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Microorganisms in pig slurry leach through agricultural soil to field drains

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The amount of animal manure applied in modern agriculture for fertilization is increasing due to the increase in global, animal production and intensified agriculture. Pig slurry is known to contain zoonotic bacterial pathogens such as E. coli, Salmonella spp., Campylobacter spp. and viruses such as hepatitis E virus and group A rotavirus. Faecal coliform bacteria, present in manure, have previously been shown to leach into tile drain when manure is used as fertilizer on agricultural fields. Such pathogens may potentially be transmitted to the aquatic environment and contaminate drinking water sources.

The objective of the study was to assess the risk of viruses and bacteria leaching into the aquatic environment when manure is applied to fields in accordance with current regulations, to compare their leaching capabilities and to evaluate somatic coliphages as appropriate model organisms for leaching of viruses originating from pigs.

Pig slurry was applied to a tile drained field and the leaching of six different microorganisms, i.e. E. coli, Enterococcus spp., somatic coliphages, hepatitis E virus, porcine circovirus type 2 and group A rotavirus, naturally occurring in the slurry, was investigated in drainage- and well water.

All six microorganisms leached through the soil entering the tile drains situated in 1 meters depth. The leaching pattern of group A rotavirus differed substantially from somatic coliphages, otherwise used as indicator for microbial contamination of viruses. Furthermore, group A rotavirus was detected in groundwater up to two months after application of pig slurry.

The detection of viruses in drainage water and groundwater poses a potential human health risk as drinking water reservoirs located in areas fertilized with slurry may be contaminated with zoonotic pathogens.