

# Slurry storage on dairy farms

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The majority of farmers store slurry in concrete tanks, typically either indoor slatted tanks or open, outdoor, concrete tanks. As cow houses get bigger it becomes ever more challenging to manage slurry. Automatic scrapers need to deposit slurry at regular intervals into tanks or channels; long or deep tanks can be difficult to agitate.

Farmers developing a new dairy unit on a green-field site can look at alternatives. They might consider lined lagoons and over-ground steel tanks. The relative cost of all four options is shown in Chart 1.

The storage capacity required is calculated at 16 weeks (Nitrate Zone A), and adding a buffer of 20% (6.3m<sup>3</sup> per cow). The required storage period is higher for other Nitrate Zones at between 18 to 22 weeks. The cost of any reception tanks is not included for the lined lagoon or steel tank.

The cost of the storage systems is similar with the exception that the lined lagoon is cheaper. The cost of the open concrete tank includes fencing and agitation platforms. Half a meter of rainfall is assumed. On some sites with high water tables the only viable option maybe a fully, or partially, over ground tank.

## Lined lagoon storage

This is the lowest cost storage available. It really doesn't make sense to install a small lagoon so the cost of the lagoon is for a net storage of 1,277 m<sup>3</sup> or 70% more than the other storage systems.

Lagoons can work well where high volumes of liquid can be spread on dry ground with an umbilical system within reach of the storage facility. Some local planning authorities will not give planning permission for lined lagoons. Safety is an absolute priority with all systems of slurry storage but special care is needed with the lined lagoon.

This should include the provision of numerous 'tyre ladders' (where tyres are bolted together and bolted to the fence posts with a galvanised steel chain or rope) in the lagoon and a weed barrier of concrete or a plastic membrane underneath the fence and on any clay inside the fence. The lat-

Chart 1: cost of slurry storage options for a 116 cow herd

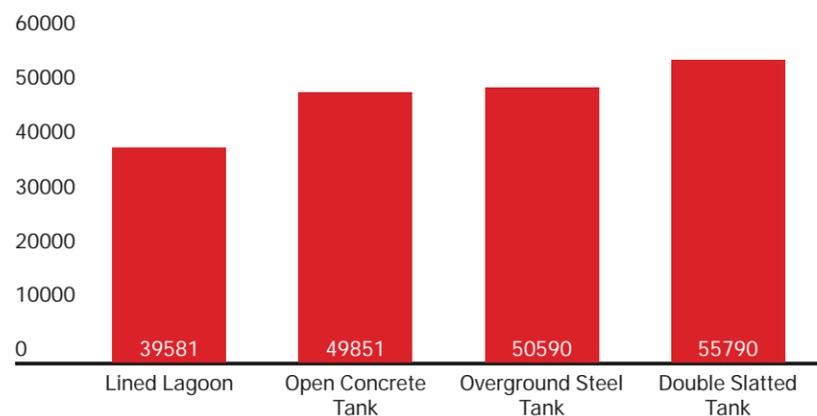
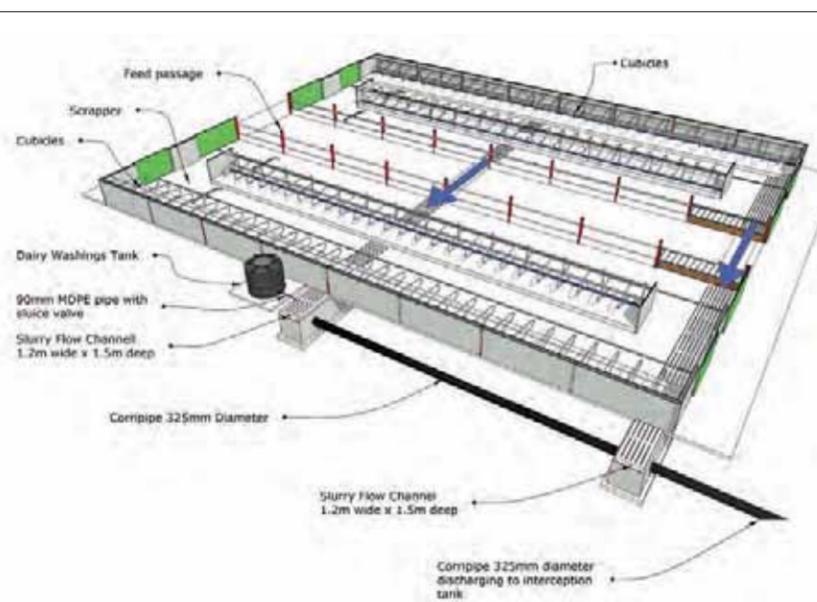
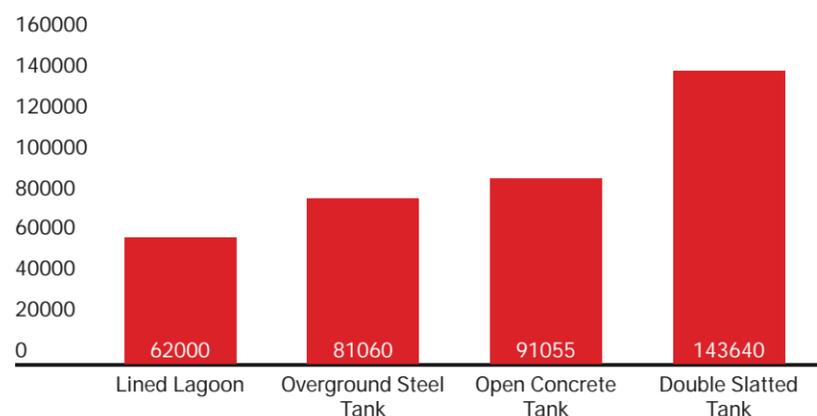


