Controlling Avian Influenza Through In-House Composting of Depopulated Flocks: Sharing Delmarva's Experience

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Introduction

The importance of having effective and pre-approved carcass disposal options became apparent during the 2002 outbreak of Low Pathogenic H7N2 Avian Influenza (AI) in Virginia. To prepare for a possible AI outbreak on Delmarva, an evaluation and demonstration of in-house composting of catastrophic poultry mortalities was conducted by the University of Maryland and the University of Delaware in 2003. The project validated appropriate procedures and showed that in-house composting was a viable, economical, biosecure, and practical option for disposal of catastrophic poultry mortalities. When the Delmarva Peninsula experienced an outbreak of Low Pathogenic H7N2 AI in 2004, in-house composting was chosen by State officials as the method for containment, virus inactivation, and carcass disposal. This procedure was well received by the poultry industry, government agencies, and the general public and was largely credited for limiting the outbreak to three farms. This method is documented in a compact disk presentation which was incorporated into a National Training Program on Depopulation and Carcass Disposal Options. Success of these outreach programs has stimulated in-house composting demonstrations and publications in other regions of the country. In-house composting is rapidly becoming the preferred method of carcass disposal by most meat-type poultry operations and USDA-APHIS because of its major advantages.

Can catastrophic poultry mortalities be composted inside a poultry house?

Composting of poultry mortalities is a widely accepted method of carcass disposal. Various configurations of bin systems have been used for disposal of routine mortalities. Outside, windrow composting has also been used for disposal of catastrophic events such as major heat losses. However, economical, biosecure, and acceptable methods for disposal of catastrophic poultry mortalities due to highly pathogenic diseases are limited. Murphy (1992) reported success with in-house composting of 86,000, 4½ pound broilers on a four-house commercial farm. After 10 days in the windrows, the compost material from this agricultural herbicide contaminated flock was removed, applied to cropland and incorporated as fertilizer. In-house composting has also been used on a limited scale for avian influenza (AI) broiler and turkey flocks in Pennsylvania. However, widespread acceptability of this procedure has been limited due to lack of detailed guidelines and experience. In order to address this deficiency, an evaluation and demonstration of various methods of in-house composting of catastrophic poultry mortalities was conducted by the University of Maryland and the University of Delaware in 2003 (Tablante 2003). Processing plant dead-on-arrival (DOA) birds were used to simulate a whole-house depopulation of market age birds with a highly infectious disease. The following combinations of composting variables were studied; bird size (broiler *vs.* roaster), carbon source (litter *vs.* sawdust) water (added *vs.* no water), and carcass type (whole *vs.* shredded). During the first 18-day primary heat, all treatments achieved temperatures conducive to virus inactivation. Carcasses for all treatments at 18 (windrows turned) and 63 (study completed) days ranged from 55-97 percent and 95-99 percent degraded, respectively. Any intact carcass portions were fully "cooked" and often fell apart in the turning process. A "mix and pile" procedure was found to be very effective and cost an estimated 50-75 percent less than the alternative disposal option, a sanitary landfill. After observing first hand this in-house composting process, our local poultry industry and agency personnel were more receptive to this disposal option.

In the winter of 2004, three Delmarva farms were found to be positive for Low Pathogenic H7N2 avian influenza virus. To minimize potential spread of the virus and to address environmental concerns, in-house composting was identified as the disposal method of choice. Details on this procedure and its application during the 2004 AI outbreak on Delmarva are discussed by Malone et al. (2004). Farm A had two houses with 12,000 dual-purpose birds ranging from 3 to 26 weeks of age, Farm B had three houses with 74,000 five week old broilers, and Farm C had four houses with 119,000 six week old broilers. Litter depth on all three farms averaged 3 to 3½ inches. A single 14 foot wide windrow was formed in each house using a mix and pile procedure. These 4 to 5 foot high windrows were capped with a minimum of 3 inches of litter or fresh sawdust to cover any exposed carcasses. Windrows were turned inside the house, consolidated and capped with additional sawdust at 14 to 19 days. After ~4 to 5 weeks, the compost was removed, stockpiled on the farm and covered for an additional month. Although the litter moisture was not ideal for composting, temperatures in these windrows often exceeded 130^{o}F for most of the process. Carcass degradation at turning and upon removal from the house has been excellent for the broilers and good with the dual-purpose birds. As an additional measure to inactivate this heat-sensitive virus, all houses were heated to 100° F for three consecutive days after forming the windrows and again after turning the piles. All virus isolation samples from the compost and house environment prior to turning and again before compost removal from the house were negative for AI virus.

