



# Fact Sheet #1: Procedures for In-House Composting Poultry Mortality as a Rapid Response to Avian Influenza

Virginia Cooperative Extension  
*Knowledge for the Commonwealth*

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**“Research indicates that Avian Influenza (AI) virus can be inactivated in 10 minutes at 140°F (60°C) or in 15 to 20 minutes at 133°F (56°C) (Senne et al. 1994).”**

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## SUMMARY OF THE METHOD

Composting is the natural degradation of organic resources (such as poultry carcasses) by microorganisms. Research in Maryland, Delaware, and North Carolina indicates that composting is effective in killing a variety of diseases including avian influenza (AI). In-house composting was successfully used in Delaware and Maryland to control an outbreak of AI. Current research in Virginia indicates that in-house composting can be effective with most bird types and poultry house designs.

Senne et al. (1994) reported Avian Influenza (AI) virus can be inactivated in 10 minutes at 140°F (60°C) or in 15 to 20 minutes at 133°F (56°C). Microbial activity within a well-constructed compost pile can generate and maintain temperatures ranging from 130°F to 150°F (54°C to 66°C) for several weeks, which is sufficient to inactivate the AI virus with generous margins of error.

## ADVANTAGES OF IN-HOUSE COMPOSTING

- Limits the risks of groundwater and air pollution
- Limits the potential for farm-to-farm disease transmission
- Inactivates pathogens in carcasses and litter
- Limits public concerns over disease exposure
- Relative low cost

## PLANNING PRIOR TO AN OUTBREAK

- Additional sources of carbon material should be identified and secured to ensure availability.
- Rapid Response Teams, with team leaders and alternates, should be created within each poultry complex to oversee sanitation, depopulation, and in-house composting.
- Rapid Response Team training should include respirator fit testing.
- Worker decontamination plans and equipment should be prepared.
- Movement of carcasses in the houses and equipment brought onto the farm should be limited.
- Alternate disposal options should be planned for farm operations where in-house composting may not be possible.

*A demonstration project of in-house composting of turkeys conducted in Virginia in 2005 showed that tilling and crushing the carcasses increased temperature and decreased downtime by 3 and 11 days respectively.*

## EQUIPMENT AND SUPPLIES

- Skid steer loader(s), tiller attachment, pallet or hay fork, and shovels
- Sawdust, litter, woodchips, or other carbon material
- 1 Compost thermometer per house (36" or 48" stem length)
- Power washer, disinfecting equipment and recommended disinfectants

## PROTOCOLS

### Prior to euthanizing the flock

- Ensure that all personnel have appropriate personal protective equipment and training.
- Raise poultry feeders and waterers to the ceiling.
- Effective in-house composting must have a minimum of 1.3 pounds of carbon material (litter) per pound of bird.
- Determine pounds (lbs.) of birds
  - lbs. of birds = number of birds X average weight in lbs.
- Determine pounds of litter
  - cubic feet of litter = length of house X width of house X depth of litter (in feet)
  - pounds of litter = cubic feet of litter X 30 (average weight of a cubic foot of litter)
- Determine amount of additional carbon needed
  - shavings = 10 pounds per cubic foot
  - sawdust = 15 pounds per cubic foot
  - woodchips = 30 pounds per cubic foot
- Mobilize euthanasia, composting, and sanitation crews.

