



PROFESSIONAL SERVICES

Boehringer Ingelheim Vetmedica, Inc.

TECHNICAL BULLETIN

***Mycoplasma bovis* antibody response in pregnant cows following vaccination with Pulmo-Guard™ MpB bacterin and evaluation of passive transfer of *M. bovis* antibody to their calves**

Key Points

- *Mycoplasma bovis*-specific IgG₁ was higher in vaccinated cows than non-vaccinated cows at 3 weeks after first vaccination ($P < 0.0001$) and at calving ($P = 0.047$).
- The level of *M. bovis*-specific IgG₁ in calf serum at 48 hours of age was positively correlated with the level in maternal serum at parturition, indicating passive transfer.

Introduction

Disease due to *Mycoplasma bovis* commonly occurs in association with the stress of freshening and early lactation. Vaccinating during the dry period may stimulate sufficient immunity to protect cows during early lactation. In calves, *Mycoplasma bovis* may cause respiratory disease and ear infections at a very young age, prior to it being practical to vaccinate. Vaccinating cows prior to calving against IBR, PI₃, BRSV, and BVD has resulted in increases in specific IgG levels against these viruses. This IgG may then be passively transferred to the calves via colostrum. However, it is unclear if vaccinating cows with *Mycoplasma bovis* during the dry period will result in passive transfer of *M. bovis* antibody through colostrum.

Objectives

1. Determine if vaccinating cows with Pulmo-Guard MpB bacterin during late gestation will increase the level of *M. bovis* antibodies in serum, colostrum, and milk.
2. Determine the serological response in calves born to dams vaccinated with Pulmo-Guard MpB bacterin during late gestation.

Materials and Methods

Seventy-eight Holstein cows were enrolled in the study 0 to 6 days after dry off. Cows were randomly assigned to treatment groups with a coin flip determining assignment of the first cow to a treatment and then cows were alternately assigned to the two treatments. Cows in the vaccinated group were given Pulmo-Guard MpB (2 mL) at enrollment (~60 days pre-partum) and again three weeks later (~39 days pre-partum). Controls were not vaccinated. Blood was collected at enrollment, 3 weeks later, and at calving. A 10 mL composite colostrum sample was collected from each cow at calving and a composite milk sample was collected at 7 to 13 days in milk (DIM).

Thirty Holstein heifer calves from the above cows were utilized to evaluate absorption of *M. bovis* antibody from colostrum. Eighteen heifers born to vaccinated cows and twelve heifers born to non-vaccinated cows were enrolled at birth. Calves were offered 3L of colostrum within 15 minutes of birth and again at 12 hours of age. Blood samples were collected prior to the first colostrum feeding, at 48 hours of age, and at 30 days of age.

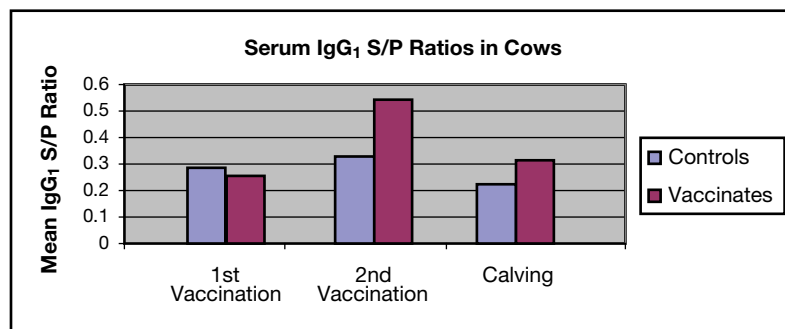
Following collection, serum, colostrum, and milk samples were frozen at -10° C and then shipped to the American Animal Health (AAH) Laboratory for analysis. AAH personnel were blinded to treatment groups. An ELISA was used to analyze samples for *Mycoplasma bovis*-specific IgG₁ concentration. Optical density (OD) of the samples was read with a microplate reader with dual wavelength of 450 and 630 nm. To minimize ELISA plate-to-plate variability, S/P ratios were calculated for each sample by the following formula:

$$\text{S/P ratio} = [(\text{OD}_{450} \text{ sample} - \text{OD}_{450} \text{ negative control}) \div (\text{OD}_{450} \text{ positive control} - \text{OD}_{450} \text{ negative control})]$$

