Understanding stewardship: Associations with treatment thresholds for antimicrobial use among dairy calf producers

G.G. Habing, *DVM, MS, PhD, DACVPM*[1]; **C. Djordjevic**, *MPH*[1]; **G. Schuenemann**, *DVM, MS, PhD*[1]; **J. Lakritz**, *DVM, PhD*[2]

[1]*Department of Veterinary Preventive Medicine, The Ohio State University, Columbus, OH 43210*
[2]*Department of Veterinary Clinical Sciences, The Ohio State University, Columbus, OH 43210*

Introduction

Calf-raising operations provide a unique microbial niche where immature intestinal flora, dense animal populations, and frequent application of antimicrobials may facilitate the emergence of antimicrobial resistant pathogens. In the US, producers report that 18% of calves receive an antimicrobial for diarrhea prior to weaning, often with antimicrobials designated as "critically important" to human medicine. The overall objective for this research was to understand the decision criteria for antimicrobial use for calf diarrhea. We hypothesized that selective antimicrobial use is associated with herd-level predictors, including the presence of veterinarian-written treatment protocols and producer attitudes about the impact of antimicrobial use in livestock.

Materials and Methods

Surveys were mailed to 1,100 randomly selected Grade A dairy producers in Ohio and Michigan. Producers were asked to indicate current treatment practices for a series of case descriptions with increasing severity. Based on the responses, producers were categorized as applying antimicrobials for all, select, or none of the described cases. The survey included potential predictors, including herd size, age, education, veterinarian-written protocols, and attitudes about the public health impact of antimicrobial use in livestock.

Results

In total, 481 (44%) producers returned the survey, and 10%, 55%, and 30% of producers reported applying antimicrobials to all, select, or none of the cases described in the survey, respectively. Based on ordinal univariable logistic regression, more selective therapy was significantly ($P < 0.05$) associated with a higher level of concern about the public health impact of antimicrobial use. Selective therapy did not have an association with herd size, age, education level, or the presence of a veterinarian-written protocol.

Significance

The reported antimicrobial use practices of dairy calf producers were significantly associated with producer attitudes about the impact of antimicrobial use on public health.

A case-control study of herd-level risk factors for nursing calf bovine respiratory disease on cow-calf operations

A.R. Woolums, *DVM, MVSC, PhD, DACVIM, DACVM*[1]; **R.D. Berghaus**, *DVM, PhD, DACVPM (Epi)*[2];
D.R. Smith, *DVM, PhD, DACVPM (Epi)*[1]; **R.F. Daly**, *DVM, DACVPM*[3]; **G.L. Stokka**, *DVM, MS*[4]; **B.J. White**, *DVM, MS*[5]

[1]*Department of Pathobiology and Population Medicine, Mississippi State University, Mississippi State, MS 39762*
[2]*Department of Population Medicine, University of Georgia, Athens, GA 30602*
[3]*Department of Veterinary and Biomedical Sciences, South Dakota State University, Brookings, SD 57007*
[4]*Department of Animal Science Extension, North Dakota State University, Fargo, ND 58108*
[5]*Department of Clinical Sciences, Kansas State University, Manhattan, KS 66506*

Introduction

Bovine respiratory disease (BRD) is the leading cause of death for feedlot cattle, weaned dairy heifers, and nursing (preweaning) beef calves 3 weeks of age and older. Bovine respiratory disease results from interaction of respiratory infection, inadequate host immunity, and certain management practices. Management practices related to feedlot or dairy calf BRD have been reported, but little information is available regarding management practices that increase BRD risk

for nursing beef calves. Surveys indicate that approximately 20% of US cow-calf operations recognize nursing calf BRD to be a problem, leading to the possibility that important risk factors could be identified by comparing affected herds to appropriately matched unaffected herds. The objective of this study was to determine herd-level risk factors for nursing calf BRD through a matched case-control study of cow-calf operations in 3 US states.

Materials and Methods

Cow-calf operations in Nebraska, North Dakota, and South Dakota were enrolled during 2012 to 2014. Herds were eligible for enrollment if they had an average weaning age of at least 120 days and had at least 30 cows calving. Case herds were defined as operations treating 5% or more of nursing calves for BRD; control herds were defined as treating no more than 0.5% of calves, and were matched to case herds by referring veterinary practice and year of enrollment. Telephone interviews of producers were used to collect information about herd management. Conditional logistic regression was used to evaluate herd-level risk factors for calf BRD while accounting for the matched case-control study design. All statistical testing assumed a 2-sided alternative hypothesis, and P<0.10 was considered statistically significant.

Results

Thirty case herds and 54 matched control herds were enrolled. Twenty-nine of the herds were located in Nebraska,

23 in North Dakota, and 32 in South Dakota. There was no significant difference between case and control herds in the percent of herd composed of first-calf heifers, length of calving season, percent of calves surviving 48 hours after birth that lived until weaning, or average age or weight of calves at weaning. In the multivariable analysis, 3 variables were significantly associated with calf BRD: herd size, the use of intensive grazing, and synchronizing cows and heifers after calving. Compared to herds with fewer than 150 cows, the odds of having >5% incidence of calf BRD were 7.9 times higher for herds with 150 to 499 cows, and 12 times higher for herds with 500 cows or more. Compared to herds that did not use intensive grazing, the odds of having >5% incidence of calf BRD were 3.3 times higher for herds that used intensive grazing. Compared to herds that did not use a synchronization program after calving, the odds of having >5% incidence of calf BRD were 4.5 times higher for herds that used a synchronization program.

Significance

To our knowledge, this is the first reported case-control study to evaluate herd-level risk factors for nursing calf BRD in US cow-calf operations. These results provide data to support informed decision making by veterinarians who want to decrease rates of nursing calf BRD in herds where the condition is a problem. Future research will be needed to confirm which management manipulations effectively mitigate nursing calf BRD.

Diagnostic accuracy of clinical illness for bovine respiratory disease diagnosis in feedlot beef calves: a systematic review of the literature and Bayesian meta-analysis

E. Timsit, *DVM, PhD, DECBHM*[1]; **N. Dendukuri**, *MSc, PhD*[2]; **I. Schiller**, *MSc*[2]; **S. Buczinski**, *DrVét, MSc, DACVIM*[3]
[1]*Department of Production Animal Health, Faculty of Veterinary Medicine, University of Calgary, Calgary, AB T2N 4Z6, Canada Feedlot Health Management Services, Okotoks, AB T1S 2A2, Canada*
[2]*Division of Clinical Epidemiology, McGill University Health Centre, Montreal, QC H4A 3J1, Canada*
[3]*Department of Clinical Science, Faculté de Médecine Vétérinaire, Université de Montréal, St-Hyacinthe, QC J2S 2M2, Canada*

Introduction

Bovine respiratory disease (BRD) diagnosis in feedlots is based on clinical inspection (CI) done once or twice daily by pen-riders or pen-walkers. A diagnosis of BRD is typically established when an animal has visual signs of BRD and a rectal temperature above a threshold (ranging from 103.1 to 104 °F) (39.5 to 40 °C). This diagnostic approach is known

to have less than ideal sensitivity (SeCI) and specificity (SpCI). However, accurate estimates of SeCI and SpCI are not available, in part due to the absence of a reference test for antemortem diagnosis of BRD. The objective was to determine the diagnostic accuracy of CI for BRD diagnosis in post-weaned beef calves. The presence of lung lesions at slaughter (LU) was used as an imperfect reference test to determine SeCI and SpCI.