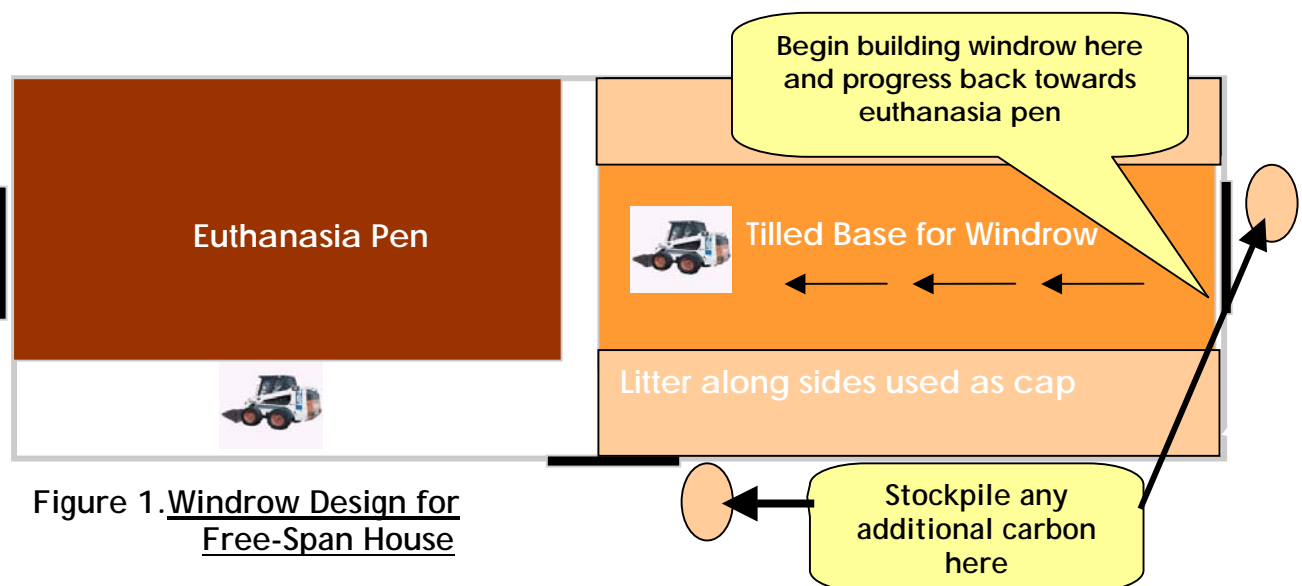


Figure 1. Windrow Design for Free-Span House

Construction of Windrows in Free-Span Houses



- Till the litter in the house to form a good base for the windrow.
- Use the skid loader and/or tractor to crush the birds within the euthanasia pen.
- Place any remaining feed on top the birds.
- Begin mixing birds and litter from the euthanasia end of the poultry house alternating 1 loader bucket of birds with 1 bucket of litter.
- Using the skid loader, begin constructing the windrow with the bird/litter mix on the tilled base at the other end of the poultry house (see Figure 1).
- The windrow should be 6 feet high and 12 feet wide.
- As the windrow is being constructed, cap with 6 to 8 inches of litter from the sides of the windrow.
- Continue this process until all of the bird/litter mix has been added to the windrow.
- Any remaining litter should be used to cap the windrow.

Considerations for Breeder Houses



- All operations must occur within the 13-foot scratch area between the slats (see Figure 2).
- Compost piles should be constructed 4 to 6 feet high if possible.
- Once windrow construction begins, no additional equipment or supplies will be accessible until all birds have been added to the windrow because the skidloader will be confined to the middle of the house.

