

Evaluating the efficacy of Tri-Shield® First Defense® as a treatment for diarrhea in pre-weaned dairy calves

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Introduction

Diarrhea in pre-weaned dairy calves remains a challenge. Antibiotic use can often be inappropriate and adversely affect the gut microbiome. There exists an opportunity to explore alternative treatments for early calfhood scours. Tri-Shield® First Defense® is a veterinary biologic derived from hyperimmunized bovine colostrum concentrated to a standard potency of antibodies against K99 + *E.coli*, coronavirus and rotavirus. One dose at birth serves as a scour preventative, reducing mortality and morbidity caused by K99 + *E.coli* and coronavirus, while also reducing severity and duration of scours caused by rotavirus. The objective of this study was to evaluate the efficacy of Tri-Shield® First Defense® as a treatment for diarrhea occurring between 5 and 14 days of age. We hypothesized calves treated with Tri-Shield, in this off-label application, would recover fecal consistency sooner, have improved average daily gain, and lower morbidity and mortality than calves treated only with oral electrolytes.

Materials and methods

This study was conducted on a commercial dairy (3,400 milking cows) located in California between August 2023 and January 2024. Female Jersey calves were fed pasteurized waste milk fortified with milk replacer twice daily. Calves with diarrhea symptoms between 5 and 14 days of age, without any prior disease events, had a fecal sample analyzed using PCR methodology, then calves were randomly allocated to one of 2 groups. Calves in the control group (CTRL) were offered electrolytes once daily until the diarrhea resolved. Calves in the treatment group (FDTS) were provided the same electrolyte protocol, but also received a single dose of Tri-Shield on the first day of scours diagnosis. Fecal scores were conducted daily (as described by Renaud et al., 2020) until the diarrhea was resolved, which was defined as the first of 2 consecutive days with fecal score < 2. Calves that deteriorated after 4 days, or presented new signs of severe clinical disease, were eligible for escape therapy (IV fluids and/or antibiotics according to farm protocol). All calves were weighed at birth and at ~95 days of age.

Results

Enrollment totaled 140 calves (CTRL: n = 69; FDTS: n = 71). As per the study design, 100% of calves in both the CTRL and FDTS groups had diarrhea. The fecal pathology was similar between groups with Rotavirus and *Cryptosporidium parvum* being most prevalent (Rotavirus – CTRL n = 48, FDTS n = 50; *Crypto. parvum* – CTRL n = 24, FDTS n = 23; *E.coli* – CTRL n = 17, FDTS n = 18; Coronavirus – CTRL n = 11, FDTS n = 13). There were no differences between treatment groups for calves that had a relapse diarrhea event, defined as a diarrhea diagnosis occurring after the cure date (CTRL: 15.9 [9.00-26.65]; FDTS: 22.5 [14.23-33.78]; $P = 0.33$), or for calves that required escape therapy (CTRL: 14.5 [7.94-25.00]; FDTS: 8.5 [3.82-17.67]; $P = 0.27$), and there were no differences in mortality (CTRL: 10.1 [4.88-19.90]; FDTS: 16.9 [9.81-27.56]; $P = 0.25$). Calves treated with FDTS did experience less severe scours (fecal score = 3) than the CTRL group (CTRL: 21.3 [17.81-25.22]; FDTS: 15.7 [12.36-19.66]; $P = 0.03$). Calves in the FDTS group also had lower incidence of BRD compared to CTRL (CTRL: 79.7 [68.49-87.66]; FDTS: 63.5 [51.54-73.80]; $P = 0.04$). FDTS treated calves weighed on average 3.08 kg more than CTRL calves at 95 days of age (CTRL: 70.3 ± 1.32; FDTS: 73.4 ± 1.36; $P = 0.11$) and tended to have a higher average daily gain (ADG; kg/d) from birth to 95 days of age (CTRL: 0.46 ± 0.01; FDTS: 0.50 ± 0.13; $P = 0.06$). Lastly, although not a statistical reduction in duration of scours between groups (HR: 0.82 [0.58-1.17] $P = 0.20$), calves in the FDTS group cured on average 0.7 days sooner than CTRL calves (CTRL: 4.3 ± 0.40; FDTS: 3.6 ± 0.32).

Significance

In conclusion, using Tri-Shield® First Defense® as a treatment for diarrhea in the first weeks of life can reduce the severity of the diarrhea and incidence of BRD, while also improving average daily gain.

