# HIGHLY PATHOGENIC AVIAN INFLUENZA RESPONSE PLAN
## *THE RED BOOK*

# FAD PReP
## Foreign Animal Disease Preparedness & Response Plan

United States Department of Agriculture

United States Department of Agriculture • Animal and Plant Health Inspection Service • Veterinary Services

**UPDATED** MAY 2017

May 22, 2017
USDA APHIS, Veterinary Services
National Preparedness and Incident Coordination Center

Between December 2014 and June 2015, the United States experienced its largest highly pathogenic avian influenza (HPAI) outbreak—and most serious animal health disease incident—in history. This plan was updated in August 2015 to reflect immediate changes required based on those events. Soon thereafter, in January 2016, there was an HPAI/low pathogenicity avian influenza (LPAI) outbreak in Indiana. This version of the *USDA APHIS HPAI Response Plan: The Red Book (Updated May 2017)* reflects the knowledge and lessons learned during both of these outbreaks, as well as in the recent HPAI/LPAI incident in 2017. Additionally, this version incorporates changes made in related Foreign Animal Disease Preparedness and Response Plan (FAD PReP) materials.

The following list highlights important revisions that were made to this version of the *HPAI Response Plan*.

- Reflects policy changes resulting from the 2014–2015 outbreak that was developed after August 2015.
- Incorporates policy guidance from the 2016 outbreak.
- Reflects the new National Response Framework, released June 2016.
- Reflects the 2016 World Organization for Animal Health (OIE) *Terrestrial Animal Health Code.*
- Includes new surveillance sections, revised by the Center for Epidemiology and Animal Health.
- Incorporates new permitted movement guidance.
- Corrects any errors identified in the prior version.
- Addresses comments made on the Draft August 2015 version.
- Provides additional guidance on restocking activities.
- Reflects the updated *Secure Poultry Supply Plan*, which harmonizes and integrates existing plans for eggs, turkeys, and broilers.

Additional policy guidance documents for HPAI response are available at www.aphis.usda.gov/fadprep. These documents, developed by the National Incident Coordination Group during the 2014–2015 and 2016 responses, contain details on specific aspects of a response. While the *HPAI Response Plan: The Red Book* provides strategic guidance, these policy guidance documents provide information on how to operationalize activities, particularly for the unified Incident Command. They are consistent with the *HPAI Response Plan*. These documents, alongside the *HPAI Response Plan: The Red Book*, should be used in any future HPAI outbreak. Please check these documents frequently as they do change as needed.

As of May 2017, the following policy guidance documents are available:

**Initial Response**

- Stamping-Out & Depopulation Policy
- Ventilation Shutdown Evidence & Policy
- New State Checklist
- Initial Contact Epi Report

- Financing the Response: State/Tribal Information

**Finance and Administration Procedures**

- Overview of Finance and Administration Procedures
- Details for Bird and Egg Appraisal and Indemnity Procedures
- Details for Virus Elimination Financial Processes
- Details for Materials Destroyed Financial Processes
- Appraisal and Indemnity Request Form Appendix A1: Form for Poultry Owner
- Appraisal and Indemnity Request Form Appendix A2: Form for Contract Grower
- Appraisal and Indemnity Request Procedures Appendix B1: Contract Grower Worksheet for Meat Birds
- Appraisal and Indemnity Request Procedures Appendix B2: Contract Grower Worksheet for Layers
- Appraisal and Indemnity Procedures Appendix C: DUNS and SAM
- Commercial Flock Plan: H5/H7 AI Euthanasia/Depopulation, Disposal & Virus Elimination Procedures for Commercial Infected Premises
- Backyard Flock Plan: H5/H7 AI Euthanasia/Depopulation, Disposal & Virus Elimination Procedures for Backyard Infected Premises

**Critical Response Activities**

- Surveillance and Diagnostics:
    - Avian Sample Collection for Influenza A and Newcastle Disease
    - Surveillance of Backyard Flocks Around Infected Premises
    - Surveillance Sampling for Commercial Premises in the Control Area.
- Quarantine, Movement Control, and Continuity of Business:
    - HPAI Zones and Premises
    - Movement Control
    - Overview: HPAI Control Area Permitting Process
    - Overview of the EMRS Customer Permit Gateway
    - Testing Requirements for Movement from the Control Area
    - Contact Premises
    - HPAI in the Live Bird Marketing System
- Disposal and Cleaning/Disinfection (Virus Elimination):
    - Mortality Composting Protocol for AI Infected Flocks
        - Job Aids for Composting Process
    - Cleaning and Disinfection Basics: Virus Elimination
    - Using Heat Treatment for Virus Elimination
    - Landfill Disposal Guidance—Recommended Waste Acceptance Practices for Landfills
        - CDC Interim Guidance for Landfill Workers

**Recovery and Restocking**

- Control Area Release
- Timeline, Eligibility, and Approval for Restocking
- Example Restocking Form
- Post C&D Environmental Sampling Guide

**Health & Safety Information**

- Quick Response Card
- Personal Protective Equipment Recommendations for HPAI Responders

**For More Information on HPAI & Response**

- General Resources and Information
- H5/H7 Avian Influenza Case Definition
- Use of the Antigen Capture Immunoassay

We realize that preparing for and responding to an HPAI outbreak remains a complex effort, requiring collaboration from all levels of government and industry stakeholders. We will accept comments on the *HPAI Response Plan* for incorporation into future versions. Ongoing HPAI events will dictate when the next version of this response plan will be released and the extent of the changes required; further policy guidance may also be released depending on what is requested, required, and based on current events.

Please email all comments to FAD.PReP.Comments@aphis.usda.gov with the subject line of "Comments to Updated 2017 HPAI Response Plan."

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*The Foreign Animal Disease Preparedness and Response Plan (FAD PReP) mission is to raise awareness, define expectations, and improve capabilities for FAD preparedness and response.*

For more information, please go to:
http://www.aphis.usda.gov/fadprep
or e-mail FAD.PReP.Comments@aphis.usda.gov

# Executive Summary

This *Highly Pathogenic Avian Influenza (HPAI) Response Plan: The Red Book (Updated May 2017)* incorporates policy guidance developed during the 2014–2015 and 2016 HPAI outbreaks in the United States, as well as comments received and updates to other Foreign Animal Disease Preparedness and Response Plan (FAD PReP) materials. This plan strives to reflect the important lessons learned from the three recent U.S. HPAI outbreaks–particularly the 2014–2015 outbreak, which was the largest HPAI outbreak in U.S. history, as well as the smaller, mixed HPAI/low pathogenicity avian influenza (LPAI) incidents in 2016 and 2017.

The objectives of this plan are to identify (1) the capabilities needed to respond to an HPAI outbreak and (2) the critical activities that are involved in responding to that outbreak, and time-frames for these activities. These critical activities are the responsibility of unified Incident Command in an outbreak situation. This plan protects public health and the environment, promotes agricultural security, secures the food supply, and guards animal health and animal agriculture by providing strategic guidance on responding to an HPAI outbreak. Developed by the National Preparedness and Incident Coordination Center in Surveillance, Preparedness, and Response Services in Veterinary Services, this plan gives direction to emergency responders at the Federal, State, Tribal, local, and industry levels to facilitate HPAI control and eradication efforts in poultry in the United States. This plan complements, not replaces, existing regional, State, Tribal, local, and industry plans.

HPAI is potentially zoonotic, and while it appears to have a relatively high species-specific transmission barrier, it also can be fatal for humans. Animal health officials coordinate with public health officials in the event that HPAI is identified in the United States; appropriate health and safety measures should always be observed when conducting HPAI response activities.

The HPAI virus is highly contagious and causes extremely high morbidity and mortality rates in poultry. During the 2014–2015 outbreak, HPAI H5N2 rapidly spread to over 200 commercial premises in the Midwest, where the focal point of the outbreak was Iowa and Minnesota. Turkeys and layer-type chickens were heavily affected: for example, approximately 10 percent of the annual average U.S. layer inventory was depopulated. Nearly $850 million was obligated for response activities (including personnel support) and indemnity payments, in addition to $100 million, which was made available for further preparedness activities.

HPAI is easily spread through direct contact with sick or infected poultry, as well as via fomites, such as equipment and vehicles. An HPAI outbreak in the United

States results in major economic consequences: in the 2014–2015 outbreak, current estimates suggest that the outbreak had a $3.3 billion impact on the U.S. economy, with $1.6 billion in direct losses from poultry flocks that had to be depopulated.[1] While none of the HPAI strains that affected the United States were demonstrated to be zoonotic, there is a significant social and psychological impact on flock owners and responders from response activities.

*The goals of an HPAI response are to (1) detect, control, and contain HPAI in poultry as quickly as possible; (2) eradicate HPAI using strategies that seek to protect public health and the environment, and stabilize animal agriculture, the food supply, and the economy; and (3) provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products. Achieving these three goals will allow individual poultry facilities, States, Tribes, regions, and industries to resume normal production as rapidly as possible. The objective is to allow the United States to regain disease-free status without the response effort causing more disruption and damage than the disease outbreak itself.*

*The United States' primary control and eradication strategy for HPAI in domestic poultry, as recommended by the World Organization for Animal Health (OIE), is "stamping-out."*

During an HPAI outbreak response, many activities—such as epidemiology, surveillance, biosecurity, quarantine and movement control, and depopulation—must occur in a deliberate, coordinated fashion. In particular, rapid depopulation of infected poultry is critical to halt virus transmission and must be prioritized. In addition to providing strategic direction on these various activities, this plan explains the underlying Incident Command System structure, applying the National Response Framework (NRF) and National Incident Management System (NIMS) principles and systems to control and eradicate an outbreak of HPAI in the domestic poultry population.

Incorporating current scientific knowledge and policy guidance about HPAI, the *HPAI Response Plan*

- provides information for responders at all levels in the event of an HPAI outbreak;
- provides technical information on HPAI and the impact an HPAI outbreak can have in the United States;
- explains the integration of the NRF, NIMS, and the other FAD PReP documents;

[1] Greene, Joel L. (2015, July). Update on the highly-pathogenic avian influenza outbreak of 2014–2015. *Congressional Research Service,* R44114. Retrieved from https://fas.org/sgp/crs/misc/R44114.pdf.

- describes U.S. Department of Agriculture preparedness and response activities, both domestic and international, including collaboration with public health agencies and APHIS Incident Management;

- presents information on 23 specific response critical activities and tools, such as surveillance, diagnostics, cleaning and disinfection, health and safety, personal protective equipment, and depopulation;

- details OIE standards for HPAI surveillance, virus inactivation, and disease freedom; and

- supplies information on proof-of-freedom procedures and restocking after an HPAI outbreak.

This response plan is carefully integrated with other FAD PReP documents, including the HPAI Standard Operating Procedures and National Animal Health Emergency Management System Guidelines. Additionally, policy guidance documents specifically for HPAI are listed in the memo which precedes this executive summary. Together, these documents provide a comprehensive preparedness and response framework for an HPAI outbreak. Please visit the FAD PReP website, which promotes preparedness relationships and advances response capabilities. The website is at: www.aphis.usda.gov/fadprep. Public health information about avian influenza and humans can be found at http://www.cdc.gov/flu/avianflu.

