Investigation into the Efficacy of *Bdellovibrio bacteriovorus* as a Novel Pre-harvest Intervention to Control *Escherichia coli* O157:H7 and *Salmonella* in Cattle Using an *In Vitro* Model

Page, Jennifer A.¹; Lubbers, Brian²; Maher, Joshua²; Ritsch, Linda²; Gragg, Sara E.³

¹: Department of Animal Sciences and Industry, Kansas State University, Olathe, Kansas 66061, USA ²: Kansas State Veterinary Diagnostic Laboratory, Kansas State University, Olathe, Kansas 66061, USA ³: Department of Animal Sciences and Industry, Kansas State University, Olathe, Kansas 66061, USA.

Abstract
Cattle are an important reservoir for the foodborne pathogens *Salmonella* and *Escherichia coli* O157:H7; they frequently harbor these microorganisms in their digestive tracts and shed them in their feces. Thus, there is potential for contamination of cattle hides and, subsequently, carcasses. Interventions aimed at reducing or eliminating pathogen shedding pre-harvest will also reduce the likelihood of beef product contamination by these pathogens. Therefore, this study used an *in vitro* model to evaluate *Bdellovibrio bacteriovorus*, a gram-negative microorganism that preys upon other gram-negative microorganisms, as a pre-harvest intervention to control *Salmonella* and *E. coli* O157:H7. Rumen fluid and feces were inoculated with pansusceptible or antimicrobial-resistant strains of one pathogen. Control samples were treated with HEPES buffer, whereas experimental samples were exposed to HEPES buffer plus *B. bacteriovorus*. *Salmonella* and *E. coli* O157:H7 populations were quantified at 0, 24, 48, and 72 h. The most-probable-number (MPN) technique, followed by streaking onto xylose lysine Tergitol 4 agar, was used to determine *Salmonella* populations, whereas spread plating onto sorbitol MacConkey agar supplemented with cefixime and tellurite was employed to enumerate *E. coli* O157:H7. *B. bacteriovorus* reduced pansusceptible *Salmonella* in cattle feces by 2.02 Log MPN/g (*P* = 0.0005) and antimicrobial-resistant *Salmonella* by 3.79 (*P* < 0.0001) and 2.24 (*P* = 0.0013) Log MPN/g after 24 and 48 h, respectively, in comparison to control samples. Significant reductions were not observed for *E. coli* O157:H7 in rumen or feces. These data suggest that further investigation into *B. bacteriovorus* efficacy as a pre-harvest intervention to control *Salmonella* in cattle is warranted.

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