

## **CARCASS DISPOSAL OPTIONS AND EXPERIENCES FOR EMERGENCY DISEASE DEPOPULATION**

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### **Introduction**

Having pre-approved disposal options and knowledge on how to implement these procedures is absolutely essential in effective and timely control of Foreign Animal Diseases such as Avian Influenza (AI). As described in the latest draft version (August 2006) of the USDA, APHIS, VS National Highly Pathogenic Avian Influenza Response Plan, the disposal decision should be made on a case-by-case basis depending on the individual premise circumstances, evaluation of disposal sites, and optimal disposal procedures. The State and industry plans include site specific disposal methods for premises within their jurisdiction. Local, county, State and Federal environmental officials should be consulted in the disposal plan. The disposal method must eliminate infective materials in a timely, safe, biosecure, economic, environmentally sound and socially acceptable matter. There have been recent catastrophic mortality events in which there was uncertainty and lack of knowledge on methods of mass disposal, lack of preparation to deal with this type of 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 disease crisis.

The following are some of the questions that need to be asked when analyzing potential disposal options for an AI outbreak.

- What local, state, and/or federal regulations apply to this situation?
- Is the AI a low or high pathogenic form?
- What are the viable disposal options given the situation on each farm and house on that farm?
- Will the mass depopulation procedure that is used complement or complicate the disposal option?

- How many and what size of birds are involved on the farm, in the region?
- What resources, manpower, equipment and disposal options are available on the farm, from the poultry company or agency(s) overseeing this matter?
- With the recent media and human health attention given to “bird flu” in Asia and Europe, additional safeguards are needed to insure public health and ease fear.
- How the public “perceives” the disposal option being recommended cannot be over emphasized!

### **Disposal Options**

The following discussion is limited to a portion of the methods used and lessons-learned to dispose of AI infected meat-type bird carcasses during recent outbreaks in the USA and Canada.

Burial. At one time, on-farm burial was the predominant carcass disposal option for many types of catastrophic losses. This practice is one of the fastest, simplest and most cost-effective ways to deal with a mass mortality event. Although it may eliminate off-farm transport of infected carcasses, precautions are necessary to minimize contamination (i.e. feathers, dust, litter) when removing and transporting carcasses to the on-farm disposal site. This procedure can be equipment intensive and time required to decontaminate the machinery before off-farm transport must be considered. Soil type and proximity to the water table at the site will dictate if burial is allowed or how it will be implemented (e.g. liners). Site conditions (frozen ground) and access to the burial site may prevent or hinder this disposal option. Concerns with virus survivability at the burial site, potential impact on water quality, liability issues and public perception are additional concerns. Although burial was the accepted disposal method in the 1983 Virginia AI outbreak, over the next 19 years there was a complete reversal of opinion with it being the least desirable option during their 2002 AI event. Burial, like most other options only deals with carcass disposal, the treatment and disposal of the infected litter after bird removal still poses significant disposal challenges. Even with virus negative litter there is a stigma associated with litter from an AI farm that poses a disposal issue.

Sanitary Landfill. Sanitary landfills have been used for mass disposal of AI flocks in the last few decades and remains a viable option for many locations. Since all landfills do not accept or limit the volume of carcasses, pre-approval is required and there can be logistical challenges when coordinating the transportation and deposition of large amounts of carcasses to these sites. Costs associated with transportation in sealed, leak-proof trucks, tipping fees and sanitation can be significant. Like on-farm burial, potential liability, virus survivability and public perception are concerns when using landfills. As with any off-farm disposal option there can be a risk of spreading virus and fear of the public and other poultry farmers who reside near the transportation routes.

Incineration. Various types of forced air curtain incineration units have been used on a limited scale in recent AI outbreaks. 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 AI event and manned by skilled operators. Selection of a site that avoids potential neighbor air quality complaints and a location that does not pose any potential for surface or groundwater contamination is essential. Based on the experiences in Virginia (2002) and British Columbia (2004) the incineration process is both costly and *slow*!

To avoid issues with loading decomposed carcasses, refrigerated transport and holding trailers may be required. Ash disposal (0.3 tons of ash per ton of carcass) may also present a challenge. Without the proper fuel source, supervision of the process, and distance from neighbors, smoke and odor can create nuisance complaints and may pose challenges for some poultry production areas.