This plan is a dynamic document that will be updated and revised based on future knowledge and further stakeholder input. Your comments and recommendations on this document are invited. Please send them to: FAD.PReP.Comments@aphis.usda.gov.

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# Preface

The Foreign Animal Disease Preparedness and Response Plan (FAD PReP)—*Highly Pathogenic Avian Influenza (HPAI) Response Plan: The Red Book (Updated May 2017)* provides strategic guidance for responding to an animal health emergency caused by HPAI in the United States. This *HPAI Response Plan (Updated May 2017)* updates the *HPAI Response Plan (Draft August 2015)* and replaces previous versions of HPAI summary response plans. Information in this plan may require further discussion and development with stakeholders.

This *HPAI Response Plan* is under ongoing review. This document was last updated in **May 2017.** Please send questions or comments to:

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# Chapter 1
# Introduction and HPAI Information

## 1.1 Introduction to Response Plan

This updated version of the *Highly Pathogenic Avian Influenza (HPAI) Response Plan: The Red Book (Updated May 2017)* has been updated based on three recent outbreaks in the United States: the widespread 2014–2015 outbreak, the 2016 HPAI/low pathogenicity avian influenza (LPAI) outbreak in Indiana, and the 2017 HPAI/LPAI outbreak in the southeastern United States. It also incorporates comments received and updates made to other Foreign Animal Disease Preparedness and Response (FAD PReP) materials.

The objectives of this plan are to identify the (1) capabilities needed to respond to an HPAI outbreak in poultry and (2) critical activities that are involved in responding to that outbreak and the time-frames for these activities. In an outbreak situation, these critical activities are under the authority of a unified Incident Command (IC) per the National Incident Management System (NIMS).

This *HPAI Response Plan* provides current information on HPAI and presents an overview of the organizational strategy for an effective response to a detection of HPAI in poultry. In addition, it offers guidance on stamping-out, the primary HPAI outbreak response strategy. This plan also contains guidance for conducting critical response activities, which include biosecurity, mass depopulation, disposal, and appraisal and compensation.

## 1.2 Audience and Purpose of Document

This plan provides strategic guidance for the U.S. Department of Agriculture (USDA) and the Animal and Plant Health Inspection Service (APHIS) and responders at all levels in the event of an HPAI outbreak. It also provides current policy information and a strategic framework for the control and eradication of HPAI, should an outbreak occur in the United States. It offers additional resources for tactical information for responders (Federal, State, Tribal, local, and industry), owners, growers, and industry stakeholders who act during an HPAI outbreak in poultry.

This plan does not replace existing regional, State, Tribal, local, or industry preparedness and response plans relating to HPAI. Regional, State, Tribal, local, and industry plans should be aimed at more specific issues in an HPAI response. In particular, States should develop response plans focused on the specific characteristics of the State and the State's poultry industry. Industry should

develop response plans focused on the specific characteristics of their commercial operations and business practices.

As indicated by links throughout the document, this plan is integrated and coordinated with other FAD PReP documents such as HPAI standard operating procedures (SOPs), National Animal Health Emergency Management System (NAHEMS) Guidelines, and existing APHIS policy guidance. (Appendix A provides a list of documents related to HPAI outbreak response and an overview of FAD PReP).

## 1.3 Scope of Response Plan

Avian influenza (AI) is primarily an infection of birds. While other species are susceptible (for a list see Section 1.6.6 of this plan), this plan is focused on poultry.[1] However, if susceptible animals other than poultry become significant to the response effort, the case and laboratory definitions will be adapted by the unified IC to fit the prevailing epidemiological findings during an outbreak. This is further discussed in Chapter 4.

The plan does not address control and eradication of LPAI in poultry. However, LPAI *is* addressed comprehensively in the USDA APHIS *National Poultry Improvement Plan (NPIP)*: http://www.poultryimprovement.org.

## 1.4 Preparedness Planning

There has been a tremendous amount of preparedness planning based on past HPAI detections in the United States and the ongoing HPAI outbreaks worldwide. Finding more efficient and effective ways to control and contain the virus is a priority. As specified in the *2016 HPAI Preparedness and Response Plan*—presented to the Secretary of Agriculture—many capabilities were enhanced and improved after the 2014–2015 outbreak.[2] In particular, new policies were implemented to facilitate rapid depopulation of affected flocks, appraisal and indemnity processes were streamlined, and a shift from cleaning and disinfection to virus elimination was made; additionally, flat rate compensation for virus elimination was developed. This enabled, and continues to enable, effective cleaning and disinfection with appropriate cost controls. Though the guidance provided in this *HPAI Response Plan* is not highly detailed to remain applicable

[1] For this *HPAI Response Plan*, poultry is defined as: chickens, and any of the following birds, if these other birds are kept, raised, captured, bred, or otherwise used for a commercial purpose: turkeys, ducks, geese, swans, pheasants, partridges, grouse, quail, guinea fowl, pea fowl, pigeons, doves, ostriches, emus, rheas, cassowaries. Commercial purposes include the production or sale of birds, or of their meat, eggs, or feathers. Does not include chickens or other birds displayed in a licensed exhibition or zoo.

[2] APHIS Veterinary Services. (2016). 2016 Highly Pathogenic Avian Influenza (HPAI) Preparedness and Response Plan. *USDA*. Retrieved from https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/ai/hpai-preparedness-and-response-plan-2015.pdf.

to a wide variety of potential HPAI incidents, the information provided within this plan remains consistent with the intent of and activities pursuant to these initiatives. Industry, academic, and USDA APHIS scientists and veterinarians—as well as all responders—continue to prepare for a resurgence of HPAI each fall, as temperatures cool and migratory routes become highly active.

## 1.5 CURRENT SITUATION

HPAI remains a high-priority concern for USDA APHIS. Caused by influenza virus A, AI viruses are classified as either HPAI or LPAI, depending on the genetic features of the virus and the severity of disease produced in poultry. Most AI viruses are LPAI and do not result in high mortality in wild birds or domestic poultry. However, HPAI can be associated with morbidity and mortality rates of up to 100 percent: the 2014–2015 outbreak resulted in the loss (death or depopulation) of approximately 50 million birds.

Reservoirs of LPAI virus exist worldwide in wild bird populations. The ongoing transmission of LPAI viruses, and the transmission of LPAI from reservoirs to susceptible species—typically poultry—can result in strain mutation or reassortment to an HPAI virus (through antigenic shift or antigenic drift). For example, in the 2016 HPAI/LPAI outbreak in Indiana: an LPAI virus mutated to an HPAI virus in a commercial turkey flock. While historically HPAI viruses have not established endemic infection status in the poultry populations of countries that have developed veterinary infrastructure, the spread of HPAI in the United States during the 2014–2015 outbreak shows the critical threat that HPAI poses to animal health and agriculture.

In the 2014–2015 HPAI outbreak in the United States, H5N2 was the most common subtype of HPAI followed by H5N8. In 2016, the LPAI/HPAI was an H7N8 virus. In 2017, the HPAI virus was an H7N9 (of a North American wild bird lineage—not related to the Asian H7N9 HPAI virus). None of these strains were detected in humans during these U.S. outbreaks, including in response personnel who were monitored for illness.

However, it is worth acknowledging that there are AI viruses circulating in poultry that are of significant concern to public health, such as H5N1[3], H5N6, and the Asian lineage H7N9. The majority of these infections have been detected in Asia, though there have been human cases identified around the world. While human infections remain relatively uncommon due to an apparently high species-specific transmission barrier, mortality rates can be high. Current evidence suggests that close contact with dead, sick, and infected birds or their secretions is

[3] There was an H5N1 virus detected in the State of Washington during the 2014–2015 outbreak, but this strain was genetically distinct and is *not* the same strain causing human illness and death in Asia and Africa.

the primary mode of human infection.[4] Therefore, it is critically important for agriculture and public health agencies to coordinate efforts in any response to HPAI.

# 1.6 HPAI INFORMATION

The following sections provide an overview of HPAI and cover the following subjects:

- Etiology
- History and global distribution
- HPAI in the United States
- International Trade
- Impact of an HPAI outbreak
- Ecology
- Diagnosis in avian species
- Immunity.

The USDA AI website also contains valuable information: www.usda.gov/birdflu. Further information on HPAI can be found in the HPAI Overview of Etiology and Ecology SOP. Chapter 5 of this plan includes a current *USDA APHIS Case Definition for H5/H7 AI*.

## 1.6.1 Etiology

### 1.6.1.1 OVERVIEW

AI, also known as fowl plague, is caused by *Influenzavirus A*, which is in the family Orthomyxoviridae. Influenza A viruses are further classified by their surface glycoproteins, hemagglutinin (H or HA) and neuraminidase (N or NA). Sixteen H (H1 to H16) subtypes and nine N (N1 to N9) subtypes of influenza A have been identified.

[4] Centers for Disease Control and Prevention (CDC). (2015, June 2). HPAI A H5 virus background and clinical illness. *Influenza (Flu).* Retrieved from https://www.cdc.gov/flu/avianflu/hpai/hpai-background-clinical-illness.htm.

### 1.6.1.2 WORLD ORGANIZATION FOR ANIMAL HEALTH (OIE) INFECTION WITH AVIAN INFLUENZA VIRUSES[5]

In the *Terrestrial Animal Health Code (2016)*, the OIE defines infection with avian influenza as follows:

1. For the purposes of the Terrestrial Code, avian influenza is defined as an infection of poultry caused by any influenza A virus of the H5 or H7 subtypes or by any influenza A virus with an intravenous pathogenicity index (IVPI) greater than 1.2 (or as an alternative at least 75% mortality) as described below. These viruses are divided into high pathogenicity avian influenza viruses and low pathogenicity avian influenza viruses:

    a. High pathogenicity avian influenza viruses have an IVPI in six-week-old chickens greater than 1.2 or, as an alternative, cause at least 75% mortality in four-to eight-week-old chickens infected intravenously. H5 and H7 viruses which do not have an IVPI of greater than 1.2 or cause less than 75% mortality in an intravenous lethality test should be sequenced to determine whether multiple basic amino acids are present at the cleavage site of the haemagglutinin molecule (HA0); if the amino acid motif is similar to that observed for other high pathogenicity avian influenza isolates, the isolate being tested should be considered as highly pathogenicity avian influenza virus;

    b. Low pathogenicity avian influenza viruses are all influenza A viruses of H5 and H7 subtypes that are not high pathogenicity avian influenza viruses.

2. The following defines the occurrence of infection with an avian influenza virus: the virus has been isolated and identified as such or specific viral ribonucleic acid has been detected in poultry or a product derived from poultry.

[5] The World Organization for Animal Health (OIE) (2016 *Terrestrial Animal Health Code)* defines poultry as "all domesticated birds, including backyard poultry, used for the production of meat or eggs for consumption, for the production of other commercial products, for restocking supplies of game, or for breeding these categories of birds, as well as fighting cocks used for any purpose.

Birds that are kept in captivity for any reason other than those reasons referred to in the preceding paragraph, including those that are kept for shows, races, exhibitions, competitions or for breeding or selling these categories of birds as well as pet birds, are not considered to be poultry."

