Floating Protective Cover Solution for Slurry Tanks and Lagoons

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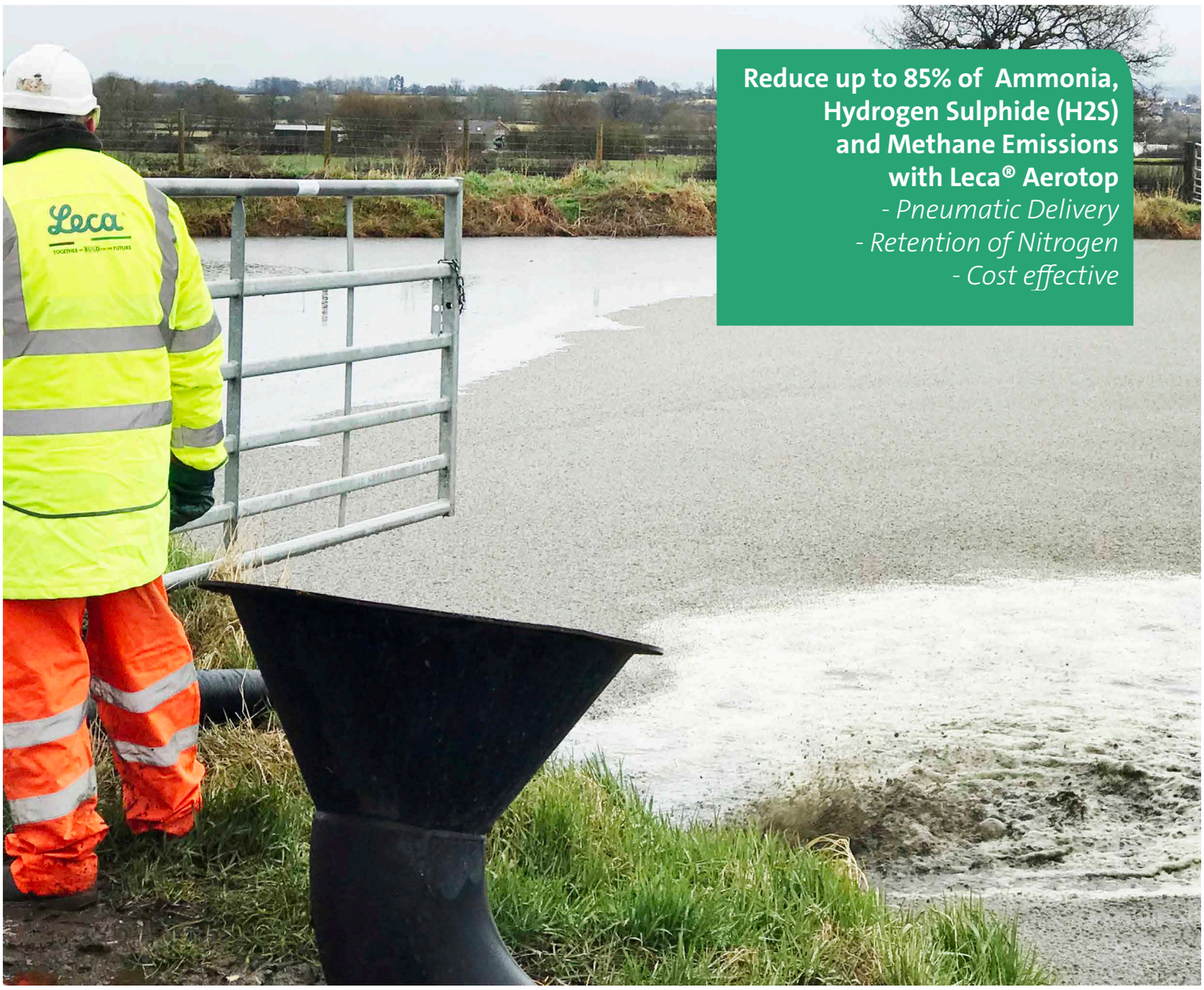

