



Results of the Manure Standards Project

The project “**Advanced manure standards for sustainable nutrient management and reduced emissions**” (Manure Standards) has been completed.

Manure Standards - two-year (10/2017–09/2019) EUSBSR Flagship project aiming to provide farmers, advisors, authorities and policy-makers enhanced capacity to govern and to turn **manure** use towards improved sustainability and resource-efficiency.

Although the initial idea of developing a single manure management system for all Baltic Sea countries, the elaboration of the common system according to the discussions by for determining the quality and quantity of manure, introduced different experiences of the Member States.

The detailed work for achieving the project works has given several significant project outcomes. One of the main benefits of the Farmers' Parliament (ZSA), with the close cooperation with the specialists of the State Plant Protection Service (VAAD), precisely accomplished the tasks of the project: prepared questionnaires on farms, sampling and analyzing manure, processing data and creating interesting data processing models.

Iveta Grudovska, agriculture expert of the Farmer’s Parliament: "The Farmers Parliament with this project concludes five years of work on various projects related to manure management. Key Conclusions: Manure is a very valuable source of nutrients that needs to be managed properly, otherwise manure handling will cause environmental pollution. Much work remains to be done in Latvia to educate farmers about the value of manure and to set up a support system for the purchase of modern technology. Only a comprehensive approach will make a significant contribution to the economic growth of farms while respecting the environment".

Skaidrīte Rulle, Director of the Agrochemical Department of the National Plant Protection Service: “The main benefit of the project is the exchange of information on manure management in the Baltic Sea Region (Denmark, Estonia, Latvia, Lithuania, Poland, Finland, Germany, Sweden) and the Russian Federation and the development of uniform guidelines (instructions) for the sampling of manure, the evaluation of laboratory methods used for the analysis of manure and the development of a calculation program for the calculation of manure volume and chemical composition. 22 Latvian livestock farms were involved in the

project and 124 samples were analyzed, thus the amount of manure and its chemical composition were updated according to modern production conditions, which are influenced by many different factors: livestock productivity, used feed and its doses, animal housing, methods of manure removal and storage. The instructions and calculation programs developed during the project will be used by farmers and agricultural consultants in their daily work, and by policy makers in the development of rules and requirements for manure management”.

The proposals for legislative changes still under development so that the basic principles of manure management in Latvia are united, understandable and aimed at eliminating possible negative environmental impacts, while helping farms to see the economic benefits.

Manure Standards benefits:

- **Guidelines for sampling and analysis of manure have been developed.** Until now, there has been no common approach on how to properly sample manure, but this is very important because, as the project team concluded, manure analyzes always contain errors, and the biggest source of error is sampling. Bedding manure is heterogeneous, while liquid manure is stratified. Proper sampling is time consuming as a balance has to be found between the time consumed and the accuracy (number of samples).

Instructions for manure sampling as well as video in Latvian are available on VAAD and ZSA websites.

- **Instructions for analyzing manure samples are available.** Although equipment and facilities vary from one Member State to another, recommended standards have been developed for laboratories carrying out manure analyzes. We also recommend that accredited laboratories in Latvia use these guidelines to avoid the possibility that the results of analyzes of the same sample may differ significantly between laboratories.

- **Guidelines for calculating manure using feed data have been developed.** A specific program to calculate the amount and composition of manure at farm level has been established. The program in Latvian will be available on VAAD and ZSA websites. Collaboration has also been started with Rural Advisory and Training Centre specialists, hoping that the consultants could recommend this program on farms where complete information on forage and animal husbandry systems is available.

The project website also has a Program for calculating the amount and composition of manure at regional / national level, but there is a lack of data to use it at our national level.

- **A Manual for Manure Management has been prepared which summarizes the main conditions for good manure management.** Available as a brochure, as well as electronically in Latvian on VAAD and ZSA websites.

- Due to the large number of analyzes - 124 samples from different types of farms - the chemical composition of the manure will be specified. Namely, the currently applicable regulations - Cabinet Regulation No. 834, which will be binding on each animal farm, will be clarified according to expert advice.

