

# Practical Partial Biofiltration of Swine Exhaust Ventilation Air

Steven J. Hoff<sup>1</sup>, Jay D. Harmon<sup>1</sup>, Lide Chen<sup>1</sup>, Kevin A. Janni<sup>2</sup>, David R. Schmidt<sup>2</sup>  
Richard E. Nicolai<sup>3</sup>, Larry D. Jacobson<sup>2</sup>  
Iowa State University<sup>1</sup>, University of Minnesota<sup>2</sup>, South Dakota State University<sup>3</sup>

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**Species:** Swine  
**Use Area:** Animal Housing  
**Technology Category:** Biofilter  
**Air Mitigated Pollutants:** Odor, Ammonia

**Point of Contact:**  
Steven J. Hoff, Ph.D.  
Iowa State University  
212 Davidson Hall  
Ames, IA 50011  
USA  
515-294-6180  
hoffer@iastate.edu

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## System Summary:

The mitigation technique discussed is to utilize biofiltration for a portion of swine barn ventilation air. The portion mitigated is that portion of air emitted into stable atmospheres. Stable atmospheres have poor vertical mixing potential and therefore gases and odors emitted tend to remain close to the earth's surface and can therefore be sensed at longer distances downwind. It is impractical to mitigate all of the exhaust ventilation air required in swine housing. Techniques are needed that apply odor and gas mitigation to a portion of the ventilation air stream, when receptors might experience an odor event. Additionally, many barns incorporate combinations of fans and curtains (i.e. hybrid ventilated) to supply required ventilation air. Any mitigation strategy applied to barn ventilation air must be able to accommodate these hybrid ventilation systems as well.

Ventilation air exhausted during the heat of summer days is exhausted into an atmosphere that is, for the vast majority of times, very unstable providing excellent and natural mixing potential near the building source. In more stable atmospheres, typically present during the evening hours, biofiltration of a critical minimum amount of ventilation air (i.e. partial biofiltration) would reduce ammonia and odor emissions during those times when the potential for odor plumes to travel long distances is greatest. The overall effect would be a more attractive biofiltration strategy that maximizes ammonia and odor reduction potential when most needed.

## Applicability and Mitigating Mechanism:

- Biofiltering of a critical minimum amount of ventilation air
- Applies mainly to hybrid ventilated swine finishing facilities
- Can be used as an odor "impact based" mitigation strategy

## Limitations:

- Requires fan ventilation of barns up to about 81 m<sup>3</sup>/h-pig (48 ft<sup>3</sup>/min-pig)
- Biofilter applications apply added stress to the ventilation system
- Biofilters require ample water supply to keep the biofilter media in the 50-60% range

## Cost:

The biofilter application presented in this research required \$4,959 for biofilter supplies and equipment including four new biofilter fans (300-head pig finishing room). Biofilter supplies, equipment, and construction labor resulted in a total implementation cost of \$6,759 or \$22.53/pig space. The added energy to operate the biofilter fans resulted in an additional \$0.42/pig-produced.