#### 1.6.1.3 U.S. CODE OF FEDERAL REGULATIONS DEFINITIONS OF AI[6]

In 9 Code of Federal Regulation (CFR) §53, HPAI is defined as:

(1) Any influenza virus that kills at least 75 percent of eight 4- to 6-week-old susceptible chickens within 10 days following intravenous inoculation with 0.2 ml of a 1:10 dilution of a bacteria-free, infections allantoic fluid;

(2) Any H5 or H7 virus that does not meet the criteria in paragraph (1) of this definition, but has an amino acid sequence at the hemagglutinin cleavage site that is compatible with highly pathogenic avian influenza viruses; or

(3) Any influenza virus that is not an H5 or H7 subtype and that kills one to five chickens and grows in cell culture in the absence of trypsin.

### 1.6.2 History and Global Distribution

AI was first reported in Italy and described as a serious disease of poultry in 1878. An influenza A virus was identified as the causative agent of fowl plague in 1955. AI viruses, including HPAI, are found in most countries of the world where poultry is produced. The worldwide prevalence of AI viruses is influenced by the distribution of both domestic and wild avian species, locality of poultry production, migratory routes, and season. Accurate prevalence rates of infection are difficult to determine—particularly for LPAI—because international surveillance systems and procedures used to identify and track AI vary.

Outbreaks of HPAI occur worldwide in domestic poultry. Some countries have endemic HPAI, such as Egypt, China, India, Indonesia, Nigeria, and Vietnam (this is list is not exhaustive). However, in countries with advanced veterinary infrastructure, outbreaks of HPAI have historically been sporadic and infrequent.

However, starting in late fall of 2016 and continuing into 2017, widespread HPAI outbreaks have occurred and continue to occur in Europe in domestic poultry. These outbreaks have been primarily been caused by HPAI H5N8, though other strains have also been reported. As these outbreaks continue, H5N8 has been reported from over 30 countries spanning not only Europe, but Africa, the Middle East, and Asia. Additional information on the distribution of HPAI is available from the OIE and U.N. Food and Agriculture Organization.

Fortunately, in terms of zoonotic potential, the number of H5N1 cases in humans has decreased significantly in recent years.[7] However, other AI viruses, including

[6] Please see the appropriate CFR sections for further information, such as CFR definitions of poultry.

[7] World Health Organization (WHO). (2017, January). Cumulative number of confirmed human cases for avian influenza A (H5N1) reported to WHO, 2003–2017. Retrieved from http://www.who.int/influenza/human_animal_interface/H5N1_cumulative_table_archives/en/.

the Asian lineage H7N9, continue to circulate and result in human illness and fatalities.[8] Again, none of the HPAI viruses which were detected in the recent U.S. outbreaks are known to have caused disease in humans.

## 1.6.3 HPAI in the United States

### 1.6.3.1 HISTORICAL

LPAI viruses are present in wild birds and are periodically detected in domestic poultry flocks in the United States. In addition, the United States experienced HPAI outbreaks in 1924, 1983, 2004, 2014–2015, 2016, and 2017. No significant human illness has been reported from any of these HPAI outbreaks.

The 1983 and 2004 outbreaks were linked to the live bird marketing system (LBMS) via epidemiological investigation. By contrast, scientists believe the initial introduction of HPAI in 2014 was from wild birds into poultry flocks; in 2016, an LPAI virus mutated into an HPAI virus.

### 1.6.3.2 2014–2015 HPAI OUTBREAK[9]

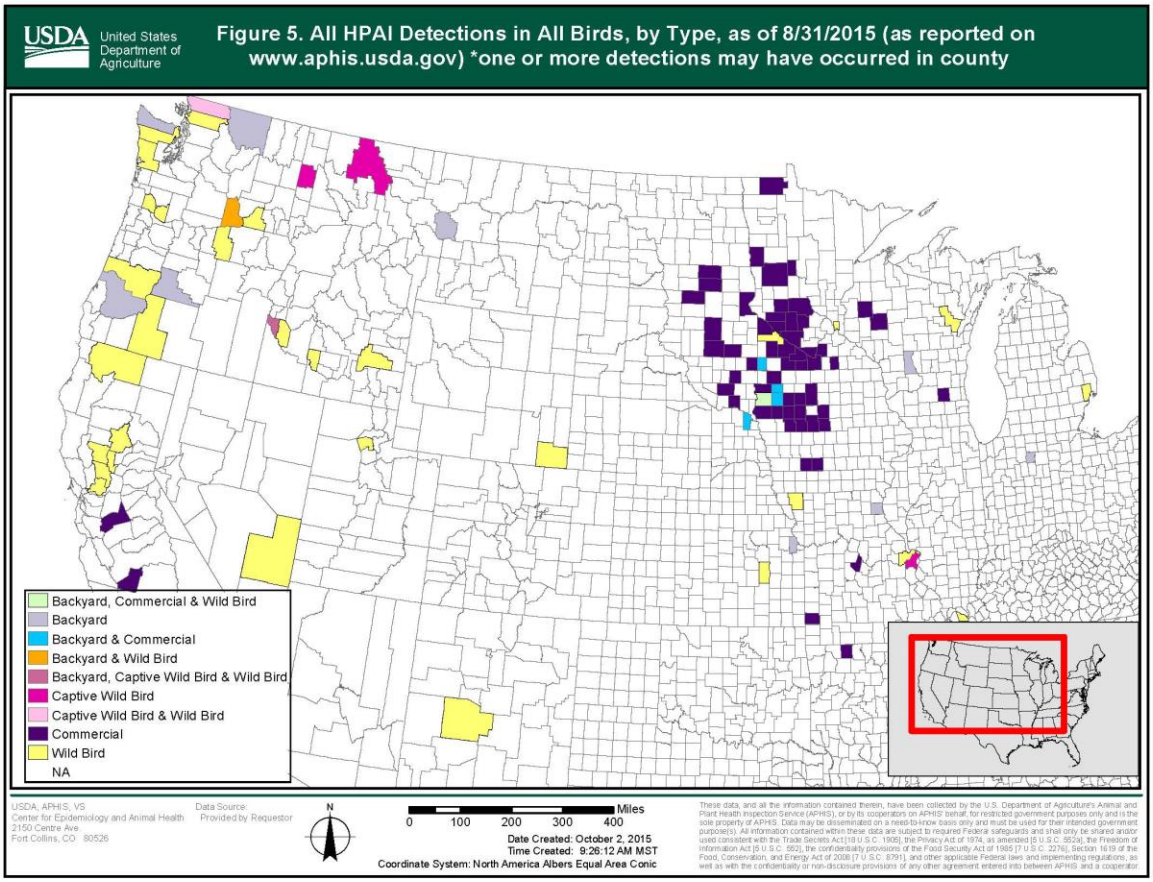
The 2014–2015 HPAI outbreak is the largest ever in the United States, and resulted in the loss of 50.5 million commercial birds (depopulated or succumbed to the virus) mostly infected with H5N2. The first case was detected in December of 2014 and the last case was confirmed on June 16, 2015. Based on the calculations made in June/July 2015, the death/depopulation losses represent 7.46 percent of average U.S. turkey inventory, 10.01 percent of the average layer inventory, and 6.33 percent of average U.S. pullet inventory. Broilers were mainly unaffected during the outbreak.

The hardest hit States were Minnesota (over 100 affected premises) and Iowa (over 70 affected premises); the States of South Dakota, Wisconsin, Nebraska, California, Missouri, North Dakota, and Arkansas also had one or more detections of HPAI in commercial flocks. Figure 1-1 illustrates the detections of HPAI in the United States, and includes detections in wild birds, captive wild birds, backyard flocks, and commercial operations. In all, 21 States had one or more detections of HPAI.

[8] WHO. (2017, April). Human infection with avian influenza A(H7N9) virus--China. Retrieved from http://www.who.int/csr/don/20-april-2017-ah7n9-china/en/.

[9] APHIS. (2016). *Final report for the 2014–2015 outbreak of HPAI in the United States (Public Version).* Retrieved from www.aphis.usda.gov/fadprep.

*Figure 1-1. HPAI in the United States 2014–2015; Detections in All Birds*




Though the initial introduction is believed to be from migratory wild birds, the virus eventually spread through other means as well. While it is difficult to identify a single pathway, known and predictable routes of disease spread have been implicated. These include breakdowns in farm biosecurity, rodents and small birds inside poultry houses, sharing of equipment, and the movement of employees and other personnel. It is also conceivable that airborne transmission of HPAI occurred over limited distances.

### 1.6.3.3 2016 INDIANA HPAI/LPAI OUTBREAK[10]

While APHIS and all stakeholders prepared for a resurgence of HPAI in the fall of 2015, as temperatures cooled and migratory routes became highly active, the United States remained HPAI-free until January of 2016 when HPAI was detected in a single commercial flock in Indiana. Further diagnostic testing and epidemiological investigation showed that an LPAI virus had mutated into an HPAI virus in that flock; LPAI was confirmed on eight additional premises. The HPAI-infected flock, LPAI-infected flocks, and dangerous contact flocks were

[10] APHIS. (2016). *Final report for the 2016 HPAI outbreak in the United States* [Presentation]. Retrieved from www.aphis.usda.gov/fadprep.

rapidly depopulated, and the virus did not spread. Just over 400,000 commercial birds were affected; no backyard flocks were affected by this incident.

#### 1.6.3.4 2017 SOUTHEASTERN HPAI/LPAI OUTBREAK

On March 4, 2017, HPAI H7N9 (of a North American wild bird lineage—not related to the Asian H7N9 HPAI virus) was confirmed in a commercial broiler breeder flock in Lincoln County, Tennessee. Subsequently, 12 additional premises were confirmed to have presumptive or confirmed LPAI H7N9 in Tennessee (3 premises), Alabama (6 premises), Kentucky (2 premises), and Georgia (1 premises).[11] In addition, there was a second HPAI detection in the same county (Lincoln County), which was confirmed on March 15, 2017. Information suggests that the LPAI virus and HPAI virus were extremely similar across all genes. In total, 14 premises were affected, including 8 commercial premises (all commercial broiler breeders), and 6 backyard premises. At the writing of this plan, there have been no further HPAI detections and response activities to this mixed HPAI/LPAI incident are concluding.

#### 1.6.3.5 CURRENT STATUS

At the writing of this plan (May 2017), there have been no recent HPAI detections in wild birds (click here for more information): since July 2016, the only detections were in Montana in August 2016 and Alaska in December 2016. Both of these detections were the Eurasian/North American virus H5N2, which are highly pathogenic to poultry.

In the fall of 2016 and into the spring 2017, Europe has experienced and continues to respond to significant and widespread HPAI transmission.[12] Due to bird migration patterns and resurgence of HPAI worldwide, the USDA and all stakeholders continue to prepare for the reemergence of HPAI in the fall and winter of 2017 and beyond.

