

E. coli O157:H7 Shedding in Beef Calves Vaccinated with *E. coli* O157:H7 SRP[®] Vaccine Born to Cows Vaccinated Prepartum with *E. coli* O157:H7 SRP[®] Vaccine

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Introduction

Cattle are the reservoir for *E. coli* O157:H7 which is a contaminant of beef products and has been associated with food-borne illnesses in humans. Recently an *E. coli* O157:H7 SRP[®] vaccine extract received conditional licensure in the United States for the control of *E. coli* O157 in cattle. Cattle are believed to become colonized with *E. coli* O157 around the time of birth. The majority of existing research and control strategies attempt to control *E. coli* O157 at the feedyard and harvest stages of production. These approaches are addressing the problem post-colonization. The objective of this study was to determine the shedding characteristics and performance of *E. coli* O157:H7 SRP-vaccinated beef calves born to *E. coli* O157:H7 SRP-vaccinated dams.

Materials and Methods

In January of 2009, 437 cows from Kansas State University's two commercial cow-calf herds were blocked by age and randomly assigned to either *E. coli* SRP vaccine or placebo treatment groups. The vaccinations were given to each cow at 60 and 30 days prior to the beginning of the calving season. To create a 2X2 factorial treatment structure, calves were then blocked by dam treatment and randomly assigned to *E. coli* SRP vaccine or placebo treatment groups which were administered at branding, preconditioning, and entry to the feedlot. The vaccine was prepared by the sponsoring company and labeled as A and B to blind study personnel. Blood samples were taken from cows prior to the initial vaccination to ensure *E. coli* O157:H7 SRP antibody-free status. Prior to each vaccination and again prior to harvest, a fecal and serum blood sample was taken from each calf for *E. coli* O157 culture and ELISA testing. All laboratory personnel were blinded to the treatment assignment of each sample. Feedlot performance data were also collected at regular intervals according to normal feedlot procedures and analyzed statistically in SAS[®].

Results

E. coli vaccination tended to increase body weight (BW) at 60 days-on-feed (DOF) in feeder calves (576 lb

vs 563 lb [261.8 kg vs 255.9 kg], vaccinated vs. placebo, $P=0.12$). There also tended to be a difference in BW at 60 DOF in calves from different ranches (576 lb vs 563 lb, Ranch 1 vs Ranch 2, $P=0.13$, respectively). *E. coli* vaccination tended to decrease dry matter intake (DMI) during the first 60 DOF (25.13 lb vs 25.22 lb, [11.4 kg vs. 11.46 kg]; vaccinated vs placebo, $P=0.10$). However, *E. coli* vaccination had no significant effect on feed efficiency ($P=0.94$). Fecal *E. coli* O157:H7 prevalence was too low at branding and weaning for statistical comparisons to be made (0/395 and 1/395, respectively), however, at feedlot entry overall prevalence was 20% (78/391). There was a cow vaccination by calf vaccination interaction for the prevalence of the calves shedding *E. coli* O157 at feedlot entry ($P=0.04$). *E. coli* O157:H7 prevalence for placebo-vaccinated calves born to placebo-vaccinated cows was 20% (20/99), whereas placebo-vaccinated calves born to SRP-vaccinated cows was 32% (30/94). SRP-vaccinated calves born to placebo-vaccinated cows had an *E. coli* O157:H7 prevalence of 18% (17/95), while SRP-vaccinated calves born to SRP-vaccinated cows had a prevalence of 11% (11/100).

Significance

This is the first report examining prepartum vaccination of beef cows with *E. coli* O157:H7 SRP vaccine and its effects on feedlot performance and fecal shedding of their offspring. The labeled three dose regimen could be an obstacle for industry adoption and implementation of the technology. This study demonstrated a significant interaction between dam and calf vaccination status that results in lower fecal shedding of *E. coli* O157:H7 when both dam and calf are vaccinated without any significant effects on feedlot performance. This may be due to protective passive immunity during the time of initial colonization immediately after birth. This has also laid the ground work for further study into entire lifecycle *E. coli* O157:H7 management rather than focusing only on specific segments of the beef industry.