

Decreased Fecal Shedding of *Salmonella* Newport through Vaccination

Daryll Emery, PhD; Darren Straub, MS; James Sandstrom, DVM; Larry Slinden, DVM; Doug Burkhardt, MS

Epitopix, LLC, Willmar, Minnesota 56201

Introduction

Foodborne enteric pathogens, such as *Salmonella* and *Escherichia coli*, have met with increased scrutiny by consumers, the food industry and government regulatory agencies. One of the primary food safety initiatives today is to prevent the spread of bacterial enteric pathogens from the farm to the table. Controlling these pathogens at the farm level is one of many strategies being pursued to ensure the safety of our food supply. One such approach in reducing consumer health risks associated with *Salmonella* and *E. coli* has focused on preventing intestinal colonization and fecal shedding of these pathogens in meat producing animals. Unfortunately, other than for improving general hygiene and reducing oral-fecal transmission, the control of these pathogens has met with limited success, leaving the producer vulnerable and often bewildered as to “what to do”. The following study evaluates the use of a novel vaccine composition to prevent intestinal colonization of *Salmonella* in a controlled *Salmonella* Newport challenge in calves.

Materials and Methods

The objective of this study was to evaluate the efficacy of a subunit vaccine, consisting of Siderophore Receptor and Porin proteins (SRPTM), against a *Salmonella* Newport challenge in calves. The outcome parameters used to evaluate vaccine efficacy were: individual calf morbidity, as evidenced by rectal temperature; frequency and concentration of fecal shedding of *Salmonella* Newport; serological response to vaccination; and injection site reactions. Thirty male Holstein calves, 4-6 months of age, were randomly assigned to two treatment groups, consisting of 20 SRPTM vaccinated calves and 10

calves that received adjuvant as a placebo (controls). Calves in both groups received two vaccinations 21 days apart. Sixteen days after the second vaccination all calves were challenged orally with 10^{12} colony forming units of a virulent strain of *Salmonella* Newport. Calves were monitored daily for 18 days post-challenge.

Results

There was a statistical difference in fecal shedding of *Salmonella* Newport between groups during the observation period. Averaged across the study period, the SRP-vaccinated calves shed less *S. enterica* per gram of feces than the placebo group (average $\log_{10}=0.91$, 95%CI $\log_{10}=0.17-1.64$, $P=0.04$). The odds of being culture-positive for *Salmonella* among calves in the placebo group was 2.5 times greater when compared to calves in the SRP-vaccinated group (OR=2.5, 95%CI=1.24-4.93, $P=0.02$). There was also a statistical difference in antibody titers of the SRP-vaccinated group compared to controls, which increased after each vaccination. In addition, there was a significant difference in rectal temperature between the SRP-vaccinated and placebo groups during the post-challenge period. The average rectal temperature for calves in the placebo group was approximately 0.4°F higher (95%CI=0.01-0.79°F) compared to the SRP-vaccinated calves ($P=0.045$). There was no adverse tissue reaction at the site of injection in any of the SRP-vaccinated calves. In summary, vaccination of calves with the SRPTM vaccine was associated with lower rectal temperatures and reduced fecal shedding of *Salmonella* Newport after experimental challenge. The vaccine was safe and associated with minimal local reaction.