

MASS MORTALITY COMPOSTING PROGRAMS

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INTRODUCTION

Every poultry farm should have a plan to deal with a catastrophic mortality event! This plan should include mass disposal options and procedures, list of materials and contact people. Basic knowledge of the procedure(s) and all necessary approvals that will allow a swift response is essential. Local, state and federal regulations will dictate the disposal option(s). Furthermore, the disposal method must be economical, environmentally and socially acceptable. Although the poultry industry makes every effort to circumvent catastrophic losses, there are numerous situations that pose risk, many of which are unavoidable. A catastrophic loss can be a few thousand birds in a house or farm, or can represent millions of birds in an entire region of the country that requires mass disposal. There have been several recent examples in which there was uncertainty and lack of knowledge on methods of mass disposal, lack of preparation to deal with a catastrophic event and perhaps more important, not having procedures pre-approved by local and state regulatory authorities. The consequence of these situations has been conflict, delays in responding to the emergency at the most critical time period and added overall cost to deal with the crisis.

Situations that lead to catastrophic mortality events are numerous. With a shift toward windowless housing and greater dependency on electronics and power ventilation, electrical outages less than half-hour duration can result in partial or whole houses "heat" losses. The losses can be limited to one or more houses on a farm or can be widespread in a region such as recently seen with Hurricane Katrina. Although back-up generators are required for most farms to deal with power outages, past experience has found they are not fail-proof in all situations. To further complicate mortality disposal issues are natural disasters which cause additional structural damage to the houses. Examples of natural disasters causing structure damages include wind from hurricanes and tornados, and collapsed roofs from heavy snow or ice loads. As seen with Hurricane Floyd in North Carolina, flooding can cause yet another significant disposal challenge. When the decision is made to depopulate a farm for disease control purposes, selection of the disposal method should focus on minimizing disease spread. Recent Avian Influenza events suggest every effort should be made to inactivate the virus prior to carcass (and litter) removal from the house. Finally, flocks identified with and depopulated due to chemical residues must use a disposal method that avoids further environmental contamination.

Every catastrophic loss on each farm needs to be assessed to determine the appropriate disposal option(s). The following are some of the questions that need to be asked when analyzing potential options. What caused the catastrophic event? How many and what size birds are involved? Is it a partial, whole house or entire farm loss and are these losses widespread in the region? What resources and disposal options are available on the farm, from the poultry company or agency(s) overseeing this matter? What is the state of carcass decomposition? What local, state and/or federal regulations apply to this situation? How will the public “perceive” the disposal option being recommended?

MASS CARCASS DISPOSAL OPTIONS

Burial. For many catastrophic mortality events on-farm burial has historically been the predominant disposal option. This practice is one of the simplest and most cost-effective ways to deal with many types of mass mortality losses. Although some states relax environmental standards for burial when dealing with an emergency, this situation is changing due to increasing water quality and public perception concerns. Following the unearthing of intact ~15 year old carcasses at a trench burial site from an Avian Influenza event in Virginia in the late 1990s, environmental standards have become so stringent in this state the requirements have essentially eliminated on-farm burial as a mass disposal option. In locations having high seasonal water table such as the Delmarva Peninsula, burial above the water table may not be an option. Finding an elevated site that is not in close proximity to the water table can be a major challenge following a flooding catastrophe. Furthermore, burial may not be an option for some types of chemical residue depopulation situations and when the ground is frozen. When houses are damaged beyond repair due to natural disasters, separation of house debris from carcasses and litter is not possible and burial of the entire mass may be one of the few viable options.

Sanitary Landfill. The use of sanitary landfills has been used extensively for mass disposal of Avian Influenza flocks in the last few decades. It may also be one of the few options for disposal of some types of chemical residue contamination in poultry carcasses. Since all landfills do not accept carcasses, pre-approval is required and there can be logistical challenges when coordinating the transportation and deposition of large volumes of carcasses to these sites. Costs associated with transportation and tipping fees can be significant. During several recent Avian Influenza outbreaks there are indications that any disposal option that removes infectious carcasses from farms poses a potential biosecurity risk of spreading the virus to other farms.

Rendering. For some geographic areas that have plants capable of processing mortalities, rendering may be a viable and cost-effective option for non-disease and residue-free carcasses. The coordination of known tonnage of non-deteriorated carcasses is a requirement and can be a logistical challenge.

