

Title: Effect of Manure Application Timing and Management on the Persistence and Transport of Antibiotics and Antibiotic-Resistant Bacteria in Corn and Soybean Production Systems, **NPB#16-039**

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Scientific Abstract:

Antibiotics are commonly used by swine producers at therapeutic levels for disease treatment and at sub-therapeutic levels for disease prevention. These pharmaceuticals reduce animal death rates at swine facilities, thereby enhancing overall production efficiency and increasing profitability. The goal of this study was to improve understanding of the occurrence and transport of antibiotic resistant bacteria (ARB) and antibiotic resistant genes (ARGs) from fields receiving swine manure versus those treated with chemical fertilizer. The study assessed ARB and ARG levels in soil and drainage water from plots amended with manure at different times (early fall, late fall, spring) and management practices (chisel plow, no till). The study also investigated different manure management strategies (anaerobic digestion, two-phase storage, centrifugation, and ionophore addition) for treatment of manure prior to land application for their potential to reduce ARGs and ARBs. Swine manure applications in early fall, late fall, and spring resulted in mostly similar patterns of ARB and ARG dissipation in soil. For the ARG, there was evidence for shorter persistence after spring manure applications; however, late fall and spring application had a higher percent detection of ARGs in drainage when compared to the control. The spring period is the season with greatest precipitation and tile drainage, factors which increase risk of transport to downstream waters. Overall our findings suggest that drainage predominates over ARG survival in soils in determination of ARG transport. This knowledge will assist farmers, researchers, and extension personnel in the development of better management strategies for manure storage and application for limiting the prevalence of ARGs and ARBs.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

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