### 1.6.4 International Trade

The United States does not import live poultry from countries or regions currently experiencing HPAI outbreaks in commercial or backyard poultry flocks. However, USDA APHIS may recognize HPAI-free regions (also called zones) for trade in countries affected by HPAI that demonstrate adequate veterinary

[11] In some cases, the pathogenicity was unable to be determined from the existing sample. In these cases, the lack of clinical signs indicated that these were LPAI infections. Thus, they were termed "H7N9 Confirmed/Presumptive LPAI" or "H7 Confirmed/Presumptive LPAI" to note that while the subtype was determined (either the hemagglutinin, neuraminidase, or both), the pathogenicity was presumptive based on clinical findings.

[12] The OIE publishes situation reports summarizing HPAI reports from around the world. OIE. (2017, May). OIE situation report for avian influenza. Retrieved from http://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/OIE_AI_situation_report/OIE_SituationReport_AI__6_8May2017.pdf.

infrastructure and authority, movement, disease control measures, and surveillance activities for HPAI. Countries and regions that are recognized, per 9 CFR 94.6 (a)(2), by the United States as *affected* with HPAI are listed here.

Just as the United States bans imports from HPAI affected countries and regions, in the 2014–2015 HPAI outbreak in the United States, many countries placed restrictions on exported U.S. poultry and poultry products. While some countries placed bans only on a specific region, county, or State, other countries did ban poultry and poultry products from the entire United States. These bans have a significant economic impact. However, in 2016, decisions made by some countries to regionalize the United States helped to significantly limit the economic impact of this particular incident; only one country imposed limitations on the entire United States.

## 1.6.5 Impact of an HPAI Outbreak

### 1.6.5.1 Economic

A widespread HPAI outbreak can have a substantial economic impact, as clearly demonstrated in the 2014–2015 outbreak in the United States. The 1983–1984 HPAI outbreak in the northeastern United States resulted in the destruction of more than 17 million birds at a cost of approximately $65 million. The retail price of eggs jumped nearly 30 percent. A 2004 outbreak of H7N3 in Canada resulted in C$360 million in gross economic losses.[13]

For the 2014–2015 outbreak, nearly $850 million was obligated for response activities (including personnel support) and indemnity payments. Another $100 million was made available for further preparedness activities. Estimates suggest that this HPAI outbreak gave rise to $1.6 billion in direct losses from the turkeys and chicken layers euthanized. In total—when accounting for factors like restocking and future production—impact to the U.S. economy is assessed closer to $3.3 billion.[14] In part, this is a consequence of partial or full trade embargoes from over 30 countries; there was a reported decline in poultry and egg exports of 14 percent from January to June 2015.[15] With these restrictions, egg prices where the highest observed in over 30 years (adjusting for inflation).[16]

[13] Swayne, D.E. (2008). High pathogenicity avian influenza in the Americas. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 191–216). Ames, Iowa: Blackwell Publishing.

[14] Greene, J.L. (2015, July). Update on the highly-pathogenic avian influenza outbreak of 2014–2015. *Congressional Research Service*, R44114. Retrieved from https://www.fas.org/sgp/crs/misc/R44114.pdf.

[15] USA Poultry & Egg Export Council. (2015, August). Avian influenza takes a toll on U.S. poultry exports. Retrieved from http://www.usapeec.org/p_documents/press_492700213.pdf.

[16] Huang, W., Hagerman, A., & Bessler, D.A. (2016). The impact of highly pathogenic avian influenza on table egg prices. *Choices*, 31(2). Retrieved from http://www.choicesmagazine.org/UserFiles/file/cmsarticle_507.pdf.

#### 1.6.5.2 ZOONOTIC POTENTIAL AND PUBLIC HEALTH IMPLICATIONS

HPAI can have significant public health implications. AI viruses are potentially zoonotic, and although it appears to have a relatively high species-specific transmission barrier, under certain circumstances, specific strains of HPAI have been demonstrated to infect and be fatal to humans.[17] For example, as of February 2017, there have been 856 cases and 452 deaths of laboratory-confirmed HPAI H5N1 reported to the World Health Organization (WHO) between the years of 2003 and 2017; the numbers dropped significantly after 2015—only 10 cases were reported in 2016.[18] However, other HPAI viruses including H5N6, H7N7, and H7N9 viruses have also infected humans. Public health officials and animal health officials vigilantly monitor AI because of the unique ability of influenza A viruses to genetically reassort to more pathogenic—and possibly mammalian—strains. Fortunately, rates of HPAI infections in humans remain low.

## 1.6.6 Ecology

Many avian species are susceptible to infection with HPAI viruses, including but not limited to

- chickens,
- turkeys,
- ducks,
- geese,
- guinea fowl, and
- a wide variety of other birds, including migratory waterfowl and shorebirds.

Psittacine birds (such as parrots and cockatiels) are more rarely affected. Mammalian hosts, including swine and humans, may be vulnerable to infection by some AI strains, particularly the H5, H7, and H9 subtypes.

#### 1.6.6.1 RESERVOIR

AI viruses usually infect migratory waterfowl, particularly Anseriformes (ducks and geese) and Charadriiformes (gulls and shorebirds) that can carry LPAI viruses without showing illness. Other aquatic species may also be maintenance hosts.

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[17] Swayne, D.E., & Thomas, C. (2008). Trade and food safety aspects for avian influenza viruses. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 499–512). Ames, Iowa: Blackwell Publishing.

[18] WHO. (2017, January). Cumulative number of confirmed cases for avian influenza A/(H5N1) reported to WHO, 2003–2017. Retrieved from http://www.who.int/influenza/human_animal_interface/H5N1_cumulative_table_archives/en/.

LPAI virus strains occur worldwide and have been isolated from more than 100 different species of birds.[19] The wild-bird reservoir of LPAI viruses is a major potential source of infection for domestic birds, particularly free- and open-range poultry. Following transmission of LPAI from wild to commercial birds, the virus can mutate or reassort in gallinaceous (e.g., chickens) poultry flocks, resulting in an HPAI virus.[20] It remains unclear how long and to what extent wild birds can maintain HPAI viruses, though there is evidence that certain species of Anseriformes can carry and shed certain HPAI viruses without clinical signs. This poses a serious transmission risk to commercial poultry.

#### 1.6.6.2 Introduction and Transmission of AI in Poultry

Contact with infected wild birds or their secretions is a common mode of AI introduction into a poultry population. While live poultry markets have been documented as a source of introduction and further dissemination of both LPAI and HPAI in past outbreaks both in Asia and the Americas, there is strong evidence that the 2014–2015 outbreak in the United States was introduced from wild birds to poultry flocks.

HPAI virus is transmitted via direct exposure to infected birds, feces, or secretions from infected birds. Transmission can occur through the movement of contaminated fomites, including by people, on contaminated clothing, equipment, and vehicles. Airborne transmission is not likely a primary mode of transmission, although it may occur over short distances as an aerosol via contaminated dust and debris. Especially in windy environments where there are high concentrations of virus, this mode of transmission may occur to nearby premises and houses. When a hen is infected, the HPAI virus is also likely to be present on the eggshell and internal egg contents.

#### 1.6.6.3 Persistence in Environment and Animal Products

AI viruses are easily inactivated by heat but may remain viable for longer in cold and humid environments. At colder temperatures, virus survival has been documented in feces from less than 4 days to at least 30–40 days in various experiments.[21] Two H5N1 HPAI viruses were also shown to persist in water at cool temperatures, surviving for 94–158 days at 17ºC, but not after 30 days at

[19] Swayne, D.E. (2008). Epidemiology of avian influenza in agricultural and other man-made systems. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 59–85). Ames, Iowa: Blackwell Publishing.

[20] Alexander, D. J. (2007). An overview of the epidemiology of avian influenza. *Vaccine*, 25(30), 5637–5644. doi:10.1016/j.vaccine.2006.10.051.

[21] The Center for Food Security and Public Health (CFSPH). (2016). Avian Influenza. *Iowa State University*. Retrieved from www.cfsph.iastate.edu/Factsheets/pdfs/highly_pathogenic_avian_influenza.pdf.

28ºC.[22] The virus can also survive for extended periods when protected from sunlight (from 2 days to 2 weeks depending on temperatures).

AI viruses can also be isolated from animal products, including eggs.[23] Therefore, the OIE recommends guidance for the inactivation of AI in poultry and poultry products; for example, for the inactivation of AI in meat, the core temperature must reach 70ºC for 3.5 seconds, and whole eggs should be heated to a core temperature of 60ºC for 188 seconds. Refer to the OIE Code Articles 10.4.24–10.4.26 for the full inactivation standards of AI in poultry products. Furthermore, heat can be used to effectively inactivate virus in poultry housing, as determined by a study from USDA's Agricultural Research Service (ARS); this in turn serves as a basis for the USDA guidance document *Using Heat Treatment for Virus Elimination*.[24]

## 1.6.7 Diagnosis in Avian Species

The incubation period for HPAI viruses in naturally infected chickens ranges from 3 to 14 days.[25] The OIE *Terrestrial Animal Health Code (2016)* gives the incubation period for AI infection as 21 days.[26] AI may have longer incubation periods in some species than others; each HPAI virus—even those of the same subtype—may have a slightly different incubation period.

### 1.6.7.1 Clinical Signs

Birds affected with HPAI show a variety of clinical signs, involving the respiratory, digestive, reproductive, or nervous systems. Signs of LPAI are typically much milder.

#### 1.6.7.1.1 Galliformes

Common clinical signs of HPAI in galliformes (such as chickens, turkeys, and guinea fowl) include

- marked depression with ruffled feathers,

[22] Swayne, D.E. (2008). Epidemiology of avian influenza in agricultural and other man-made systems. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 59–85). Ames, Iowa: Blackwell Publishing.

[23] Cappucci D.T., et al. (1985). Isolation of avian influenza virus (subtype H5N2) from chicken eggs during a natural outbreak. *Senne Avian Diseases,* 29(4), 1195–1200. doi: 10.2307/1590473.

[24] Stephens, C. & Spackman, E. (2015). Inactivation of avian influenza virus in chicken litter as a potential method to decontaminate poultry houses. *American Association of Avian Practitioners.* Abstract retrieved from ARS. (Publication #323923).

[25] Swayne, D.E. (2008). Epidemiology of avian influenza in agricultural and other man-made systems. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 59–85). Ames, Iowa: Blackwell Publishing.

[26] OIE. (2016). Infection with avian influenza viruses. *Terrestrial Animal Health Code*, Article 10.4.1. Retrieved from http://www.oie.int/.

- decreased feed consumption,
- excessive thirst,
- decreased or cessation of egg production,
- mild to severe respiratory distress,
- swollen wattles and combs, and
- watery greenish diarrhea.

Clinical signs relating to the nervous system are not frequently observed in Galliformes. However, if present, they include the inability to walk or stand and a loss of coordination.

#### 1.6.7.1.2 Anseriformes

Anseriformes (such as, ducks and geese) usually do not show clinical signs with infection of LPAI. While some species of these birds may also carry HPAI viruses sub-clinically, HPAI viruses can also present as the following

- sudden death;
- nervous signs (such as a lack of coordination and the inability to stand and walk); and
- dyspnea, depression, and diarrhea.

