Improved Animal Housing

Objectives

- To reduce ammonia emissions to the environment.
- To reduce losses of manure and nutrients.
- To reduce the inflow of rainwater into the manure storage.

Techniques

The techniques aim at reduced exposure of manure to the open air and at well-constructed manure channels to transport manure efficiently to the manure storage systems. This prevents losses and reduces the exposure time.

The following techniques are available (these are based on the present Best Available Techniques in the Netherlands):

For pig housing:

- Pen manure channel with slanted side walls
- Manure Surface Cooling Channel
- Manure Channel with Gutters
- Manure Scraper
- Bioscrubber or Chemical Wetscrubber

For poultry housing:

- Manure storage under cages in open storage
- Manure removal by scraper
- Manure removal by way of manure belt
- Manure belts with forced drying
- Deep-pit and canal systems
- Deeplitter system

Information on these techniques is available in the publication: Dutch notes on Best Available Techniques for pig and poultry intensive livestock farming (a document prepared for the European...
Improved animal housing

This information includes:

- Description (technical details and estimated ammonia emission from the system).
- Sketch drawing (as above).
- Applicability (special conditions which might limit the use of this technology).
- Advantages and Disadvantages of the housing system.
- Economics (investment and running cost).
- Extent of use of the system in the Netherlands.
- Literature (Research Institute reference).

To prevent the inflow of rainwater into the manure storage a separate system for the drainage of rainwater in animal housing is necessary. The rainwater discharge system should include gutters along all roofs to capture the rainwater. The rainwater could be stored separately and used for drinking water, for cleaning or for irrigation, thus reducing the needs for clean fresh water.

Costs

In the publication on Best Available Techniques details on cost are presented for each technique in combination with the expected effectiveness. Most techniques are only cost effective when there is a financial incentive for reducing ammonia emissions and manure losses.

Targeted Livestock Systems

Mainly Industrial pig and poultry production

Impact

- Positive environmental impact
  - Reduced emission of ammonia to the atmosphere
  - Reduced leakage and losses of nutrients and manure to the land, ground water and surface water
  - Reduced quantity of stored manure

- Negative environmental impact
  - The energy inputs for some of the technologies are high

- Livestock productivity impact
  - Reduced ammonia concentrations in the air result in increased growthrates and feed conversion efficiency
  - Reduced ammonia concentrations lead to reduced incidence of respiratory problems and diseases.
Improved animal housing

Context of Application

- **Policy:** legislation and standards on ammonia emissions incentives to reduce and prevent ammonia emissions.
- **Education:** awareness raising for preventing ammonia emissions.
- Training/extension in techniques to prevent ammonia emissions and manure losses.

Monitoring: EIA; Indicators

- Numbers of livestock enterprises with improved animal housing
- Ammonia concentrations in animal housing
- Length of channels for manure transport

References

Mineral policy in the Netherlands; Dutch policy to reduce undesired effects of mineral losses to the environment. Published in 1999 by the Ministry of Agriculture, Nature Management and Fisheries and the Ministry of Housing, Spatial Planning and the Environment. Available from: Ministry of Agriculture, Infotiek, P.O. Box 20401, 2500 EK the Hague, The Netherlands.

Hendriks, H.J.M. and van de Weerdhof, A.M. 1999. Dutch Notes on BAT for Pig and Poultry Intensive Lifestock Farming . Information Centre for Environmental Licensing, P.O. Box 30732, NL-2500 GS The Hague, The Netherlands. Tel: +31 70 3610575; Fax: +31 70 3633333; Internet: “www.infomil.nl”. Click here to view document in Acrobat format.

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Pen Manure Channel with Slanted Side Walls

Convex floor with concrete slats and side walls on a slope in the manure pit

**Working principle:**

- Limiting the manure surface in the manure channel,
- Remove the manure frequently by a sewage system.
Manure Surface Cooling Channel

Working principle:

- Cooling the manure.
Manure Channel with Gutters

Working principle:

- Limiting the manure surface in the manure channel
- Two times a day removing the manure by flushing
Manure Scraper

Partly slatted floor with a manure scrapper

**Working principle:**

- Removing the manure frequently to the manure pit outside the building.

[Livestock & Environment Toolbox Home](http://www.fao.org/lead/toolbox/Tech/30ManScr.htm)
Bioscrubber or Chemical Wetscrubber

Working principle:

- Ammonia absorption and biological breakdown

Bioscrubber design
Working principle:

- The manure is gathered on plastic flaps under the cages
- After that, the manure is stored in an open pit under the cages for a longer period
Manure Removal by Scraper

**Working principle:**

- The manure is gathered on plastic flaps or plates under the cages.
- Daily or several times a week the manure is brought to a closed storage with scrapers.

[Livestock & Environment Toolbox Home]
Manure Removal by Way of Manure Belt

Working principle:

- The manure produced by the hens is gathered on manure-belts underneath the cages.
- The manure-belts transport the manure to a close storage twice a week.
- There are no manure-rests left on the manure-belts.

[Livestock & Environment Toolbox Home]
Manure Belts with Forced Drying

Working principle:

- The manure is gathered on a belt under the cages.
- By way of an air stream with pre-heated air the manure is dried in 7 days.
- After this drying period the manure is transported out of the hen-house.
- No manure rests are on the belt because the belt is so smooth.
Deep-pit and Canal Systems

Working principle:

- A current of warm air that leaves the hen house passes the manure which is stored in a pit.
- This warm current of air dries the manure.
- The manure is stored in a deep-pit house for about 2 years.
- The manure in a canal house is stored for 6 months.

[Livestock & Environment Toolbox Home]
DeepLitter System

Working principle:

- Scratching area at the side walls (1/3 of the usable area).
- In the middle slatted floor with feed water and laying nests.
- Manure storage under the slats during the laying period (14 months).
- Tubes underneath the slats for manure drying.