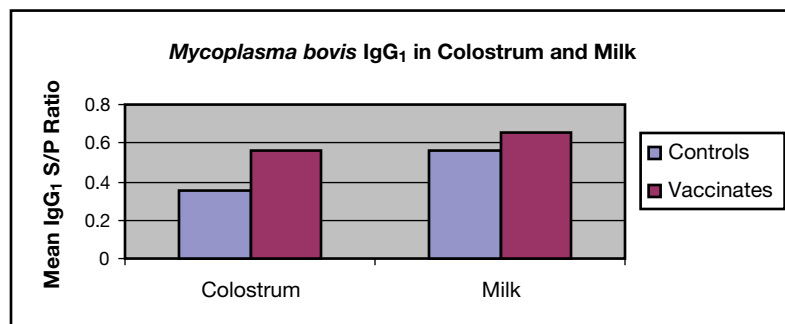
Passive transfer was assessed on the basis of total serum IgG concentration at 48 hours of age via radial immunodiffusion. Failure of passive transfer was defined as total serum IgG concentration <1000 mg/dL.

Results

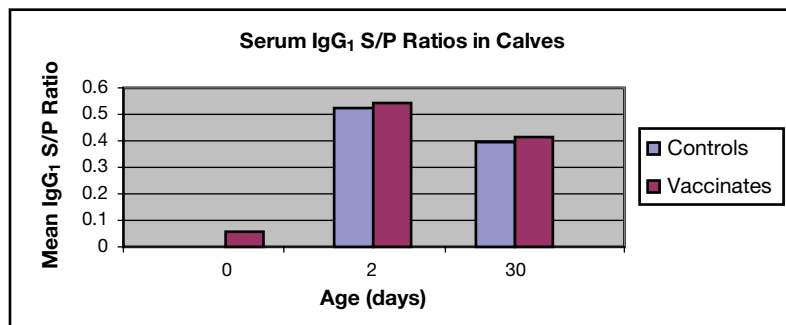
Cows – Serum Antibody: All cows had similar levels (P=0.2254) of *M. bovis*-specific serum IgG₁ at the time of the first vaccination. However, as compared to controls, vaccinated cows had a significantly higher level three weeks after the first vaccination (P<0.0001) and at calving (P=0.047).



Cows – Colostrum and Milk Antibody: *M. bovis*-specific IgG₁ was significantly higher in colostrum from vaccinated cows (P=0.0106); however, the level in milk samples was not different between treatments (P=0.3215). An unexpected finding was the higher levels of *M. bovis*-specific IgG₁ in milk versus colostrum. This is unusual in that higher IgG₁ concentrations are expected in colostrum. Further investigation of the colostrum and milk ELISA used in this study is required to determine their practical usage.



Calves – Serum Antibody: All calves had adequate passive transfer of immunity and there was no difference ($P=0.3697$) in total serum IgG concentration between controls and vaccinates. Dramatic increases in serum *M. bovis*-specific IgG₁ were seen in both treatment groups when comparing pre- and post-colostrum ingestion. Regardless of the dam's vaccination status, there was a positive correlation between the amount of *M. bovis*-specific IgG₁ in the dam's serum at parturition and the amount of *M. bovis*-specific IgG₁ in the calf serum at 48 hours of age ($P<0.002$; $r^2=0.361$). However, calves fed colostrum from vaccinated cows did not have significantly higher *M. bovis*-specific IgG₁ in serum at 48 hours or 30 days of age versus calves fed colostrum from non-vaccinated cows.



CONCLUSION

- Vaccinating cows with Pulmo-Guard™ MpB during the dry period resulted in significantly higher serum *Mycoplasma bovis*-specific IgG₁ at calving.
- The level of *M. bovis*-specific IgG₁ in calf serum at 48 hours of age was positively correlated with the level in maternal serum at parturition.
- In this study, vaccination of cows during the dry period did not result in additional *M. bovis*-specific IgG₁ being passively transferred to calves via colostrum. This **may** be due to *M. bovis* exposure being prevalent on the study farm resulting in the presence of a pre-existing level of immunity in the cows (vaccinates and controls). Additional studies evaluating passive transfer are necessary to determine if vaccination of *M. bovis* naïve cows has benefit in dairies with lower levels of *M. bovis* prevalence.



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