

# Research Summaries 3

## Randomized Clinical Field Trial of the Effect of Prewaning Viral Vaccination on the Incidence of Respiratory Disease in Dairy Heifer Calves Up to Four Months of Age

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### Introduction

Bovine respiratory disease (BRD) is an important illness of dairy replacement heifer calves that has substantial impacts on growth, survival and profitability. The objective of this research was to determine the effects of one or two doses of a commercial, multivalent, modified-live viral (MLV) vaccine, administered to heifer calves prior to weaning. It was hypothesized that vaccination would reduce the incidence of BRD and that two doses would be more efficacious than one.

### Materials and Methods

A total of 2882 calves were enrolled from 15 herds in Ontario and four in Minnesota. Calves were examined at 1-7 days, 15-21 days, 35-42 days, and 82-120 days of age. Calves were randomly assigned to receive a MLV vaccine against bovine viral diarrhea (BVD)-1 and 2, bovine herpesvirus (BHV)-1, parainfluenza (PI)-3, and bovine respiratory syncytial virus (BRSV) (Bovishield Gold 5; Pfizer) by intramuscular injection at 15-21 days (two weeks only), 35-42 days (five weeks only), both two and five weeks, or to receive saline at both times (negative controls). Calves were considered to have failure of passive transfer (FPT) if serum total protein (STP) between 1-7 days was <5.2 g/dl. Herd-level incidence of FPT, overall BRD, and BRD after five weeks of age were calculated. The association between vaccination at two weeks of age and BRD from two to five weeks was evaluated. The association between vaccination at two and/or five weeks of age and BRD from five weeks to four months of age was also evaluated. Farm, herd size, region, month of birth, STP, calf-level FPT, and herd-level FPT and overall BRD were screened for association with BRD between two and five weeks or between five weeks and four months in univariable analyses. Those with  $P < 0.1$  were offered to multivariable logistic regression models, including interactions between vac-

cination and the significant variables, with farm as a random effect. Herds that had no occurrences of BRD and that contributed fewer than 25 calves to the study (three farms) were excluded from analyses because they reduced the power of the study and therefore, increased the risk of a type II error.

### Results

Overall, 19.4% of calves were treated at least once for BRD (herd range: 0 to 36.7%). There was a first occurrence of BRD in 6.2% of calves before two weeks of age, 6.5% between two and five weeks of age, and 6.7% between five weeks and four months of age. The incidence of BRD between two and five weeks was not different ( $P = 0.17$ ) in calves vaccinated at two weeks (6.0%; 95% CL=4.7 – 7.2;  $n = 81/1362$ ) and unvaccinated calves (7.2%; 95% CL=5.9 – 8.6;  $n = 106/1466$ ). Similarly, the incidence of BRD after five weeks of age was not different between vaccination groups ( $P = 0.47$ ): 8.2% of calves vaccinated at two weeks only (95% CL=6.1 – 10.2;  $n = 56/687$ ), 7% vaccinated at five weeks only (95% CL=5.0 – 8.9;  $n = 47/676$ ), 6.6% vaccinated at two and five weeks (95% CL=4.7 – 8.5;  $n = 43/655$ ), and 6.1% of control calves (95% CL=4.4 – 7.2;  $n = 47/770$ ). Farm, month of birth, and herd-level incidence of BRD were associated with BRD in univariable analyses ( $P < 0.05$ ). However, there were no interactions between these variables and vaccination in the multivariable models ( $P > 0.1$ ). There was no association between vaccination and BRD in any of the multivariable analyses ( $P > 0.1$ ).

### Significance

Under the conditions of this field study, vaccination of dairy replacement calves with a MLV vaccine against putative BRD pathogens at two and/or five weeks of age was not associated with the subsequent incidence of BRD. Reasons for this lack of association may include:

interference by maternal antibodies, unresponsiveness of the neonatal immune system, immunity achieved after peak incidence of disease, minimal prevalence of vaccine viruses within this population of calves, or herd immunity resulting from the vaccination of three quarters of the calf herd. Further research is necessary

to explore appropriate strategies for pre-weaning vaccination for the reduction of BRD in dairy herds. Such strategies should be tailored to each individual dairy operation and early vaccination may be warranted in some high-risk herds.