

4.8.1 Reduction of emissions from storage of solid manure

4.8.1.1 General practice

The storage of solid manure on a solid impermeable floor will prevent leakage to soil and groundwater. Equipping the storage with drains and connecting these with a pit allows collection of the liquid fraction and of any run-off caused by rainfall. It is common practice for farmers to have storage facilities for solid manure, to hold sufficient capacity until further treatment or application is carried out, see also Section 2.5. The capacity depends on the climate, which determines the periods in which the application to land is not possible or not allowed.

To reduce odour, the location of the storage on the farm is important and should take into account the general wind direction. The preferred position of the storage is away from sensitive objects in the vicinity of the farm, also taking advantage of natural barriers such as trees or height differences. Also, walls (wood, bricks or concrete) can be erected to surround storage heaps. These can serve as windscreens, with the opening of the storage on the lee-side of the prevailing wind direction.

Dry poultry droppings must be stored dry in a covered area. In enclosed sheds, condensation can be avoided by proper ventilation. Re-moistening of the droppings should be prevented as this will lead to a release of odorants. Droppings storage sheds should not be built so high as to allow pyrolysis to occur in the stored droppings.

Temporary stacks in the field should be located sufficient distances from watercourses. In Finland, for example, the stack must be at least 100 metres away from watercourses, main ditches or household wells and 5 metres from (small) ditches [125, Finland, 2001]. In the UK,

the applied distances are 10 metres from watercourses and 50 metres from springs, wells, boreholes or other sources intended for human consumption [190, BEIC, 2001].

For field stacks that are made in the same place every year, impermeable floors could also be applied. Where clay soils prevail and stacks change location, no accumulation of harmful amounts of nutrients is expected and special measures do not need to be applied to the bottom of the stack. To prevent water entering the manure heap, the accumulation of rainwater at the base of the stack needs to be avoided.

The covering of manure heaps is also applied to reduce run-off and evaporation of ammonia (and odour).

4.8.1.2 Application of a covering to solid manure stacks

Description: This technique mainly applies to broiler manure and dried layer droppings. Covering materials are applied to solid manure heaps and stacks in the field. These can be peat, sawdust, wood chips or a tight UV-stabilised plastic cover. The purpose of the cover is to reduce evaporation of ammonia and to prevent run-off of rainwater.

The principle behind the application of peat was reported by [125, Finland, 2001]: The use of peat (as a 10 cm layer) is based on its ability to bind cations. Ammonia is absorbed into the peat in a chemical reaction in which the NH_3 -molecule is transformed into a fixed NH_4 -ion. The higher the acidity of the peat, the more ammonia it can absorb.

If a cover is to be applied, stacks must be covered immediately after they are made, since most of the ammonia evaporates during the first few days.

Cross-media effects: Dry peat and sawdust absorb rainwater. However, straw is not a good covering material because it does not absorb ammonia and also it prevents a natural crust from forming on the surface of the manure. A crust prevents the evaporation of ammonia from the fresh surface of the manure under it better than a covering of straw does. However, peat is a non-renewable resource, which might be grounds for not using peat for the coverage of manure heaps [190, BEIC, 2001]

It is clear that tight covers can be re-used if properly applied, whereas other covering materials will need to be purchased for each new stack. These other covering materials, such as peat, will be incorporated and then treated (applied) as part of the manure. Peat will not create a hazard for grazing animals.

It is not clear whether a plastic cover causes (anaerobic) reactions in the stack that may lead to a reduction in the quality of the manure or that may affect emissions during application.

Operational data: The information was obtained under normal farming and climatic conditions. The use of covering materials such as, wood chips or sawdust might be less effective in dry and windy weather [192, Germany, 2001]

Applicability: In many areas, it is common practice, for practical reasons, to create temporary manure heaps in the field. Applying the covers is relatively easy as no complex equipment or machinery is involved. The peat littered manure of broilers is very suitable for depositing in stacks in the field, because liquid does not seep from it and nearly all rainwater is absorbed in the stack. Peat used as litter absorbs ammonia effectively.

Costs: Costs are thought to be very low. Costs consist of purchasing the covering material and applying it on the heap (labour, energy).

Reference farms in EU: Applied in trials.

Reference literature: [125, Finland, 2001]

4.8.1.3 Storage of poultry manure in a barn

Description: Solid poultry manure is normally stored in a barn. It is removed from the animal housing by front-end loaders or by means of a belt and transported to the shed, where it can be stored for a longer period of time. The barn is usually a simple straightforward closed construction with an impermeable floor and a roof. It is equipped with ventilation openings and an access door for transport.

Environmental benefits: Drying poultry manure in the housing reduces the emissions to air of gaseous compounds (ammonia) from the housing. To keep emission of gaseous compounds low the relatively high dry matter percentage of solid manure has to be maintained. This is helped by keeping solid poultry manure protected against outdoor influences such as rain and sunlight.

Cross-media effects: Odour levels may be kept low, but aerobic and anaerobic conditions can affect this. It is important to have sufficient ventilation to avoid anaerobic conditions.

If a new barn is planned it is a potential source of odour, so thought should be given to its location with respect to sensitive objects in the vicinity of the farm.

Operational data: The manure is protected against the outdoor climate by the barn construction.

Applicability: If sufficient space on the farmyard is available there are no limits to the construction of a new barn for the storage of solid manure. Existing barns may be used, but attention must be paid to the impermeability of the floor.

Costs: Costs consist of the costs for the construction and maintenance of a barn. For an existing barn, renovation of the flooring may be needed.

Reference farms in EU: The storage of poultry droppings in barns is applied in nearly all Member States.

Reference literature: [26, LNV, 1994], [125, Finland, 2001]