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EFFECTS OF DYSTOCIA AND CONFINED CALVING ON CALF-MORBIDITY RATE FROM BIRTH TO WEANING ¹

M. W. Sanderson² and D. A. Dargatz³

Summary

An analysis was performed on data from a national survey of US beef cow-calf producers to quantify the effects of management factors on calf-morbidity risk from birth to weaning. The analysis included 2,490 herds from 23 states. A high calf-morbidity herd was defined as one with greater than 10% morbidity. The rate of dystocia in the herd was categorized into five levels. All dystocia levels were associated significantly with increased risk of being a high calf-morbidity herd. Having greater than 70% of cows and heifers calve in confinement also was associated with increased risk of being a high calf-morbidity herd. Approximately 40% of herds experienced high morbidity from the effect of dystocia and approximately 10% from the effect of confined calving. This analysis indicates that dystocia and confined calving are important factors in determining a herd's calf-morbidity rate from birth to weaning.

(Key Words: Beef, Cow-Calf, Calf Morbidity, Calving, Dystocia.)

Introduction

Examination of individual-animal risk factors for morbidity and mortality from birth to 45 days of age has found increased morbidity among calves born to 2-year-old heifers, and calves experiencing dystocia. A 35 lb reduction

in weaning weight also has been shown among calves experiencing morbidity between birth and 45 days of age. Of all disease categories, diarrhea of unknown cause, predominately in calves, has the highest costs associated with treatment and labor. Over 75% of annual miscellaneous costs of disease may be due to lost weight gain. Clearly, calf morbidity is an important issue to the beef industry, resulting in reduced weight gains and expense and labor associated with treatment. The purpose of this study was to quantify the effect of herd management variables on herd risk for high calf morbidity.

Experimental Procedures

Data Source. Questionnaire data were collected from 2,490 beef, cow-calf operations between December 30, 1996, and February 3, 1997. Operations were selected from 23 states⁴ by the USDA: National Agricultural Statistics Service (NASS)⁵.

Producers were asked to estimate the number of calves experiencing morbidity from respiratory disease, diarrhea or "scours", bovine keratoconjunctivitis or "pinkeye", and infectious pododermatitis or "footrot" from birth to 3 weeks of age and

¹The authors thank the NASS enumerators and state and federal statisticians for their roles in selecting and contacting this sample of beef producers and collecting the data for this analysis. In addition, none of this would have been possible without the cooperation of all the beef producers who participated in the survey.

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from 3 weeks of age to weaning. Producers also were asked to estimate or use records to determine the number of dystocias in heifers and cows during 1996. Calvings were reported as "no assistance given", "easy pulls", "hard pulls", or "cesarean sections". Producers also provided estimates of the percent of cows and heifers calving in confined vs. extensive facilities, as well as an estimate of calving density. Confined calving was defined as cows calving in pens, sheds, or lots without access to grazing.

Data Analysis. A single morbidity rate was calculated for each herd by adding the estimates in each morbidity category and dividing by the total number of live-born calves in the herd. This calf morbidity value was used to categorize herds as high vs. low morbidity. High-morbidity herds were defined as having $\geq 10\%$ morbidity.

Herd dystocia rate was calculated by summing the estimates for easy pulls, hard pulls, and cesarean sections and dividing by the number of calves born alive or dead. The combined dystocia rate for cows and heifers was categorized into five levels: no dystocia (reference group), >0 to 5% dystocia, $>5\%$ to 10% dystocia, $>10\%$ to 20% dystocia, and $>20\%$ dystocia. Data on whether or not cows were observed regularly during calving season also was collected.

⁴California, Colorado, Montana, New Mexico, Oregon, Wyoming, Kansas, Nebraska, North Dakota, South Dakota, Oklahoma Texas, Arkansas, Illinois, Iowa, Missouri, Alabama, Florida, Georgia, Kentucky, Mississippi, Tennessee, and Virginia.

⁵This analysis is based on data from the USDA:APHIS:VS. Beef 97 survey. For complete results of the survey, contact the Centers for Epidemiology and Animal Health. Ft. Collins, CO. (970) 490-8000.

Percentage of cows and heifers calving in confined facilities was classified into three categories; $\leq 20\%$ (reference group), >20 to 70% , and $>70\%$.

Based on biological plausibility, all potential explanatory variables for which data were present for all herds were examined for association with calf morbidity. Variables associated with herd morbidity were included in an initial, multiple-logistic-regression model. The proportions of herd morbidity attributable to the identified management factors were calculated.

Results and Discussion

The estimate of mean morbidity prior to weaning was 5.8% , and mean mortality rate prior to weaning was 3.7% . The final odds ratios and confidence intervals (CI) for being classed a high calf-morbidity herd are summarized in Table 1. Odds ratios quantitate the risk of being a high calf-morbidity herd. Odds ratios for dystocia categories increased as the proportions of dystocia in the herds increased ($P < 0.01$). Odds ratios for confined calving categories increased as the proportion of cows and heifers calving in confined facilities increased ($P < 0.01$). No association was found between calf morbidity levels and regular observation of calving, specific dystocia categories such as dystocia in cows or hard dystocia (hard pull or cesarean section), or percent heifers in the herd.

In this data set, the mean dystocia rate for cows and heifers combined was 4% vs. 16.7% for heifers alone. Percentage of heifers in the herd was not associated significantly with high calf morbidity. Risk for morbidity in heifer's calves may be accounted for in the dystocia variable.

Table 1. Odds Ratios for Being Classified a High Calf-Morbidity Herd

Variable	Odds Ratio	95% CI
Dystocia class		
0%	1	
>0 to 5%	2.68***	1.8-3.99
>5% to 10%	2.68***	1.71-4.2
>10% to 20%	3.19***	1.77-5.77
>20%	5.46***	2.28-13.1
Confined calving		
0 to 20%	1	
>20% to 70%	1.34	0.67-2.65
>70%	1.8**	1.16-2.82

** P<0.01, *** P<0.001

Each category of dystocia was associated with increased risk of being a high morbidity herd. As dystocia rate increased from one category to the next, the associated point estimate for that odds ratio also increased. This relationship was particularly evident in herds with >20% dystocia, where the estimate of the odds ratio increased to 5.4. Failure to provide for adequate ingestion of colostrum and for maintenance of body temperature likely would increase morbidity

significantly. As dystocia rate increased, the number of calves requiring additional support increased. Thus, available labor may be overwhelmed, resulting in increased risk of morbidity for individual calves.

The odds ratio for herds in which 20 to 70% of cows and heifers calved in confinement was numerically, but not significantly, greater than the ratio for herds in which less than 20% of cows and heifers calved in confinement. Herds in which >70% of cows and heifers calved in confinement were significantly more likely to be high morbidity herds (odds ratio=1.8). These estimates suggest a threshold where labor inputs are exceeded or environmental contamination reaches a level where disease transmission probability increases sufficiently to cause an outbreak.

The combined effects of dystocia and confined calving accounted for a significant proportion of high morbidity. Approximately 40% of herds experienced high calf-morbidity from effects associated with dystocia, and approximately 10% of herds experienced high calf-morbidity from effects associated with confined calving. Eliminating all dystocia would be unrealistic; nonetheless, the data reported here indicate the relative effects of dystocia and confined calving on calf morbidity.