Reduce up to 85% of Ammonia, Hydrogen Sulphide (H2S) and Methane Emissions with Leca® Aerotop

- Pneumatic Delivery
- Retention of Nitrogen
- Cost effective

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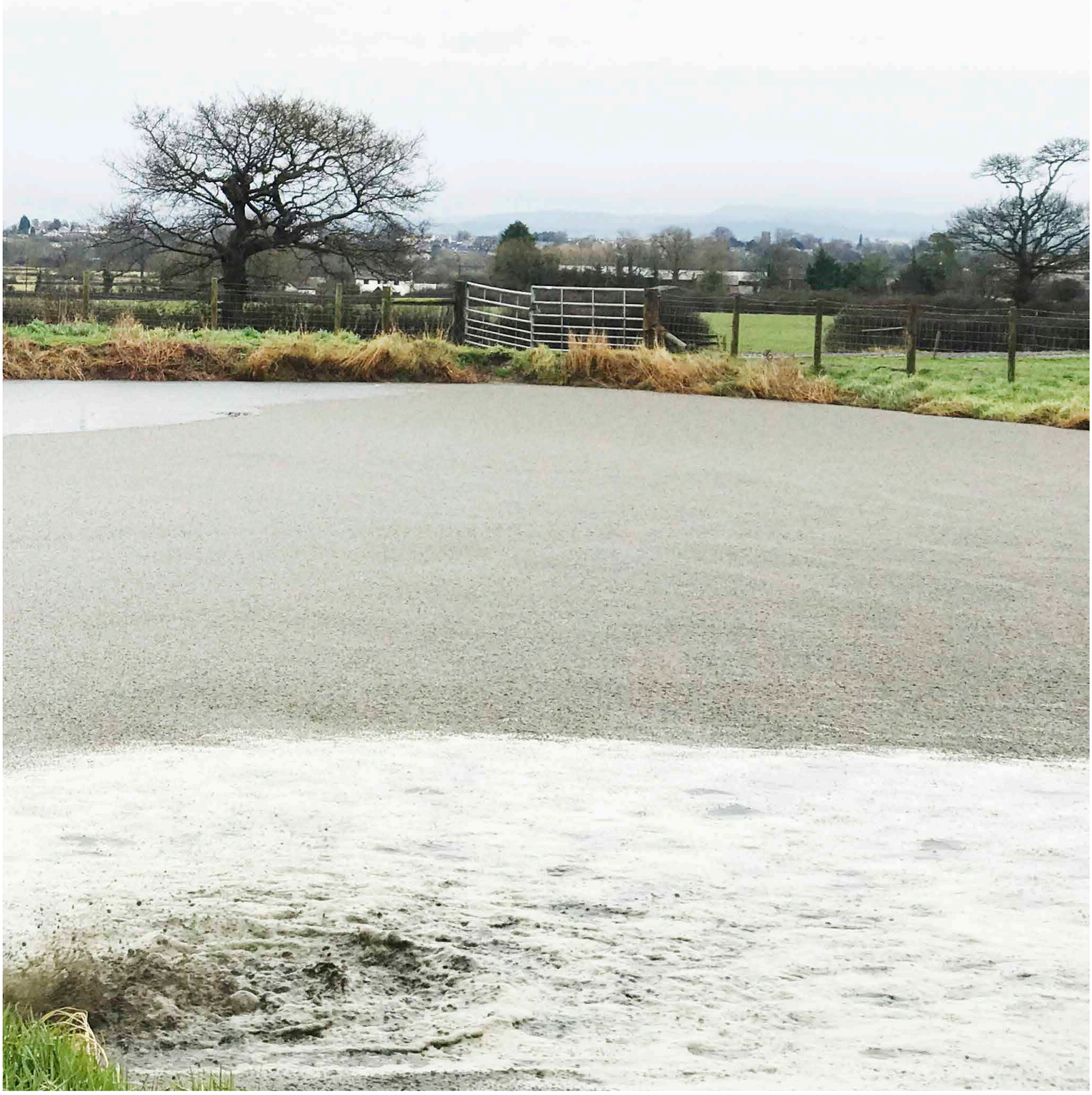


