Evaluation of feeding distiller’s grains, containing virginiamycin, on antimicrobial susceptibilities in fecal isolates of Enterococcus and Escherichia coli and prevalence of resistance genes in cattle

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Abstract

Dried distiller’s grains (DG) produced from ethanol fermentations dosed with 0 (control), 2, or 20 mg/kg virginiamycin-based product or spiked with virginiamycin (VM) post-fermentation were fed to cattle and effects on antimicrobial susceptibility, and prevalence of antimicrobial resistance genes in commensal bacteria was examined. Biological activity assays of DG (from each fermentation) indicated a concentration of 0, 0.7, and 8.9 mg/kg VM, respectively. Twenty-four crossbred beef steers were fed 1 of 4 diets (containing 8% of each of the different batches of DG) and a fourth using 8% of the control DG (0 mg/kg VM) + 0.025 g/kg V-Max50 (positive control) for 7 wk. Fecal samples were collected weekly throughout the experimental period and cultured for Escherichia coli and Enterococcus, and isolates were examined for antimicrobial susceptibility, antimicrobial resistance genes (vatE, ermB, and msrC in Enterococcus), and integrons (E. coli). No treatment differences (P > 0.05) were observed in antimicrobial susceptibility of the E. coli isolates. Enterococcus isolates were resistant to more antimicrobials; however, this was influenced by the species of Enterococcus and not treatment (P > 0.10). The prevalence of ermB was greater (P < 0.05) in the control isolates after 4 and 6 wk while at wk 7, prevalence was greater (P < 0.01) in the 0.7 and 8.9 mg/kg VM treatments. Taken together, the minor treatment differences observed for the presence of ermB coupled with the lack of effect on antimicrobial susceptibility patterns suggest that feeding DG containing VM residues should have minimal if any impact on prevalence of antimicrobial resistance.


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