

Comparison of efficacy of various *Mannheimia-Pasteurella* vaccines against pneumonic pasteurellosis in young Holstein calves

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Introduction

The objective of this study is to determine if vaccination with a commercial *Mannheimia-Pasteurella* (M-P) vaccine is effective in reducing the incidence of respiratory disease and in improving average daily gain (ADG) in Holstein steers post-weaning. Pneumonic pasteurellosis is an economically important condition in cattle. In young cattle, *Mannheimia haemolytica* and *Pasteurella multocida* are commonly cultured from cases of bovine respiratory disease complex (BRDC); however, the nidus for colonization of the lower respiratory tract is not well understood. Stressors, such as, weaning, shipping, and weather changes have a strong correlation with colonization of the lower respiratory tract by these organisms. Protecting young, high risk cattle, such as Holstein steers, against respiratory insult from *M. haemolytica* and *P. multocida* would be economically beneficial to the cattle industry. There are several commercially available vaccines available; however, their efficacy in this high risk population is not well known.

Materials and Methods

The study was conducted at 2 sites in north central Indiana. Twenty-eight days after arrival, 4-week-old Holstein steers (n=402) were enrolled in an experimental, randomized clinical trial. Each steer was assigned to one of four treatment groups: Once PMH (n=121), Bovi-Shield Gold One Shot (n=121), Presponse HM (n=121), and a control group (n=39) to which no mannheimia-pasteurella vaccine was administered. Sample size for each treatment group was estimated using EpiInfo7 software, and randomization was performed using Excel. Livestock scales were utilized to weigh each calf at day 0, 42, and 105 post-arrival. Vaccine was administered on day 28 and repeated on day 56. Beginning day 0 to day 105 post-arrival, daily health observations and treatments, according to farm protocols, were performed by the caretaker, who was blinded to the treatment groups. Respiratory disease was determined based on caretaker observations and treatments. Twice weekly, a veterinarian, blinded to the

treatment groups, visited each site to observe the steers and to collect data. The data was transcribed into an Excel file, and GraphPad InStat 3 was utilized for statistical analysis.

Results

To determine if vaccination with a commercial M-P vaccine was effective in reducing the incidence of respiratory disease in young Holstein steers, incidence proportion and 95% confidence interval (CI) was calculated. The proportionate morbidity for respiratory disease was 6.72% (4.27%, 9.17%) among all groups, 8.26% (3.28%, 13.24%) among those vaccinated with Once PMH, 6.61% (2.12%, 11.1%) among those vaccinated with One Shot, 5.79% (1.56%, 10.00%) among those vaccinated with Presponse HM, and 5.13% (2.12%, 12.37%) within the control group. A Pearson chi-square test (p=0.85) was utilized to conclude whether the differences in incidences of respiratory disease were statistically significant among the groups. To determine if vaccination with a commercial M-P vaccine was effective in improving ADG in young Holstein steers, the mean, standard deviation, and 95% CI for the post-weaning average daily gain of each treatment group was calculated. The individual group means, reported in lbs, were: 2.61±0.42 (2.54, 2.69) for Once PMH, 2.59±0.40 (2.52, 2.66) for One Shot, 2.59±0.38 (2.52, 2.66) for Presponse HM, and 2.74±0.46 (2.59, 2.89) for the control. The Kruskal-Wallis Test (Nonparametric ANOVA) (p=0.39) was used to determine if the difference in means was statistically significant among the treatment groups.

Significance

This study concluded that among the 4 treatment groups, there was no significant difference in incidence of respiratory morbidity or in post-weaning ADG. In young Holstein steers, M-P vaccine did not produce significant health benefits compared to not vaccinating. This study did not follow these Holstein steers past day 105; therefore, conclusions regarding the health benefits of M-P vaccination past this stage were not possible.