#### 1.6.7.1.3 Other Birds

Birds from other orders may also become affected with HPAI, as demonstrated in the recent 2014–2015 outbreak, where captive birds were infected. These birds include Falconiformes (e.g., the gyrfalcon) and Strigiformes (e.g., great-horned owls). These animals can die suddenly but may also experience clinical signs (including depression, diarrhea, and decreased food consumption) and recover from the virus.

### 1.6.7.2 GROSS PATHOLOGICAL LESIONS

Lesions have been observed in susceptible avian species, but they are extremely variable.[27] Galliformes with HPAI may not have prominent lesions, except those associated with general muscular congestion and dehydration. However, a variety of edematous, hemorrhagic, and necrotic lesions in visceral organs and the skin have been reported. In Anseriformes, the following gross lesions have been

[27] Swayne, D.E., & Patin-Jackwood, M. (2008). Pathobiology of avian influenza virus infections in birds and mammals. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 87–122). Ames, Iowa: Blackwell Publishing.

reported: ocular and nasal discharge, conjunctivitis, ecchymotic or petechial hemorrhage of leg and footpad, serous fluid surrounding vital organs, and pancreatic mottling.

#### 1.6.7.3 DIFFERENTIAL DIAGNOSES

HPAI may resemble acute fowl cholera (caused by Pasturella spp.), velogenic viscerotropic Newcastle disease (caused by Paramyxovirus PMV-1), intoxication (e.g., from contaminated food or water), as well as some respiratory diseases (e.g., infectious laryngotracheitis).

## 1.6.8 Immunity

#### 1.6.8.1 ACTIVE

Infection with or exposure to AI viruses, as well as immunization with vaccines, stimulates an antibody response at both the systemic and mucosal levels. Immunoglobulin A is the primary antibody to mediate mucosal protection in birds; immunoglobulin G and immunoglobulin M have also been identified.[28] The intensity of the antibody response varies with bird species.

Antibodies against the surface proteins are neutralizing and protective. Protection has been primarily associated with antibodies directed to the HA protein; however, either HA or NA antibodies, or both, prevent clinical signs and death following challenge with HPAI viruses having homologous HA or NA subtypes. The level of protection against mucosal infection and subsequent shedding of the challenge virus may depend on the degree of sequence similarity in the HA of vaccine and challenge virus. The duration of protection is variable and depends on many factors; in chicken layer flocks, protection against clinical signs and death has been demonstrated to be at least 30 weeks following a single immunization.

Immune response against internal proteins has not been shown to prevent clinical signs or death, but may shorten the period of the virus replication and consequently reduce virus shedding.

#### 1.6.8.2 PASSIVE

Studies on protection by maternal antibodies to homologous HA or NA have not been reported. On the basis of available information on other viral avian diseases, protection against clinical signs and death from a homologous AI viral challenge is probable for the first 2 weeks after hatching. For surveillance purposes, the OIE

[28] Swayne, D.E., & Kapczynski, D.R. (2008). Vaccines, vaccination, and immunology for avian influenza viruses in poultry. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 407–451). Ames, Iowa: Blackwell Publishing.

suggests that maternal antibodies derived from a vaccinated parent flock are usually found in the yolk and can persist in progeny for up to 4 weeks.[29]

#### 1.6.8.3 VACCINATION

Vaccination against different AI virus subtypes has been used in a variety of poultry species. Vaccine has been documented to be effective in both preventing clinical signs, reducing virus shedding, and preventing mortality. The duration and level of protection provided by the vaccine is affected by many factors including the dose of the virus challenge, the type of adjuvant used, the length of protection produced, the HA match of the vaccine to the field strain, the species and age of birds vaccination, and how the vaccine is administered.[30]

USDA APHIS' primary response strategy to an HPAI outbreak is rapid stamping-out. Implementation of effective biosecurity measures is also critical to control and contain the virus. Emergency vaccination has not been implemented in the recent outbreaks in the United States. Under certain conditions and with an appropriate vaccine product available, an emergency vaccination strategy could be considered, particularly for specific types of poultry. DIVA (differentiation of infected from vaccinated animals) testing is necessary for an effective emergency vaccination strategy. Emergency vaccination is further discussed in Chapter 5.

[29] OIE. (2016). Infection with avian influenza viruses. *Terrestrial Animal Health Code*, Article 10.4.28. Retrieved from http://www.oie.int.

[30] Swayne, D.E., & Kapczynski, D.R. (2008). Vaccines, vaccination, and immunology for avian influenza viruses in poultry. In D.E. Swayne (Ed.), *Avian Influenza* (pp. 407–451). Ames, Iowa: Blackwell Publishing.

# Chapter 2
# Framework for HPAI Preparedness and Response

## 2.1 Foundation of Preparedness and Response

Successful emergency preparedness for and response to HPAI is based on the principles found in the National Response Framework (NRF) and NIMS. FAD PReP, including this HPAI-specific plan, provides detailed information and specific guidance on response requirements for an outbreak in the United States. FAD PReP documents are consistent with both NRF and NIMS.

### 2.1.1 National Response Framework

The NRF is a guide to how the Nation conducts all-hazards response, through a whole community approach.[1] It describes core capabilities for response, defines specific authorities, and establishes a comprehensive approach for responding to domestic incidents that range from serious, but purely local, events to large-scale terrorist attacks or catastrophic natural disasters. The NRF is one of the five National Planning Frameworks; it builds on NIMS, which provides a consistent template for managing incidents. The NRF is available at www.fema.gov/national-response-framework.

### 2.1.2 National Incident Management System

NIMS, a companion document to the NRF, provides a systematic, nationwide, proactive approach guiding departments and agencies at all levels of government, the private sector, and non-governmental organizations. Its goal is to help these organizations work seamlessly to prepare for, prevent, respond to, recover from, and mitigate the effects of incidents, "…regardless of cause, size, location, or complexity—in order to reduce the loss of life, liberty, property, and harm to the environment." NIMS provides a core set of concepts, principles, procedures, organizational processes, and standard requirements, including the Incident Command System (ICS). ICS offers standard terminology and common

[1] As defined in the Federal Emergency Management Agency (FEMA) National Preparedness Goal, the whole community is a focus on enabling the participation in a wider range of players from the private and nonprofit sectors, including nongovernmental organization and the general public, in conjunction with the participation of all levels of government in order to foster better coordination and working relationships. For more information visit www.fema.gov.

organizational structures. NIMS information is available at www.fema.gov/national-incident-management-system.

NIMS consists of five key components that work together:

1. Preparedness (including, but not limited to, procedures, protocols, training and exercises, personnel qualifications, and evaluation);

2. Communications and information management (including, but not limited to, requirements for standardized communications and a common operating picture, based on reliability, interoperability, and scalability);

3. Resource management (including, but not limited to, resources needed to support critical incident objectives, in particular the process to identify, order, acquire, mobilize, track, demobilize, and inventory resources);

4. Command and management (including, but not limited to, three key organizational constructs: ICS, Multiagency Coordination [MAC] Systems, and Public Information);

5. Ongoing management and maintenance (including, but not limited to, the National Integration Center and Supporting Technologies that support both routine maintenance and continuous review of NIMS and associated research and development).

### 2.1.3 Foreign Animal Disease Preparedness and Response Plan

APHIS Veterinary Services (VS) established FAD PReP to provide guidance for preparing and responding to a foreign animal disease (FAD) emergency. The precursor to FAD PReP was the NAHEMS, which offered a functional veterinary framework for responding to FADs like HPAI. Now incorporated into FAD PReP, the NAHEMS Guidelines join strategic concept of operations documents, disease response plans (such as this HPAI-specific plan), SOPs, and other materials to create a comprehensive approach to FADs that is consistent with NRF and NIMS. These documents aim to ensure a successful response commensurate with the severity of the outbreak. Federal, State, and local agencies; Tribal nations; and other stakeholders involved in animal health emergency management activities should integrate the information found in these documents into their preparedness and response planning activities and processes.

FAD PReP offers

- competent veterinary guidance on cleaning and disinfection (virus elimination), disposal, mass depopulation, and other critical activities;

- information on disease control and eradication strategies and principles;

- guidance on health, safety, and personal protective equipment;
- biosecurity information and site-specific management strategies; and
- training and educational resources.

These documents provide the foundation for coordinated national, regional, State, Tribal, and local activities in an emergency situation. They also serve as a practical guide and complement non-Federal preparedness activities.

Appendix A provides more information on FAD PReP and associated materials. Typically documents are cleared by APHIS Legislative and Public Affairs (LPA) and posted on the FAD PReP website: www.aphis.usda.gov/fadprep. This website also hosts critical policy updates relating to ongoing or recent FAD outbreaks.

### 2.1.4 Coordination and Collaboration

This *HPAI Response Plan* is coordinated with the other FAD PReP documents, which are consistent with the tenets, terminology, and processes found in NRF and NIMS. This document provides strategic guidance for responding to an HPAI outbreak. Other FAD PReP documents provide information on general veterinary activities and include industry or facility manuals as well as SOPs for planners and responders. Together, these documents provide strategic and tactical details for Federal, State, Tribal, and local officials that are useful for HPAI preparedness and response. Building on existing planning and response knowledge and relationships, FAD PReP efforts raise awareness of critical issues in FAD response and foster further collaboration between Federal partners, States, Tribes, industry, academia, and other stakeholders.

## 2.2 Federal Roles, Responsibilities, and Planning Assumptions

### 2.2.1 Overview

Understanding the roles and responsibilities of Federal departments or agencies involved in responding to a FAD domestic incident promotes an effective, coordinated emergency response. The section that follows describes the roles, responsibilities, and authority of USDA in an HPAI response. The functions described are consistent with the roles and responsibilities outlined in the NRF.

Federal response to the detection of an FAD such as HPAI is based on the response structure of NIMS as outlined in the NRF. The NRF defines Federal departmental responsibilities for sector-specific responses. During the course of an HPAI outbreak response, the USDA may request Federal-to-Federal support (FFS) from other Federal departments and agencies. FFS refers to the circumstance in which a Federal department or agency requests Federal resource

support under the NRF that is not addressed by the Stafford Act or another mechanism.

### 2.2.2 USDA Roles and Responsibilities Overview

As the primary Federal agency for incident management during an FAD event of livestock or poultry, like an HPAI outbreak, USDA APHIS deploys National Incident Management Teams (NIMTs), coordinates the incident response, manages public messages, and takes measures to control and eradicate HPAI. Measures used to control and eradicate HPAI include surveillance and diagnostics, quarantine and movement control, biosecurity measures, epidemiological investigations, appraisal and compensation, depopulation or euthanasia of affected poultry, carcass disposal, and cleaning and disinfection. In some cases, emergency vaccination may be used.

The USDA is the primary agency and performs the coordinating role in Emergency Support Function (ESF) #11—Agriculture and Natural Resources—under the NRF. As stated in ESF #11, USDA responds "to animal and agricultural health issues" under USDA statutory authority. Under ESF #11, APHIS is the sub-agency responsible for detecting "animal disease anomalies," assigning "foreign animal disease diagnosticians to conduct investigations," and coordinating "tasks with other ESFs, State veterinary emergency response teams, and voluntary animal care organizations to respond."