Incineration. Portable incineration units (e.g. Air Curtain®) have been used during recent Avian Influenza outbreaks in Virginia and British Columbia. Although the end product is very biosecure there are some logistical and environmental issues with this procedure. The units need to be transported to the region of the country having the catastrophic losses. Carcasses are then transported to a central and preferably remote receiving site. The incineration process is very slow, loading decomposed carcass poses a problem and it will require disposal of 0.3 tons of ash

per ton of carcass. Without the proper fuel source and supervision of the process, smoke and odor can create nuisance complaints. With special permitting, collapsed and severely damaged houses from a natural disaster along with the litter and birds have been burned on-site.

Composting. There has been increasing acceptance of composting as a practical, economical and environmentally sound method for disposal of many types of catastrophic mortality events. Implemented properly, this method avoids many of the water and air quality issues that may be associated with burial and incineration, respectively. On farm mass mortality composting eliminates costs related to transportation (landfill, rendering, incineration) and tipping fees (landfill). For a disease outbreak such as Avian Influenza, in-house composting of meat birds may be one of the most biosecure methods since the virus is eliminated in the carcass and litter prior to removal from the house. However, composting must be implemented correctly and knowledge of the procedures is essential! Windrow composting inside poultry houses can be a challenge in facilities that have post or low ceilings. Depending on the cause and extent of the catastrophic loss, resources available, production schedule, and applicable regulations, mass mortality composting can be implemented in the poultry house or manure storage structures or outside windrows (Figure 1).

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Disease Control

During the low pathogenecity H7N2 Avian Influenza outbreak on Delmarva in 2004, in-house composting was used successfully to contain and inactivate the virus in the carcasses and litter (Malone *et al.*, 2004). A *mix and pile* procedure was used on the infected three farms (nine houses total). This procedure requires mixing the litter and carcasses uniformly into a windrow and covering all exposed carcasses with litter or carbon materials (e.g. sawdust). A single windrow is formed in the center of the house and typically is 10 to 12 foot wide and 3 to 5 foot high. This procedure requires a *minimum* of 0.8 inches of litter or carbon material per pound of carcass per square foot floor space. Temperatures during the one-month in-house composting procedure averaged 130° F, enough to inactivate this heat sensitive. Virus isolation tests of the compost at ~14 and ~21 days were negative on all farms. After ~2 weeks the windrows were turned inside the house, capped to cover any exposed tissue, and allowed to continue composting for an additional 2 weeks prior to removal. An alternative procedure is to remove the compost after the first 2 weeks and place in a covered windrow outside the house. Crushing or shredding carcasses prior to windrowing reduces the additional carbon requirement to compost large carcasses such as roasters and turkeys (Bendfeldt *et al.*, 2005). Although whole market-age turkey carcasses (up to 40 pound toms) did compost in the demonstration by Bendfeldt, *et al.*, (2005), shredding carcasses speeds up the composting process (e.g. temperatures). These *mix and pile* and *shred and pile* procedures tend to work best with a mass depopulation method is used that distributes the mortality somewhat evenly over the floor of the house. If the carcasses are concentrated to a small portion of the house, a *layering* method may be appropriate. Detailed procedures for these in-house composting methods are described by Tablante and Malone (2005).

An Ag-Bag® composting system was employed during recent Avian Influenza events in Virginia (2002) and British Columbia (2004). This system requires specialized equipment to

mix carcasses with the carbon source, load the mixture into the bags and maintain proper aeration. Due to logistical considerations it may be more appropriate to transport the carcasses to a central site for composting with this system. The Ag Bag® system was used successfully to compost over 1 million Avian Influenza *negative* birds during the 2004 British Columbia outbreak. Since broiler breeder and caged layer farms may have limited on-farm carbon sources and these types of carcasses tend to be more difficult to compost, transporting these mortalities to a centralized and professionally operated Ag-Bag® site may be appropriate.