Comprehensive guidelines were developed and used to train poultry company personnel on in-house composting procedures. All results suggest in-house composting of avian influenza infected flocks is a biosecure, cost effective, and environmentally acceptable method of disposal of broiler carcasses in clear-span houses.

Challenges

When AI was confirmed on the first farm (index case) in Delaware in 2004, poultry industry, state, and federal emergency response personnel realized that they lacked a pre-approved list of vendors that met our biosecurity guidelines and were willing to get involved with the AI outbreak. It was difficult to find skid-steer operators, sawdust suppliers, and truckers who had minimal or no contact with the poultry industry on short notice. Many operators and vendors have direct daily contact with poultry farms and are concerned with getting involved with AI-infected farms for fear of repercussions on their business. It also became obvious on the index case that we did not have enough personnel to perform depopulation and carcass disposal tasks. After the second outbreak on a nearby farm, comprehensive in-house composting guidelines were developed and used to train a coordinator for each Delmarva poultry complex. This training and additional support helped distribute the coordination and labor burden for subsequent farm activities. When a third farm broke with AI a month after the second outbreak, we had already refined and improved most of the procedures and material needs to accomplish the tasks in a more efficient manner. As a result of sharing Delmarva's experiences in a highly successful lecture-type National Training Program on Mass Depopulation and Disposal Options for Catastrophic Poultry Disease Events, the poultry industry nationwide is now considering in-house composting as the method of choice for carcass disposal of meat-type poultry. This training also identified the need for national, comprehensive hands-on training program on depopulation and in-house composting procedures which has recently been funded by the USDA. A demonstration on foam depopulation and in-house composting was conducted in Maryland in October 2006 and at least two more demonstrations are scheduled in other major poultry producing regions in 2007

. Responding to a catastrophic disease event like Avian Influenza is no easy task. There is no "textbook recipe" for success and, as we learned, there are some problems but plenty of opportunities for improved communications, implementation, and coordination in all aspects of the outbreak response, including depopulation and carcass disposal.

Conclusion

In-house composting of poultry carcasses from depopulated AI-infected flocks was tested and proved to be a practical, cost-effective, and biosecure method of carcass disposal during the 2004 AI outbreak on the Delmarva Peninsula. Not only was the virus completely inactivated (as proven by the negative virus isolation test results at the first turning and prior to compost removal), but the outbreak was contained effectively as evidenced by consistently negative AI surveillance tests more than a month after the last reported outbreak on March 5, 2004. Unlike the disastrous AI outbreaks in Virginia in 2002 and British Columbia in 2004 where removal of infected carcasses from poultry houses may have played some role in the spread of the disease, in-house composting of AI-infected carcass on Delmarva confined the virus inside the poultry houses and prevented further spread of the disease. As a result, the Delmarva AI outbreak was limited to only three farms in a densely populated poultry production area. Other factors that contributed to Delmarva's success in controlling the 2004 AI outbreak were team work and preparedness. Despite our lack of field experience in dealing with an AI outbreak, we did have basic procedural guidelines for in-house composting (from our 2003 study) and were able to apply these procedures during a real outbreak of AI. In retrospect, AI could have spread like wildfire to adjacent farms had it not been for in-house composting which was not only effective but was also well-received by the general public.

Countries or regions where meat-type birds are raised on floor litter may consider in-house composting as a viable alternative to landfill disposal, burial, incineration, or rendering when an AI outbreak occurs because:

1. the high temperature (135-145^{o}F) generated by the composting process inactivates the virus;

2. avoiding the transport of infected carcasses to landfills prevents further spread of the virus;
3. the process averts groundwater pollution associated with burial, prevents air pollution generated by incineration, and avoids the high costs associated with transport to landfills and associated tipping fees.

References

Malone, G.W., S. Cloud, R. Alphin, L. Carr, and N. Tablante. 2004. Delmarva in-house composting experiences. Proceedings 39th National Meeting on Poultry Health and Processing. Ocean City, MD.

Murphy, D. 1992. Massive depopulation and disposal by composting. Proceedings 96th Meeting of US Animal Health Association.

Tablante, N. 2003. In-house composting of catastrophic poultry mortalities. Proceedings 38th National Meeting on Poultry Health and Processing. Ocean City, MD.