Randomized longitudinal study to test the effect of pre-calving vaccination of range beef cows and other factors on the incidence of calf pneumonia

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Introduction

Pneumonia is a leading cause of sickness and death in beef calves prior to feedlot entry. The objective of this study was to test the effect of pre-calving vaccination of beef cows and other factors on the subsequent incidence of calf pneumonia on a ranch with a history of incidence of calf pneumonia > 10%.

Materials and Methods

Range beef cows (n=430) in late gestation with prior history of annual vaccination with a viral respiratory disease vaccine, were randomly assigned (by use of spreadsheet software) to 2 treatments: 1) pre-calving vaccination with a killed-virus vaccine directed against bovine herpes virus-I, bovine viral diarrhea virus types 1 and 2, bovine parainfluenza type-3 virus, and bovine respiratory syncytial virus; or 2) no pre-calving vaccination. At treatment, body condition score, cow identification, and age were recorded. Calving dates, calving group, gender, birth weight, and date of first treatment for pneumonia were recorded contemporaneously. Calves were weaned between 60 to 90 days of age and managed as backgrounded calves on grass with supplemental feed. Calves were observed for pneumonia from birth through backgrounding. The personnel who observed, diagnosed, and treated calves were blinded to the pre-calving vaccination status of the dam.

Results

Health records from 393 calves were available; however, 5 records were not used because the calves died at or shortly after birth, leaving 388 records for analysis. Random intercept generalized linear mixed model logistic regression with calving group as a random effect was used to test associations between cumulative incidence of calf pneumonia and pre-calving vaccination or other factors. The median interval from vaccination to calving was 36 days (mean, 40 days). Pneumonia was diagnosed in 45 (12%) calves ranging in age from 38 to 154 days (median, 64 days; mean, 70 days). Twenty-three of 177 (13%) calves born to unvaccinated dams and 22 of 211 (10%) calves born to vaccinated dams developed pneumonia. Incidence of pneumonia was not significantly reduced by vaccine treatment (OR, 0.8; P=0.54) or by dam's body condition or age, calf birth weight, or when calves were born in the calving season. Male calves had a significantly greater incidence of pneumonia (OR, 2.0; P=0.04). A non-significant (P=0.07), but clinically relevant, interaction suggested that the efficacy of pre-calving vaccination differed by gender such that male calves received no protection from pneumonia by pre-calving vaccination of the dams, but female calves did. There was no evidence that vaccination of half of the cows in this herd protected calves born to unvaccinated dams (i.e. herd immunity), because incidence of calf pneumonia was similar in other groups on the same ranch that did not receive pre-calving vaccination.

Significance

Pre-calving vaccination of late-gestation cows did not significantly reduce overall incidence of calf pneumonia on this ranch. Findings of this study contribute to the evidence that male gender is associated with increased risk for calf pneumonia. Collectively, these results help to inform veterinarians and their clients about which factors put calves at risk for pneumonia and what benefit there might be from vaccinating cows against viral pneumonia prior to calving.