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, including AI. Having skilled skid-steer operators and basic knowledge how to compost mass mortality events is essential. Research has shown the heat-sensitive AI virus is inactivated in 90 minutes at 133° F or 10 minutes at 140° F (Lu et al., 2003). These temperatures are commonly achieved when composting mortalities. The initial guidelines and procedures for in-house composting as a means of carcass disposal of AI flocks were established by the Universities of Maryland and Delaware in 2003. One year after developing these guidelines this procedure was successfully implemented as a means to contain and inactivate the H7N2 AI virus in the carcasses and litter on the three infected Delmarva farms (Malone et al., 2004). The procedure used on these farms involved a uniform mixture of carcasses and litter in a single windrow down the center of the house. The windrows were capped with sawdust to cover all exposed carcasses. This procedure required 0.8 inches of litter or carbon per pound of carcass per square foot floor space (Tablante and Malone, 2005). Shredding carcasses prior to windrowing helped reduce carbon requirements and enhanced composting of large carcasses (e.g. roasters). Whole and shredded/crushed turkeys (up to 40 pound toms) were also successfully composted in a follow-up demonstration by Bendfeldt et al. (2005). In the Delmarva experience, after ~2 weeks the windrows were turned in the house, capped to cover any remaining surface tissue, and allowed to compost for another two weeks prior to pile removal. Temperatures during this month-long composting procedure exceeded 130° F. Virus isolation tests of the compost and house environment were all negative at the two-week turning event (Malone, et al., 2004). If permitted, with approved compost temperature standards and/or virus isolation test, an alternative procedure may be to remove the compost after the first 2 weeks and place in a covered outside windrow thus freeing up the production facility. Since there was a 30-day quarantine on the Delmarva AI positive farms, the in-house composting was completed within the required timeframe. It was estimated the cost of in-house composting was ~50% less than the transportation cost and tipping fees associated with the alternative disposal option of using a sanitary landfill. The use of in-house composting for disposal of AI infected carcasses was well received by the local industry, agencies and the public.

In situations where in-house composting may be more challenging if not impossible to implement (e.g. pole-type and two-story housing), on-farm outside windrow composting may be a consideration. Identifying an appropriate site and implementing techniques that minimize possible surface and groundwater contamination is important. The windrows can be constructed in a similar fashion as the in-house method with the additional requirement of a carbon base pad and an appropriate windrow cover (e.g. compost fleece). An in-bag, forced aeration outside composting system (Ag Bag®, Ag Bag International, Warrenton, Oregon) was employed on two AI positive flocks in Virginia and more extensively on 1.3 million AI *negative* carcasses in British Columbia. This system requires having the appropriate site conditions, water and

electric. Permits to transport large pieces of specialized equipment to the farm or an off-farm site may be required. Skilled operators are needed to mix, load and operate this system.

### Compatibility of Fire Fighting Foam with Composting

With the emergence of fire fighting foam as a new mass emergency depopulation method, the question of this procedure being compatible with in-house composting was posed. A Delmarva industry sponsored foam depopulation demonstration was implemented in July 2006 using a medium expansion nozzle and high expansion foam generator systems. Three in-house composting treatments were evaluated; control carcasses (processing plant DOAs) were compared to the two foam depopulated groups (~2600 six pound broilers per group). In addition to carcass degradation and compost temperature monitoring over the 28-day demonstration, virus survivability in the windrows was studied using five-week old broilers inoculated with LaSota vaccine strain of Newcastle Disease. These vaccinated broilers were euthanized, saturated in one of the two foam products and inserted into the respective windrows treatments at two depths. These carcasses were removed and tested for virus at multiple intervals over the first 14 days of composting.

Compared to the control, the foam compost temperatures during the 28-day evaluation were higher (121° vs 113° F) near the surface of the windrow (one-inch depth), higher (139° vs 128° F) at the one-foot depth, and were also higher (119° vs 107° F) during the first 14 days (prior to turning) at the three-foot depth. Moisture from the mill-run sawdust used to cover the windrows appeared to have a greater impact on compost moisture than did the added water from the foaming procedure. Two virus samples were recovered at day 1 from the non-foam treated compost. No positive samples were recovered from the foam treated compost or at any later sampling periods. All samples are currently being retested to validate these findings. Under the conditions of this demonstration there was no indication the foaming procedure impeded the composting process and may actually have been beneficial.

### **Summary**

When the decision is made to depopulate a farm for disease control purposes, every effort should be made to select a disposal method that minimizes disease spread while being economically, socially and environmentally acceptable. Many real-world experiences have been gained from recent AI events and the need to have various disposal *options* is essential. Ideally, the mass depopulation method should complement the disposal procedure. When appropriate, there is growing consensus that on-farm disposal in general, and in-house composting specifically, is the most desirable option. Implemented properly, this method is one of the more biosecure options since it contains and inactivates the AI virus prior to carcass (and litter) removal from the house. Being prepared and having the knowledge to implement the appropriate disposal option(s) is critical to a successful AI control program.

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