

Using Vegetative Buffers to Reduce Environmental Concerns

Bud Malone
Extension Poultry Specialist
University of Delaware

Presented at US Poultry & Egg Assoc. Environmental Seminar in Atlanta, GA on 3/6/08



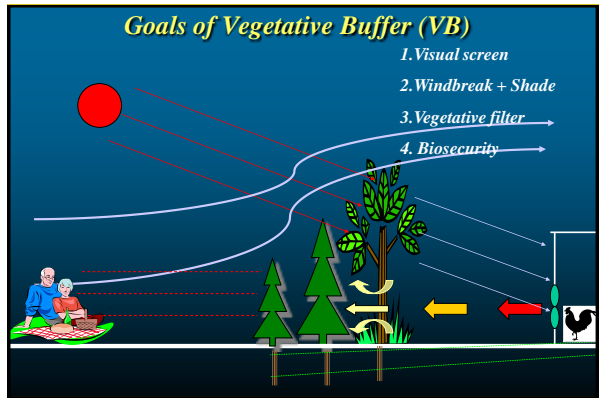
Industry Trends & Issues

Move to tunnel/windowless houses & larger farms

Emissions

Rural encroachment + conflict/zoning

Delmarva stakeholder meeting
Dec. 2000 to discuss VB.



Production Benefits

- ❖ Reduce snow drifting
- ❖ Reduce heating cost
- ❖ Reduce cooling cost
- ❖ Maintain fan efficiency
- ❖ Reduce airborne farm-to-farm disease spread

Influence of Woods on Broiler Production (USPEA Funding)

Microclimate

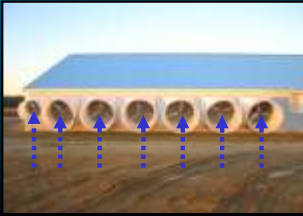
Broiler Performance

Fan Performance

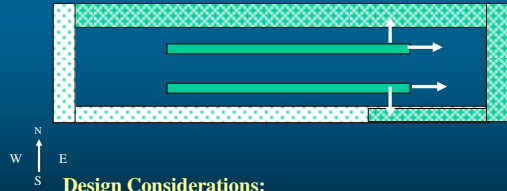
- ❖ Delmarva Wind
- ❖ Avg = 5.5 mph
- ❖ Max. = 15 mph

VB to Reduce Backpressure on Fans

- ❖ 15 mph wind = 15.5% reduction in fan cfm & 4.4% increase in amperage.
- ❖ VB blocks winds and aids in maintaining optimum fan efficiency.



VB Design Considerations for Poultry Farms.



Design Considerations:

- ❖ Increase porosity (>spacing, deciduous trees, shrubs) on prevailing summer wind side of farms.
- ❖ Increase density (<spacing, evergreens, multiple rows) on winter wind side and opposite fans

Reduce Air-Borne Disease Transmission: Roadway and Farm-to-Farm

LT spread on Delmarva (Johnson, et.al. 2001)

- ❖ Distance from LT farm not as important as direction of wind from that farm
- ❖ Downwind farms 4 times more likely to get LT
- ❖ N-S oriented houses 40% more likely to get LT than E-W houses
- ❖ Conventional houses 3 1/2 more likely to get LT than tunnel houses

VB = 16% less aerobic bacteria aerosols

Bioaerosol Transfer Between Houses on Same Farm



Preliminary results suggest VB reduces aerosol bacteria by ~16%

Environmental Benefits

- ❖ Reduce ammonia, dust and odor
- ❖ Reduce runoff
- ❖ Reduce groundwater nitrates
- ❖ Convert CO₂ to O₂
- ❖ Low cost program to *partially* address future air quality & emissions challenges

Test Site for Measuring Efficacy of Vegetative Buffers



Planted March 2002:
 Bald cypress 16 ft high
 Leyland cypress 14 ft
 Red cedar 8 ft high