Floating cover solution for slurry tanks and lagoons

Leca® Aerotop is an innovative ceramic bulk material that can be added to the surface on a slurry tank or lagoon to form a floating layer. Leca® Aerotop is a product that tackles the issue of odour at their source and has been proven to significantly reduce harmful gas emissions. This innovative material floats on the surface of lagoons, storage tanks and run off areas to control the release of Hydrogen Sulphide (H2S), Ammonia, Methane and other odours* (SeeTable: page 8).

The Scientific Innovation of Leca® Aerotop

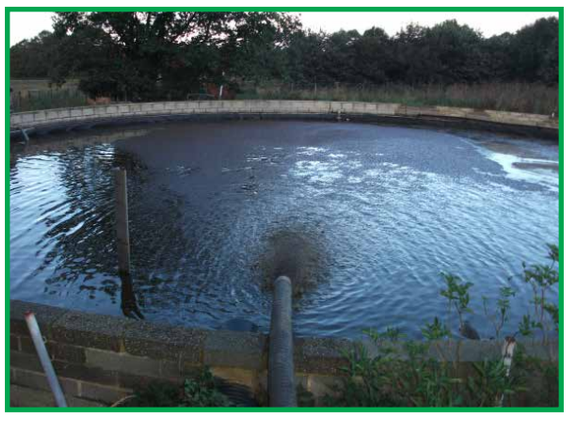
The gas emission removal system is created by a catalyst reaction on the Leca® Aerotop surface, which contains iron oxide and other metal oxides. This means that the emission removal solution and performance will last – preventing the release of harmful gases and odour into the surrounding area.

The lightweight nature of Leca® Aerotop means that the aggregate simply **floats on the surface** of the lagoon or slurry tank, making it a cost effective, quick and simple solution in the prevention of harmful gases and odour. The iron oxides in the clay mineral structure acts as a catalyst for chemisorption of Hydrogen Sulphide (H2S), Ammonia, Methane and other organic compounds.

The Leca® Aerotop floating cover solution can significantly **reduce the capital costs** involved in digestate storage solutions, while offering **significant financial returns** through the retention of nitrogen. Leca® Aerotop also reduces the financial costs required for the on-going maintenance required for alternative types of covers such as floating plastic covers and other fixed covers, which depending on the size of the lagoon can be extremely expensive, time intensive and difficult to install.

Advantages:

- **Easy to implement** - just pour Leca® Aerotop over the slurry
- **Longlasting solution** - fully resistant to chemical compounds
- **Lightweight** - no excessive load on the tank construction
- **Cost reduction** - less expensive than traditional reinforced concrete covers and tent roofing.
- **Reduces** foul smell and gas emissions by up to 85%
- Protects and keeps nutrients within the slurry



Innovative and Quick Delivery Methods

We have accumulated a wealth of experience over the past 20 years in successfully transporting and delivering Leca® Aerotop to diverse agricultural projects throughout the UK and Ireland. Depending on the project, we can source the vehicles that best suit the project requirement. This also includes the popular and innovative **pneumatic blowing delivery** (see image facing) which can deliver Leca® Aerotop in difficult terrain and can be blown in at a distance of up to 40 metres allowing for greater flexibility and aiding environmental consideration to a variety of access and constructional challenges. This can be pneumatically delivered to provide **immediate coverage** to a lagoon. Another popular method of delivery is through tote bags (2.2m3 volume), which again make it easy to transport onto site.

How can Leca® Aerotop help?

