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Content

At DIAS, Department of Agricultural Engineering work is conducted to develop a Farm Wet Scrubber that through the use of water washes the odour compounds, ammonia and dust particles out from the air before it leaves the livestock building. Results show that 70-90 % of odour is removed and half of the amount of ammonia. After 4 years of development – in close collaboration with private companies and the agricultural sector – the Farm Wet Scrubber is now being tested in practise.

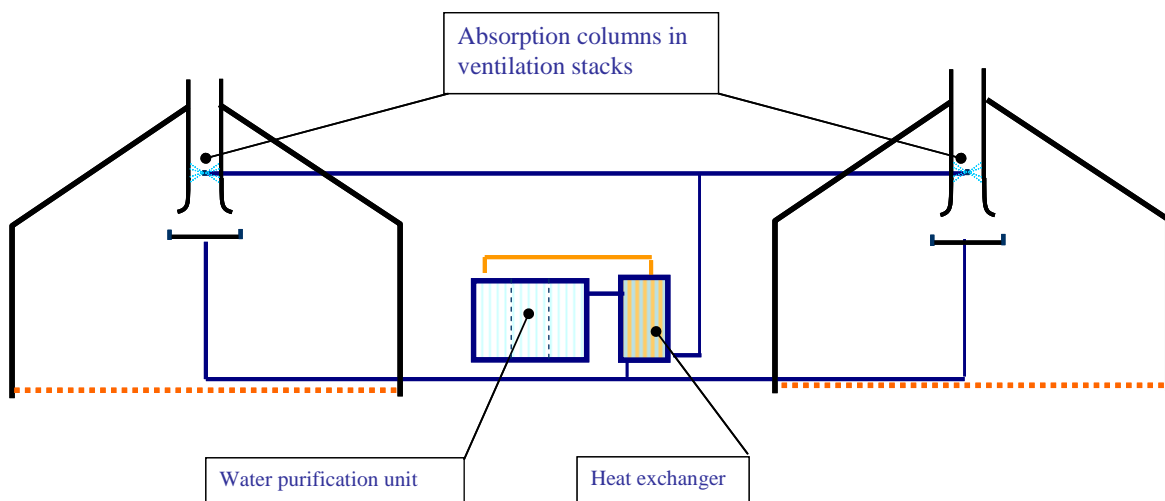
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Farm Wet Scrubber

The main objective of the project is to obtain the fundamental knowledge needed for the development of a new concept for wet scrubbers for livestock buildings. The full title of the project is 'Absorption in water droplets of odours, ammonia and dust from livestock buildings', of which developing a prototype of a Farm Wet Scrubber is a sub-task.

Demands for the reduction of offensive odour, ammonia and dust emissions from livestock production facilities by people living in the vicinity, as well as by the rest of the society, will be intensified in the coming years. A wet scrubber mounted in a ventilation stack will be an effective technical solution for reduction of offensive odour, ammonia and dust emissions from livestock buildings. The technology can be applied both in swine and poultry buildings.

In the project the ventilation air is lead through a so-called absorption column where it is washed with water that is injected into the column through special nozzles. In the industry



the cleaning of air for chemical compounds is already in use but the art in relation to livestock housing is to develop a system that can clean the air in the very low concentrations

that are in livestock buildings, where the odour compounds also have widely different chemical characteristics.

A substantial part of the development work has been to find out if it is possible to wash odour compounds, ammonia and dust out of the air. The scientists have among other things considered to mix e.g. soap or oil in the water, but have so far decided to work with pure water in order not to destroy the micro organisms work processes in the biofilters that are to decompose the odour compounds in the water afterwards.

During the project period it is succeeded to develop nozzles that can inject water into the column with a velocity and droplet size that allows the water droplets to catch a large proportion of the odour compounds.

There are more than 300 different odour compounds in livestock air, but the project have chosen some selected key compounds that we think contribute most to the odour annoyance. By now it is possible to construct an absorption column so that the water droplets catches up to 80 % of most of the odour compounds, and 70-90 % of the dust is removed from the air.

Tests on farm during the summer of 2005

In the summer of 2005 two prototypes of the Farm Wet Scrubber, i.e. a research model and an industry model, have been established on a farm near Århus. The systems have been tested by taking out odour samples, and the odour reduction efficiency is then evaluated by



Top left – the research model. Top right – the industry model. Bottom left – the data logging unit. Bottom right - the weather station with wireless communication facilities.

means of instrumental measurements and the use of an Odour Panel. Although only few experiments have been carried out until now and no database to evaluate the odour reducing efficiency exists, it seems that some of the key odour compounds (KOCs) can be reduced by 70 to 90 %. Reduction of ammonia is in the range of 40 to 50 %.

A wireless control and monitoring system for the research model has been established. The functions of the system are organized at three different levels, i.e. **level 1** for data logging and activation of pumps etc., **level 2** (local base station) for data storage and calculation of control and monitoring parameters and **level 3** (remote base station) for remote monitoring and control. There is a wireless communication throughout from level 1 to level 3 so that the research model can be monitored and controlled through the internet. The system has been developed in cooperation with the project “Odour from animal production facilities”, which has been developing an IT-based automatic sampler (ITBAS).

The future progress of the project will among other things focus on the field tests under different working conditions, the organization and dissemination of the obtained data and information to develop a new concept for wet scrubbers for livestock buildings. This will be achieved through experiments with the prototypes on the farm to explore the performance of a wet scrubber under different working conditions, and by incorporating the results into the decision support system “StaldVent”.

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For more information on the project take a look at the project homepage www.luftvasker.dk or the following references:

Takai, H., Dahl, P.J., Tøgersen, F.Aa., Johnsen, J.O., Maahn, M., & Søggaard, H.T., 2005. Analysis of odorous compounds in swine buildings and their relationship to thermal environment, management and categories of pigs. Proc. 7th int. Livestock Environment Symp. (ILES7), Beijing, China, May 18-20. ASAE Publication 701P0205

Takai, H., Dahl, P.J. & Maahn, M., 2004. Desorption of ammonia and odorants from dust collected in swine houses. AgEng 2004, Leuven, Belgium. Book of Abstracts

For more information on odour and odour reduction technologies following website collects the research within the topic in DIAS: http://www.agrsci.org/microsites/forskning_i_lugt

Topics of coming newsletters

- HortiBot - A Plant Nursing Robot
- European Research on ICT and Robotics in Agriculture and related Industries.