SITE SOLID MANURE HEAPS ON CONCRETE AND COLLECT THE EFFLUENT - UK32 first DRAFT

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Description

- When stored outside, manure heaps should be sited on an impermeable concrete base with facilities for collecting the effluent that drains from the heap.
- The effluent should be spread on the land when there is little risk of it causing pollution.

Rationale, mechanism of action

The impermeable base and collection of effluent prevents the transport of pollutants in runoff and in drainage through the soil. If stored directly on the soil surface, liquid from the manure heap will seep into the soil and/or flow over the ground surface. Flows will be increased by rain falling onto the heap.

Storing manure on an impermeable base prevents seepage and accumulation of high concentrations of soluble N and P in the soil below the heap, which may subsequently be leached to surface and ground waters or flow directly through cracks to field drains. The concrete surface also reduces the area of soil compaction caused by farm machinery during loading and unloading of manure. Collection of the effluent prevents overland flow from the heap, which could otherwise transport N, P and faecal indicator organisms (FIOs) to watercourses. The effluent can be spread at a later date when soil conditions are suitable and the nutrient content can be utilised by the crop.

Applicability

The method is applicable to all livestock farms that produce solid manure (and to arable farms that import manure) and currently do not take these precautions. About 27 million tonnes of straw-based FYM and 4 million tonnes of poultry manure are produced annually in England and Wales. The action will be most effective on heavier soils, where there is a greater risk of surface run-off and where field drains are more likely to be present, and on sandy soils or shallow soils over permeable rocks where the risk of leaching is greatest.

Effectiveness, including certainty

Cuttle et al. [1] estimated that 0-1 kg N/ha per year reduction in leaching on the fields concerned. The calculation assumed that 20% of manure heaps are at risk (i.e. over a drain, etc), and 2% of total N is leached. Averaged over the area of the model farms described, this gave rise to a reduction in loss per unit area of 0.1 - 0.5 kg N/ha.

For phosphorus, Cuttle et al. [1] estimated that the manure component of the baseline P loss was reduced by 4% on the model farms with manure used in the study. For faecal indicator organisms (FIOs), they estimated that losses could [potentially be reduced by 10%, provided that effluent is collected and applied at the correct time and rate.

Estimates of effectiveness at the farm-scale assumed that 20% of the farmed area is affected within the Arable (plus manure), Beef and Broiler systems defined in the

study. The effectiveness is assumed to be zero for a broiler farm because the litter is a relatively dry material and the heap would need to receive an appreciable amount of rain before any seepage occurred. By this time, the temperature in the heap would be expected to have risen sufficiently to kill off most of the FIOs that are present.

Time frame
For nitrate, the option will be effective within a couple of winters of implementation. For phosphorus, full effectiveness could potentially take a number of years, due to the amount of time needed for soil P reserves to run-down. Effectiveness for FIOs will be immediate following the season of implementation.

Environmental side-effects / pollution swapping
The method will also reduce water pollution risks from ammonium-N and elevated levels of BOD. It is unlikely to increase any pollutant losses above those normally arising from manure storage [1].

Relevance, potential for targeting, administrative handling, control
The method would be simple but costly to adopt in terms of time and investment. There are few limitations on where it could be implemented. If the precaution to site manure heaps away from watercourses and drains was already being observed, the additional benefits of this method would be largely confined to reductions in nitrate leaching, as the impact of P and FIO losses in surface run-off would already be minimised.

Costs: investment, labor
There will be costs associated with the construction of a 150 mm concrete pad with drains and a runoff trap.

References
[1] Cuttle, S., Macleod, C., Chadwick, D., Scholefield, D., Haygarth, P., Newell-Price, P., Harris, D., Shepherd, M., Chambers, B. & Humphrey, R. (2006) An Inventory of Methods to Control Diffuse Water Pollution from Agriculture (DWPA) USER MANUAL. Defra report, project ES0203, 115 pp. p. 43-44 http://www.cost869.alterra.nl/UK_Manual.pdf