Guidelines for In-House Composting Poultry Mortality as a Rapid Response to Avian Influenza

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Virginia Cooperative Extension
Knowledge for the CommonWealth

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"Research indicates that Avian Influenza Virus (AIV) can be inactivated in 10 minutes at 140ºF (60ºC) or 90 minutes at 133ºF (56ºC) (Lu et al., 2003)."

SUMMARY OF THE METHOD

Composting is the natural degradation of organic resources (such as poultry carcasses) by microorganisms. In-house composting was successfully used in Virginia, Delaware and Maryland to control outbreaks of AI. This experience demonstrates that in-house composting can be effective with most bird types and poultry house designs.

Lu et al. (2003) reported that Avian Influenza Virus (AIV) can be inactivated in 10 minutes at 140ºF (60ºC) or 90 minutes at 133ºF (56ºC). Microbial activity within a well-constructed compost pile can generate and maintain temperatures ranging from 130ºF to 150ºF (54ºC to 66ºC) for several weeks, which is sufficient to inactivate the AI virus with generous margins of error.

ADVANTAGES OF IN-HOUSE COMPOSTING

- Contains the disease and limits off-farm disease transmission
- Limits the risks of groundwater and air pollution
- Inactivates pathogens in carcasses and litter
- Limits public concerns over disease exposure
- Specialized equipment is unnecessary
- Protected from severe weather conditions (frozen ground, etc.)

PLANNING PRIOR TO AN OUTBREAK

- Additional sources of carbon material should be identified and secured to ensure availability.
- If national 3-D contractors will not be utilized, rapid response teams should be created within each poultry complex to oversee sanitation, depopulation, and in-house composting.
- Rapid response team should comply with national health and safety guidelines.
- Worker decontamination plans and equipment should be prepared.
- Movement of equipment onto and off the farm should be limited.
- In-house composting can be done in most poultry houses. Where not possible, composting can be conducted outside the poultry house.
- Variations in house designs may require adaptations of euthanasia and windrow construction methods outlined in this fact sheet.

In 2007, composting was used to dispose of more than 2,000,000 pounds of carcasses on 2 turkey farms exposed to LPAI in Virginia and West Virginia.

EQUIPMENT AND SUPPLIES

- Skid loader(s), pay loader, dump trucks, and shovels
- Sawdust, litter, woodchips, or other carbon material
- Compost thermometers (36" or 48" stem length) or wireless/wired temperature probes
- PPE, power washer, disinfecting equipment and recommended disinfectants

PROTOCOLS

Prior to Depopulation

- Ensure that all personnel have appropriate personal protective equipment and training.
- Minimize ventilation; raise poultry feeders, and waterers.
- Effective in-house composting must have a minimum of 1.5 pounds of carbon material (based on a 30 lbs/cubic foot material) per pound of bird. (1 lb. of carbon per lb. of bird in the mix and the remaining carbon for base and cover.)
- Determine total pounds (lbs.) of birds
  - lbs. birds = number of birds X average weight in lbs.
- Determine total lbs. carbon needed
  - Total carbon = lbs. birds (from above) X 1.5
- Determine pounds of litter in house
  - cubic feet of litter = length of house X width of house X depth of litter (in feet)
  - lbs. litter = cubic feet of litter X weight of a cubic foot of litter (Average = 30 lbs; Range = 25 to 35 lbs.)
- Determine amount of additional carbon needed
  - Cubic yards of additional carbon needed = (total lbs. carbon needed – lbs. litter in house)/(weight per cubic ft. of carbon material)/(27)
    - woodchips, litter or wet sawdust = 30 lbs./cubic ft.
    - dry sawdust = 15 lbs./cubic ft.
- Mobilize depopulation, composting, and sanitation crews.

Figure 1. Typical Free-Span House—Preparation for Windrow Construction

Depopulation with Fire-Fighting Foam

- Birds may be confined to the center of the house to prevent damage to the end walls and minimize the volume of foam necessary (see Figure 1).
- Stockpile additional carbon material (if needed) near doors so it is accessible during windrow construction.
- Follow industry guidelines for humane euthanasia.
- If other depopulation methods are used, windrow construction procedures will differ.

