



Please note: This evidence and policy may be revised as the situation develops or more information is available.

BACKGROUND & DEPOPULATION GOAL

During the 2014–2015 highly pathogenic avian influenza (HPAI) outbreak in commercial poultry in the United States, HPAI spread rapidly despite the response measures implemented. APHIS, State, and industry stakeholders agree that one of the most critical problems was the delay in depopulating infected poultry, due to the amount of virus produced. As such, the stamping-out policy has been revised, setting a goal for poultry to be depopulated within 24 hours of a presumptive positive classification, based on the current case definition. Contact Premises as well as cases meeting the suspect case definition may also be depopulated, based on a joint decision by APHIS and State officials. This policy is further elaborated in the *Stamping-Out & Depopulation Policy*, posted at www.aphis.usda.gov/fadprep; it is consistent with the epidemiological principles of an HPAI response: to stop the production of HPAI virus by infected poultry and protect susceptible poultry from the virus.

EVIDENCE SUPPORTING REVISED DEPOPULATION GOAL FOR DISEASE CONTROL

Rapid stamping-out is needed to prevent continued virus shedding and further amplification of HPAI. The amount of virus produced by infected birds is significant; the more virus that exists, the harder it is to control and contain the outbreak. In particular, environmental contamination becomes a significant challenge when depopulation is delayed, and can result in further HPAI transmission.

As noted by the World Health Organization and the U.N. Food and Agriculture Organization, birds that are infected with avian influenza virus shed large quantities of virus, particularly in their feces^{1,2} and respiratory secretions.³ There is strong evidence that a delay in depopulation results in an exponential increase in the total amount of HPAI virus shed into the environment by infected poultry; highlighting the imperative for rapid depopulation to control and contain an outbreak.

A depopulation delay creates a serious biosecurity challenge for responders, who must consider sick birds, their feces, and everything in contact with those materials as infectious. Even with strict and well-enforced biosecurity measures, the raw amount of infectious material makes effective biosecurity in the midst of a response effort extremely challenging. Indeed, stringent biosecurity was one of the factors identified in the APHIS epidemiology report as critical to control and eradicate HPAI in future outbreaks.

However, because of the economic impact and cost of continued HPAI transmission, exponential virus production must be reduced at the source by preventing depopulation delays. As such, the

¹ World Health Organization (WHO). 2006. "Review of latest available evidence on potential transmission of avian influenza (H5N1) through water and sewage and ways to reduce the risks to human health." Accessed from http://www.who.int/water_sanitation_health/emerging/h5n1background.pdf (September 9 2015).

² Food and Agriculture Organization of the United Nations. 2015. Q&A on Avian Influenza. Accessed from <http://www.fao.org/avianflu/en/qanda.html#10> (September 9 2015)

³ Spickler AR, Trampel DW, Roth JA. 2008. "The onset of virus shedding and clinical signs in chickens infected with high-pathogenicity and low-pathogenicity avian influenza viruses." *Avian Pathology* 37(6):555-577.

decision was made to revise the stamping-out and depopulation policy, by implementing the 24 hour goal, in order to reduce the quantity of infectious material and eliminate further potential for HPAI transmission.

DEPOPULATION METHODS

More than one method of depopulation is likely to be required in an HPAI outbreak; carbon dioxide (CO₂) and water-based foam have been the most commonly implemented methods during the current outbreak. However, at the height of outbreak detections, these methods were insufficient for rapid depopulation and disposal, and could not be executed quickly enough to halt the production of HPAI virus in infected flocks. As such, APHIS, State, and industry stakeholders acknowledged that other rapid depopulation methods must be considered if HPAI re-emerges in the fall.

While CO₂ and water-based foam will continue to be the primary methods first considered in a response, alternative methods will be immediately considered if these primary methods will not achieve depopulation of infected flocks (based on the presumptive positive result) within 24 hours. Ventilation shutdown (VSD) is an adjunct method that will be considered by State and APHIS officials for depopulation of infected poultry based on the defined policy. However, VSD should be used only after a full consideration of the epidemiologic threat posed concludes that no other method can achieve a sufficiently timely measure of assurance that the virus will not spread.

