

TECHNOLOGY SUMMARY

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The Use of Vegetative Environmental Buffers for Livestock and Poultry Odor Mitigation

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Species: Swine, Poultry, Beef, Dairy
Use Area: Animal Housing and Manure Storage
Technology Category: Environmental Barrier
Air Mitigated Pollutants: Particulate Matter, Odor,
Ammonia

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System Summary:

Vegetative Environmental Buffers (VEBs) - linear arrangements of trees and shrubs planted near and around livestock/poultry production sites - have been shown to incrementally mitigate odors, particulates, and ammonia through a complex of dynamics. Among the most important dynamics are: 1) enhancement of vertical atmospheric mixing through forced mechanical turbulence – leading to enhanced dilution/dispersion of odor; 2) odor filtration through particulate interception and retention – odor largely travels by way of particulates; capturing particulates also captures odors; 3) odor/particulate fallout due to gravitational forces enhanced by reduced wind speeds; 4) adsorption and absorption of ammonia onto and into the plant – this is due to a chemical affinity that ammonia has to the waxy coating on tree leaves; 5) softening socio-psychological responses to odor due to improved site aesthetics and creating “out of sight, out of mind” dynamics; and 6) improved producer/community relations by using highly visible odor management technology.

Applicability and Mitigating Mechanism:

- As air moves across vegetative surfaces, leaves and other aerial plant surfaces can remove odors, dust, gas, and microbial constituents of airstreams.
- VEBs can mitigate odors/ particulates from all livestock/poultry species;
- VEBs are size neutral technology and can be used to mitigate odors/particulates from all sources of odor: buildings, manure storage, and land application.
- Trees/shrubs are among the most efficient natural filtering structures in a landscape.

Limitations:

- Mitigation effectiveness is highly site specific and will vary considerably from farm to farm.
- VEBs often require considerable land area and may take up to five years to become physically effective.
- Care in VEB design must be taken to avoid causing snow deposition, ventilation, and on-farm visibility problems.
- At best, odor/particulate mitigation will be “incremental” and therefore should be always used with other odor management strategies.

Cost:

Costs for VEB systems are highly variable and are site/design specific – but for midsized producers (and larger) VEBs likely amount to just a few cents per animal produced. There are three main categories of expenses associated with VEBs: 1) Site prep costs, 2) tree establishment costs, and 3) long term maintenance costs. It should be noted that the majority (usually in the range of 40-70%) of the total cost is “upfront” and is tied to the cost of the initial planting stock (e.g. older, larger nursery stock can be considerably more expensive than bare-root seedlings but such an investment may “buy time” in VEB establishment). Long term maintenance costs vary depending upon the overall health of the VEB. It should be recognized that there are expenditures that occur regularly throughout the life of a VEB and maintenance is an annual process, however as a VEB system matures the annual maintenance requirements will likely decrease over time.