

TRAINING MATERIAL

Title:

The use of **liquid manure** as fertilizer

Training:

Main features of the subcategory

Livestock manure from housing usually contains high percentage of water which consist of urine, spilt feed and drinking water as well as water for washing. During physical separation, most of water retains in the liquid fraction, together with the soluble nutrients including mineral N, orthophosphate, K, etc. This liquid manure can be used as a liquid organic fertiliser in agriculture. With post-treatments such as evaporation and membrane filtration, the nutrients in liquid manure can be concentrated and the volume can be reduced which saves the transportation cost. Additionally, acidification is used to reduce the GHG emission from liquid manure during storage, transportation and application. Normally liquid manure is injected or incorporated immediately into soil to reduce emissions. Due to the relatively low P and high mineral N&K, liquid manure has the priority to be used in regions rich in P or have restrictions on P application.

Input material

Raw (pig/calves) manure

How to produce?

Liquid manure can be produced by separation at the source using machines like centrifuge, screw or belt press, or making use of the combination of a slatted floor and a settlement mechanism to remove the solid manure.

In a VeDoWS pig stable system, underneath the slatted floor a shallow cellar is constructed which enables the primary separation of urine and solid manure (ID 322). The cellar consists of two inclining parts with in its middle an opening of 18 to 22 mm. Using a scraper, the solid manure is removed from the manure gutter daily. This primary separation of manure in the cellar is the basis of lower ammonia emissions. There is no need for chemicals by using this technique.

Primary separation in calves housing is because the calves stay on a steel slatted coated floor. The manure falls through the slatted floor on a perforated, urine permeable manure belt that lies under the grid floor (ID 591). The urine falls completely through the perforated manure belt onto a coated sub-floor that is sloped and contains a urine trough at the lowest point. This pure urine then flows away to a closed collection outside the barn. Once a day, the coated sloping subfloor is sprayed with water so that no sediment formation occurs.

Typical nutrient content and availability for plants

Pig urine (ID 322) generally contains 3.28-3.80 g/kg N, 0.01-0.19 g/kg P₂O₅ and 7.86-10.92 g/kg OC

Calves urine (ID 591) generally contains 4.3 g/kg N, 0.1 g/kg P₂O₅ and 9.6 g/kg K₂O.

Examples for liquid manure products available on the NUTRIMAN Farmer Platform

- https://nutriman.net/farmer-platform/product/id_322 (Belgium)
- https://nutriman.net/farmer-platform/product/id_591 (Netherlands)



Figure 1 VeDoWS pig urine (ID 322)



Figure 2 Use of Geamix calves urine (ID 591)

Fields of application in agriculture: crop, dosages, application method and practical recommendations.

Liquid manure or urine is suitable as a NK fertilizer without being phosphorus limited. It can be used in organic or conventional farming and in open fields or greenhouses. Pig urine can be used in all crops, while calves urine is mainly recommended for grassland, arable crops and horticulture. The urine is nitrogen limited, meaning that max 170 kg N/ha can be applied. Due to the liquid composition field application and dose is easy to set.

Benefits for farmers

Liquid manure is a liquid organic fertilizer which can be used for several crops and in several types of farming. Due to the liquid composition field application and dose is easy to set. It barely contains organic components, is rich in mineral components and has a high N/P ratio. Once you have the stable system, you have a good fertilizer for free.

Furthermore, ID 591 is a potential RENURE fertilizer in NL, which means that it will no longer be defined as livestock manure in the Nitrates Directive and therefore the application will no longer be limited to 170 kg N/ha.

Bottlenecks of application. Potential risk or limitation.

As a product recovered from manure, this liquid manure is legally treated as manure and therefore they cannot be used as chemical fertilisers in terms of the Nitrates Directive. Currently this product has to compete with animal manure and has therefore no financial value yet. An effort is needed in a further concentration step to meet proposed criteria of liquid fertilising products of the new facultative European regulation of fertilising products if free trade within the EU is an objective. However, as mentioned above, it is a potential RENURE fertilizer in NL.

Legal framework for usingSpecific national legal conditions

Due to the Nitrates Directive, this product is limited to 170 kg N/ha. However, it is allowed as pilot RENURE fertilizer in NL which means that application is no longer defined as livestock manure in the Nitrates Directive. The product has a pilot approval pending the official acknowledgement by the EC. Therefore application is not limited to max 170 kg N/ha.

Economic evaluation of the application of the products

The cost for farmers to use product ID 322 and ID 591 is €0 per hectare, since you produce it for free. However, of course there is a cost of transforming manure into the organic fertilizer. For instance, the VeDoWS adapted stable construction (ID 323) has a cost of about 80-90 eur/pig place and an operational expenditure of maximum 1.50 eur/pig place/year. Nevertheless, when calculating total costs, this technology would not be more expensive than a classic stable system, since there is no longer a need for an end-of-pipe technique such as an air scrubber.

Best management practice guideline, taking into account of specific conditions of the given territory, for the use of the product to the specific applications (soil improvers, growing media, organic fertilisers etc.).

The products (organic liquid fertilizers) can be applied before sowing or planting of the crops with the same machines which are now being used for spreading slurry or liquid manure. During the cultivation of the crops the product can be applied with precision fertilising equipment. The use of low emission application techniques is compulsory to prevent ammonia volatilization.

ID:591 → Depends on crop application rates. Currently max 170 kg N/ha as livestock manure (230-250 kg N/ha for derogation farms in NL), potential RENURE fertilizer

ID:322 → The product can be applied up to 50 tonnes per hectare.

For more information:

- https://nutriman.net/farmer-platform/product/id_322 (Belgium)
- https://nutriman.net/farmer-platform/product/id_591 (Netherlands)