SUPPORT FOR ALTERNATIVE METHODS

The need to control and eradicate HPAI—for the sake of poultry health and poultry production nationwide—makes VSD a necessary alternative: depopulating within 24-hours, by reducing virus amplification, significantly reduces the risk of ongoing transmission and protects nearby and epidemiologically linked poultry production facilities. It also helps to ensure full poultry houses do not become severely sick and die prior to response on the premises, which can create further welfare concerns, stakeholder and public complaints, and delay rapid disposal and cleaning activities.

APHIS remains committed to finding new and innovative ways to accomplish the goals of an HPAI response and associated activities, including mass depopulation. Other options, including for whole-house CO₂ depopulation, remain in progress.

FACTORS CONSIDERED IN DECISION TO IMPLEMENT ALTERNATIVE METHODS

The need to implement alternative depopulation methods to meet the depopulation goal, and the use of VSD, will be handled on a premises by premises basis, with close coordination and collaboration by State and APHIS officials. Three sets of issues will be considered: resources, epidemiology, and State/APHIS concurrence on the decision.

In selecting the depopulation method, and considering VSD, the following interrelated questions can help to guide the decision:

- ◆ Which depopulation methods can be executed safely and effectively on the premises within 24 hours?
- ◆ What resources are required for either CO₂ or water-based foam methods?
- ◆ For either CO₂ or water-based foam depopulation, how quickly (in hours) can resources and personnel deploy and complete the depopulation safely and effectively?

- ◆ Are sufficient resources available to conduct either CO₂ or water-based foam depopulation within 24 hours?
- ◆ How many personnel are required for the completion of either CO₂ or water-based foam depopulation?
- ◆ Are sufficiently trained personnel available to conduct the preferred depopulation method identified within 24 hours?
- ◆ Is ventilation shutdown possible on the premises, given house construction and environmental factors?
- ◆ Is ventilation shutdown the only option that will achieve rapid depopulation meeting the 24-hour goal, given personnel and resource constraints?
- ◆ What is the added risk of increased numbers of personnel on (and off) the premises from traditional depopulation methods such as CO₂ and water-based foam, in terms of biosecurity?
- ◆ What are the potential epidemiological consequences of virus amplification on the premises should the 24-hour goal not be met on the premises?
- ◆ Are there large densities of poultry in the surrounding area that would be at risk from virus amplification on the premises?
- ◆ Are there high-value or breeder flocks in the surrounding area that would be at risk from virus amplification on the premises?
- ◆ Could a depopulation time of greater than 24 hours be feasible if lateral spread can be mitigated through biosecurity measures, particularly in a facility without large densities of poultry or high value flocks in the surrounding area?
- ◆ Is there strong opposition from the State Animal Health Official, or designee, on any given method given the answers to the previous questions?
- ◆ Is there strong opposition from the producer/owner on any given method, given the answers to the previous questions?

Meeting the 24-Hour Depopulation Goal

There may be situations in which Incident Command may estimate that depopulation with CO₂ or water-based foam could occur within 24-36 hours, but not within 24 hours. State and APHIS officials will need to carefully evaluate the risk of virus amplification and further transmission, and the likelihood that depopulation can be realistically completed in the timeframe estimated.

