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Efficacy of Vegetative Environmental Buffers to Mitigate Emissions from Tunnel-Ventilated Poultry Houses

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Species: Poultry

Use Area: Animal Housing

Technology Category: Environmental Barriers

Air Mitigated Pollutants: Dust, Ammonia and
Odor

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System Summary:

Emissions of dust, gases and odor from poultry facilities pose major challenges for the poultry industry worldwide. Cost-effective technologies to abate emissions from modern tunnel-ventilated poultry houses are limited. In 2002 a three-row planting of trees was installed opposite two, 1.2 meter (4 ft) diameter tunnel fans to evaluate vegetative environmental buffers (VEB) as a means of mitigating emissions from the poultry house. The first row, 9.1 meters (30 ft) from the fans was 4.8 meter (16 ft) high bald cypress, followed by 4.3 meter (14 ft) high Leyland cypress and the outer most row of 2.4 meter (8 ft) high Eastern red cedar. Over the next six years the efficacy of these trees to reduce total dust, ammonia and odor was determined. Measurements were taken at 1.2 meter (4 ft) height on 47 days during peak fan operation with market-age broilers. The relative change in concentration across this 6.7 meter (22 ft) wide vegetative buffer found the VEB significantly reduced total dust, ammonia and odor by 56%, 54% and 26%, respectively. Meteorological conditions and the type of crop next to the VEB appeared to influence the efficacy of vegetation to reduce odor. Dust and ammonia concentration was influenced by these factors to a lesser degree. This suggests the use of trees as vegetative filters may offer a long-term, cost-effective means of partially abating emissions from houses. The local poultry industry trade association for the Delmarva Peninsula has hired a coordinator to implement tree plantings around farms to help abate emissions and to be proactive in addressing increasing neighbor-relations concerns.

Applicability and Mitigating Mechanism:

- Certain plants have the ability to absorb ammonia and capture particulates
- Vegetation also acts as a sink for chemical constituents of odor
- A properly designed windbreak aids in dispersion and dilutions of odors as well as reducing wind speed
- A VEB planting has multiple goals; abate emissions, improve neighbor-relations, and provide shade and shelter of the house

Limitations:

- Growers need technical assistance on the proper design, implementation and care of VEB that is tailored to the unique features of each operation
- Retrofitting a farm with VEB to capture emissions from all fans is difficult.
- Species of tree and proper implementation influences time required for VEB to become effective in reducing emissions
- VEB is a practical and multi-purpose BMP to partially abate emissions.

Cost:

Average cost for implementing a VEB on an existing broiler farm is ~\$5,500. Cost range from \$1,500 for a limited one-row planting to provide a visual screen of the farm, and up to \$12,000 for multi-row plantings around the outside perimeter of the poultry houses. There is limited information on design and efficacy of VEB plantings between houses. Locally, cost-share programs have provided support to cover most of the costs associated with implementing this program. Plantings to address neighbor-relations have been a driving factor in VEB establishment. An estimated 1/3 of all poultry farms have established VEB on the Delmarva Peninsula. A VEB is also a requirement for a new house loan from one of the major lending institutions.