Presentation Title: Environmental Mitigation of *Escherichia coli* O157:H7, Non-O157 Shiga-Toxigenic *E. coli* (STEC) with *Lactobacillus acidophilus* NP51 in Fecal and Soil Samples.

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**Category:** Pre-Harvest pathogen reduction

Objective: The objective of this study is to observe the survival of *E. coli* O157:H7 and Non-O157 Shiga-Toxigenic *E. coli* (STEC) inoculated into bovine fecal matter and feedlot soil samples exposed to *Lactobacillus acidophilus* (NP51). We hypothesized that samples treated with NP51 will decrease the prevalence over time compared to non-treated samples.

Experimental Treatments: Two experiments were conducted on separate collection dates and this process was replicated three times for each pathogen type. For one experiment each 1000-g sample of fecal material and soil collected from a feedlot were inoculated with a cocktail of three strains of *E. coli* O157:H7 at a concentration of approximately 10^3 cfu/g. In a second experiment, the 1000-g soil and fecal samples were inoculated with a cocktail of two strains each of the non-O157 STEC serogroups O26, O121, O103, O145, O45, and O111 at approximately 10^3 cfu/g. For both experiments, each sample type was divided into two 500-g aliquots. For both fecal and soil samples one 500-g portion was treated with NP51 at approximately 10^9 cfu/g. The other 500-g portion remained untreated to serve as a control containing only the inoculated pathogen type. All samples were stored at 37 ° C and samples were taken at 0, 24, and 48 hours. Ten grams from each sample were diluted in 90 ml of buffered peptone water and samples were further serially diluted and spread plated in duplicate onto CT-SMAC and Posse agar for *E. coli* O157:H7 and non-O157 STEC enumeration, respectively. Data was log_{10}-transformed and analyzed using repeated measures ANOVA.

Results: For fecal samples inoculated with *E. coli* O157:H7, there was a significant overall difference between the NP51 treatment and control samples (p=0.02) with least squares means estimates of more than 1 log_{10} cfu/g less for the NP51 treated sample compared to the

untreated control sample. However there were no significant differences detected for the NP51 treated soil inoculated with *E. coli* O157:H7 when compared to the control at any of the sampling time periods. Fecal samples inoculated with the 6 non-O157 STEC showed no significant differences between treated samples and controls. For the soil samples inoculated with non-O157 STEC, there were significant effects for both treatment (p=0.001) and time (p<0.001) but not the treatment by time interaction. The overall treatment least squares means estimates were 0.64 $\log_{10}$ less for the inoculated sample treated with NP51.

Industry Benefits: *E. coli* O157:H7 and Non-O157 STEC are ubiquitous in the feedlot environment and can survive long-term in both soil and fecal matter creating a source of cross-contamination amongst cattle during the feeding phase. These data indicate that an environmental intervention using *L. acidophilus* NP51 may help to reduce non O157 STEC in the feedlot environment when applied to soil samples.
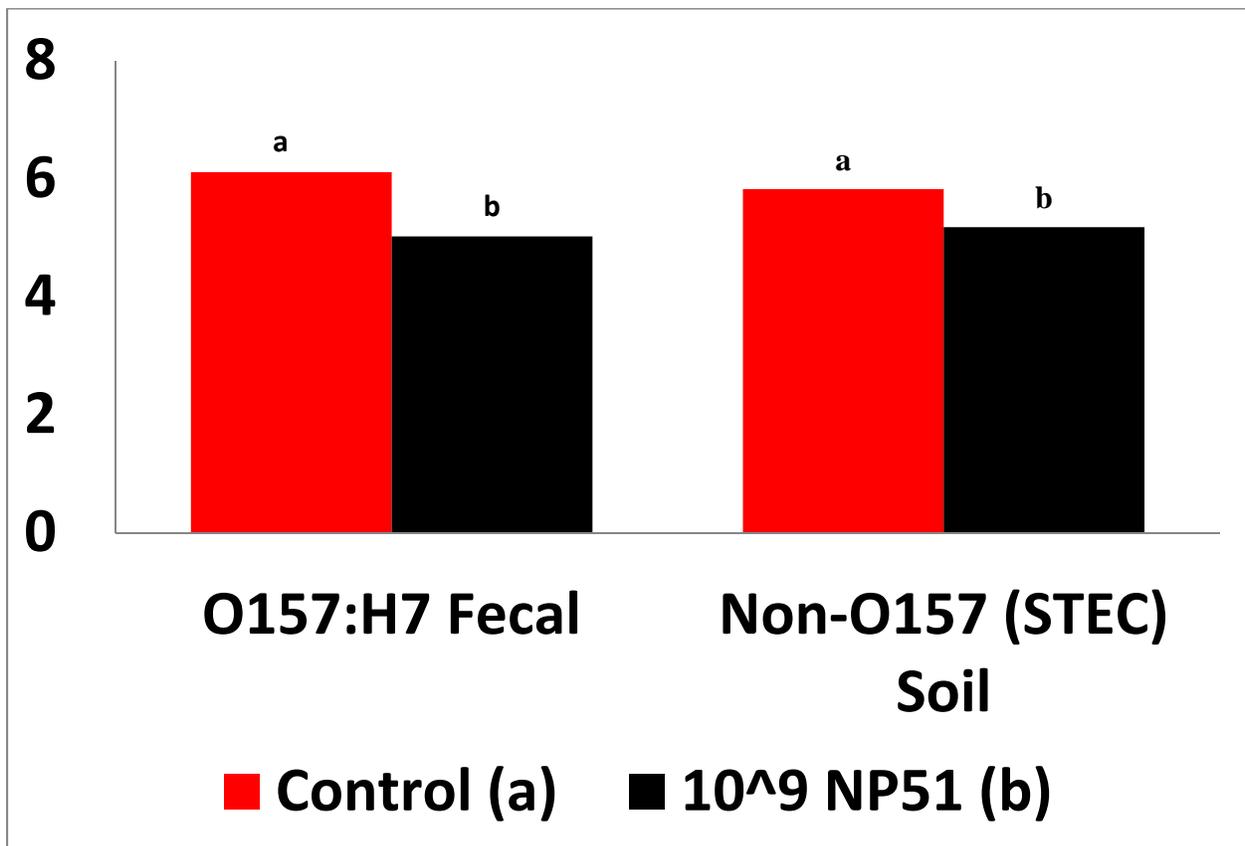
Concentration of *Escherichia coli* O157:H7 in fecal samples (left) and the 6 non-O157 STECs in soil samples (right) treated with 10^9 CFU/g *Lactobacillus acidophilus* NP51. Columns labeled with different letters are significantly different (p<0.05).