In addition to being the primary/coordinator for ESF #11, USDA (as a whole-agency) also plays supporting roles in the following ESFs:

- ESF #2—Communications
- ESF #5—Information and Planning
- ESF #7—Logistics
- ESF #8—Public Health and Medical Services
- ESF #10—Oil and Hazardous Materials Response
- ESF #12—Energy
- ESF #15—External Affairs.

In addition to these whole-agency responsibilities, other USDA sub-agencies are identified in the ESFs as having coordinating, primary, or support responsibilities. The U.S. Forest Service (USFS), which is part of USDA, has the only other coordinator/primary role for ESF #4—Firefighting. Other sub-agencies, including the USFS, have supporting roles in many of the ESFs (for more information, please see http://www.fema.gov/national-preparedness-resource-library). APHIS plays a supporting role in the following ESFs:

- ESF #5—Information and Planning
- ESF #6—Public Health and Medical Services
- ESF #11—Agriculture and Natural Resources.

During the course of an HPAI outbreak response, USDA may request Federal-to-Federal support as necessary from other Federal departments or agencies; FFS is not necessarily requested in an HPAI incident. If the President declares an emergency or major disaster, or if the Secretary of Agriculture requests the Department of Homeland Security (DHS) lead coordination, the Secretary of Homeland Security and DHS assume the lead for coordinating Federal resources. USDA maintains the lead of overall incident management. Please note than in the 2014–2015 HPAI outbreak in the United States, the largest in U.S. history with approximately 50.5 million affected birds, there was no federal emergency or disaster declaration.

For more information on the roles of other Federal agencies, such as the Departments of Health and Human Services (HHS) and the Interior (DOI), in the event of an HPAI outbreak, see the *APHIS Foreign Animal Disease Framework: Roles and Coordination* (FAD PReP Manual 1-0) at www.aphis.usda.gov/fadprep.

## 2.3 AUTHORITY

The Animal Health Protection Act (AHPA), 7 *U.S. Code* 8301 et seq., authorizes the Secretary of Agriculture to restrict the importation, entry, or further movement in the United States or order the destruction or removal of animals and related conveyances and facilities to prevent the introduction or dissemination of livestock pests or diseases. It authorizes related activities with respect to exportation, interstate movement, cooperative agreements, enforcement and penalties, seizure, quarantine, and disease and pest eradication. The Act also authorizes the Secretary to establish a veterinary accreditation program and enter into reimbursable fee agreements for pre-clearance abroad of animals or articles for movement into the United States.

Section 421 of the Homeland Security Act, 6 *U.S. Code* 231 transfers to the Secretary of Homeland Security certain agricultural import and entry inspection functions under the AHPA, including the authority to enforce the prohibitions or restrictions imposed by USDA.

The Secretary of Agriculture has the authority to cooperate with other Federal agencies, States, or political subdivisions of States, national or local governments of foreign governments, domestic or international organizations or associations, Tribal nations, and other persons to prevent, detect, control, or eradicate HPAI. If measures taken by a State or Indian Tribe to control or eradicate a pest or disease of livestock are inadequate, the AHPA authorizes the Secretary—after notice to and review and consultation with certain State or Tribal officials—to declare that

an extraordinary emergency exists because of the presence in the United States of a pest or disease of livestock that threatens the livestock of the United States (7 *U.S. Code* 8306).

Additionally, the CFR gives the APHIS Administrator authority to determine the existence of disease and the authority to prevent the spread of disease through the destruction and/or disinfection of animals, eggs, and materials as appropriate. As such, it also authorizes APHIS to appraise and indemnify animals and materials destroyed, provided certain conditions are met; these conditions include complying with quarantines, adhering to proper biosecurity protocols, and accurately designating payments between contract growers and owners of birds (9 CFR 53).

For further information on USDA APHIS authorities, see the *APHIS Foreign Animal Disease Framework*: *Roles and Coordination* (FAD PReP Manual 1-0) at www.aphis.usda.gov/fadprep.

# Chapter 3
# USDA HPAI Preparedness and Response

## 3.1 USDA APHIS HPAI Response Authorities

USDA APHIS is the lead primary Federal agency with responsibility and authority for agricultural animal disease control. USDA APHIS interfaces with Federal, State, Tribal, and local partners to prevent the introduction of HPAI into U.S. poultry and to control, contain, and eradicate the disease if it is introduced. If the President declares an emergency or major disaster, or if the Secretary of Agriculture requests that DHS lead coordination, the Secretary of Homeland Security and DHS lead the coordination of Federal-to-Federal Support and Federal resources for the incident, while the USDA maintains lead of overall incident management.

USDA is the primary Federal liaison to the U.S. animal industry. In addition, it operates the National Veterinary Services Laboratories (NVSL), including NVSL-Ames, which is an OIE reference laboratory for identifying and confirming HPAI. USDA also administers a National Wildlife Disease Program that provides assistance for the targeted surveillance of emerging and known diseases in wildlife, including AI.

The following sections detail USDA APHIS activities to prepare for an HPAI outbreak.

### 3.1.1 Preparedness Exercises and Training

Preparedness and response exercises help ensure our Nation is able to respond quickly and effectively to an HPAI outbreak. Exercises provide an ideal, no-fault learning environment to discuss, practice, and implement plans, procedures, and processes in advance of an actual event. APHIS exercises are conducted in accordance with Homeland Security Exercise and Evaluation Program guidance.

Multiple preparedness exercises and training events have been conducted to simulate an HPAI outbreak and response effort in the United States. These exercises and other events allow responders from all sectors—Federal, State and Tribal, local, industry, and academia—to discuss and practice critical activities (as discussed in Chapter 5) that would be required in an HPAI outbreak response. VS recently initiated a revitalized training and exercise program to address topics such as animal disease incident management, emergency operations, and current issues. Additionally, the Surveillance, Preparedness, and Response Services (SPRS) Logistics Center, which includes the National Veterinary Stockpile (NVS), routinely conducts exercises to deliver and stage supplies as well as

operate stockpiled equipment. Valuable lessons learned and important recommendations have resulted from these exercises as well as the recent HPAI outbreaks in 2014–2015, 2016, and 2017.

### 3.1.2 Domestic Activities

USDA has a variety of ongoing preparedness and response activities with respect to HPAI, many of which have been significantly ramped up in response to recent events. Domestically, the USDA prevents the introduction of AI at its borders, performs FAD investigations, and monitors all H5 and H7 AI viruses in U.S. commercial broilers, layers, and turkeys; their respective breeders; backyard flocks; and the LBMS. In addition to import restrictions on poultry and poultry products from all countries or regions affected by HPAI in poultry, a critical component of these domestic activities is the AI surveillance program. The following list details a selection of ongoing USDA activities:

- *Poultry surveillance and diagnostics*. APHIS has a two-pronged approach to AI surveillance:
  - The first is through the National Poultry Improvement Plan, a voluntary Federal-State-industry cooperative program that conducts AI surveillance in (1) egg- and meat-type chicken and turkey breeding flocks, including game fowl and hobby poultry breeding flocks, and (2) commercial table-egg layer chickens, meat-type chickens (boilers, roasters, fryers, etc.), and meat-type turkeys.
  - The second is through AI surveillance in the LBMS. APHIS is currently cooperating with States that are conducting surveillance in their LBMS using a system of uniform standards established by a multi-stakeholder working group.
- *National Import Export Services (NIES).* NIES safeguards the poultry industry by working with other Federal agencies to ensure poultry products and birds imported into the United States are free of transmissible diseases under 9 CFR. This link provides information on the requirements for importing poultry and poultry products. The list of HPAI affected countries/regions for trade purposes is here.[1]
- *Wildlife surveillance*. APHIS Wildlife Services (APHIS WS) coordinates with universities and other entities to support wildlife surveillance and diagnostics. In the event of an HPAI outbreak, USDA APHIS WS works in close collaboration, communication, and coordination with and other Federal, State, Tribal, and local wildlife agencies that have primary jurisdictional authority and subject matter expertise for wildlife. In response to the recent HPAI outbreak, APHIS WS, in coordination with

[1] The web address is https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-and-animal-product-import-information/import-live-animals/ct_hp_avian_influenza.

the U.S. Fish and Wildlife Service, USDA APHIS VS, U.S. Geological Survey, and the National Flyway Council drafted a comprehensive plan for wild bird surveillance in migratory flyways (found here).

- *Smuggling Interdiction and Trade Compliance (SITC).* SITC conducts risk management and anti-smuggling activities to prevent unlawful entry and distribution of prohibited agricultural commodities. It looks at domestic markets likely to have illegally imported avian products to establish baseline estimates on how much product is bypassing ports of entry.

- *Emergency veterinary assistance*. USDA works to assist States in training and maintaining State Incident Management Teams (IMT) and veterinary reserve corps; State groups serve as early response teams for an HPAI event and can educate stakeholders on AI signs, symptoms, and reporting procedures. In addition, USDA APHIS recently created the Voluntary Emergency Ready Response Corps (VERRC) to further increase the agency's capacity to respond to an emergency. USDA APHIS also has the National Animal Health Emergency Response Corps (NAHERC), which trained and deployed some responders in the 2014–2015 HPAI outbreak

- *Public health*. USDA APHIS engages public health agencies to ensure coordination in the event of an HPAI outbreak in poultry; a USDA APHIS VS representative from the One Health Coordination Center is designated as a Centers for Disease Control and Prevention (CDC)-based liaison. APHIS engages and coordinates with CDC during any HPAI outbreak to not only protect the public, but field responders as well.

- *Animal Care*. APHIS Animal Care works with the American Zoological Association (AZA) to establish effective surveillance plans for AI. Facilities that participate undertake active and passive surveillance of exhibit and wild birds on their premises. AI testing is already undertaken at all AZA zoos (and may include sampling of wild birds on the premises); AZA actively works with APHIS Animal Care and VS to develop HPAI response plans and procedures for birds held in zoo collections.

- *Modeling, Assessments & Geospatial Analyses*. The USDA Center for Epidemiology and Animal Health (CEAH) uses complex disease spread simulation models, such as Interspread Plus and the Animal Disease Spread Model (ADSM), to develop computer-generated outbreak scenarios for HPAI. The results of these models can be further analyzed using economic modeling tools. Other modeling tools are used to examine within-flock spread, wind dispersion, and geospatial risk factors. Risk assessments can also inform decision making processes. Additionally, geographic information systems (GIS) are used to support preparedness and response activities. Together, various models, assessments, and analyses are used to explore possible control strategies and evaluate the consequences of HPAI incursions in the United States. They may also help

to estimate the countermeasures, materials, and personnel needed for control and eradication.

- *Education*. Key USDA initiatives are the Biosecurity for Birds and Defend the Flock campaigns, which provide materials, messages, and biosecurity information on how to protect poultry from diseases including AI. Biosecurity for Birds encourages awareness about AI amongst bird owners (backyard, hobby, and pet birds) and the public. Defend the Flock is targeted at commercial owners and producers. Materials are available in multiple languages and located https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian-influenza-disease.

