

# Geomembrane-lined



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Lagoons are among the more cost-effective slurry storage options.



## SLURRY LAGOONS



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Tom Ryan and Peter Varley look at the main points to consider and costs of building a geomembrane-lined slurry lagoon

Geomembrane-lined lagoons are very popular on expanding dairy farms or greenfield sites that are being converted to large dairy enterprises. They are the least expensive option for storing slurry on farms. Like the other options, they come with a number of advantages and disadvantages that we have listed below.

**Advantages of a lagoon**  
 ☞ It is one of the more cost-effective options for storing large volumes of slurry.  
 ☞ Once planning permis-

sion is obtained, installation should be very fast (some contractors claim installation can be achieved in two to three weeks).  
 ☞ Slurry agitation is reasonably easy.

### Disadvantages of a lagoon

☞ Planning permission for lagoons can be difficult to achieve in some county councils.  
 ☞ Some sites are not suitable for lagoons (very rocky areas).  
 ☞ A safety fence must be erected.  
 ☞ Difficult to extend at a

later date.  
 ☞ Can gather a significant amount of rainwater.

Farmers planning to install a lined slurry store (lagoon) through TAMS II must use a contractor from the approved Department list. The specifications for geomembrane-lined slurry stores is listed on the Department's website under S126. The main specifications to note are:  
 ☞ A storage facility must be located not less than 50m from any water body in the case of new farmyards, and not less than 10m in the case of extensions or modifications to an existing facility.  
 ☞ The banks of the store must be a minimum of

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# slurry stores

**Table 1:** Geomembrane lined store - 16 weeks' storage, 3.6m deep and 0.3m freeboard and rainfall chosen 23mm per week

Cows	Total net storage m <sup>3</sup>	Total storage m <sup>3</sup>	Storage capacity / cow m <sup>3</sup>	Total costs based on TAMS II reference costs	Cost/cow	Cost/m <sup>3</sup>
50	264	414	8.28	€16,429	€329	€39.70
75	396	587	7.83	€18,768	€250	€32.00
100	528	759	7.59	€20,996	€210	€27.70
125	660	933	7.46	€23,172	€185	€24.80
150	792	1,104	7.36	€25,256	€168	€22.90
200	1,056	1,442	7.21	€29,229	€146	€20.30

**Table 2:** Geomembrane-lined store - 20 weeks' storage, 3.6m deep and 0.3m freeboard and rainfall chosen 23mm per week

Cows	Total net storage m <sup>3</sup>	Total storage m <sup>3</sup>	Storage capacity / cow m <sup>3</sup>	Total costs based on TAMS II reference costs	Cost/cow	Cost/m <sup>3</sup>
50	330	525	10.5	€ 17,947	€ 359	€ 34.20
75	495	751	10.01	€ 20,893	€ 279	€ 27.80
100	660	973	9.73	€ 23,671	€ 237	€ 24.30
125	825	1,195	9.56	€ 26,349	€ 211	€ 22.00
150	990	1,415	9.43	€ 28,926	€ 193	€ 20.40
200	1,320	1,857	9.29	€ 33,871	€ 169	€ 18.20

**Table 3:** Geomembrane lined store - 16 weeks' storage, 3.6m deep and 0.3m freeboard and rainfall chosen 23mm per week - costs based on prices quoted by one geomembrane-lined store contractor

Cows	Capacity gallons	Capacity in m <sup>3</sup>	Costs based on one supplier's quoted prices	Cost/cow	Cost/m <sup>3</sup>
60	100,000	455	€ 27,000	€450	€ 59.40
120	200,000	909	€ 30,000	€250	€ 33.00
180	300,000	1,364	€ 35,000	€194	€ 25.70
240	400,000	1,818	€ 38,000	€158	€ 20.90
299	500,000	2,273	€ 41,000	€137	€ 18.00
420	700,000	3,182	€ 52,000	€124	€ 16.30
600	1,000,000	4,545	€ 60,000	€100	€ 13.20

600mm high above ground level and be well-compacted.

☞ The slope angle should normally be 45°, but in certain soils the angle may be steeper. In no circumstance can the bank slope be steeper than 55°.

☞ The excavated and made-up ground must be finished uniform and smooth and free of any sharp protrusions.

☞ The anchor trench (which holds the liner in place and prevents it from slipping) must be carefully formed and compacted, and any undisturbed top soil beneath it must be removed.

☞ A leak detection system must be installed underneath the geomembrane lining.

☞ A proper agitation point(s) built to the specifications outlined in S126.

### Costs

Tables 1 and 2 outline the various capacities and costs associated with geomembrane lined stores. Table 1 is calculated for 16 weeks and Table 2 for 20 weeks. Other assumptions for both tables are a depth of 3.6m, freeboard of 0.3m and a rainfall figure of 23mm per week. The costs are calculated using the TAMS II reference costs for the construction of geomembrane-lined stores

plus €54.7 per metre for the surrounding protective fence.

Table 3 outlines the costs of construction (provided by one contractor of geomembrane stores) of various sizes of these types of slurry stores. A list of all contractors (S126A) supplying geomembrane-lined stores is available on the DAEM website. The cost of channels or pipes for bringing

slurry to the store is not included.

Looking at all the tables, the most notable feature is the benefit shown due to economies of scale. The bigger these storage systems are, the cheaper they are per m<sup>3</sup> and per cow. Comparing Table 1 and Table 3, it appears that the TAMS II reference costs are lagging a little behind the contractor costs.



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“A storage facility must be located not less than 50m from any water body in the case of new farmyards, and not less than 10m in the case of extensions or modifications to an existing facility

Slurry storage capacities compared >>>41

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