STORAGE, HANDLING AND DISPOSAL OF ANIMAL SLURRIES

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Contents

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Summary

In many areas of the world, intensive breeding of livestock brings about production of animal slurries. Animal slurries consist of a mixture of feces, urine and water. Important fractions of slurries are the organic fraction, the nutrients and the volatile compounds. In areas with intensive livestock breeding, application or disposal of animal slurries may

cause environmental problems. Soil acidification related to ammonia emission, greenhouse gas emissions, odor nuisance and contamination of water supplies by nitrates originating from ammonium or by oxygen demanding organic matter (BOD, COD) are the most important causes for environmental stress.

The most obvious way to utilize slurry is its application on arable land or grassland as a source of nutrients for the vegetation. Environmentally sound use of animal slurries as fertilizers requires carefully planned application linked to the nutrient uptake of vegetation in the growing season.

Several techniques are available for the spreading of slurry. Splash plates on transport vehicles or sprinklers are widely used. When reduction of odor and ammonia emissions is required, more sophisticated techniques like injectors can be used.

In regions where slurry production exceeds the nutrient requirements of crops, slurries may be transported to other areas or treated to reduce the environmental effects of their disposal. Many treatments are at hand, but their success depends on local conditions. The most widely applied treatments are lagoons, separation of solids, biogas production and aeration. In some cases, integrated large scale treatment systems producing dry organic fertilizers may be considered.
Slurries can be used for purposes other than fertilization. As the water content is high, they may be used for irrigation in areas with limited water reserves. Advanced separation techniques offer opportunities for isolation of organic compounds and heavy metals from animal slurries. Profits from regaining these substances may cover treatment costs of slurries in the near future.

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1. Introduction

In many areas of the world, intensive livestock production in relatively restricted confinements has been introduced. A large percentage of conventional animal production systems where solid manure and liquid waste were collected separately have been replaced by systems that produce animal waste in the form of a slurry due to intensification. Production rates per unit of labor have gone up and modern slurry collection, storage and application systems ensure efficient removal and transport of animal slurries.

Animal slurry is a useful fertilizer, containing all the nutrients a crop requires, even if it is in sub-optimal ratios. Slurry can be easily handled and stored. However, in areas with concentrated livestock farming, the large volumes of slurry have caused environmental problems involving odors and ammonia in the atmosphere and nutrient leakage to ecosystems and water supplies. Strategies have been developed to deal with these problems, and transport and treatment of animal slurries have created more options for sustainable utilization.

Where legislation enforces transport and/or treatment, farmers are confronted with extra labor and costs to comply with the law. As these costs affect the farmers income significantly, his or her options for storage, transport and treatment have to be carefully chosen. The desired effect and the scale of operation are important factors in the design

of a management strategy for slurry.

When building new farms, it is recommended to integrate environmental technology into the animal confinements, e.g., separated collection of feces and urine. Local conditions can be helpful in the design of slurry treatments. A good example is the use of solar energy for water evaporation from slurry.

This article describes the composition of various kinds of animal slurries and the options a farmer has for storage, transport, treatment and application of slurry. Choices to be made in these options are partly defined by the environmental and legal aspects that are described in the closing paragraph.

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Biographical Sketches

Hans C. Willers, MSc., took his degree in environmental engineering in Wageningen Agricultural University in 1986. Since then, he has been employed by the Institute of Agricultural and Environmental Engineering (IMAG), a part of the Wageningen University and Research Center (Wageningen-UR). During his first five years at IMAG, his research work was focused on aerobic treatment of animal slurries. In recent years, his field has broadened to anaerobic treatment, composting, evaporation processes and odor abatement.

Piet J.L. Derikx, PhD, took his degree in Chemistry, with specialization in Biochemistry and Microbiology in the Catholic University of Nijmegen in 1985. In 1989, he completed a PhD on "Gaseous compounds and microbial processes involved in the preparation of a substrate for the cultivation of *Agaricus bisporus*", also at Nijmegen University. From 1989, his research was performed at the Institute of Agricultural and Environmental Engineering (IMAG) in the field of animal waste treatment technology, first as a senior researcher then as head of department.

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