

## ABSTRACT

The Centre for Best Available Techniques (BAT) is founded by the Flemish Government, and is hosted by Vito. The BAT centre collects, evaluates and distributes information on environmental friendly techniques. Moreover, it advises the Flemish authorities on how to translate this information into its environmental policy. Central in this translation is the concept of “BAT” (Best Available Techniques). BAT corresponds to the techniques with the best environmental performance that can be introduced at a reasonable cost.

This document contains technical, environmental and economical information on manure processing and suggests BAT for this activity. The first edition of the document “Best Available Techniques for manure processing” appeared in 1998 and included suggestions for manure processing permit conditions in Flanders. In 2002 the study was revised. The edition of 2002 focuses on the individual manure processing techniques and compares technical, environmental and economical characteristics of manure processing approaches considered in Flanders. In this 2<sup>nd</sup> edition no suggestions were made for permit conditions.

The current revision keeps the same methodology as the study of 2002. The information on techniques and manure processing scenarios has been updated to reflect the current level of technological progress. A big difference in approach concerns the economical analysis. In this study a new economic approach was developed which gives a clear picture of the complexity and financial strength of the specialised meat piggeries. Also suggestions were made towards the government concerning emission limits for wastewater, coprocessing of manure with other organic materials and incineration of manure.

In Flanders the main purpose of manure processing is to provide a solution for excess manure produced in intensive livestock rearing. Flanders suffers from a strong discrepancy between the amounts of nutrients produced in animal husbandry and the quantities that can be used as a fertiliser on farmland. Manure processing in Flanders aims at the neutralisation of nutrients in manure (e.g. turning nitrates into N<sub>2</sub>) or at making it suitable for export to other countries requiring organic fertilizers. A broad range of techniques is available that can theoretically be used for this purpose. However, practical experience has been obtained with only a limited number of techniques. The techniques used for manure processing are described in detail in the study.

Almost all manure treatment systems combine two or more of these techniques. A BAT analysis was done for 5 representative pig manure treatment scenarios consisting of the following techniques:

1. Manure spreading on land (reference)
2. Anaerobic codigestion and drying of the digestate on drying tables
3. Separation of liquid and solid fractions of manure. Biological treatment of the liquid fraction. The effluent of the biology is spread on land within Flanders. Export of solid fraction to nutrient deficient regions / countries with or without prior composting, drying or incineration.
4. Drying of the manure on drying tables with heat from the ventilation air of the stables. The dried fraction is exported, composted or incinerated
5. Separation of liquid and solid fractions of manure. The solid fraction is dried in a drier. The condensate from the drier and the liquid fraction of the manure are treated in a biological treatment. The effluent of the biology is evaporated. The condensate is pure and can be discharged into surface water. The concentrate is dried with the solid fraction. The dried fraction is exported or incinerated.

In the economical analysis we calculated the cost to fully process one m<sup>3</sup> of manure. The cost of these techniques varies between 20 and 30 EUR per m<sup>3</sup>. Part of the sector is able to pay these amounts and still wants to expand the company. The economic analysis in this study shows that the 30 % best companies are able to process their entire manure production.

A specialised meat piggery with an average income (40 EUR per average present meat pig) can process 20 % of its total manure production if they are located in areas with a low manure pressure. In areas with a medium and high manure pressure, companies must be able to spread 80 % or more of their manure on own farmland. The majority of specialised meat piggeries have no land of their own available. These companies can already have financial problems without manure processing in areas with high manure pressure.

Besides determining the financial strength of the sector we also made an investment analysis for technique 3. In this investment analysis we compared the cost of spreading manure that is under a processing duty and paying the fine for not processing to the cost for processing of the manure. The analysis shows that, with incorporation of the fines in the analysis, manure processing is profitable for areas with medium and high manure pressure. Without the fines, manure processing is still profitable in areas with high manure pressure. This confirms the practice of manure processing for manure that is not under a processing duty in areas with a high manure pressure. This investment analyses compares two situation but gives no judgement on the economic ability of a company or the sector to bear either one of these costs.

For poultry manure land spreading was compared to export of raw poultry manure, composting followed by export and incineration. These processing techniques are economically viable for the sector. Processing of poultry manure proves to be more cost effective than processing of pig manure.

Best Available Techniques (BAT) are techniques that are proven in practice, that have the best overall environmental result and are not too costly.

BAT for pre-dried poultry manure processing is incineration, export without treatment or composting + export.

No BAT is identified on sector level for pig manure processing for the specialised meat piggeries, due the excessive costs of the techniques. In circumstances where farmers can cope with the costs the following BAT conclusions may be drawn. BAT are techniques 3, 4 and 5 as described above. Technique 2 still has to be proven in practice. Several installations are in start-up phase at the moment. Besides these techniques, mobile installations can be BAT for small farms as well. These BAT conclusions should not be considered as static or definitive, because the sector still has a lot of technological development.

In chapter 6 suggestions were made towards the government concerning emission limits for wastewater, co-processing of manure with other organic materials and incineration of manure. Also suggestions were made to government, manure processing companies and farmers to further promote manure processing in Flanders.