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**NATIONAL TRAINING PROGRAM ON PROCEDURES FOR MASS EUTHANASIA
AND DISPOSAL OPTIONS FOR CATASTROPHIC MEAT-TYPE POULTRY
DISEASE EVENTS**

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Introduction

In the event of a catastrophic disease event such as avian influenza (AI) the decision may be made to depopulate the flock in an effort to contain and eradicate the disease outbreak. Being prepared to respond swiftly and effectively to such an event is absolutely essential. Preparedness involves having knowledge of options for humane depopulation and environmentally sound disposal procedures that can be implemented in a biosecure manner. With support from a USDA grant the Universities of Delaware and Maryland are offering a free-of-charge, half-day comprehensive training program in poultry producing states on depopulation and disposal options. Most of the materials for this training have been derived from lessons learned from previous catastrophic disease events. The following is a condensed version of some of the procedures developed to depopulate and dispose of meat-type poultry (broilers and turkeys) with highly infectious diseases. The Universities of Delaware and Maryland do not endorse these procedures, but merely present what is known to date based on these real-world experiences.

Human Health Guidelines for Responders

During recent AI events, some workers have experienced illness and even death when exposed to the H5 and H7 virus when depopulating infected flocks. These concerns mandate proper precautions be taken to protect human health. The Centers for Disease Control recommends the following guidelines for responders involved in an AI event; protective clothing, footwear, gloves, eye and respiratory protection; hand sanitation, a seasonal flu vaccination prior to the event and antiviral drugs during the event. Compliance with additional guidelines such as a medical survey of workers prior to and after the event may be imposed by local and state health departments.

Euthanasia Considerations

Euthanasia can be defined as a humane death that occurs with minimum pain, fear and distress. In the event of a highly infectious disease outbreak or natural disaster, the options for

mass euthanasia may be limited. For all practical purposes, mass depopulation of meat-type poultry in the U.S.A. has been limited to inhalant gases and carbon dioxide (CO₂) in particular. The method used for mass depopulation must take into consideration and balance poultry welfare and human health; and must minimize biosecurity risk and logistical challenges.

Mass Depopulation Methods Using Carbon Dioxide

The following four CO₂ methods have been used in previous AI events; whole house, portable panels with tarp, livehaul cage cabinet, and poly tent. To achieve a desired goal of 70% CO₂ concentration with these methods, the pounds of CO₂ required can be calculated by multiplying the cubic feet of space in the enclosure by the factor 0.08 pounds. The supply of CO₂ can be in various size cylinders or tanker trucks. Equipment freezing can be a significant challenge with some forms of gas systems. Liquid forms of CO₂ must be converted into a gas phase using a specialized vaporizer. Regardless of form, appropriate safety precautions must be followed.

Whole house gassing with CO₂ has been used in recent years with varying degrees of success. This procedure works best in totally enclosed environmental houses and requires sealing off all openings to minimize gas leakage. Since CO₂ is heavier than air it tends to concentrate at bird level first. Although this method does not have a large manpower requirement and potential for virus exposure, it may require significant amounts of gas and support equipment and can be costly. In some situations, the desired gas concentration and time to death may be less than ideal with this method.

To minimize the volume of space for gassing birds, a portable panel with tarp method was developed several years ago for mass depopulation of turkey flocks. Existing plywood panels on farms were secured to poles inside the turkey house to form a euthanasia chamber. Unlike broilers which are difficult to drive, groups of turkeys were moved into this chamber. This chamber was covered with a polyethylene tarp, the edges of the poly were secured to the panels, and CO₂ was injected into the headspace above the turkeys via a hose connected to an outside gas supply. For a typical turkey farm this method required ~10 workers to implement. One of the advantages of this method is materials to implement this procedure are readily available.

Another procedure that greatly reduces the volume of space to gas birds is the livehaul cage cabinet method developed for broilers. Steel cabinets specially designed and constructed to fit over livehaul cages were used in a previous AI event. Broilers were caught, placed in livehaul cages and moved to an outside work area where a cabinet was placed over the cage, the bottom sealed to minimize leakage and CO₂ gas injected using “50 lb” cylinder tank per cabinet. Six cabinets were needed per typical broiler farm. This method resulted in rapid death, but was labor intensive for catching birds, placing cabinets over cages and removing dead birds from the cages. It also creates a potential biosecurity risks since infectious carcasses are removed from the houses and preventing feathers from littering the landscape are concerns.

