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Characterization of *Enterococci*, *Salmonella* Spp., and Generic *Escherichia Coli* Isolated From the Feces of Cattle Fed Rations with and without Tylosin Phosphate

C. Carlson*, J. Martin, D. Woerner, P. Morley, G. Georgnaras, and K. Belk

Center for Meat Safety and Quality, Colorado State University, Fort Collins, CO, USA

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Objectives

In finishing beef cattle, the use of Tylosin phosphate, a macrolide, to control liver abscesses has been the subject of extensive scrutiny relative to antimicrobial resistance. The objective of this study was to evaluate differences in the prevalence and antimicrobial susceptibility of *Salmonella* spp., generic *Escherichia coli,* and Enterococci isolated from the feces of feedlot cattle fed finishing rations with and without Tylosin phosphate.

Materials and Methods

Pens of crossbred cattle representing conventional and "natural" production systems were identified after feedlot arrival (n = 8 pens/system; n = 2210 conventional and 1656 "natural"). Cattle were processed and managed identically with the exception of Tylosin phosphate utilization—only cattle in the conventional pens were supplemented with Tylosin phosphate (90 mg/d; Elanco Animal Health, Indianapolis, IN). Approximately 12 wk after arrival, fecal samples were collected from the floors of each pen. Approximately 25 g of composited fecal sample from each pen was diluted with 225 mL of tryptic soy broth (TSB) for enumeration and enrichment. The remaining fecal sample was frozen and stored for later metagenomic analyses. Samples for enumeration were diluted and plated onto Enterococcosel (EC) or MacConkey (MC) agars and incubated for 24 (MC) or 48 (EC) h at 43°C before enumeration of Enterococci or *E. coli* colonies. Samples for enrichment were incubated at 37°C for 24 h before plating onto EC or MC agars and incubation as described above for isolation of Enterococci and *E. coli*. Additionally, samples for *Salmonella* isolation were further enriched in tetrathionate (TT) or Rappaport-Vassiliadis (RV) broths at 43°C for 24 h. Following secondary enrichment, RV and TT samples were plated onto xylose-lysine-tergitol-4 (XLT-4) and brilliant green sulfa (BGS) agars and incubated at 43°C for 24 h. Representative colonies from EC, MC, XLT-4, and BGS agars were streaked, twice, onto selective agars and incubated as described above. Confirmation of isolate etiology and susceptibility of isolates to AMDs was performed using standardized procedures.

Results

Enumeration of fecal microorganisms indicates similarity (P = 0.89) in the populations of generic *E. coli* in cattle feces; however, the data suggest higher populations of Enterococci in fecal samples collected from cattle belonging to a "natural" production system. Conversely, the prevalence of *Salmonella* was higher ($P < 0.05$) in the pen fecal samples of cattle in conventional pens (25%) versus those in "natural" pens (0%). The susceptibility of isolates to AMDS indicates that production system—and the use of Tylosin specifically—has an observable impact on the microorganism characteristics.

Conclusion

The data suggest indicate populations of Enterococci are higher in the feces of cattle fed in conventional production systems versus those finished in a "natural" system. As macrolide-resistant Enterococci from cattle are suspected in facilitating the co-selection of enterococci that are resistant to other macrolides (including erythromycin), these differences yield key insights into the influence production system (i.e., Tylosin inclusion) on resistance acquisition. These data will aid in determining the impact of macrolide use in beef production on the acquisition and expression of AMR determinants.