Heat Losses

Following a major heat loss event on the Delmarva Peninsula in 1995, the local universities conducted a demonstration and developed guidelines (Carr *et al.*, 1996) for outside windrow composting of catastrophic mortalities. This procedure involves placing a 12 inch layer of carbon material (e.g. sawdust, wood chips, litter, etc.) on a well drained site. Starting with a 12 foot wide base, the windrow is constructed in alternate layers of carcass (3 to 6 layers of carcass, each carcass layer not exceeding 10 inches depth) and carbon (6 to 8 inch thick layers). The final windrow is capped with a carbon material to cover exposed carcasses and should not exceed 7 feet in height. Windrows constructed in this manner will accommodate ~300 pounds of mortality per linear foot. Ideally, the windrow should be turned to aerate the mixture when the temperatures decline below 115° F or in about two weeks after pile formation. In recent years when litter from the farm has been used as the carbon source, the windrows have been covered with polyethylene, tarpaulin or compost fleece. These covered piles have been allowed to “age” for various durations of time before turning. Although the tarpaulin and compost fleece are more expensive, they are reusable and allow moisture and gases to escape from the pile yet shed rainfall. A wet condensate layer will often form under windrows covered with polyethylene or other impervious vapor barriers. If available and there are no mortality use restrictions, the *layering* procedure has been implemented inside manure or dry stack sheds when mortality losses are less severe (e.g. 5000 birds). Limitations of the loaders used for material handling may dictate the height and dimensions of the windrows inside sheds. The piles do not need to be covered with a tarpaulin or fleece since they are under roof, however, as with any procedure, the carcasses on the surface of the pile need to be covered with litter or a carbon source. Since the layering procedure can be more labor and material intensive and less likely to be implemented properly, the *mix and pile* procedure is becoming a more acceptable mass composting method. If the layout time between flocks is not a production issue, the in-house *mix and pile* windrow composting procedure can be used for heat losses. To avoid taking a house out of production for a prolonged period of time, the compost can be removed from the house at the first turn (~2 weeks).

Flood Losses

Carcass disposal of a flooded house is a *very unpleasant task!* Decomposition of carcasses and litter are often advanced since it may require days, even weeks before gaining access to a poultry house. As with any catastrophic mortality event, each house and farm will need to be assessed to determine viable option(s). A number of procedures have been used to compost carcasses from flooded houses. If decomposition is not advanced, in some situations the carcasses have been skimmed-off the litter surface and layered in outside windrows as described previously or placed in layers inside manure sheds. Most situations however have required blending of large amounts of dry carbon or litter in these flooded houses to facilitate material handling and removal of the

“soupy” litter/carcass mixture. This blended mixture has been placed on a sawdust base in outside windrows or in manure sheds using a *layering* method with dry carbon materials or using the *mix and pile* procedure. After capping to cover exposed carcasses (both inside or outside windrows), the outside windrows have been covered with tarpaulin or compost fleece or left uncovered to facilitate evaporation of water. One state has required a 3 foot berm of dry shavings around these uncovered windrows to contain runoff. Additional requirements and considerations for composting flooded houses include; using track-type skid loaders, the use of all-weather roadway to an approved windrow site, having an adequate quantity of trucks and equipment to load and transport carbon materials and compost mixtures, increasing the frequency of turning piles to facilitate drying, and it may require using chemicals for odor and fly control. Since downtime was not an issue on one farm, and environmental and neighbor relations were a concern, the in-house *mix and pile* composting procedure with added carbon was recently used successfully on Delmarva.

Chemical Residues

Occasionally there have been flocks requiring depopulation and disposal due to chemical residues (*i.e.*, pesticides). Composting the carcasses and litter may be an option if there are environmentally safe and approved options for disposal of the compost. One of the first documented applications of in-house composting was by Murphy (1992). A four-house farm with 86,000 4 ½ pound broilers contaminated with a herbicide were windrow composted in-house using the *layering* technique. After 10 days the compost with only a few boney bird residues was removed from the house, land applied and incorporated as a fertilizer.

SUMMARY

Composting is becoming one of the more accepted methods for disposal of catastrophic poultry mortality events. Compare to alternative disposal methods, composting it is often the more environmentally and socially acceptable, biosecure, cost-effective, and flexible implementation options. However, it is essential to have the knowledge and properly execute certain fundamental procedures for composting to be a successful mass mortality disposal option.

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Figure 1. Mass mortality composting options include in-house (left) and outside (top right) windrows or inside manure storage structures (bottom right).

