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Translocation of Orally Inoculated Salmonella Following Mild Immunosuppression in Dairy Calves

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Objectives:

Salmonella (SAL) is a foodborne pathogen of increasing concern in the U.S. as foodborne infection rates remain high and legislative action against foods containing this pathogen is being crafted. *Salmonella* in beef may be harbored within peripheral tissues that are not reached by topical pathogen interventions; however, the mechanisms by which enteric SAL translocate to atypical locations are not well understood. Therefore, the objective of this study was to determine if immunosuppression via daily dexamethasone (DEX) infusion altered SAL translocation from the GI tract.

Materials and Methods

Weaned Holstein steer calves ($n = 20$; BW = 102 ± 2.7 kg) received DEX ($n = 10$; 0.5mg/kg BW) or saline (CON; $n = 10$; 0.5mg/kg BW) for 4 d (from d -1 to d 2) via a jugular catheter prior to oral inoculation of a nalidixic acid resistant *Salmonella* Typhimurium (3.4×10^6 CFU/animal) via milk replacer on d 0. Fecal swabs for SAL shedding were obtained daily. Upon harvest (d 5), the ileum, cecal content, lymph nodes (ileocecal, mandibular, popliteal and prescapular), and synovial (stifle, coxofemoral and shoulder) swabs were collected for the isolation and quantification of the inoculated strain of SAL.

Results

Following the inoculation, 100% of DEX calves shed the experimental strain of SAL for 5 d, 90% of

CON calves shed from d 1 to 3, and 100% of CON calves shed from d 4 to 5. A treatment by tissue interaction ($P = 0.0016$) was observed when evaluating SAL concentrations in tissues collected at harvest. Greater concentrations of SAL were quantified from the cecum of DEX calves ($3.86 \pm 0.37 \log_{10}$ CFU) when compared to CON cecum ($1.37 \pm 0.37 \log_{10}$ CFU; $P < 0.001$). However, there was no difference in SAL concentrations between DEX and CON calves when evaluating Ileal tissue ($P = 0.067$), nor among ileocecal ($P = 0.569$), mandibular ($P = 0.122$), popliteal ($P = 0.992$), or prescapular ($P = 0.834$) lymph nodes. *Salmonella* was isolated from the stifle joint of one calf in the CON group; however, SAL was not isolated from any other joint fluids sampled (i.e., coxofemoral or shoulder). This is important to note as it was 3.3% of joint fluid swabs collected from the CON group and there is a high likelihood of the stifle joint fluid to come in contact with meat during hind quarter fabrication. While there were numerical increases in SAL concentrations in DEX calves, it does not appear that daily dexamethasone administration drastically altered SAL colonization or translocation in mildly immunosuppressed calves.

Conclusion

While more research is needed to elucidate the interactions of immunosuppression and pathogen migration patterns, these data confirm that orally inoculated SAL can translocate from the G.I. and be harbored in peripheral lymph nodes and synovial fluid which represents a food safety risk.