

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

Donald W. Meals and David C. Braun

Stone Environmental, Inc.

Grant Number: 2006-35102-17197

Justification:

Improved manure management practices are needed to reduce export of pathogens from agricultural land to surface waters. The project will quantify patterns of microbial pathogen and indicator bacteria transport in runoff from agricultural lands receiving dairy manure and assess the effectiveness of several management practices to reduce runoff losses under field conditions. Results will support the development of specific recommendations for practices to control pathogen losses in agricultural watersheds in regions of livestock agriculture.

Objectives:

1. Document and quantify the occurrence of *E. coli* O157:H7, *Cryptosporidium*, and *Giardia* in representative dairy manure in Vermont
2. Characterize and compare the relative magnitude of pathogen and indicator organism losses in surface runoff from hayland and cornland receiving manure at the field scale
3. Document the effects of improved management at the field scale on runoff losses of microorganisms, including: a. Delay between manure application and rainfall; b. Incorporation of applied manure on cornland; c. Season of manure application to cornland; and d. Application of manure to high vegetation on hayland

Progress to date:

Monthly sampling (2006-2007) of manure from three Vermont dairy farms showed levels of generic *E. coli* (10^4 to 10^6 organisms/g) consistent with literature values; however no *E. coli* O157:H7 were detected, and only low numbers of *Cryptosporidium* (<90 oocysts/g) or *Giardia* (<135 cysts/g) were observed in occasional samples. Data from 22 storm events monitored on paired corn and hay fields under conventional management during the Calibration Period (May 2007 – August 2008) showed low numbers of *Giardia* (≤ 300 cysts/g), *Cryptosporidium* (≤ 5 oocysts/g), and *Salmonella* (≤ 120 MPN/100 ml); median *E. coli* counts in runoff were 4500 MPN/100 ml from corn fields and 2900 MPN/100 ml from hay fields. Field treatments began in Fall 2008; monitoring will continue through 2009.

Impacts:

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.