Technologies for reduction of environmental impact and nitrogen loss of livestock manure

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Background

Livestock manure contains considerable amounts of plant nutrients and is therefore used as a fertiliser in crop production. Effective utilisation of livestock manure reduces the environmental impact of livestock production, and the demand for inorganic fertilisation. However, a considerable part of the nutrient content of livestock manure may be lost during storage and handling of manure. That reduces the manurial value of the livestock manure and may simultaneously cause considerably environmental impact in form of emission of ammonia, odour and greenhouse gases.

Objective

The aim of the project is to investigate how different technologies of manure handling effect utilisation and environmental impact of livestock manure. Some of the more specific objectives are investigations of:

- Loss of nitrogen and emission of greenhouse gases during storage of solid manure by alternative types of storage strategies
- Influence of storage strategy of solid manure on spreading evenness and ammonia loss following land spreading
- Reduction of volatilisation of ammonia and odour by anaerobic digestion and separation of slurry.

Progress - 2004

- A detailed plan for the project has been described and has been accepted by the university of Aalborg
- Application for external funding
- A national report on the nutrient loss from livestock manure systems has been published (online)
- The influence of storage on ammonia volatilisation and spreading evenness of solid manure has been evaluated. Results have been published nationally and as a peer review paper
- A study of nutrient loss and environmental impact during storage of solid manure has been concluded. Results have been published and presented at the MIDAIR conference in Germany
- Results of influence of type of spreading technologies on ammonia loss and energy requirement have been published as a peer review paper
- A study of influence of separation and anaerobic digestion of livestock manure on ammonia loss and odour problems has been performed. Results have been published nationally and will soon be submitted as a peer reviewed paper.
- A study regarding technologies for reduction of ammonia loss during land spreading of separated slurry fractions has been performed. Results will be published as a master thesis, and probably as a peer reviewed paper.

- A study regarding effect of turning of solid manure heaps regarding emission loss of ammonia and green house gases has been performed (Canada project). The quality of the study was seriously influenced by extreme climatic conditions; results may therefore not be published.
- A study of influence of aerobic/anaerobic storage conditions on emission loss of ammonia and greenhouse gas from stores of solid manure has been performed. Data has been analysed and results will be published as a peer reviewed paper.
- A study regarding influence of technology of incorporation of solid manure and timing of spreading has been concluded. Results have been published nationally and as a peer reviewed paper.
- A study of influence of incorporation technology on ammonia loss from land applied solid manure has been performed. Results will be published nationally.
- The planed lab experiment "study of influence of oxygen on production of greenhouse gasses and during storage of solid manure" has been replaced by a study regarding effect of turning of solid manure heaps regarding emission loss of ammonia and green house gases (Canada project). The change was made, as I decided to visit another Canadian Research Institute than the one originally planned.
- International publication of results obtained from the study of effect of turning of solid manure during storage (Canada project) may be given up due low quality of results.

Plans – 2004-2005

- Submissions of peer reviewed paper regarding influence of separation and anaerobic digestion on odour emission during storage and landspreading of livestock manure
- Publication of results of influence of aerobic/anaerobic solid manure storage condition on nutrient loss and environmental impact
- National publication of influence of incorporation technology on ammonia loss from land applied solid manure.
- PhD thesis

Publications

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