Comparison of reproductive performance of dairy cattle following a post-partum vaccine protocol with two different multi-valent modified live vaccines

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Introduction

More than 70% of dairy operations in the U.S. vaccinate their cows, with increasing percentage as herd size increases (NAHMS 2014). There is evidence that vaccination in general improves the risk of pregnancy by about 5% compared to non-vaccinated animals (Newcomer et al.). Reports from the field indicate that the use of a particular modified live vaccine (Bovi-Shield Gold FP5 L5 HB) pre-breeding results in better reproduction than other modified live vaccines but there is no peer-reviewed literature to support, or refute, that claim. The objectives of this study were to compare the effects of 2 modified live vaccines on reproductive performance in post-partum dairy cows (first service outcome [FSO], pregnancy status at 150 days and time to pregnancy censored to 150 days).

Materials and methods

Two modified live vaccines were used in this study (Titanium 5 L5 HB [T5] and Bovi-Shield Gold FP L5HB [BG]). Vaccines were randomly assigned to fresh dairy cows 28-34 days in milk (DIM) on a single large dairy in the upper Midwest (n = ~8,500 cows) and administered from February 27 to October 8, 2020. Five thousand cows (2,500 in each treatment group) were targeted to detect a 4% difference in FSO (46 vs 50%). Vaccines were administered according to label, predominately by 1 person throughout the study. There were 5,657 animals vaccinated during the trial. To be included in the analysis (n = 5,329), vaccination had to occur 28-34 DIM and at least 30 days prior to breeding with a known (pregnant or open) FSO. First service outcome and pregnancy status at 150 DIM was analyzed via a multivariate logistic model. Time to pregnancy was analyzed with a proportional hazard model censored to 150 days. Explanatory variables used in the models included the occurrence of any transition disease in the first 60 days (y/n), month of first breeding, technician, the interval from vaccination to breeding dichotomized into two periods (39-45 or 46-52 days), parity, previous days carried calf, calvings the same week, calving ease, calving outcome (twins/single) and treatment.

Results

First service outcome was not different between vaccines ($P = 0.97$, OR of pregnant for T5 vs BG = 1.00, 95% CI 0.89-1.12). Additionally, pregnancy status at 150 DIM was not different ($P = 0.59$, OR of pregnant, T5 vs BG = 0.97, 95% CI 0.85-1.10) nor was time to pregnancy censored to 150 days ($P=0.64$, OR T5 vs BG = 0.98, 95% CI 0.92-1.05). Any disease (y/n) in the first 60 days (mastitis, metritis, retained placenta, ketosis, displaced abomasum or milk fever) was significant in all models. For FSO, an animal without a transition disease was 1.48 times more likely to be pregnant than an animal with a transition disease ($P < 0.001$ 95% CI 1.25-1.76). Disease incidence was low with no differences in individual diseases ($P > 0.13$) or occurrence of any disease ($P = 0.85$) between treatments. Vaccination interval was significant with those animals bred with a longer interval being 1.15 times more likely to be pregnant on FSO ($P = 0.015$, 95% CI 1.03-1.29). Primiparous cows were 1.21 times more likely to be pregnant on FSO than multiparous cows ($P = 0.016$, 95% CI 1.04-1.41). Cows bred the first time in cooler months were more likely to get pregnant than cows in warmer months ($P < 0.001$). Occurrence of any disease, month of first breeding and parity were significant in all models. Interval range was significant in FSO and time to pregnancy models but not in the pregnancy status at 150 days model ($P = 0.80$).

Significance

At this dairy, there was no effect of the pre-breeding vaccines evaluated on reproductive performance including FSO, pregnancy status at 150 days or time to pregnancy censored to 150 days. The significant effect of interval from vaccination to insemination on FSO is consistent with work in beef (Perry et al.). Bovine practitioners should continue to evaluate timing of vaccination relative to breeding and effects of transition cow health.

