

# VERA VERIFICATION STATEMENT

## VERIFICATION OF ENVIRONMENTAL TECHNOLOGIES FOR AGRICULTURAL PRODUCTION

It is hereby stated that the

**Management system: Reduction of ammonia emissions in mink houses  
by removal of slurry every day**

**Developed by: Copenhagen Fur**

has been tested according to the VERA test protocol for  
Livestock Housing and Management Systems, version 1

The following main results have been documented through the test:

**Verified environmental efficiency:**

Ammonia emission reduction efficiency at 26 % when removing mink slurry from gutters  
under the cages every day compared to once a week.

**Operational stability**

As the test concerns a management system,  
operational stability is not validated.

April 12<sup>th</sup> 2013



**VERA** 

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*Mr. Peter Engel, Head of the International VERA Secretariat*

### *Exemption of liability*

The VERA Secretariat does not endorse, certify or approve technologies. VERA verifications are based on an evaluation of the technology performance under specific, predetermined criteria and the appropriate quality assurance procedures.

VERA as a representative for the Danish EPA, the German Federal Ministry of Food, Agriculture and Consumer Protection and the Dutch Ministry of Infrastructure and Environment make no expressed or implied warranties as to the performance of the technology and do not certify that a technology will always operate as verified.

The end user is solely responsible for complying with any and all applicable federal, state, and local requirements. Further the end user must be aware that the countries involved in VERA are having different legal requirements which will influence the status and use of this verification statement in each country.

## The VERA Organisation

VERA – Verification of Environmental Technologies for Agricultural Production – is an international organisation for test and verification of environmental technologies for agricultural production. VERA is established as a co-operation between the Danish Environmental Protection Agency, the Dutch Ministry of Infrastructure and Environment and the German Federal Ministry of Food, Agriculture and Consumer Protection.

The purpose of VERA is to enhance a well-functioning market for environmental technologies to increase the environmental protection of agricultural production by substantially accelerating the acceptance and use of improved and cost-effective environmental technologies.

VERA verifies the performance of technologies by carrying out tests according to pre-defined test protocols. A VERA Verification Statement secures validated documentation for the environmental efficiency and operational stability of the technology and is an important step in introducing the technology to the market. Based on information from the test reports, the VERA Verification Statement gives a general and short description of the technology, its principle of operation, and the main results and conclusions from the VERA test.

## Applicant Data

Technology type	Management system for removal of slurry every day
Applied for	Reduction of ammonia emissions in mink houses
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Test institute	AgroTech A/S, Martin Nørgaard Hansen

## System Description

This management system aims at reducing ammonia emission from mink farms. The task is to remove the slurry from the slurry pits every day instead of slurry removal on a weekly basis, which is the common practice.

The slurry can either be removed manually, or by an automatic system.

The manual removal of slurry from the slurry pits is done by pushing the content of the slurry gutters to the vertical slurry ducts by a slurry plate fitted to the size of the slurry pits.

In automatic systems the slurry plates are normally attached to a wire propelled by an electrical motor situated at the end of the slurry pits. The wire is normally equipped with several slurry plates, that by back and forth movements push the content of the slurry pit to the vertical slurry ducts at the end of the slurry pits. The automatic system is either equipped with an automatic or a manual starting system.

When the slurry enters the below ground slurry channels it is normally transported to outdoor slurry tanks by either vacuum systems or a channel flushing system. A channel flushing system is equipped with two pumps. One of the pumps is situated in the slurry tank on an adjustable raising and lowering system. The pump is used to pump liquid slurry from the slurry tank to the below ground slurry channels via tubes normally 250 mm id. The below ground slurry ducts have a slight decline towards the second pump, which is situated in a well near the outdoor slurry tank. The second pump pumps the liquid slurry from the slurry tanks and the mink slurry is removed from the slurry pits to the outdoor slurry tank.

