
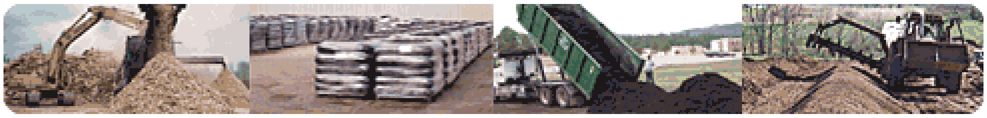

BioCycle



ADVANCING COMPOSTING, ORGANICS RECYCLING & RENEWABLE ENERGY



# COMPOSTING WILD BIRDS, GAME BIRDS AND BACKYARD POULTRY

BioCycle November 2006, Vol. 47, No. 11, p. 52

Virginia state agencies study methods for small-scale carcass disposal in response to an outbreak of avian influenza.

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WINDROW COMPOSTING has been successfully used in the U.S. to dispose of commercial poultry flocks infected with Avian Influenza (AI). Virginia's commercial poultry industry plans to use in-house composting - a form of windrow composting - as the primary method of disposing of carcasses and containing the spread of disease in the event of an outbreak of highly pathogenic AI such as the H5N1strain. (See “In-House Composting As A Rapid Response To Avian Influenza,” May, 2006.) However, windrow composting may not specifically meet the needs of agencies and persons responsible for disposing of backyard flocks, game birds and wild birds. In-vessel and static pile composting, two alternatives to windrow composting, are appropriate for small-scale carcass disposal. Burial, landfilling and incineration are considered to be the main methods that health officials will use to dispose of backyard flocks, game birds, and wild birds in the event of a disease outbreak. They have been used in the past to deal with mortalities in wild and captive bird populations. However, continued spread of the highly pathogenic H5N1 strain of bird flu adds a different dimension to the disposal issue.

While these three methods still may be used, they have significant limitations and disadvantages. Composting is another disposal option well-suited for managing and containing a highly pathogenic bird flu outbreak with on-site carcass disposal and with other benefits. The main benefit of composting is the virus can be easily inactivated. Lu et al. (2003) report the AI virus is inactivated at 140°F in 10 minutes, or in 90 minutes at 133°F, temperatures that are easily generated and monitored in well-managed compost piles.

Composting is the natural degradation of organic sources (such as poultry carcasses) by microorganisms. Composting small numbers of birds is not new to the poultry industry. The University of Maryland pioneered composting for daily mortality management with commercial broiler operations in the late 1980s. Composting has become the accepted disposal method for daily mortalities within the chicken industry. Commercial turkey operations began using composting in the 1990s to manage their daily mortality.

STATIC PILE COMPOSTING

Static pile composting is similar to the process used by the commercial poultry industry for daily mortality - the pile is managed in three stages with turning and aerating occurring between each stage. However, the primary goal of static pile composting is to construct a pile that generates sufficient heat to deactivate the virus and decompose the carcasses without needing to turn or aerate the pile. To accomplish this goal, the pile must be constructed with the optimum C:N ratio and moisture content. Within a well-constructed compost pile, microbial activity generates temperatures ranging from 130ºF (54ºC) to 150ºF (66ºC) and maintains these temperatures for several weeks.

Static pile composting offers a biosecure disposal alternative to burial, landfilling and incineration, since carcasses are not removed from the infected premises. The cost is similar to on-site burial, but without the potential for environmental impacts. Additionally, the process quickly deactivates the virus. For biosecurity reasons, access to the piles should be controlled.

Construction should begin with a 12-inch (30 cm) base layer of absorbent carbon material such as poultry litter, sawdust, wood chips, or other appropriate materials. A single layer of bird carcasses is placed on the base, and eight inches (20 cm) of carbon is added to the carcasses. Alternating layers of poultry carcasses and carbon are used until all the carcasses are added or pile height reaches six feet (1.8 m). The pile should be capped with eight to 10 inches (20 to 25 cm) of carbon material. A generous cover and cap is critical for reducing the odors that attract scavengers. It is recommended that the compost pile be completely covered with a compost fleece or breathable cover to further reduce the potential for attracting scavengers. The entire pile can also be surrounded by woven-wire fence. Alternatively, the pile may be constructed inside a barn or other structure for better scavenger control. If not controlled, scavengers can transport carcasses before the composting process has inactivated the AI virus.

