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Runoff of Pathogens over Vegetative Filter Strips and Unmanured Setbacks following Surface Application of Animal Manure to Frozen Ground

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Abstract:

Vegetative filter strips, unmanured setbacks, and nutrient-limited manure application are being investigated as management practices to reduce the movement of pollutants from manured fields to nearby waters. Pollutants include nutrients, sediments, oxygen-demanding organics, pathogens (*Escherichia coli*, enterococci, *Salmonella* spp., Enterohemorrhagic *E. coli*, and *Campylobacter* spp.), host-specific PCR biomarkers, real-time qPCR fecal indicators, and antibiotic resistant bacteria. Six small watersheds (1 ha each) were treated in the winters of 2007 and 2008 with either swine manure (x2), turkey litter (x2), or left unamended as controls (x2) according to annual agronomic nitrogen requirements for corn (target level was 180 kg N ha⁻¹). Thirty three meter wide unmanured setbacks were maintained between the manure-application area and the edge of field where runoff samples were collected in Coshocton wheel samplers. Additionally, six small plots (66 x 12 m) received beef manure slurry to investigate the performance of vegetative filter strips following winter manure application; 2 plots plus one control plot had 33 m long x 12 m wide filter areas below them and 2 plots plus one control plot had 66 x 12 m filter areas below them. Ohio NRCS recommends a 66 m buffer area for winter manure applications along with slope and vegetative cover recommendations. Dustpan runoff sample collectors were placed at the lower edge of each of the manure application areas to acquire data on buffer loading and 11 m further down the slope (within the filter strips) to simulate shorter vegetative buffers. We will present our first two years of data regarding the movement of pathogens through these landscape runoff management practices.

Impact Statement:

This project is expected to yield results that will assist extension agents and farm operators in choosing appropriate and effective management practices to limit runoff of pollutants, including fecal pathogens, from manure application to frozen ground, a common practice in the North-Central and Northeastern States of the US. This will be partly accomplished through improvement of the scientific foundation for guidance regarding winter application of manure to land when the soil is frozen (Managing Manure Nutrients at Concentrated Animal Feeding Operations, EPA-821-B-04-006, Appendix L). Data generated in this and parallel studies at other farm sites will also be used to improve models for nonpoint source pollution. This project is made possible through cooperation of the USEPA-ORD, USEPA-Region 5, and USDA-ARS with funds leveraged through these sources and the National Research Initiative of the USDA Cooperative State Research, Education and Extension Service.

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