General recommendations:

- Manure management and fertilizer use should be based on up-to-date data on manure volume and composition. This applies both to farms and to recommendations and monitoring measures developed at national level.
- The same source data should be used in regulatory, emission inventory and national nutrient balance calculations to avoid discrepancies between estimates. There is also a need to agree on a common terminology - different terms are currently referred to in different sources.
- Official national standards for manure, which define both quantity and quality, should be easily accessible to all users as average values.
- The responsible organization collecting official data on manure should be clearly identified in order to ensure uniform data collection and documentation.

Farm recommendations:

- On farms where manure is used, fertilization planning should be started with manure calculations. Fertilizers should be included in the fertilization plan only if the nutrient NPK cannot be supplied by the manure.
- Fertilizer planning should always be based on up-to-date data on the nutrient content of manure, regardless of the nationally supported data collection method. In addition to the NPK and other nutrient content of manure, fertilization requirements of different crops, soil quality and climatic conditions should also be considered.
- Nutrient balance calculations on farms should be implemented to ensure a balanced introduction and removal of nutrients from the soil. For farms with a high volume of manure production, a balance sheet calculation would allow a decision to be taken on the need to transfer part of the manure to other farms or for processing, thus eliminating the risk of nutrient wastage or even contamination.
- The expertise of consultants should be strengthened to ensure that farmers can receive support for the practical and efficient use of manure.

How to reduce NH₃ emissions from animal housing, choosing the appropriate feeding strategy

Silvija Dreijere, director of livestock department at Latvian Rural Advisory and Training Centre. "Livestock feeding strategies decrease NH₃ emissions from manure in both housing

and storage, and following application to land. Livestock feeding strategies are more difficult to apply to grazing animals, but emissions from pastures are low and grazing itself is essential measure. Livestock feeding strategies for reduction NH₃emissions are implemented through phase feeding, low-protein feeding, with or without supplementation of specific synthetic amino acids, ruminal by-pass protein, minerals, increasing the non-starch polysaccharide content of the feed and increased digestability of forages.

For animal housing, reduction NH₃emissions is based on one or more of the following principles: 1) decreasing the surface area fouled by manure; 2) rapid removal of urine; rapid separation of feces and urine; 3) decreasing the air velocity and temperature above the manure; 4) reducing the pH and temperature of the manure; 5) increasing grazing time. The costs of techniques used to lower NH₃emissions from housing are related to: a) depreciation of investments; b) return on investments; c) energy; and d) operation and maintenance. In addition to costs, there are benefits related to increasing animal health and performance. These benefits are difficult to quantify and have not always been included in the total cost estimate.

For manure storages, reduction of NH₃emissions is based on one or more of the following principles: a) decreasing the surface area where emissions can take place, i.e., through covering of the storage, encouraging crusting and increasing the depth of storages; b) decreasing the source strength of the emitting surface, i.e., through lowering the pH and ammonium (NH₄) concentration. These principles are generally applicable to slurry storages and manure (dung) storage. However, the practical feasibility of implementing the principles are larger for slurry storages than for manure (dung) storages. Straw-based systems producing solid manure for cattle are not likely to emit less NH₃ in the animal houses than slurry-based systems. Further, N₂O and di-nitrogen (N₂) losses due to (de)nitrification tend to be larger in litter-based systems than slurry-based systems. While straw-based solid manure can emit less NH₃ than slurry after surface spreading on fields, slurry provides a greater opportunity for reduced emissions applications. The physical separation of feces (which contains urease) and urine in the housing system reduces hydrolysis of urea, resulting in reduced emissions from both housing and manure spreading.

Interested!

Various valuable materials, including Baltic manure management experience, databases, reports, etc. available on the project website <https://www.luke.fi/manurestandards/en/results/>

Presentations of project seminars and conferences are available on the web pages of VAAD and ZSA

<http://www.vaad.gov.lv/article/projects.aspx>

<http://zemniekusaeima.lv/projects/manure-standards/>

Thanks to all the farms that agreed to participate in the project!

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