

SUSANE - Sustainable, sanitary and efficient management of animal manure for plant nutrition

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Ph.D. Studies in Vietnam and Denmark

One of the major objects of SUSANE research is training of Ph.D.-students in efficient and environmental safe manure management. The studies will be implemented as a sandwich programmes, with theoretical training in Denmark and practical field-work in Vietnam. Further the research applies the whole farm research approach which is new for in Vietnamese research.

From each of the three Vietnamese institutes, National Institute of Veterinary Research, National Institute of Animal Husbandry and National Institute for Soils and Fertilizers, a PhD student has been enrolled at a Danish university.

Together with staff at the institutes the PhD students will carry out research within the Ph.D. projects 1) Animal manure management - Bio system Engineering, 2) Optimising animal manure fertilizer value - Plant Nutrition and 3) Environmental health and hygienic aspects of manure management.

The study has been initiated with a baseline study in Vietnam, carried out by the three Ph.D. students, where manure management in selected provinces (Bac Giang and Thai Binh) was monitored and described.

All three PhD students will spend approximately two third of their studies in Vietnam with experimental and field activities, while the other part of their study will be spent in Denmark with PhD courses, lab training and experimental work, as well as PhD thesis writing and examination. Their first stay in Denmark began in September 2006, with the participating in the international RAMIRAN conference 'Technology for Recycling of Manure and Organic Residues in a Whole-Farm Perspective'.

Animal manure management



Ms. *Vu Thi Khanh Van* from National Institute of Animal Husbandry is enrolled at University of Southern Denmark and will carry out a Ph.D. study in manure management. Ms Van holds a M.Sc. degree in Management of Natural Resources and Sustainable Agriculture from the Agricultural University of Norway, and a B.Sc. in Livestock Science from Hanoi Agricultural University, Vietnam.

The project title of the PhD is 'Manure management – Farm System approach'. Supervisors are Dr. Vu Chi Cuong, National Institute of Animal Husbandry, Hanoi, and Professor Sven Sommer, Danish Institute of Agricultural Sciences, Denmark.

At present there is little knowledge about the plant nutrient value of animal manure and technologies for environment-friendly manure management is sparse. This lack of knowledge enhances the risk of polluting the environment by the inappropriate use of livestock manure and is also a potential risk for transferring disease organisms between livestock and from livestock to humans. Therefore, the research in this PhD study will focus on developing manure management systems, technologies and guidelines for the more efficient and safer recycling of animal manure.

The planned research activities are:

- Monitoring of manure management in the two provinces
- Model for assessing the fertilizer composition in excreta from pigs.
- Characterisation of plant nutrient and pathogen flow on livestock farms in Vietnam
- Effect of quality of Vietnamese diets on the composition of excreta.
- Model for assessing manure composition on Vietnamese livestock farms

Research will be carried out focusing on the development of models on nutrient cycling on Vietnamese farms. The activity in Vietnam is to carry out feeding and excretion experiments and correlate manure composition and feed type/regime.

During the study information and data will be collected and used to develop models assessing manure composition at Vietnamese farms. The development of these models is carried out partly in Vietnam and partly in Denmark.

Optimising animal manure fertilizer value



Mr. *Tran Minh Tien* from National Institute for Soils and Fertilizers is enrolled at The Royal Veterinary and Agricultural University and will carry out a Ph.D. study in Plant Nutrition and Animal Manure Fertilizer Value. Mr. Tien holds a M.Sc. degree in Soil Science from Hanoi Agricultural University, Vietnam, and a BSc in Land and Natural Resources Management, from Hanoi Agricultural University, Vietnam.

The project title of the PhD is 'Optimising animal manure fertilizer value'. Supervisors are Dr. Tran Thuc Son, National Institute for Soils and Fertilizers, Vietnam, and Professor Lars Stoumann Jensen, The Royal Veterinary and Agricultural University, Denmark.

The project's subject area focuses on the fertilizer efficiency of animal manure in the relevant cropping systems as affected by

- composition and quality of manure
- application methods and ammonia loss
- rate and timing compared to nutrient release patterns and crop demand
- crop type and sequence.

The PhD study will, apart from the joint baseline study of two researched provinces in Vietnam, include a joint field study on farm level in selected farm systems in Viet-

nam. A lab study will be carried out concerning N mineralization and ammonia-volatilization methods in Denmark, with data analysis.

The study also includes characterisation of fresh and composted solid manures and effect of incorporation of ammonia loss in the field in Vietnam. Field experiment will be performed in Vietnam on the influence of rate and timing of manure application on nutrient supply in relation to crop demand patterns. If time allows, farm-based trials on manure practices will be carried out.

Environmental health and hygienic aspects of manure use



Ms. *Dang Thi Thanh Son* from National Institute of Veterinary Research is enrolled at The Royal Veterinary and Agricultural University and will carry out a PhD study in minimizing spreading of pathogens in animal manure. Ms. Son holds a BSc from Hanoi Agriculture University, Vietnam. At present Ms. Son is a researcher with 5 experience years working on the field of bacteria identification.

The project title of the PhD is 'Survival and transmission of Pathogens in Animal Manure'. Supervisors are Dr. Tran Thi Hanh, National Institute of Veterinary Research of Vietnam, and Professor Anders Dalsgaard, The Royal Veterinary and Agricultural University, Denmark.

The PhD project will study occurrence, survival and transmission of important pathogens in animal husbandry manure management in Vietnam, focusing on pig manure.



Bacteria examination in laboratory

Knowledge acquired during the study in Denmark will be used to design different studies in Vietnam, e.g. on occurrence and fate of selected pathogens and indicator organisms in manure from different farming systems and manure management systems, and in pilot research activities on survival and transmission of pathogens following application of manure on soil and in fish pond.

The study will also focus on pig-fish production farms, determining survival of pathogens and indicator microorganisms during different steps of manure management (manure collection, storage, processing and use in fish ponds), and determining the level of antimicrobial resistance among enterococci and indicator bacteria in integrated pig-fish production systems.

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All information and databases collected are expected to be used to create models assessing fate of pathogens during manure handling as well as environmental and health risks (animals and humans).



Pig-fish production farm in Vietnam