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Precision Zone Ventilation Design and Application in Pig Housing

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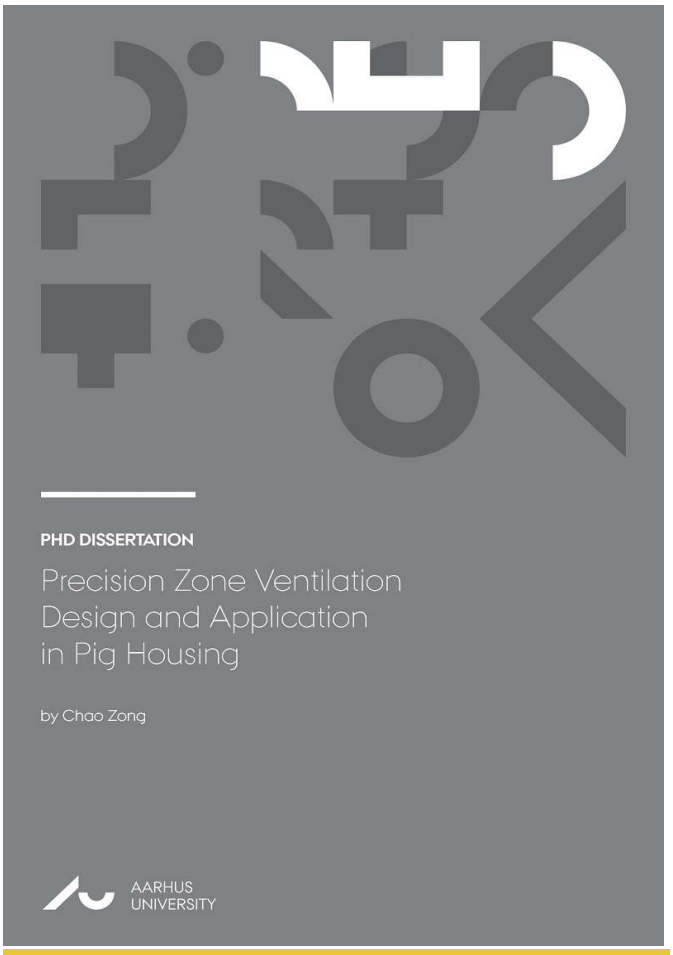
It is well known that pig production is an important source of polluting gaseous emissions in Denmark. Aiming at effectively reducing gas emissions and improving indoor air quality, a concept of Precision Zone Ventilation including direct air supply to/extraction from animal occupied zone and pollution source zone and etc. was proposed. In this PhD study, we primary focused on partial pit ventilation (PPV) system using an extra pit air exhaust extracting polluting air directly from pit headspace. Experiments were carried out both in laboratory and field conditions. Performances of PPV system on airflow and gas dispersion were analysed. In addition, computational fluid dynamics (CFD) was introduced for modelling pig house with PPV system. A geometry simplification method was also assessed.

The results of this PhD study demonstrate that partial pit ventilation is a cost effective approach to mitigate emissions from mechanically ventilated pig housing when combined with air purification system. Meanwhile, this study provides reference for CFD simulations on pig building with PPV system.



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