Construction of Windrows in Free-Span Houses (birds over 10 pounds)

- Begin clearing both sides of the house (approximately 1/3 of the house width on each side) and piling the carcasses and litter in the center 1/3 of the house (see Figure 1).
- The carcasses and litter need to be distributed evenly in the center pile.
- Place any remaining feed on the center pile.
- Using the skid loader, begin constructing the windrow by building windrow bases on each side of the center pile with additional carbon material.
- The base should be 10 – 12 feet wide and 12 – 15 inches deep.
- Using 2 skid loaders on each end of the center pile, place the carcasses and litter mix to the windrow bases making sure that the skid loaders do not run on the bases to avoid compaction.
- The windrow should be 4 to 6 feet high and 12 feet wide.
- After the windrow is constructed, cap with 12 inches of carbon material.
- Any remaining litter should be used to cap the windrow.

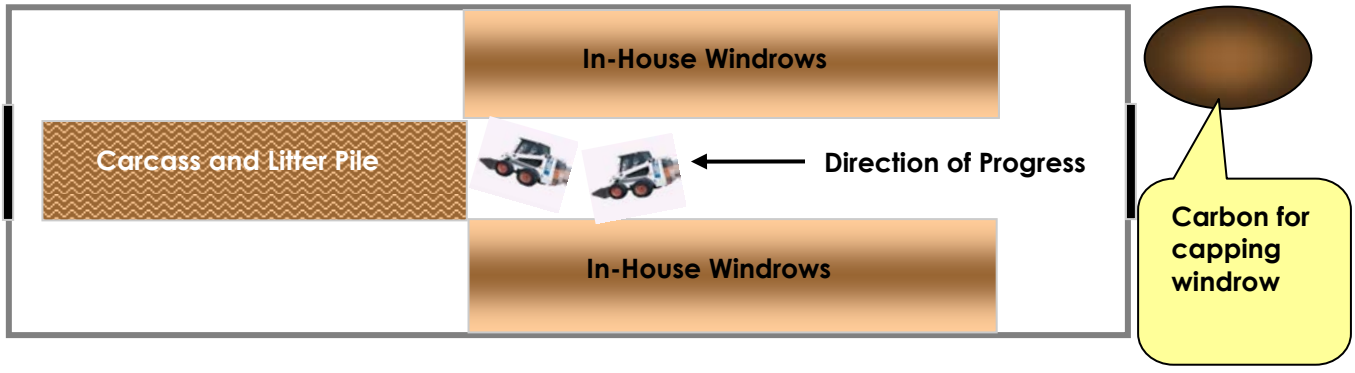

Figure 2. Typical Free-Span House—Windrow Construction

Considerations for Houses with Pole Supports

- A center compost windrow should be constructed (see figure 3).

Considerations for Birds Under 10 Pounds

- Only a single center compost windrow may be necessary (see figure 3).

Considerations for Breeder Houses

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

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

TEMPERATURE MONITORING

- Temperatures at 18" and 36" depths in the compost piles should be regularly monitored at 50 foot intervals the length of the windrow and charted. See sample log on page 6.
- In the case of HPAI, remote temperature monitoring is preferable for biosecurity and worker safety.
- Windrow temperatures should reach at least 130° F within the first week (see Figure 4).