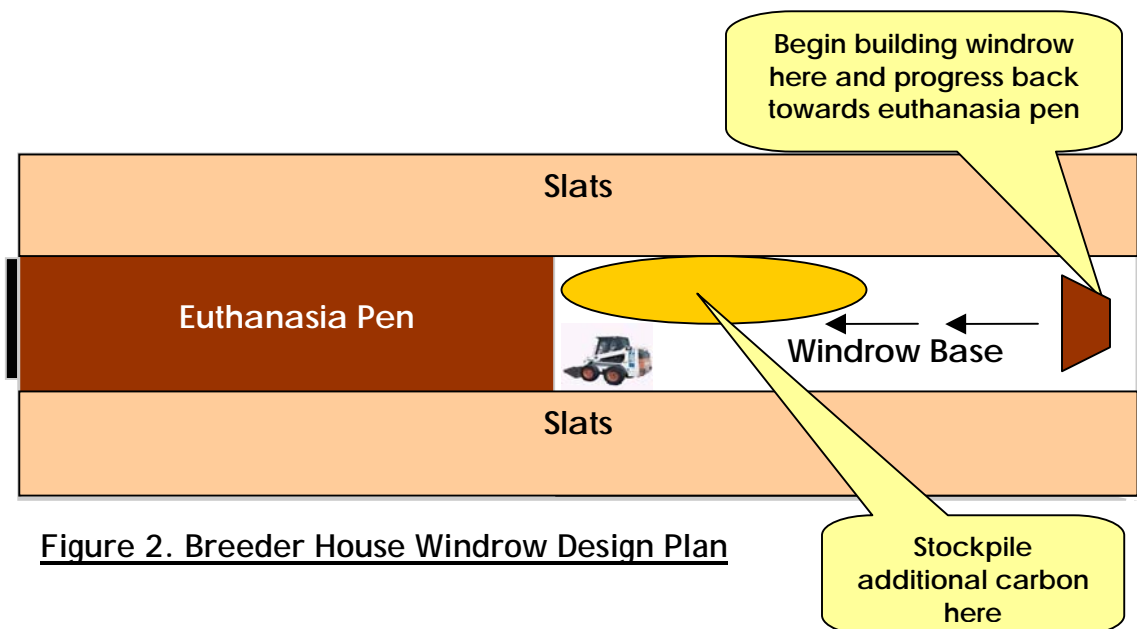


Figure 2. Breeder House Windrow Design Plan



*“Composting is the natural degradation of organic resources (such as poultry carcasses) by microorganisms.”*

**Considerations for Double-Deck Houses**

- Euthanize birds both upstairs and downstairs.
- Crush birds downstairs with skid loader.
- Begin composting downstairs by mixing birds and litter; build the first windrow in the side alley of the building (see Figure 3).
- If there is sufficient height, the windrows can be capped after both are constructed, otherwise, they should be capped as constructed.
- Using a small tractor, push only enough birds and litter from upstairs down through the trap doors that can be crushed effectively prior to placing in the next windrow.
- The windrow for the birds and litter from upstairs should be started in the opposite side alley (see Figure 3).
- Alternate pushing birds and litter downstairs, crushing and mixing, and forming the windrow until all birds and litter from the upstairs have been added to the windrow.
- If not capped during construction, cap the windrows with litter or other carbon source so no carcasses are exposed.

