



Name: Li Rong



PhD Thesis: Reduction of Odor Source in and Emission from Swine Buildings. Aalborg : Department of Civil Engineering : Aalborg University, 2010, 120 p. (DCE thesis; 25)

Abstract: Danish farmers produce approximately 25 million pigs with only 5.4 million humans. More than 80% of this production is exported, and this makes Denmark one of the world's largest exporters of pig meat. It also makes pig meat the country's most important export product, around 5% of total value exported. While pigs mean profits, they also cause some problems such as effects on the environment, influence on the neighbors and even on tourism business especially in summer because of the emissions of odorants. Therefore, all livestock producers with farms larger than 75 livestock units must have an environmental authorization if they wish to establish new units or extend or modify existing units from January 1 of 2007. This new authorization procedure involves regulation of odor, phosphorus, ammonia emission and discharge of nitrite.

Odor emissions from swine buildings have been the topic for many research projects. The focus has primarily been on identification of odorants at the source, measurement of odor emissions from livestock production facilities, air cleaning of exhaust air using biofilters and scrubbers and atmospheric dispersion to the surroundings.

However, the interaction between air movements in the room and in the slurry channel will affect the odorant concentration in the channel and in the room air. More information about the exchange mechanisms between air and the slurry surface in the slurry channel and between air and solid surface is needed since local velocity, turbulent intensity, manure surface temperature, airflow rate, etc. have very important effects on the emission of odorants. At the same time, little is known about the odor emission which is dependent on the air as transportation medium. Therefore, the objective of this PhD thesis is to investigate effects on odor emissions of airflow patterns and ventilation rates and to provide fundamental knowledge of the mass transfer processes of odorants in the air and slurry boundary layers.

Supervisor: Professor Peter V. Nielsen

Opponents: Professor Per Heiselberg (chairman), Aalborg University, Professor Dirk Müller, RWTH Aachen University and Dr. Claus Topp, NIRAS.

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