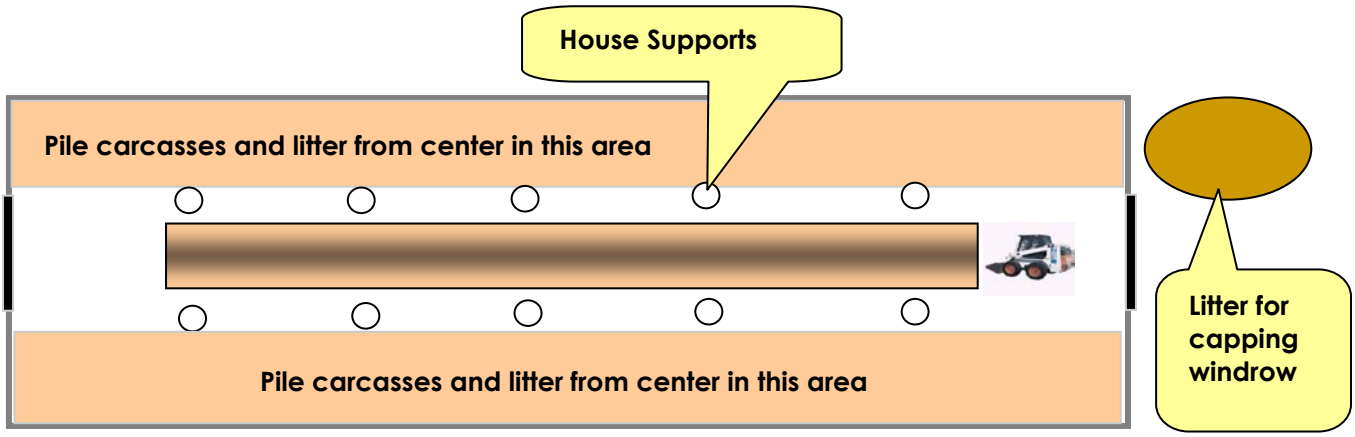

Figure 3. Typical House with Pole Supports

TESTING FOR VIRUS

- Virus isolation testing should be conducted after 2 weeks.

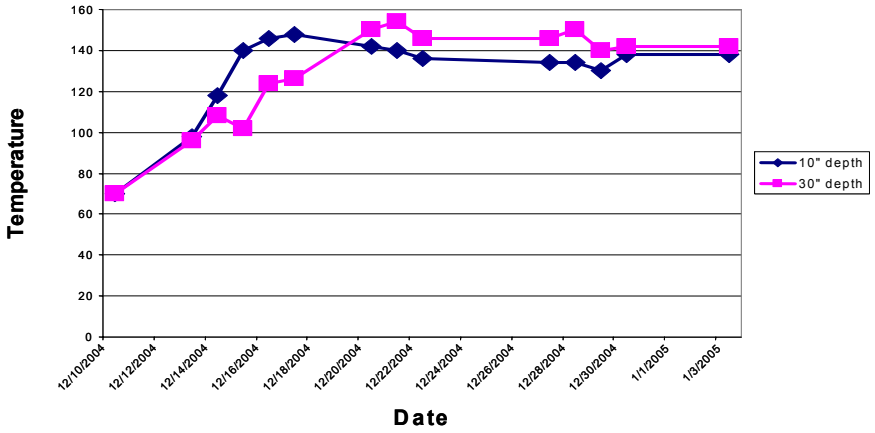

Figure 4. Representative Temperature Graph for Windrow Composting

REMOVING THE COMPOST FROM THE POULTRY HOUSE

- Temperatures should be regularly monitored after construction to ensure that temperatures adequate for virus inactivation are reached and maintained.
- 10 to 14 days after construction of windrow, 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, the compost can be removed from the poultry house and windrows constructed outside the houses for additional composting.
- A sample should be collected and submitted for virus isolation testing and nutrient analysis.
- Upon receipt of litter analysis and a negative virus isolation test result and subject to quarantine release by the State Veterinarian, the compost may be land applied at agronomic rates and incorporated if appropriate.

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

In-House Composting Temperature Log

Farm Name:
House Number:

Date	1		2		3		4		5		6		7		8		9		10		Daily Average

LIST OF REFERENCES

Lu H., Castro A.E., Pennick K., Liu J., Yang Q., Dunn P., Weinstock D., and D. Henzler. 2003. Survival of Avian Influenza virus H7N2 in SPF Chickens and Their Environments. Avian Diseases 47:1015-1021

Tablante, N.L and G.W. Malone, 2005. Guidelines for In-House Composting of Poultry Mortalities Due to Catastrophic Disease. www.rec.udel.edu/poultry

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