



Two-Airspace Building Design For Reducing Odour and Gas Emissions From Pig Farms

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The Message

An innovative two air-space building concept for grower-finisher barns has been developed where pigs use an enclosed dunging area (EDA) that is built above the slatted portion of the pen. The air coming out of the EDA is treated with a biofilter. The EDA concept should improve gas containment and should provide a better environment for pigs and workers.

Effects of the EDA on odour and gas concentrations compared to regular room:

- Ammonia concentration: 40% reduction
- Odour concentration: 20% reduction

To be completed:

- A full data analysis (PSCI);
- Odour and gas measurements from the room equipped with EDAs and biofilters (Edmonton).

Introduction

Odour and gas emissions from swine buildings and manure storage can cause nuisance to nearby residents. By keeping the manure inside the building, the nuisance sources would be reduced from two to one.

A two-air-space building concept where pigs would dung in an EDA above the slats could result in an improvement of the barn air quality as the odour and the gases from dunging and manure are contained in the EDA. By extracting part of the ventilation rate through the EDA and by treating this air through a biofilter, the overall emissions from a swine operation could be reduced.

Objectives

To construct an EDA that will:

- be consistently used by the pigs.
- minimise odour/gas transfer to the pig/worker airspace.

To observe the pig behaviour in a pen equipped with an EDA.

To design and test 4 types of opening for the EDA:

- no door, solid door, strip curtain and air curtain.

To construct and evaluate a two-air-space ventilation system.

To investigate the use of biofiltration for odour removal from EDAs.

To measure odour and gas emissions from a feeder barn provided with EDAs and biofilters.

Material and methods

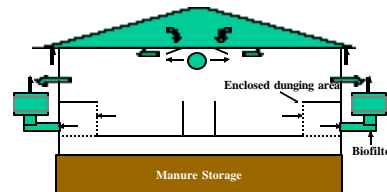
The EDA design was established by:

- air containment tests realized in laboratory at U of S;
- behaviour studies of the pigs using the EDAs realised at PSCI;
- engineering modifications to control pig dunging behaviour.

The most promising EDA was selected for in barn testing at PSCI and was equipped with:

- a full strip curtain on the whole width of the pen (compromise between gas containment and pig behaviour);
- bars laid on the slats and intermittent water sprinkling used for a few days to discourage pigs from sleeping in the EDA.

The Two-Airspace Building Design

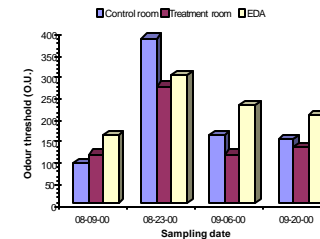


Building concept

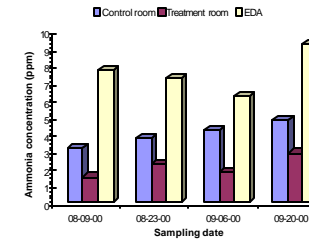


Room equipped with EDAs at PSCI

Results



Odour threshold measured with the full curtain EDA (PSCI)



Ammonia concentration measured with the full curtain EDA (PSCI)

Conclusions

Odour and ammonia concentrations are reduced with the full curtain EDA

- 20 and 40% reductions for odour threshold and ammonia, respectively;
- No difference was measured on the hedonic tone and the CO₂ concentrations.

To be completed:

- A full data analysis of the pig behaviour and odour and gas measurements from PSCI experiment;
- The experiment with a room equipped with EDAs and biofilters (Edmonton).

Acknowledgements

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