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Stream water quality associated with a livestock/poultry production operation in Southeastern Manitoba, Canada

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Water quality was examined in two parallel streams in southeastern Manitoba that enclosed a small hog and poultry operation with associated waste lagoons and manure spread fields. Nitrate-N (NN), molybdenum reactive phosphorus (MRP), dissolved organic matter index (DOMI), chloride, total alkalinity, total dissolved solids (TDS), total suspended solids (TSS), pH, temperature, and total (TC) and fecal (FC) coliform bacterial counts were measured at weekly intervals during the ice-free season at two upstream and two downstream sites relative to the operation. Significantly higher values downstream compared to upstream were observed for MRP, TSS, TDS, chloride, and to some extent NN, indicating the escape of these materials into the adjacent streams. TC were correlated with the rainfall, water temperature, TDS, and pH at all sites. However, TC were also correlated with TSS, MRP, and DOMI only at the downstream sites, while NN was correlated more strongly downstream than upstream. FC were correlated with water temperature and NN at all sites, as well as with TSS and MRP downstream only. Downstream FC/TC ratios increased with increasing rainfall, indicating proportionately greater escape of FC compared to TC under higher runoff conditions. The results suggested that environmental loading of livestock waste adversely altered natural stream water quality dynamics, underlining the need for improved management practices, including the timing of manure spreading during drier weather conditions to minimise the large-scale escape events.

Keywords:

coliform bacteria; livestock; nitrogen; phosphorus; stream water quality

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