EPA/DNREC 319 funding

**VB Opposite Tunnel Fans “Reduced”
Wind Speed (99%), Dust (57%),
Ammonia (55%) and Odor (27%)**



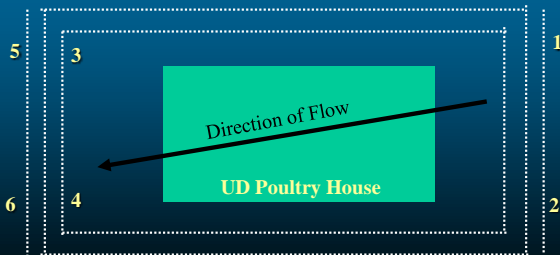
2002-2007 data
42 sample days

**Wind direction and crop (porosity) behind
VB “appears” to influence odor reduction**



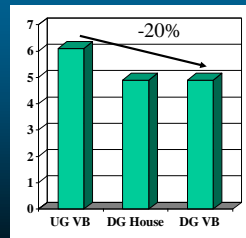
Better odor dispersion if VB near the source (50' vs 200')

Effect of VB on Ground Water Quality



Six wells sampled spring and fall from 2004 to 2007

Nitrate-N (ppm) in Test Wells



Preliminary data suggest
VB reduced nitrates by 20%
as groundwater moves
from up gradient to down
gradient the poultry farm.

**Potential for Carbon Credits and
Biomass?**



**Neighbor Relations
Benefits:**

- ❖ Creates positive image
- ❖ Landscape appearance & increase property value
- ❖ Blocks view of houses, waste facilities and routine farm activities
- ❖ Out-of-Sight-Out-of-Mind!!
- ❖ Attractive farms have less odor (Mikesell, et. al., 2001)
- ❖ Reduces odor, dust, feathers, noise, etc.



Delmarva Neighbor Relations Trends

- ❖ Increasing number of nuisance complaints and more stringent zoning ordinance.
- ❖ DPI survey: ~ 40% complaints are dust/feathers, 40% odor & 20% visual, noise, etc.
- ❖ Direction and location of tunnel ventilation a major issue.
- ❖ DPI developed a proactive industry neighbor policy, VB a major component of the BMPs.

Examples of Neighbor Issues

Dust From Fans



Visual Pollution



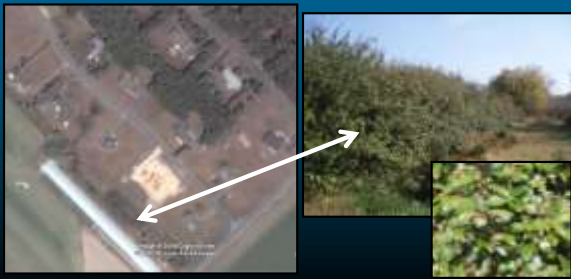
Odor From Farm



Value of New Houses



Fragrant Shrubs & Trees to Mask Odor?



VB Implementation Challenges

Design VB For Each Side of Each Farm with a Goal to Meet ALL Objectives – Tree Selection is Critical



Best to Design and Implement Tree Plan BEFORE Building Poultry Houses!



Form of Plan Material to Use is Important

Bare root = high mortality

Cuttings require water

Containers better option

B&B costly/ plant shock

VB Distance from Fans

- Fan efficiency decreased <4 times fan diameter
- Plume distance 10 times fan diameter
- Plantings near maximum plume distance, add for more fans at each location.

Maintenance and Care Essential

Insects

Weed Control

Irrigation

Limited Information on Planting Trees Between Houses

Potential for VB with Few Years

Summary

- ❖ **Emission reductions** encouraging, continue to better define this program.
- ❖ Provides a long-term, low-cost, *partial* solution to emerging industry issues (maybe one of the most cost-effective BMP's).
- ❖ Neighbor relations has driven interest in VB.

Summary (cont.)

- ❖ Growers need technical assistance in designing, implementing and maintenance of VB.
- ❖ Cost-share programs available in some states.
- ❖ Delmarva poultry industry committed to VB for farms – hired a coordinator to implement this program.