

Administration of an SRP Salmonella Newport Vaccine Improves Milk Production and Somatic Cell Count in dairy Cows with no Clinical Signs of Salmonellosis

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Introduction

Salmonella is a common cause of disease in animals and humans. Many Salmonella infections are asymptomatic and many dairy herds do not know that they have Salmonella present until clinical cases present. Lack of recognition of subclinical salmonellosis or asymptomatic Salmonella infection by practitioners and producers can lead to oversight in management decisions for the infected herd, allowing the propagation of the pathogen within the herd. A novel vaccine against siderophore receptors and porin proteins (SRP® technology) has been adapted for control of Salmonella Newport in cattle. Many dairy producers utilize this vaccine on a routine basis for control of salmonellosis. However, there are no peer-reviewed papers on the efficacy of SRP Salmonella Newport vaccine for controlling Salmonella, or what impact this vaccine has on the health and production of dairy cows.

Materials and Methods

Holstein dairy cows and heifers (153 hd) in a commercial dairy operation were utilized to determine the effects of a commercially available SRP Salmonella enterica serotype Newport vaccine. Cows were randomly assigned to one of two treatments: SRP Salmonella Newport vaccine (Agrilabs Ltd) or placebo. Cows and heifers were vaccinated 46-90 days pre-freshening and again 14-21 days pre-freshening. Milk production was monitored by an electronic recording system that weighs milk on a continuous basis. Milk weights were recorded electronically. Fecal samples were collected on the day of first vaccination, 7 to 14 DIM and 28 to 35 DIM. Fecal samples were transported directly to the Kansas State University Veterinary Diagnostic Laboratory (KVDL). Salmonella serogroup isolation and identification was conducted at the KVDL. Salmonella isolates were sent to NVSL for serotyping. Blood samples were collected on the day of first vaccination, 7 to 14 DIM and 28 to 35 DIM. The serum samples were frozen and all samples were sent to EpiToxix, LLC (Willmar, MN) for ELISA serum antibody testing. Milk samples for somatic cell

counts (SCC) were taken on 1 DIM, 30 to 60 DIM and 60 to 90 DIM. All samples were delivered to the DHIA lab in Manhattan, KS, to measure somatic cell count (SCC) of the milk. Mixed-models methodologies were used to analyze the data. Where repeated measures were taken, first-order autoregressive covariance matrices were used to account for within-animal dependency over time. Continuous outcomes and categorical responses were modeled using linear and logistic regression techniques, respectively. Parity was forced into the models as a random variable and parity adjusted least-square means were computed. For repeated measures, the main effects of vaccination and day and their interaction were included in initial models.

Results

Average daily milk yield was greater in cows vaccinated with the SRP Salmonella Newport vaccine (88.8 lb/d) relative to the cows vaccinated with the placebo (86.3 lb/d; $P < 0.01$). Salmonella was recovered from 14 % of cows; all isolates were *S. Agona*. There was no detectable difference in Salmonella shedding in cows vaccinated with SRP technology relative to cows vaccinated with the placebo at any of the three fecal sampling times during the study. Numerically, SCC were lower for cows vaccinated with SRP technology at all sampling times but only the SCC samples taken at 30-60 DIM were significantly lower for cows vaccinated with SRP technology relative to control cows ($P = 0.01$). Vaccination with SRP had no detectable effect on cow morbidity during the study.

Significance

Vaccinating the dairy cows with Salmonella Newport SRP vaccine increased milk production for the first 90 DIM. Vaccination with SRP technology had no detectable effect on recovery of Salmonella Agona but did have a positive impact by decreasing somatic cell counts. These improvements in milk quantity and quality may lead to improved profitability of for dairy producers.