Chart 2: cost of slurry storage options for a 300 cow herd



John Walsh and Eddie Walsh at Teagasc Kildalton use a trailing shoe spreader to reduce gaseous emissions.

ter will remove the need to go inside the fence except at the designated agitation points.

## Slurry storage options for a large herd

Chart 2 shows the cost of the different storage options for a large herd. Each option includes parlour washings, except the double slatted tank option, and there is 53% extra storage in the lined lagoon. There is now a noticeable difference between the cost of each of the storage options.

Excavation in particular, but also the provision of a protective fence and safe agitation points, significantly add to the cost of the open concrete tank and lined lagoon. It is assumed that there are no economies of scale in choosing the 'double slatted tank'

option.

There is also the challenge and cost of collecting and transferring the slurry to the storage system. A suggestion of how this could be achieved without incurring excessive cost is shown in Figure 1. Here it is envisaged that washings from the milking machine and bulk milk tank will be pumped to a header tank. This will be used to flush slurry down the pipe system to the storage facility or a reception tank.

Farmers have had trouble with flow channels. Cows on low DMD silage,



or if there is a high level of maize in the diet, will have dung that won't flow anywhere. More research and visits to similar designs abroad is needed. A farmer developing a green field dairy operation could install a large slurry store at the start and add modules of the cubicle accommodation shown in Figure 1 over time. The extra storage capacity would give options like working with roofless cubicles for a period and perhaps renting out spare storage capacity to neighbours

## Ammonia and other gas losses from slurry

The extent of ammonia losses during slurry storage can be experienced by simply visiting a poorly ventilated slatted shed. There is, however, little scope to reduce gas losses from slatted tanks.

Comfort Slat Mats have a system to reduce ammonia emissions that's approved in the Netherlands. In a dairy unit the tank could be largely slatted with slats at intervals to take slurry from an automatic scraper system.

Further development of robotic technology may facilitate this in the future. This might, however, increase the risk of inhaling slurry fumes and there is also the concern that ammonia is flammable.

Covering over ground steel tanks is not recommended since it adds about 66% to the cost and the trapped gases would corrode the steel. Covering a lined lagoon would more than double the cost of the lagoon.

Tips for reducing ammonia losses during storage:

- Have sufficient storage to store parlour washings and slurry together. The washings will dilute the slurry. There is also less nitrogen losses (to the air) from dilute slurry after spreading and it is easier to spread dilute slurry with a trailing shoe etc. Store everything in the one tank but have a 2.1 m wall (in a 2.4 m tank) between the parlour washings section of the tank and slurry store so the former can overflow into the slurry tank from late winter. This assumes animals stand over the parlour washings section during milking only. Parlour washings are separate and can be spread during the early part of the closed period while giving the benefits of mixing outside this period. Parlour washings can also be piped or

pumped to slurry tanks once stock are out in the spring.

- Allow a natural crust to develop in outside tanks to contain gases. The crust can get too thick so it has to be swallowed up in agitation from time to time.
- Propeller agitators mix slurry less aggressively compared to pump agitators so there is less gaseous loss. However, slurry pumps have become very popular in recent years because they can handle big tanks and get the job done fast. In overground tanks and lined lagoons there is scope to use propellers as the main form of agitation as the smooth surfaces facilitate agitation and there is generally less time pressure to complete the job with these facilities.