### 3.1.3 International Activities

In addition to the domestic activities discussed above, the USDA also has ongoing international activities to bolster HPAI preparedness, planning, and response capabilities:

- *Emergency veterinary assistance.* USDA APHIS works to provide technical assistance and expertise, at a country's request, in the event of an animal health emergency.

- *International coordination.* USDA APHIS collaborates with other agencies and international partners to mitigate, prevent, and control HPAI threats outside the United States through the sharing of information and development of infrastructure.

### 3.1.4 International Trade

USDA, in collaboration with the Department of State and the United States Trade Representative, promptly addresses foreign governments that impose unjustifiable U.S. poultry and product trade restrictions because of an HPAI case. These efforts focus on cases where bans are inconsistent with OIE standards, or with any U.S. AI bilateral protocols.

USDA overseas embassy offices have guidance on how to rapidly report trade disruptions to Washington, DC headquarters and how to help foreign officials respond to such events. Multiple USDA agencies, led by the Foreign Agricultural Service, coordinates a response to any such trade disruption and communicates with industry in the United States. USDA APHIS would also quickly fulfill any official requests for additional scientific information, such as U.S. HPAI domestic poultry flock case surveillance, movement control measures, and laboratory diagnostics.

OIE member countries, like the United States, are to "immediately" notify the OIE of any confirmed HPAI cases in poultry, defined in the OIE *Terrestrial Animal Health Code (2016)* as

> all domesticated birds, including backyard poultry, used for the production of meat or eggs for consumption, for the production of other commercial products, for restocking supplies of game, or for breeding these categories of birds, as well as fighting cocks used for any purpose.
>
> Birds that are kept in captivity for any other reason referred to in the preceding paragraph, including those that are kept for shows, races, exhibitions, competitions, or for breeding or selling these categories of birds as well as pet birds, are not considered to be poultry.

In addition, member countries are to notify the OIE in the event of an LPAI H5 or H7 detection in poultry. International standards for HPAI do allow countries to impose bans (which may be country-wide or regional) on imports from countries with HPAI infection in poultry. USDA APHIS actively maintains a list of HPAI-affected countries here.

### 3.1.5 Compartmentalization

Another tool that may mitigate the economic consequences of a disease outbreak is compartmentalization. Compartmentalization defines subpopulations of distinct health status by management and husbandry practices, as related to biosecurity. Compartmentalization is best implemented, as suggested by the OIE in the *Terrestrial Animal Health Code (2016)*, by trading partners through the establishment of parameters and agreement on necessary measures, *before a disease outbreak.*

Implementation of compartmentalization would rely on Federal and State animal health authorities as well as producers and industry stakeholders. The importing country must be satisfied that its animal health status is appropriately protected by the biosecurity measures undertaken by the exporting country.

Currently, no compartmentalization plans have been fully accepted or implemented in the United States. Chapters 4.3 and 4.4 of the OIE *Terrestrial Animal Health Code (2016)* explain the concept and the application of compartmentalization.

## 3.2 USDA APHIS ORGANIZATIONAL STRATEGY

In the event of an HPAI outbreak, effective and efficient whole community situation management and clear communication pathways are critical for an effective response effort. A synchronized management and organizational structure supports the control and eradication actions. Accordingly, APHIS employs NIMS and the ICS organizational structures to manage response to an

HPAI outbreak. ICS is designed to enable efficient and effective domestic incident management by integrating facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

## 3.3 APHIS INCIDENT MANAGEMENT STRUCTURE

The APHIS Administrator is the Federal executive responsible for implementing APHIS policy during an HPAI outbreak; the Administrator is supported by the APHIS Management Team (AMT) (Figure 3-1 and Figure 3-2). Depending on the size of the outbreak, the APHIS Administrator and AMT may establish an APHIS-level MAC Group to coordinate resources; many of the MAC functions may be delegated to the VS Deputy Administrator, who is the Chief Veterinary Officer of the United States. The VS Deputy Administrator is supported by the VS Executive Team (VSET) to coordinate policy.

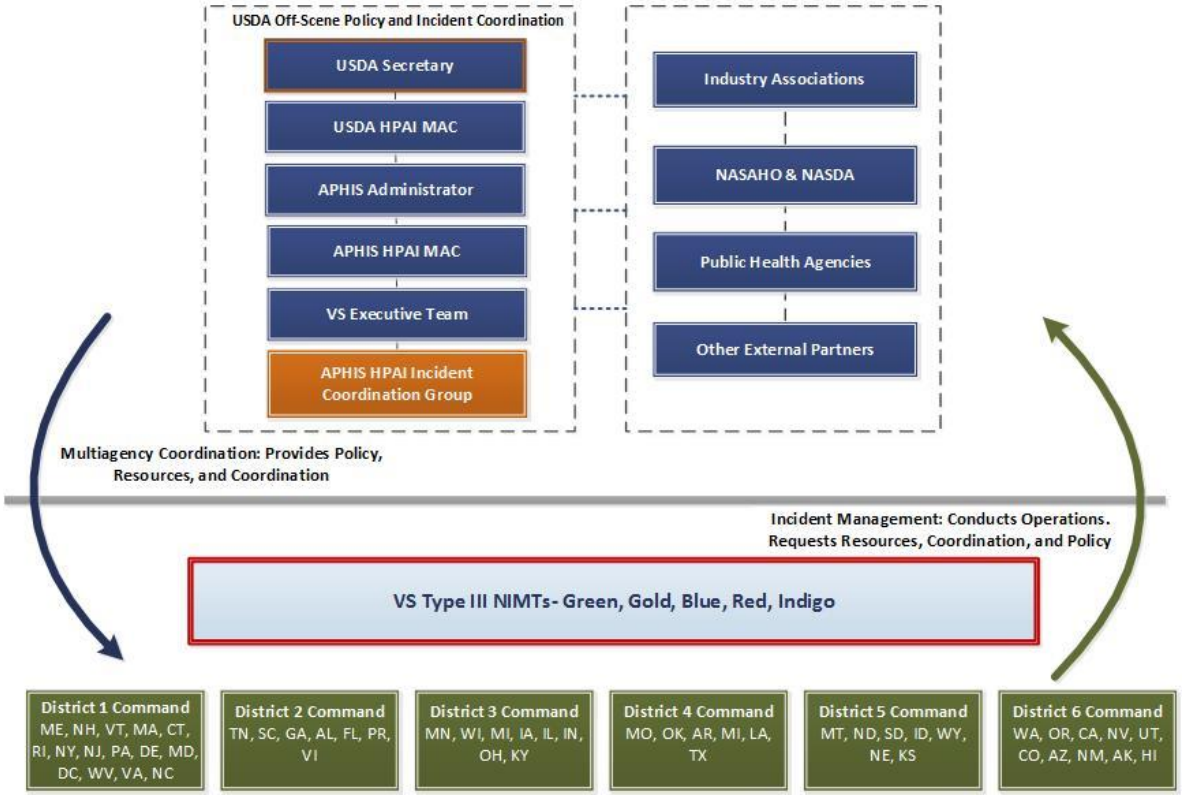
An APHIS National Incident Coordination Group (ICG), led by an Incident Coordinator and a deputy National Incident Coordinator, is immediately established to oversee the functions and response activities associated with the incident. This ICG is flexible and scalable to the size and scope of the incident, and works closely with IC personnel in the field, in a unified IMT (pictured in Figure 3-2). The ICG also coordinates with any MAC Group that is established at the APHIS or USDA level, based on the specific incident. For example, in the 2014–2015 HPAI outbreak in the United States, both the USDA MAC Group and the APHIS MAC Group were formed due to the size, scope, and impact of the incident.

In addition to policy and incident coordination, the APHIS Administrator, AMT, VS Deputy Administrator, and VSET communicate, collaborate, and coordinate with relevant industry associations, the National Assembly of State Animal Health Officials and National Association of State Departments of Agriculture, public health agencies (Federal and State), and other partners in a whole community approach.

Figure 3-1 is an example of an overview of the relationship between USDA, APHIS, and VS Leadership, MAC Groups, ICG, VS NIMTs, and Districts for an HPAI incident. Figure 3-2 provides more details on the MAC Groups, ICG, and the unified IMTs.[2] These figures reflect the incident management structure that was executed in the recent HPAI outbreaks in the United States; all organizational structures may be modified or scaled based on the needs of future incidents.

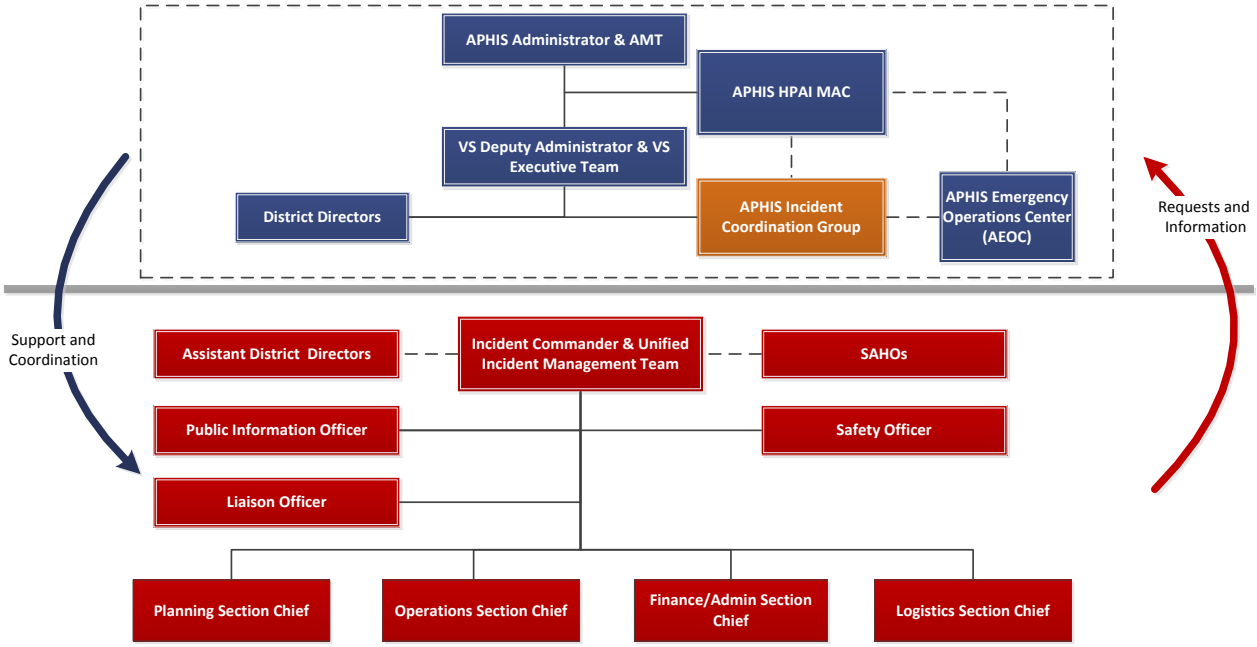
[2] NIMT refers to the standing VS IMTs that exist; a unified IMT includes the NIMT, but also State/local personnel who are part of the unified IC structure.

