FAECAL PATHOGENS

Problem

Microbiological contamination of surface and ground waters together with general contamination of arable/grassland.

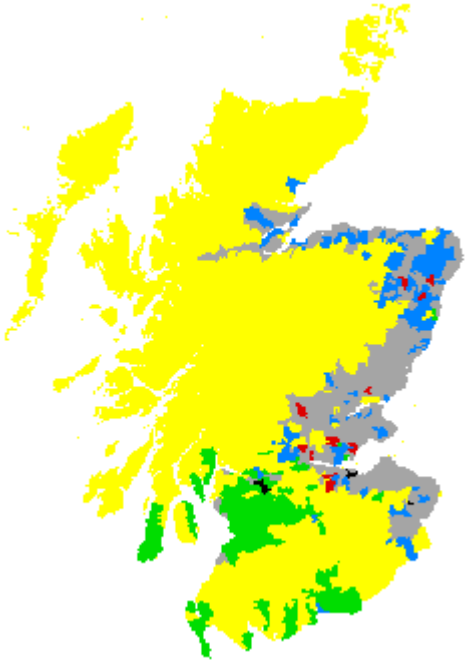
Impact

Drinking water quality, amenity value of freshwaters, estuaries and coastal waters, public access to countryside. Specific concern with *E. coli* O157.

Areas at Risk

Here the presence of livestock waste material is considered synonymous with faecal indicator organisms. Proximity of a 'source of microbiological contaminants' allowing direct contamination of ground/surface waters, presence of field drainage system can increase the risk of contamination after slurry/farm yard manure applications. Other sources include direct runoff from livestock housing, hard standing areas, leakage/failure from waste storage units, runoff from unconfined middens, direct dunging in streams, buried livestock.

- shallow groundwater source are especially at risk from contamination by faecal coliforms (e.g. Aberdeenshire private water supplies ~ 40% of samples failed).
- rivers and coastal bathing water/beaches (recent example of Ayrshire SW Scotland).
- direct ingestion of contaminated soil/plant material.



Distribution of Main Farm Types

	Areas at RIsk		
Farm Type	Localised	Regional	Universal
General Cropping	Where organic waste imported		
Mixed			Surface/ groundwater contamination
Dairy			Surface contamination
Pigs and Poultry			Surface/ groundwater contamination
Cattle and Sheep			Surface/ groundwater contamination

Practical Actions

Agricultural livestock represent only one possible source of faecal indicator organisims and it be beneficial to be able to separate out other contributors such as septic tanks. We divide sources into three physically distinct 'sources' or mechanisms of contamination.

- loss via runoff from farm buildings/hard standing areas, from surface runoff after waste spreading
- direct losses from failure of storage facilities, or direct dunging into surface waters where access for drinking allowed and
- deep percolation and transport through soils via drainage waters.

The characteristics and nature of contamination from these three broad groups differ. In many cases the sources implicated in the first group are highly responsive to rainfall intensity/duration and will display a high degree of temporal variability related to waste spreading. Runoff of livestock waste is especially likely to occur during the period directly after

application. The last group probably provides a ‘background’ signature and factors such as soil texture and depth become important with respect to attenuation of pathogen numbers.

- practical mechanisms for reducing microbiological contamination from farm waste are included in the PEPFAA code.
- recent guidelines for the microbial protection of groundwater include items such source protection through fencing off the well, maintain lid and concrete skirting, provide a locked cover and enclose in a shed.
- minimise risk of direct runoff of livestock wastes by following the PEPFAA code for livestock waste spreading.
- it is possible that reed beds/wetland areas could have a beneficial role in reducing pathogen numbers.
- specific management of sediment ‘hot spots’, achieved through stabilisation or stream bank, fencing of stock, providing drinking trofts, moving feeding rings regularly, management of clean and dirty water in farm yard.

Linkages

Sediment loss – many faecal pathogens are associated with suspended solids.

Research Gaps

Separation of the contribution from faecal indicator organisms derived from human and livestock sources
Prioritising contributions from different farm practices
Evaluate the impact that changes in the timing of waste spreading (as part of legislation – closed winter periods) will have on potential for contamination.
Improved estimation of decay (death) rates under different environmental conditions (during transport and storage).

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