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**Assessment of Dairy Manure Management Practices to Reduce Pathogen  
Runoff Losses from Agricultural Watersheds**

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Abstract:

Runoff from animal waste applied to agricultural land frequently delivers indicator bacteria and pathogens to surface waters, contributing to violations of water quality standards and potential risks to public health. Improved manure management practices are needed to reduce export of indicator bacteria and pathogens from agricultural land to surface waters. This research will increase understanding of processes governing pathogen losses from agricultural land and develop tools of known effectiveness applicable to reducing the impact of livestock agriculture on water quality. Project objectives include:

- Document and quantify the occurrence of *E. coli* O157:H7, *Salmonella*, *Cryptosporidium*, *Giardia*, and generic *E. coli* in representative dairy manure in Vermont
- Characterize and compare pathogen and indicator organism losses in surface runoff from hayland and cornland receiving manure at the field scale
- Using a paired-watershed design, document the effects of improved management at the field scale on runoff losses of microorganisms, including delay between manure application and rainfall, incorporation of applied manure on cornland, season of manure application to cornland, and application of manure to high vegetation on hayland.

We completed manure sampling at three farms for generic *E. coli*, *E. coli* O157:H7, *Giardia*, *Cryptosporidium*, and *Salmonella* in 2007. Levels of generic *E. coli* (104 to 106 organisms/g) were consistent with values reported elsewhere. No *E. coli* O157:H7 were detected, and low numbers of *Giardia* (<135 cysts/g) or *Cryptosporidium* (<90 oocysts/g) were observed in occasional samples. Calibration period monitoring of 22 runoff events from paired corn and hay fields was completed in August 2008. Very low numbers of *Giardia* (<310 cysts/L), *Cryptosporidium* (<5 oocysts/L), and *Salmonella* (<120 organisms/100 ml) were detected in runoff. Median *E. coli* counts were 4500 MPN/100 ml in cornland runoff and 2900 MPN/100 ml in hayland runoff. Field treatments began in Fall 2008; post-treatment monitoring will continue through 2009.

Impact Statement:

D.W. Meals, D.C. Braun, J.P. Hanzas, and P.S. Warden. 2008. Prevalence of microbial pathogens in dairy manure from three farms in the Vermont Lake Champlain Basin. Lake Champlain Research Consortium. Lake Champlain: Our Lake, Our Future, January 8-9, Burlington, VT.

Braun, D.C. and D.W. Meals. 2008. Assessment of Dairy Manure Management Practices to Reduce Pathogen Runoff Losses from Agricultural Watersheds. Poster presentation. 2008 Nonpoint Source Conference, New England Interstate Water Pollution Control Commission, May 19-21, Groton, CT.

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