



# PROPER ACCUMULATION OF MANURE



## General advices

**The arrangement of proper manure storage is the only way to protect the environment of animal farms from pollution and to preserve the nutrients in manure.**

It is not obligatory to arrange manure storages at small animal-sheds, where is kept no more than 10 animal units (AU). It is possible to accumulate the manure safe enough without any manure storage:

- manure should be accumulated in an elevated site of relief, in order not to be flooded during flood season or heavy rain;
- the site should be surrounded by the dike of 50cm height;
- before starting to accumulate manure in the site, a 50cm thick layer of peat or a 70 cm thick layer of chopped straw and leaves should be put on the bottom for the absorption of sewage;
- manure should be kept covered with polythene film or with a 20 cm thick layer of peat or straw.

• Manure storage is a long-termed construction, therefore a proper place must be chosen for it so that it would be convenient to move out manure from a cattle-shed as well as to load manure into trailers and to drive up to the field. The best place for the arrangement of manure storage is a shady side of a cattle-shed, no closer than 30 m to a dwelling house and water well.

• The construction of manure storage depends upon the type of animals housing and bedding. In small cattle-sheds (where the number of livestock is no more than 40) the most economic way is to keep livestock on litters and to produce solid manure.

• The most economic way in pig-breeding farms and in large dairy-farms is to keep animals on a slatted floor without any litter. Slurry is produced in such farms.

• Manure storage should be no less than 6 months storage capacity. Urine and slurry stores should be covered or handled by a method that

efficiently reduces ammonia emissions

## The accumulation of solid manure

**Good solid manure is the one which contains no less than 20% of dry matter.**

Manure may be removed from a farm into manure storage by stationary mechanical means - using pivotal, scraping or reciprocating transporters, as well as by mobile means - a tractor-bulldozer, a mechanical manure-fork. In small cattle-sheds manure can be removed using a push-cart or with a winch.

The best material for the building of manure storage is concrete. Before having started concrete works, the layer of sand and gravel no thinner than 15 cm is to be spread on the bottom. This layer is covered with hydro-isolating film. Then the storage is being constructed using the concrete of the class no lower than B25. The concrete layer should be no thinner than 15 cm.

Temperature seams are made every 3-4m and they are filled up with bitumen. Seams should not be made of wooden planks, because their quick decay may result concrete erosion in seams. The walls of manure sites are of 1-1.5m high and they are made of the of ferro-concrete elements or of a monolithic ferro-concrete. The concrete used for the building of thin walls should be of the class no lower than B30 containing plasticators.

A ferro-concrete gutter covered with grating is arranged for the accumulation of urine from manure pad. Urine gets from the gutter into the bottom of the urine reservoir through a pipe. The end of a pipe is arranged at the height of about 20-30 cm above the bottom of a reservoir. Such supply of urine into the reservoir reduces ammonia evaporation. The urine reservoirs are to be covered.

The form of urine reservoir is usually cylindrical. The underground reservoirs are made of monolithic ferro-concrete; the overground ones are made of ferro-concrete or metal tin elements covered with a special anti-corrosive coat.

Urine may get into a reservoir by itself if 4-6% slop is available for supplying pipe or may be pumped. For it pumps with special pumper for

coarse sediments to make fine and with mixing valves are to be used.

Small reservoirs of the volume up to 100 m<sup>3</sup> (Figure 1) are often covered with thin ferro-concrete slabs, while bigger ones are arranged together with light roofs made of tents, films etc. (Figure 2). If a reservoir has no roof, the surface of sewage must be covered with floating coats of elastic film, oil or other materials.



Figure 1. Manure storage and urine reservoir on V. Liutkevicius farm in Kedainiai district.



Figure 2. Urine reservoir with a light roof on A. Visockas farm in Biržai district.

## The accumulation of slurry

In modern cattle farms and pigsties slurry is obtained when animals are kept on slatted floor. The removal of slurry requires not much of labour as nearly 78% of animals' excrement get right into the gutter through slots.

Slurry contains up to 12% of dry matter, therefore it may be removed by itself from a

pigsty or using transporters. Then slurry is transported into the manure storage with a special pump, or by itself (if the relief conditions are acceptable).

The construction of manure storage for slurry accumulation is similar to the one of urine reservoir.

In manure storage slurry stratifies into three layers: the upper layer - crust, the middle one - sewage, and the lower layer - sediment. These layers occupy accordingly 10-15, 55-70, 20-30% of the total volume of the manure storage. The crust on the top of slurry reduces the losses of nitrogen evaporation, therefore it is not necessary to cover the slurry reservoir. Before having started emptying the slurry reservoir, manure is mixed up properly using special mixers until the upper crust, slurry and sediment make up a single matter. In well-mixed slurry the nutrient (NPK) distributes evenly and there is almost no sediment on the bottom. The mixers may have electrical engines or they may be attached to a tractor.

The mixer with the power of 2-2.5kW is enough for a small manure site (up to 100 m<sup>3</sup>). Mid-size slurry reservoirs (up to 1000 m<sup>3</sup>) require the mixer with the power of 5-10kW, while the mixing of manure in big slurry storages (up to 3000 m<sup>3</sup>) need the mixer with the power of 20-25kW (Figure 3).



Figure 3. Different kinds of tractor-type mixers for slurry mixing.

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