Pile moisture content should be between 45 percent and 55 percent. Moisture can be estimated a week after pile construction by squeezing a handful of compost; material should hold together in a ball without dripping water. If the carbon material is extremely dry, the birds should be lightly sprayed during the construction process.

Compost piles should reach temperatures of 130ºF (54ºC) to 150ºF (66ºC). A long stem thermometer or temperature probe can be used to monitor the pile's core temperature. The compost pile should be inspected regularly to ensure that scavengers have not disturbed the cover. After three weeks of microbial degradation of the carcasses and deactivation of the virus, the pile may be turned. Turning introduces oxygen, encourages microbial activity, and generates a second heat cycle. If moisture within the pile has dropped below 50 percent, water should be added. The composting process should continue for an additional three to five weeks. After the second heat cycle, a few bones and feathers may remain; however, the compost material can be land applied as a soil amendment.

## IN-VESSEL COMPOSTING

In-vessel composting is an enhanced composting process that takes place within a rotating drum. Poultry carcasses and a carbon source are loaded in the composter. Once loaded, the unit is started and turned slowly, providing thorough mixing, aeration and physical breakdown of the carcasses.

Compared to other composting methods, in-vessel composting has a number of advantages for disposing of AI infected birds. Because of the constant physical activity within the drum, in-vessel composting generates compost temperatures faster than other methods. Microbial activity within the drum generates temperatures of up to 140ºF (60ºC) within 48 hours with ongoing temperatures averaging 145ºF (63ºC) (Flory 2002).

The enclosed drum provides maximum vector control and is environmentally sound. As with other composting methods, it produces an end product that that can be used as a soil amendment. An additional advantage of in-vessel composting is that the units can be made mobile for transport to the infected premises.

Unlike static pile composting, in-vessel composting requires purchasing or leasing the composting equipment and entails an additional cost. Equipment is often produced upon order; the agency responsible for carcass disposal should purchase or lease the equipment prior to an outbreak. An adequately sized mobile in-vessel composter, such as the Greendrum Type 408 used in the Virginia demonstrations in 2002, cost between $10,000 and $15,000.

With in-vessel composting, poultry carcasses and litter are loaded into the composter at a ratio of one part carcasses to three parts litter. Other carbon sources such as sawdust, peanut hulls, and wood shavings may be substituted for poultry litter. In-vessel composters should be loaded to a minimum working capacity (approximately half full) to generate sufficient heat. When only a few birds are being composted, this volume can consist principally of litter or other carbon material.

Once carcasses and carbon material are loaded into the drum, the unit should be started and begins to turn slowly. The optimum moisture content of the compost is 50 percent. Moisture can be estimated within 24 hours of starting the composter by squeezing a handful of compost. (Material should hold together in a ball without dripping water.) Water may need to be added if the moisture content is estimated to be below 50 percent. Additional dry carbon material may be added if there is excessive moisture. Internal drum temperatures should reach at least 130ºF (54ºC) within 48 hours. A long stem thermometer or internal temperature probe can be used to monitor the temperature of the compost. (Failure to reach adequate temperatures is usually due to improper moisture content.)

Additional carcasses may be added daily to continuous feed composters. Daily capacity is dependent on the size of the unit. Compost may be removed from the finish end of the unit in batches after five to 10 days or partially unloaded on a daily basis depending upon operational needs. Access to the compost should be controlled until virus isolation tests confirm the AI virus has been inactivated.

## DECIDING FACTORS

Agency personnel responsible for carcass disposal decisions will need to consider many environmental and human health factors. The number of carcasses, the observed clinical symptoms in other birds, and the presence or absence of test results provide some of the information necessary to make informed decisions. For example, when managing a small wild bird mortality event where there are not clinical symptoms in other birds in the population, incineration or landfilling may be the most logical decision. As the number of carcasses increase, off-site disposal options become more difficult to manage.

Recent deaths of people infected with the H5N1 strain of the Avian Influenza virus in Asia and Europe remind us that the human health risk associated with carcass disposal must be strictly managed. Any time carcasses are transported off the infected premises the risk of disease transmission increases. Although there currently is no evidence that suggests indirect exposure to infected carcasses can transmit the disease, public concern may affect and alter disposal options and decisions even if those decisions are based on sound scientific principles. In considering the different carcass disposal options and methods, agencies and people responsible for the disposal of backyard flocks, game birds, and wild birds should consider on-site options such as composting to minimize the potential for disease transmission to humans.

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