Leca® Aerotop is the only lightweight aggregate with a granularity of 10-20 mm and has a bulk density that does not exceed 300 kg / m3. As suggested by the Department for Environment Food & Rural Affairs (DEFRA), in the Government document 'Code of Good Agricultural Practice (COGAP) for Reducing Ammonia Emissions', **using lightweight expanded clay aggregate as a floating cover solution can provide an effective protective layer against dangerous emissions including Hydrogen Sulphide (H2S), Ammonia and Methane into the surrounding environment**.

Cost effective, Simple and Quick solution

Manufactured by Leca in its unique kilns, Leca® Aerotop is a Lightweight Expanded Clay Aggregate that offers many fundamental properties which make it a perfect solution for lagoon cover.

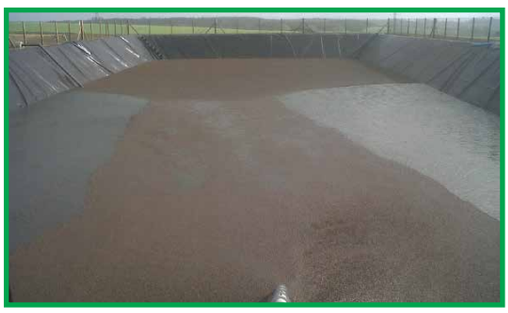
Leca® Aerotop is a flexible and quick solution helping to reduce the build-up of crusting. A 10cm layer of Leca® Aerotop poured over slurry **limits the emission of harmful gases and foul odours by up to 85%*** (SeeTable: page 8).

Valuable Nutrient Protection

Digestate is as valuable a commodity to British farming as spreading helps return to the land nitrogen, phosphate, potash and sodium. All four of these are important to the agricultural industry and for the future of British farming.

Legal Obligations for Farmers and Anaerobic Digestion Plants

Ammonia and odorous gases are produced by microbial activity in slurry, these gasses rise to the top of the surface and are released into the atmosphere at varying rates. The reduction in gas emissions (including ammonia and H2S) and in the removal of foul odours of slurry tanks is becoming a major legal challenge for many farmers. There are a number of techniques available to farmers and digestion plant owners. However, many of these solutions have been found to be expensive and unfit for purpose. This is where Leca® Aerotop offers an innovative and proven solution (See Wrexham Bio-Gas Digestate Lagoon Case Study opposite)

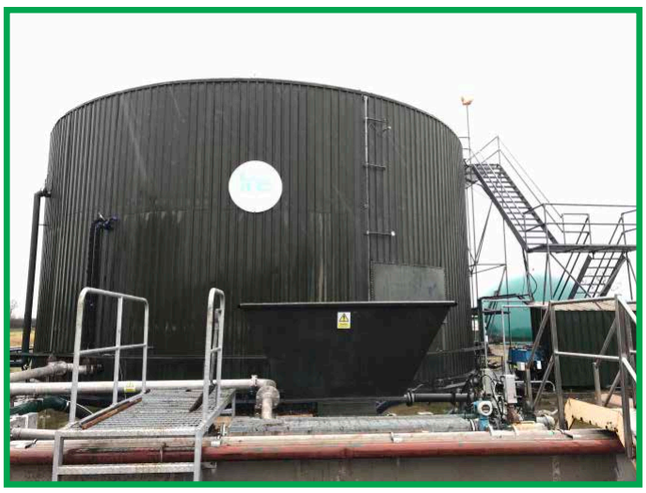


The benefits of utilising Leca® Aerotop on a slurry tank includes:

- Stable structure – does not degrade or collapse
- Durable and resistant natural clay mineral material without any hazardous or artificial components.
- Quick pneumatic installation available
- Lightweight nature means reduced construction costs, filling and removal costs.
- Well defined product grading (10-20mm).
- Leca® Aerotop has sorption capacity towards H2S and several other compounds including ammonia and methane so the filter will start removing odour instantly.
- Up to 80% reduction in hydrogen sulphide emissions.*
- Reduced ammonia emission by up to 80%*.
- Complies with EU Standards and BAT guidelines (Best Available Techniques)
- Reduces carbon dioxide and other vocs*
- No expensive roof or permanent cover required
- Proven ability to effectively retain nitrogen.
- A 10 cm layer can remove up to 80% of the contaminants
- Long lasting floating lifetime*

Leca® Aerotop offers an **environmentally friendly floating cover solution**. It uses no plastics in its construction and can be spread on the land at the end of its usable life. **Leca® Aerotop innovatively rises and falls with digestate levels** and allows for easy access to the digestate, this is essential for good digestate handling practice and regular agitation.