## Test Design

The management system was tested during one production year (2011- 2012) according to the VERA Test Protocol for Livestock Housing and Management Systems (Version 1).

The test took place at two commercial mink farms. Both farms produce typical mink species in standard housing systems. At each farm two identical housing sections were chosen as test sections. One of these test sections was chosen as case test section, while the other was chosen as the control test section.

### **Ammonia emission**

Six measurement periods were conducted at each test farm. Each measurement period lasted 7 days and included test of the ammonia reduction effect comparing the two scenarios, slurry removed every day and slurry removed once a week. The six measurement periods at each location were as evenly as possible distributed over a production year running from May to April.

## Odour emission

No odour measurements were performed. As manure is considered to be the main source of odour in mink houses, a more frequent removal of slurry is not expected to increase the odour emission. As frequent removal of mink slurry is not expected to have negative effects on odour emission, the vendor of the test decided to omit the measurement of the odour effect.

## Dust emission

No dust measurements were performed. Slurry is a wet fraction which does not produce dust. Frequent removal of slurry is therefore not considered to have any effect on dust emission from mink houses. The vendor of the test therefore decided to omit the measurement of the dust effect.

# Test Results

## Environmental Efficiency

**Table 1:** The measured ammonia emissions from two mink farms with weekly slurry removal and once daily. Weekly slurry removal is normal practise and therefore used as control measurements. All values are g NH<sub>3</sub>-N per adult female (adult female plus 6.4 offspring/female and requested males for mating) per day.

Farm	Slurry removal	June-July	July-Aug	Sep	Oct-Nov	Feb-Mar	Mar-April	Mean
1	Weekly	2.1	6.8	8.9	5.9	1.6	1.5	<b>4.47</b>
1	Daily	2.28	4.56	6.73	3.56	1.20	1.29	<b>3.27</b>
2	Weekly	6.14	5.97	8.52	7.48	1.46	0.86	<b>5.07</b>
2	Daily	3.62	3.94	4.61	4.72	0.89	0.99	<b>3.13</b>

**Table 2:** Reduction of ammonia emissions from mink farms in percentages when slurry is removed every day compared to weekly. Weekly slurry removal is normal practise and therefore used as control measurements.

Farm	June-July	Aug	Sep-Oct	Oct-Nov	Feb-Mar	Mar-April	Mean
1	-7.6	32.6	24.1	39.5	26.3	13.2	<b>21.3</b>
2	41.0	34.0	45.9	36.9	39.5	-14.5	<b>30.5</b>
Mean	16.7	33.3	35.0	38.2	32.9	-0.6	<b>25.9</b>

Removal of slurry from the slurry pits every day compared to once a week reduces the ammonia emission by 26 % in mink houses.



## *Operational Stability*

The management system tested was frequent removal of mink slurry from slurry pits. In general a VERA Verification Statement includes a verification of the technology tested. As this test concerns a management system, the operational stability has not been validated. When slurry is removed manually the operational stability depends on complying with the management plan outlining a time plan for the slurry removal. When slurry is removed with an automatic system, the operational stability depend both on compliance with the management plan, as well as the electrical system which should be monitored accordingly.

## *Identified Side Effects*

None observed.

## *Additional Results*

None observed.

## **Additional Information**

No additional information.

## **Test institute**

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## **Validity and Terms of Use**

### *Validity*

This VERA Verification Statement is only valid for the specific verified management system. There is no time limit for the validity of this VERA Verification Statement as long as the product/technology stays unmodified.

The International VERA Secretariat can, however, at any time invalidate the VERA Verification Statement if it is found to be misused or if significant modifications have been made to the product/technology that are estimated to have a negative effect on the environmental efficiency or operational stability. In regard to the latter, the VERA Secretariat can require that a new VERA test should be performed.

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- This verification cannot be considered an endorsement, approval, authorization or warranty of any kind
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- All other information obtained or produced during the verification process is considered confidential and will not be made available for others than the part owning the intellectual property rights.

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