

0293 - Field scale observations from slurry applications to grassland following a freeze thaw event of faecal indicator organisms in drainage water

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Background: Faecal indicator organisms (FIOs) are *Escherichia coli* and Intestinal enterococci (IE). Their detection in recreational waters is as a surrogate for the presence of pathogens, therefore FIOs are a key instrument in public health protection. Diffuse pollution from agriculture is acknowledged as a significant source of FIO loads to recreational waters in the UK. The application of organic manures to agricultural land is seen as the main source of this diffuse pollution.

Purpose: To enhance our understanding of the losses and pathways of FIOs from livestock manures to water.

Methods: Dairy cattle slurry was applied to the Rowden drainage platform at North Wyke Research, Devon UK in the autumn of 2008. Slurry was applied to 6 of 12 1 ha plots, 3 drained and 3 undrained, at a rate of $46 \text{ m}^3 \text{ ha}^{-1}$. Drainage waters were collected from both the drained and undrained plots within a week of the slurry application and analysed following standard methods for FIOs. On the 17 December 2008 the prevailing climatic conditions changed to a dry, cold, easterly air flow which resulted in the drainage waters freezing, until the thaw on 11 January 2009. Water samples were collected and analysed for FIOs to coincide with the thaw.

Results and Discussion: FIO concentrations in the slurry were $6.5 \log_{10}$ and $6.7 \log_{10}$ CFU 100 ml^{-1} for *E.coli* and intestinal enterococci, respectively. Initial (prior to freezing) FIO concentrations from the plots to which slurry was applied were; $5.6 \log_{10}$ and $5.4 \log_{10}$ CFU 100 ml^{-1} for drained plots ($n=3$) and $4.9 \log_{10}$ $4.0 \log_{10}$ for undrained plots ($n=3$) for *E.coli* and IE, respectively. FIO concentrations in both the drained and surface collected waters declined steadily over time. By the 15 December 2008 detected FIOs were at background concentrations; $1.3 \log_{10}$ for *E.coli* and less than $1 \log_{10}$ CFU 100 ml^{-1} for IE. FIO concentrations detected in the thaw water on the 12 January 2009 were $3.5 \log_{10}$ CFU 100 ml^{-1} *E.coli* and $2.2 \log_{10}$ CFU 100 ml^{-1} IE in drainage water and $3.4 \log_{10}$ and $2.0 \log_{10}$ CFU 100 ml^{-1} respectively, for the surface waters.

The majority of research into the survival of FIOs is undertaken within laboratory settings with reported survival rates of a few days. Here we have observed an expected decline in viable FIOs to background concentrations over a number of weeks, but an unexpected significant increase in FIO concentrations in drainage waters following a freeze thaw event 100 days after a slurry application.