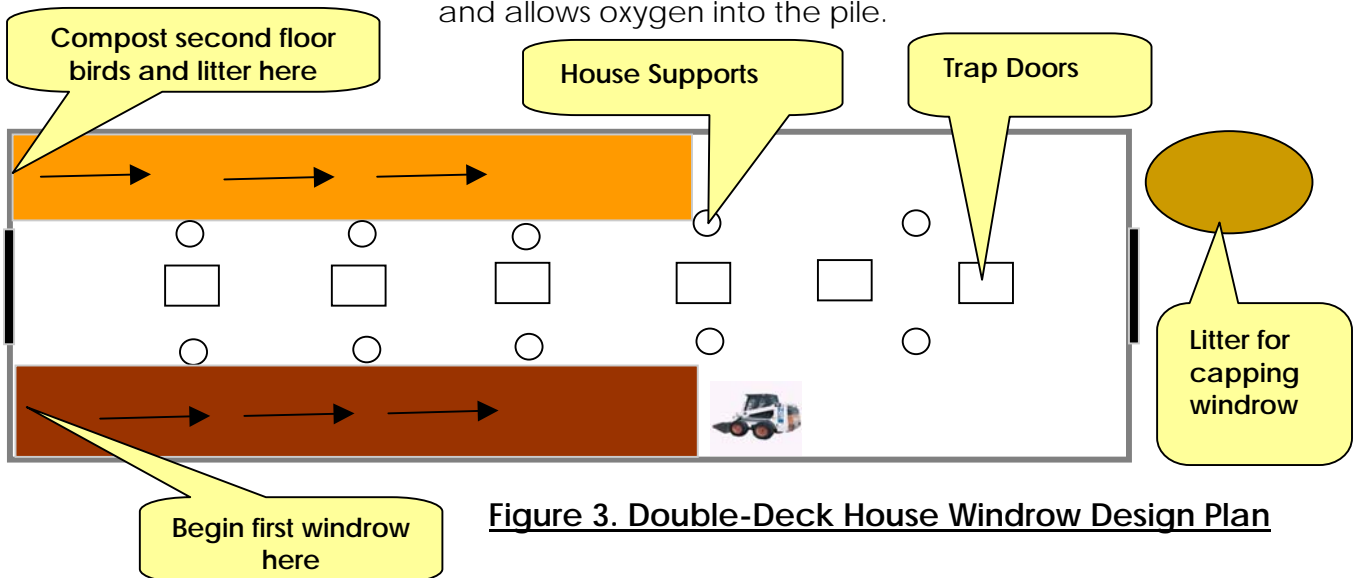


**TEMPERATURE MONITORING**

- Temperatures within the center of the compost piles should be monitored at 25 to 50 foot intervals the length of the windrow and charted daily.
- Windrow temperatures should reach at least 130° F within the first week (see Figure 4)

**AERATING THE WINDROW**

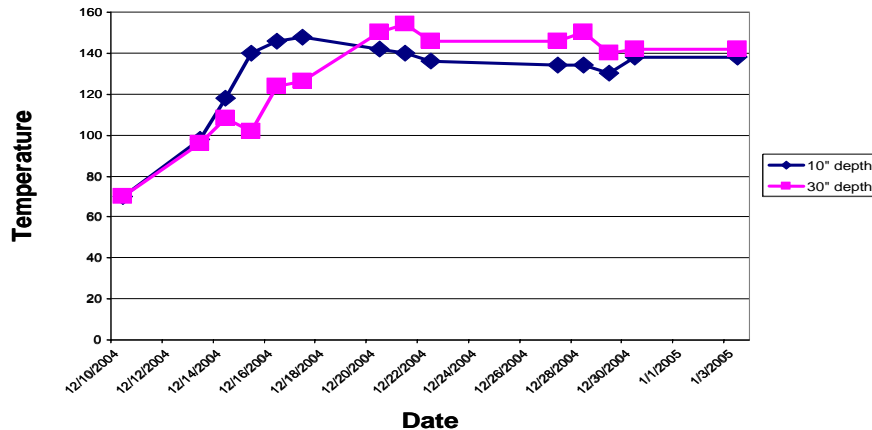
- If the windrow temperature peaks and drops below 105° F, it should be aerated by slowly lifting with a hay or pallet fork the length of the pile. The forking method does not disturb the cap and allows oxygen into the pile.



**Figure 3. Double-Deck House Windrow Design Plan**

## TESTING FOR VIRUS

- Virus isolation testing should be conducted after 2 weeks.



**Figure 4. Representative Temperature Graph for Windrow Composting**

## REMOVING THE COMPOST FROM THE POULTRY HOUSE

- Temperatures should increase after aerating the windrows and should be monitored.
- 1 to 2 weeks after aerating, the material within the pile should be inspected to evaluate the decomposition of the carcasses. At this stage, carcasses should be reduced to bones and feathers with little flesh remaining.
- If inspection confirms the near complete decomposition of all fleshy material and virus isolation results have come back negative, the immature compost can be removed from the poultry house and deep stacked on the farm.
- The compost should go through an additional heat during deep stacking before land application.
- A sample should be collected and submitted for nutrient analysis.
- Upon receipt of litter analysis and subject to quarantine release by the State Veterinarian the compost may be land applied at agronomic rates.
- A transportation subsidy of \$10 per ton may be necessary to facilitate the movement and distribution of the compost and overcome the stigma associated with material originating from an AI positive farm.

## TROUBLESHOOTING

Problem	Issue	Solution
Excessive flies or odor	Exposed carcasses	Add additional cap material
Leachate from windrow	Mixture too wet	Add additional carbon material, mix and cap
Temperature does not reach 135°F	Mixture too dry (< 40% moisture)	Add water to pile, mix if necessary
Temperature does not reach 135°F	Mixture too wet (> 60 % moisture)	Add additional carbon material, mix if necessary
Temperature drops early	Not enough oxygen	Aerate or mix pile

