A Novel Approach to the Reduction of Antibiotic Resistant Escherichia coli Present in Livestock Waste through Use of Plant Extracts

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More than 700,000 people worldwide die annually from infections caused by drug-resistant bacteria (CDC). One major contributor to antibiotic resistance is the overuse of antibiotics in agricultural practices which can facilitate the development of bacterial resistance through the spread of infected livestock waste. This study describes a simple method of using targeted plant extract cocktails to inhibit the growth of antibiotic resistant Escherichia coli (E. coli) in livestock fecal matter. A total of 25 different individual and extract cocktails were screened using a Kirby-Bauer Disk Diffusion Assay to determine their effectiveness in inhibiting the growth of Q-50 (nalidixic acid resistant), SSuT (tetracycline, streptomycin, and sulphonamide resistant), and Q-63 (antibiotic susceptible) strains of E. coli. It was determined that the most effective extract tested was a cocktail of 87.5% Cryptolepis sanguinolenta and 12.5% Hydrastis. All strains of E. coli were found to be highly susceptible to this cocktail, indicating its effectiveness in successfully inhibiting the growth of E. coli strains with multiple antibiotic resistances. Additionally, when this cocktail was used as a treatment on bovine fecal matter, it exhibited a 3-5 log (>99.9%) reduction in antibiotic resistant E. coli growth in comparison to the control groups, thus demonstrating the high potential of this targeted cocktail as an effective, environmentally sound sanitization treatment for fecal matter. Applications can be extended for other sanitization uses in the agricultural, food, and healthcare industries as well as a potential alternative to antibiotics that is effective at inhibiting drug-resistant bacteria.

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