Organic Acid Blend with Pure Botanical Product Treatment Reduces Escherichia coli and Salmonella Populations in Pure Culture and in In Vitro Mixed Ruminal Microorganism Fermentations

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Foodborne pathogenic bacteria can live in the intestinal tract of food animals and can be transmitted to humans via food or indirectly through animal or fecal contact. Organic acid blend products have been used as nonantibiotic modifiers of the gastrointestinal fermentation of food animals to improve growth performance efficiency. However, the impact of these organic acid products on the microbial population, including foodborne pathogens, remains unknown. Therefore, this study was designed to examine the effects of a commercial organic acid and botanical blend product (OABP) on populations of the foodborne pathogenic bacteria, Escherichia coli O157:H7 and Salmonella Typhimurium. Pure cultures (2x10⁶ colony-forming units [CFU]/mL) of each pathogen were added to tubes that contained water-solubilized OABP added at concentrations of 0, 0.1, 0.5, 1, 2, 5, and 10% (vol/vol; n = 3). Water-solubilized OABP reduced (p<0.05) the growth rate and final populations of E. coli O157:H7 and Salmonella Typhimurium in pure culture at concentrations ≥ 2%. E. coli O157:H7 and Salmonella Typhimurium were added (2x10⁵ and 3x10⁶ CFU/mL, respectively) to in vitro mixed ruminal microorganism fermentations that contained water-solubilized OABP at concentrations of 0, 1, 2, 5, and 10% (vol/vol; n = 3) that were incubated for 24 h. OABP addition reduced (p<0.05) final populations of E. coli O157:H7 and Salmonella Typhimurium in the ruminal fluid at concentrations ≥ 5%. The acetate-to-propionate ratios from the in vitro fermentations were reduced (p<0.05) by OABP treatment ≥ 5%. Treatments to reduce foodborne pathogens must be economically feasible to implement, and results indicate that organic acid products, such as OABP, can enhance animal growth efficiency and can be used to reduce populations of pathogenic bacteria.

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