities for veterinarians to collect data on not only antibiotic use, but also other important metrics of cattle health and production within their client herds.

Herd size was also an important variable associated with veterinary involvement in management decisions. The authors speculate that veterinarians are willing to travel longer distances to provide services to a large producer. Larger producers may recognize the benefit of involving a veterinarian in their cow-calf operations, and be willing to pay for the distance travelled by the veterinarian. Smaller producers may find it more difficult or expensive on a per cow basis to have regular veterinary involvement in their operations compared to larger producers (Table 2).

Although percent of income generated from the cow-calf operation was not associated with either veterinary involvement outcome in this study, other financial factors not tested in this study may be of importance. For instance, the economy of scale for cow-calf operations may allow larger operations a greater ability to justify the cost of veterinary involvement compared to smaller operations. The statistical difference between herds of 1-49 head and ≥ 100 head (Table 3) may be the result of producer opinions such as these. Other studies have found that veterinary involvement increases as herd size increases.¹⁸ As herd size increases, producers and veterinarians alike may be willing to maintain a VCPR despite prolonged distances between the veterinarian and an operation. Producers managing larger herds have been shown to utilize cattle health and production records more when compared to smaller producers,⁸ therefore the availability of those records may contribute to veterinarians using them to make management recommendations more often on larger cow-calf operations compared to smaller cow-calf operations (Table 3). A previous study found an association between herd size and likelihood of using antimicrobials on cow-calf operations in Tennessee.⁵

Although no interaction between herd size and regularly recording antibiotic treatments was found in the present study for the outcome of veterinary involvement in management decisions, it may be that regularly recording antibiotic treatments occurs by instruction from a veterinarian. A record of treatments is an example of data that is useful for epidemiologic investigations of disease occurrence and measuring treatment success, therefore veterinarians who are accustomed to using such data to answer problems in cattle health and production likely train producers to collect the required data. These producers likely record antibiotic treatments because their veterinarian has instructed them to do so, and in most cases, individual animal identification is necessary.

It is not surprising that use of individual animal identification was associated with both outcomes tested in this study (Table 2). Although significant as a univariable model, and necessary for any successful cattle health and production record-keeping system, the behavior of producers captured by use of individual animal identification was better described by producers recording antibiotic treatments in the multivariable model for the outcome of veterinary involvement in management decisions. Individual animal identification is necessary for cattle health data collection, but cattle can be individually identified in the absence of data collection. Recording antibiotic treatments may indicate that the producer believes there is value in collecting and recording health data on their cattle. Similarly, veterinary involvement in management decisions was less determined by operation type, and more about herd size. Seedstock and commercial producers may have extensive need for veterinary involvement in decisions related to heifer development, nutrition, reproductive performance of bulls and cows, and marketing of cattle (e.g. feeder calves for commercial producers, herd sires for seedstock producers, etc.). Seedstock producers have been shown to utilize cattle health and production record-keeping systems more often than commercial producers;⁸ however, level of veterinary involvement in management decisions was not ultimately determined by operation type in this study.

The outcome of veterinary use of cattle health and production records to provide management recommendations was most strongly associated with whether or not a producer was regularly recording antibiotic treatments. Individual animal identification was confounded by recording antibiotic use, and fell from the model when the 2 variables were included together. Similar to the model of the outcome of veterinary involvement in management decisions, inclusion of regularly recording antibiotic use likely reflects producer interest in data collection. Producers who collect data may do so under the direction of a veterinarian interested in using cattle health and production records. Producers must be collecting some data on their animals before a veterinarian can use data to provide management decisions, and antibiotic use is an example of data that producers could record.

Conclusion

The results of this study describe veterinary involvement in MCA member cow-calf operations. These results may be informative to veterinarians regarding factors that influence producer interest in veterinary involvement in their operations; however, the opinions of members of the MCA may not be representative of non-member cow-calf producers. Slightly less than half of cow-calf producer members of the MCA currently involve their veterinarian in management decisions regarding their cow-calf operation. However, approximately one-quarter of cow-calf producer members of MCA would be willing to pay a veterinarian for cattle health and production record-keeping services. Slightly more cow-calf producers appear to be willing to pay a veterinarian to collect and analyze cattle health and production records than are currently receiving these services from a veterinarian. Whether or not a veterinarian was involved in management decisions on the cow-calf operation was influenced by herd size of the cow-calf operation, and if the cow-calf producer was already recording antibiotic treatments. Access to a veterinarian based on geographical location of the cow-calf producer was not a factor that influenced veterinary involvement in management decisions on cow-calf operations in Mississippi. There appears to be an opportunity for veterinarians to provide cattle health and production record-keeping services to cow-calf producer members of the MCA.

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