

# Effect of *Lactobacillus* L28 on the reduction of *Escherichia coli* in cattle manure collected from cattle fed 3 different diets

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**Abstract – The objective is to determine the effect of *Lactobacillus* L28 on the reduction of Shiga-Toxin Producing *Escherichia coli* (STECs) in cattle manure collected from cattle fed 3 different diets. Fecal samples were collected from cattle fed base diets containing 3 variations: 1) no probiotics, Tylosin or Monensin 2) Monensin with a probiotic, and 3) Monensin and Tylosin with no probiotic (control). Samples were inoculated with a cocktail of three pathogenic *Escherichia coli* (*E. coli*) strains (O157, O111, and O26). *Lactobacillus salivarius*, L28, was used at three concentrations ( $10^6$ ,  $10^7$ , and  $10^8$  log<sup>10</sup> cfu/ml). Samples were collected at 1, 6, 12, and 24 hrs. Concentrations of  $10^8$  cfu/g were effective in reducing STECs in manure samples regardless of the cattle diet.**

**Key Words – animal diet, fecal, foodborne pathogen, lactic acid bacteria, microbiology, safety**

## I. INTRODUCTION

The agricultural industry's leading issue for the livestock is food safety [1]. The reduction or elimination of the *Escherichia coli* present in the cattle to begin at the feedlot [2]. One of the primary reservoirs of *E. coli* O157:H7 are in cattle [3]. There is a correlation between cattle with pathogen present in the feces with carcass contamination [2]. Cattle may shed the pathogenic *E. coli* in the feces, which becomes a food safety concern for the beef product [3]. Lactic acid bacteria (LAB) is long known as to inhibit pathogens such as *Escherichia coli* in laboratory media and foods. *Lactobacillus* has been tested as one of the common strains as a probiotic agent for livestock to be fed to cattle in order to improve animal performance [2]. The objective of this research is to determine the effect of *Lactobacillus* L28 on the reduction of Shiga-Toxin Producing *E. coli* (STECs) in cattle manure collected from cattle fed 3 different diets to determine the potential for use as an environmental mitigation treatment.

## II. MATERIALS AND METHODS

Fecal samples were collected from the Texas Tech University's Burnett Center from cattle fed 3 different rations based on conventional high concentrate diets: 1) no probiotics, tylosin or monensin (base), 2) monensin with a probiotic (monopro), and 3) monensin and tylosin with no probiotic (control). Variations were studied due to the fact that the presence of antimicrobial agents could potentially change the pathogen. Autoclaved samples were inoculated with a cocktail of three pathogenic *E. coli* strains (O157, O111, and O26) to an initial concentration of 3.5-4.0 log<sub>10</sub> cfu/ml. *Lactobacillus salivarius*, L28, was used as an environmental mitigation treatment at three concentrations ( $10^6$ ,  $10^7$ , and  $10^8$  log<sub>10</sub> cfu/ml). Samples were collected at 1, 6, 12, and 24 hrs after inoculation and incubation at 37°C. Pathogenic *E. coli* were enumerated on MacConkey agar with a thin-layer overlay of Tryptic Soy Agar to facilitate injured cell recovery.

## III. RESULTS AND DISCUSSION

By 24 hours, the fecal samples collected from cattle fed diets with monensin and tylosin with no probiotic (3) with  $10^7$  L28 added had a reduction of 1.66 log<sub>10</sub> cfu/g comparing the base and monopro samples. The fecal samples from cattle fed the control diet had a reduction of 5.56 log<sub>10</sub> cfu/g when treated with  $10^8$ . The fecal samples collected from cattle fed diets with monensin and a probiotic (2) with  $10^8$  L28 added had a reduction of 3.84 log<sub>10</sub> cfu/g comparing the control and treated samples. Lastly, the fecal samples with no probiotics, tylosin or monensin had a reduction of 4.83 log<sub>10</sub> cfu/g after 24 hours when treated with a concentration of  $10^8$  L28 in Figure 1. Concentrations of  $10^8$  log<sub>10</sub> cfu/g were effective in reducing STECs in manure samples regardless of the cattle diet.

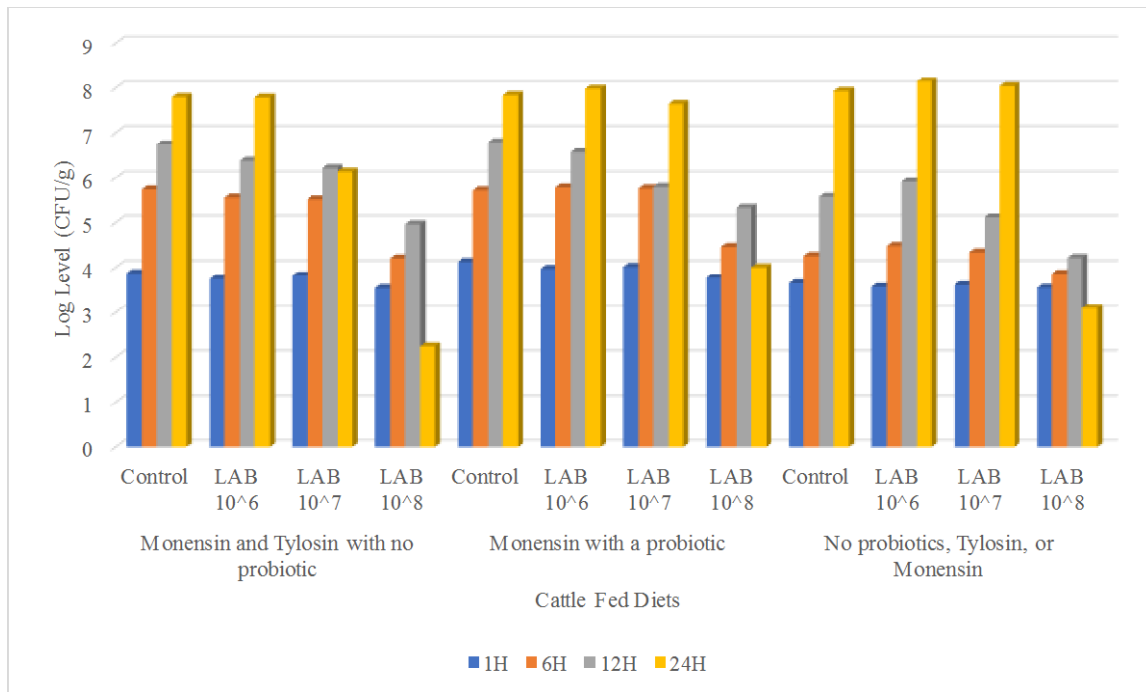


Figure 1. Reduction of *Escherichia coli* in cattle manure from three cattle fed diets by using *Lactobacillus* (L28)<sup>1</sup>  
<sup>1</sup>Lactic Acid Bacteria (LAB) concentration added in the manure after sterilization

#### IV. CONCLUSION

This study contributes to the search of solutions for the control of STECs as an alternative for the reduction of antibiotic use in the animal production. There appears to be a synergistic effect of cattle feeding combined with additional environmental application.

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