A procedure used for broilers and roasters and could potentially be used for small turkeys is the poly tent method. CO₂ cylinders are placed (spacing of tanks based on bird age) down the center of the house. One edge of 40 foot wide polyethylene is anchored with litter on each side of the house while the opposite edge of poly from each roll is temporarily fasten to the ceiling. Starting on one side of the house for the entire length, workers pull the edge of the poly that was temporarily fastened to the ceiling over the birds, then repeat the process for the opposite site of the house. The CO₂ gas is then turned on under the overlapping layers of poly. This method is labor intensive, has the potential of exposing workers to the virus, requires trained personnel to execute properly, and requires disposal of the contaminated poly. One advantage of

this method is materials for this procedure are readily available and can be implemented in short notice.

There are other mobile euthanasia systems for meat-birds that are under various stages of development in the U.S.A. A company in the Midwest offers a mobile conveyor system that can gas birds with CO₂ or electrocute animals using an electrical contact pad mechanism. The procedure requires catching birds and placing them into the unit or driving birds onto a conveyor, where they fall into a chute, are euthanized, and conveyed into a container for ultimate disposal. A similar mobile CO₂ euthanasia system has been developed by a Dutch company, but has not been introduced into the USA to date. These systems may be more applicable for turkeys since they require driving birds onto conveyors, a task not easily suited for broilers. Researchers at the University of Delaware are developing an innovative mass depopulation system using foam. Similar to chemical induced hypoxia with inhalant gases, when broilers are submerged in the proper consistency of foam, there is a rapid physically-induced hypoxia via airway obstruction. Based on a series of experiments and demonstrations using both compressed air and high expansion fire fighting foam systems, this procedure may have numerous poultry welfare, human health and biosecurity advantages over current methods. Prototype systems have been constructed and are being tested for broilers on Delmarva, and turkeys in North Carolina.

Disposal Options for Catastrophic Disease Flocks

Local and state regulations may dictate disposal options for diseased flocks. Similar to depopulation options, it is essential to have pre-approved methods; identify a team leader, labor, supplies, equipment, and vendors; and to prepare and practice if applicable, these disposal options. On-farm burial, landfilling, incineration and composting have been the predominant means of disposal of catastrophic disease flocks.

On-site burial is cost-effective and historically, a practical method of disposal. However, growing concerns over degradation of water quality and public perception is increasingly making this option more challenging. To minimize potential water quality concerns, trenches are only constructed at designated sites and at known distances from groundwater. Restrictions are often imposed on the depth of birds placed in the trenches and coverage of carcasses with soil. This method requires skid-steer loaders, dump trucks and excavation equipment. A disadvantage of this or any method that removes infected carcasses from houses is potential increase risk of spreading virus in the surrounding environment. Previous AI outbreaks suggest this may have been a factor in the spread of the disease in some regions.

Taking carcasses to a pre-approved, sanitary landfill for disposal has been used in previous catastrophic disease events. This method requires equipment and labor to remove carcasses from houses, load onto trailers and transport to landfills. Tipping fees can represent a significant cost associated with this method of disposal. Coordination of equipment and labor to remove and load carcasses, sanitize vehicles, and transport to receiving landfills can be additional challenges.

Air Curtain™ incinerators were used during a 2002 AI outbreak in Virginia. Although this procedure produced a very biosecure end product, there were numerous logistical, environmental and public perception issues. Based on these concerns, communications with personnel involved with this method suggest it should be a low priority disposal method.

In-house composting as a disposal and carcass/litter pathogen inactivation procedure is emerging as the preferred method to deal with a disease outbreak. Composting will rapidly inactivate AI virus, eliminate potential air and water quality concerns and is a practical, cost

effective disposal option. Depending on depopulation method and carcass size, in-house composting can be achieved using three different procedures. A mix and pile procedure is the most efficient method and most applicable when carcasses are evenly distributed over the litter surface. For roasters and turkeys, a shred and pile procedure may be the preferred method. Although more labor and material intensive, the traditional layering method for composting mortality may be required when the carcasses are concentrated to one area of the house. Detailed instructions for these in-house composting methods can be obtained at the following web site: www.rec.udel.edu/poultry.

Summary

The national training program on procedures for mass euthanasia and disposal options for catastrophic meat-type poultry disease events has been very timely and well received. Sessions are continually being scheduled to assist poultry companies and agencies develop emergency response plans for catastrophic disease events. Materials for this training are constantly being updated as new information becomes available. A final product of this effort will be a network and resource system to assist those having to plan and respond to a disease outbreak.