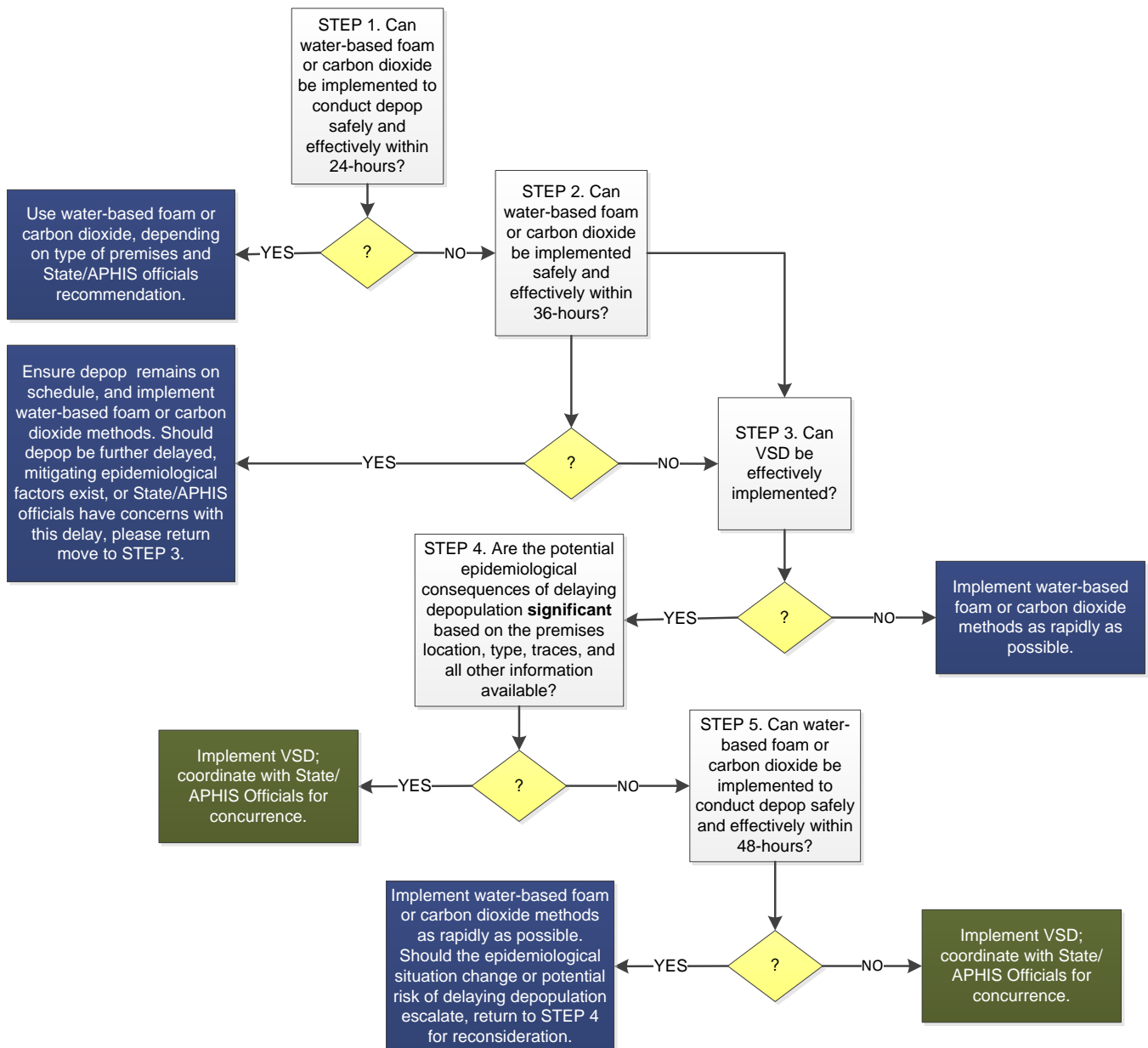
The exponential increase in both infectious birds and virus makes time a critical factor. As such, in all cases, if Incident Command indicates that completion of depopulation with CO₂ or water-based foam is unlikely or not going to be completed within 36 hours, alternative methods should be *immediately* considered by Incident Command, State, and APHIS officials.

Multiple methods and “Plan B” should also be discussed by Incident Command, State, and APHIS officials when a presumptive positive case occurs: for example, if water-based foam is to be used as the depopulation method, 12 hours have already elapsed since detection, and suddenly there are insufficient personnel or broken equipment, alternative methods may need to be revisited.

DECISION TREE FOR SELECTING DEPOPULATION METHOD

Based on the goal of depopulating poultry within 24-hours, a decision-tree may help to inform the decision to implement VSD on premises. The Incident Commander and appropriate staff on the Incident Management Team should review this tree, and then consult with the Incident Coordination Group (and National Incident Coordinator), as well as with State Animal Health Officials.

Figure 1. Decision Tree for Implementing VSD



DOCUMENTATION OF SELECTING VSD AS A DEPOPULATION METHOD

The decision to implement VSD as the depopulation in an HPAI outbreak indicates that

- ◆ Other depopulation methods are not available, or will not be available in a timely manner; AND
- ◆ The amplification of the virus on the premises poses a significant threat for further transmission and ongoing spread of HPAI; AND
- ◆ The questions in this *Ventilation Shutdown Evidence and Policy* document have been reviewed and discussed by APHIS officials, State/Tribal officials, and the Incident Management Team (IMT); AND
- ◆ The IMT recommends VSD as the most appropriate method; AND
- ◆ The State Animal Health Official, or designee, concurs with the selection of this method; AND
- ◆ The National Incident Coordinator, or designee, concurs with the selection of this method.

When these criteria have been completed, VSD may be implemented. Depending on the premises or State, written or electronic documentation of these criteria may be required.