

Response of Antibiotics and Antibiotic Resistance Genes (ARG) in High-Level and Low-Level Managed Manures

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Abstract

The purpose of this study was to determine the response of antibiotics and antibiotic resistance genes (ARG) to manure management. A pilot field study was conducted using horse manure containing no antibiotics, into which chlortetracycline, tylosin, and monensin were spiked and compared to un-spiked controls. Subsequently, a large-scale field study was conducted comparing manure from a dairy with minimal use of antibiotics and a feedlot with regular subtherapeutic use of antibiotics. The manures were subjected to high-level (HL) (amending, watering, and turning) and low-level (LL) (no amending, watering, or turning) management and were monitored for antibiotic concentrations and levels of tetracycline ARG (*tet(W)* and *tet(O)*) using quantitative real-time polymerase chain reaction. All three antibiotics in the pilot study dissipated rapidly, with half-lives ranging from 6-28 days. Levels of *tet(W)* were significantly higher after 141 days of treatment, but levels of *tet(O)* were significantly lower in all treatments. In the large-scale study, tetracycline, oxytetracycline, and chlortetracycline, and the ARG *tet(W)* and *tet(O)* were present at higher initial concentrations in the feedlot manure. After six months of feedlot manure treatment, *tet(W)* and *tet(O)* had decreased significantly and antibiotic concentrations fell below 10ppb, with half-lives ranging from 14-32 days. Dairy manure treatment required only four months for similar results.

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