Case Study: Fre-Energy



Fre-energy in Wrexham is a major innovator in waste management in the UK and one of its major features is Lodge Farm Biogas Ltds Anaerobic Digester. Operating as an efficient slurry and food waste management system, their patented combined de-gritting and gas actuated mixing technology is designed to manage grit laden, high-strength wastes and slurries. The main aim of Lodge Farm Biogas AD is to assist local food manufacturers deal with process waste in an eco-friendly way. The lagoon was constructed to handle the digestate produced after the AD process. A valuable, natural fertiliser, digestate is by process virtually inert (most of gases converted to biogas by anaerobic digestion) and odourless. The application of Leca® Aerotop serves to meet regulatory compliance by handling the residual ammonia that would otherwise be released to atmosphere.

Environmental regulations set by DEFRA ensures that the levels of harmful gas released from waste management processes must be reduced to a minimum – Leca® Aerotop's unique properties prevents harmful gases into the surrounding countryside – potentially causing damage and pollution to the local area. These initiatives, and targets set by government to reduce gas emissions (including ammonia) and the removal of foul odours of slurry tanks is a major challenge for many farmers.

A quick and simple solution is to pour Leca® Aerotop directly on top of the slurry, which acts as an effective floating protective cover for a slurry tank or lagoon. A 10cm layer of Leca® Aerotop poured over slurry limits the emission of harmful gases and foul odours by up to 85%. The Leca® Aerotop floating cover solution is designed for reducing gas emissions (mostly ammonia) from liquid animal waste and complies with EU standards and BAT guidelines (Best Available Techniques) and may be used on a par with closed tanks. Conversely the Leca LWA provided a protective layer to keep the nutrients generated by the farm within the slurry.

Lodge Farm Biogas Site Manager, Tom said that....."The material did exactly what we required and this was to provide an effective cover for our lagoon with the aim of reducing the amount of ammonia released into the surrounding area. The material was quickly blown onto site with the Leca blowing machine with no issues and quickly covered the lagoon which is over 1200m2 in size. This operation took only a few hours to complete. The floating nature of the material quickly provided a floating cover for the slurry pit.

"The time saving solution provided by Leca Aerotop was key performance indicator for us, we needed to find a product which would effectively reduce emissions of Ammonia and provide a protective layer for keeping the nutrients within the slurry in our farms."

Documentation

	NO COVER	LECA® 10-20			
		2 cm	5 cm	10 cm	8 cm
Evaporation from water, kg/m² x days	5,8	5,9	6,4	4,3	
Ration, no cover = 100*	100	103	112	75	
Evaporation from slurry, kg/m² x days	3,2	1,0	0,7	0,6	
Ration, no cover = 100*	100	31	23	19	
Reduction of NH4-N, g/m² x days	13,2	4,0	3,1	2,6	
Ration, no cover = 100*	100	30	24	19	
Reduction of total N, g/m² x days	11,6	3,3	2,4	2,9	
Ration, no cover = 100*	100	28	21	25	
Reduction of ammonia NH3, ppm	101				48
Ration, no cover = 100**	100				53
Reduction of methane CH4, ppm	9542				493
Ration, no cover = 100**	100				6

The table shows the reduction of evaporated from clean water and slurry and the reduction of Nitrogen in different thicknesses of Leca® Aerotop.

*Danish Agricultural Technological Institute (today a part of Aarhus University), 1988.

**AgroTech, part of Danish Technological Institute, 2017

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