

ENVIRONMENT

Title: Fecal-contaminant indicators in soils and water of a watershed producing swine and other livestock. NPB # 03-133

Investigator: Mark D. Tomer

Institution: USDA/ARS - National Soil Tilth Laboratory

Co-Investigator: Tom B. Moorman

Abstract

The South Fork of the Iowa River drains a 215,000 acre watershed that contains nearly 100 confined livestock operations, mostly producing swine. Concerns about water quality in this watershed include bacterial pollution, indicated by the presence of *Escherichia coli* (*E. coli*), which could originate from manure. This study evaluated spatial and temporal patterns of *E. coli* in soil, field runoff, tile flow, and stream water during a 12-month study. After manure application, *E. coli* counts in soil were diminished to pre-application levels within 24 days, and indicated a 2.4 day half-life. A runoff event that occurred six and seven days after fall manure application showed large concentrations of *E. coli*. However, runoff from an adjacent, non-manured field also showed large concentrations, which were only 25-66% smaller, indicating wildlife as a possible significant *E. coli* source. Compared to runoff, tile flow had small *E. coli* concentrations, based on data from six county tiles. Only one of the six sites showed frequent exceedance of the applicable standard, probably because of surface inlet flows. Stream water monitoring over a 23-month period showed average *E. coli* counts in the three watersheds were similar, even though there are big differences in numbers of livestock facilities. There were distinct seasonal trends with greatest bacterial levels present in the summer. Runoff events immediately after manure application produce very high concentrations at field and watershed scales. Control of runoff through tillage practices, buffer strips or other means would help mitigate this risk. Finally, analytical methods were developed to detect the antibiotic tylosin in swine lagoon slurry, with concentrations of 0.065 to 1.97 ppm found at two facilities. This provides a possible range of concentrations that would be applied to soil.

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For more information contact:

National Pork Board, P.O. Box 9114, Des Moines, Iowa USA

800-456-7675, Fax: 515-223-2646, E-Mail: porkboard@porkboard.org, Web: <http://www.porkboard.org/>