*Figure 3-1. Overview of USDA APHIS Multiagency Coordination, Incident Coordination Group, Field Personnel (National Incident Management Teams and Districts), and Stakeholder Relationships for an HPAI Incident*




Note: NASAHO = National Association of State Animal Health Officials, NASDA = National Association of State Departments of Agriculture

*Figure 3-2. Details of USDA APHIS Multiagency Coordination, Incident Coordination Group, and a Unified Incident Management Team for an HPAI Incident*




The following subsections describe the MAC Group and APHIS ICG, as well as the APHIS organization for single and multiple incidents. The *APHIS Foreign Animal Disease Framework: Roles and Coordination* (*Foreign Animal Disease Preparedness and Response Plan [FAD PReP] Manual 1-0*) contains more information.

## 3.3.1 Multiagency Coordination

MAC functions are executed at various levels, and typically include the coordination of policy, incident priorities, resource allocation and acquisition, and resolution of issues common to all parties. The size and scope of the HPAI incident dictates what levels and types of MAC Groups and MAC functions are required. However, these groups are not part of the on-scene IC; therefore, MAC groups do not command activities in the field.

An APHIS MAC Group would typically be composed of senior-level APHIS representatives, and may include subject matter experts that can reach across the agency to achieve an effective coordination structure. In the event that there are significant threats or consequences to public health, the environment, or the economy, a USDA MAC Group could also be established, composed of high-level representatives from programs and agencies throughout the department. MAC Groups establish supportive relationships among departments, agencies, and units preparing for and responding to an HPAI outbreak. Further information can also be found in the APHIS *Emergency Mobilization Guide*. The current

version is located at https://www.aphis.usda.gov/library/manuals/pdf/aphis_1050.pdf).

## 3.3.2 APHIS Incident Coordination Group

The APHIS ICG is responsible for acquiring resources, formulating policy options, and assisting in implementing response and recovery strategies for an HPAI outbreak. APHIS ICG responsibilities in an HPAI outbreak include

- providing policy guidance for response activities,
- providing information and coordination with health and safety personnel to ensure responder and public health and safety,
- supporting NIMTs and the unified ICs and their requirements,
- assisting in coordinating resources and integrating other organizations into the ICS, and
- providing information to the Joint Information Center (JIC) for use in media and stakeholder briefings.

The organization of the ICG is flexible and scalable by incident, but it is consistent with NIMS and includes the typical Planning Section, Operations Section, Finance/Administration Section, and Logistics Section. It is led by a National Incident Coordinator and a Deputy Incident Coordinator. The ICG includes Groups and Units to handle functions such as epidemiology, policy, information management, diagnostics, budget, contracting, personnel, depopulation, disposal, and logistics. Additional information, including an ICG organizational chart, can be found in the *APHIS Emergency Mobilization Guide* and in the *APHIS Foreign Animal Disease Framework: Roles and Coordination* (*FAD PReP Manual 1-0).*

## 3.3.3 Organization at the Field Level

At the beginning of an incident, the State Animal Health Official (SAHO) or designee, and the VS Assistant Director (AD), or designee, initially serve as Co-Incident Commanders in a unified IC structure. The AD and SAHO (or their designees) may be relieved by a VS NIMT as requested. To-date, VS has five standing NIMTs. Either the SAHO/AD or NIMT establish an Incident Command Post (ICP), which serves as the base of deployment for field personnel. There may be multiple ICPs, depending on the incident. These remain unified State-Federal IC organizational structures.

If there is more than one incident, more than one IC is likely to be established. An Area Command (AC) may also be established. In this case, individual Incident Commanders responsible for potentially multiple unified IMTs would report to

the AC. AC organizational structures may not be established or appropriate in all incidents; in many cases, the ICG will perform the same functions as an AC. For more information on single incident and multiple incident coordination along with a full NIMT configuration, please see *APHIS Foreign Animal Disease Framework: Roles and Coordination (FAD PReP Manual 1-0).*

## 3.4 USDA APHIS TIERED RESPONSE TO HPAI

Consistent with the NRF, USDA APHIS uses a tiered response to FAD incidents, which includes HPAI. HPAI response will begin and end locally. As suggested by the NRF, organizational structures used to respond to HPAI—like a NIMT, ICG, or MAC Group—can be "partially or fully implemented in the context of a threat, in anticipation of a significant event, or in response to an incident."[3] This ensures that the level of response is consistent and appropriate with the scale of the incident. For example, the HPAI outbreak in 2014–2015—a very large event—required rapid scale-up of organizational structures, coordination, and resources. Smaller incidents are handled by State, Tribal, and local resources; larger events require full mobilization of VS and resource and coordination from APHIS. Depending on the incident, resources or coordination may also be requested from USDA by the APHIS Administrator. USDA is the lead Federal agency in any HPAI incident detected in poultry.

## 3.5 DIAGNOSTIC RESOURCES AND LABORATORY SUPPORT

USDA also has critical diagnostic resources and laboratory support that are leveraged in an HPAI outbreak.

### 3.5.1 National Veterinary Services Laboratories

The NVSL is the official reference laboratory for FAD diagnostic testing and study in the United States. The NVSL performs animal disease testing in support of USDA-APHIS programs designed to protect the health of U.S. poultry and livestock. The NVSL provides *all* confirmatory testing for HPAI on all specimens, including those found presumptively positive at a National Animal Health Laboratory Network (NAHLN) laboratory or other USDA-approved laboratory. The NVSL has two locations for FAD diagnostic testing: Ames, IA (NVSL-Ames), and the Foreign Animal Disease Diagnostic Laboratory (FADDL), Plum Island, NY (NVSL-FADDL). NVSL-Ames provides confirmatory testing for HPAI.

[3]FEMA. (2016). National Response Framework. Retrieved from https://www.fema.gov/national-response-framework.

## 3.5.2 National Animal Health Laboratory Network

As of the date of publication, the NAHLN consists of more than 60 laboratories and coordinates the veterinary diagnostic laboratory capacity of State animal health laboratories and their extensive infrastructure, including facilities, equipment, and professional expertise. Of these laboratories, over 55 are currently approved to perform AI testing diagnostics (Appendix B).

The NAHLN provides a means for early detection of AI, rapid response through surge capacity to test outbreak samples, and recovery by the capability to test large numbers of samples to show freedom from AI. The confirmation of an HPAI outbreak is made at NVSL-Ames. After positive confirmation of HPAI, subsequent samples from premises inside the established Control Area may be sent directly to laboratories that are part of NAHLN. Please see Section 5.4 for more information on diagnostics.

## 3.5.3 Center for Veterinary Biologics

APHIS's Center for Veterinary Biologics is responsible for licensing new products, including new diagnostic test kits and vaccines for AI. This work—centered on enforcement of the Virus Serum Toxin Act—ensures that pure, safe, potent, and effective veterinary biologics are available for the diagnosis, prevention, and treatment of animal diseases.

# Chapter 4
# HPAI Outbreak Response Goals and Strategy

Chapter 4 covers a wide range of information about how USDA APHIS, States, Tribal Nations, localities, and stakeholders respond to an HPAI outbreak in poultry in the United States. In particular, this chapter

- identifies USDA APHIS goals for responding to an HPAI outbreak,
- identifies critical activities and tools required to achieve the response goals,
- discusses the epidemiological principles for an HPAI response effort,
- provides the USDA APHIS primary response strategy for HPAI in poultry,
- introduces factors influencing the scope of regulatory intervention, and
- reviews the international standards from the OIE for AI.

## 4.1 Response Goals

*The goals of an HPAI response are to (1) detect, control, and contain HPAI in poultry as quickly as possible; (2) eradicate HPAI using strategies that seek to protect public health and the environment, and stabilize animal agriculture, the food supply, and the economy; and (3) provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products.*

*Achieving these three goals will allow individual poultry facilities, States, Tribes, regions, and industries to resume normal production as rapidly as possible. The objective is to allow the United States to regain disease-free status without the response effort causing more disruption and damage than the disease outbreak itself.*

The United States protects its poultry from HPAI through a number of measures, including extensive AI surveillance, import restrictions, and education programs. In the event of an HPAI outbreak, USDA and the affected State(s) work with the poultry industry to control and eradicate the disease as expeditiously as possible. In an HPAI outbreak, APHIS coordinates with the CDC and other public health authorities, including at the State, Tribal, and local level, as needed. APHIS also collaborates with the DOI and other Federal, State, tribal, and local wildlife

agencies that have primary jurisdictional authority and subject matter expertise for wildlife.

# 4.2 Principles, Critical Activities, and Tools for an HPAI Response

## 4.2.1 Critical Activities

In order to achieve the goals of an HPAI response, critical activities and tools must be implemented to successfully execute the response strategy. Box 4-1 lists these critical activities and tools. A science- and risk-based approach that protects the public, animal health, the environment, and stabilizes animal agriculture, the food supply, and the economy is employed at all times. Please see Chapter 5 for further information on these activities and tools.

*Box 4-1. Critical Activities and Tools for an HPAI Response*[1]

**Critical Activities and Tools for Containment, Control, and Eradication**

- Public communication and messaging campaign
- Swift imposition of effective quarantine and movement controls
- Stringent and effective biosecurity measures
- Rapid diagnosis and reporting
- Epidemiological investigation and tracing
- Rapid appraisal and indemnity process for producers
- Increased surveillance
- Continuity of business measures for non-infected premises and non-contaminated animal products (*Secure Poultry Supply Plan*)
- Rapid mass depopulation and euthanasia
- Effective and appropriate disposal procedures
- Cleaning and disinfection (virus elimination) measures

## 4.2.2 Epidemiological Principles

Three basic epidemiological principles form the foundation to contain, control, and eradicate HPAI in the U.S. poultry population:

1. *Prevent contact between the HPAI virus and susceptible poultry.*

    a. This is accomplished through quarantine of infected poultry and movement controls in the Infected Zone(s) (IZ) and Buffer Zone(s)

[1] Emergency vaccination may be considered, but has not been implemented in past HPAI outbreaks.

(BZ) (which comprise the Control Areas [CA]), along with biosecurity procedures to protect non-infected poultry.

b. Certain circumstances may warrant accelerating the depopulation or euthanasia of poultry at risk for exposure to HPAI to decrease the population density of susceptible poultry.

c. There is a serious transmission risk posed by people, material, conveyances, and animals that may have been in contact with HPAI and serve as mechanical vectors. Contact between poultry and these items should be prevented, and transmission risk mitigated through stringent biosecurity and cleaning and disinfection measures.

2. *Stop the production of HPAI virus by infected or exposed animals*. This is accomplished by rapid mass depopulation (and disposal) of infected and potentially infected poultry.

3. *Increase the disease resistance of susceptible poultry to the HPAI virus or reduce the shedding of HPAI in infected or exposed poultry*. This may be accomplished by strategic emergency vaccination if a suitable vaccine is available and can be administered in a timely manner.

### 4.2.3 Coordinated Public Awareness Campaign

One of the most important critical activities is a public awareness campaign. Box 4-2 details the importance of effective communication and messaging to the overall HPAI response effort.

*Box 4-2. Coordinated Public Awareness Campaign*

**Importance of Communication to Support Response**

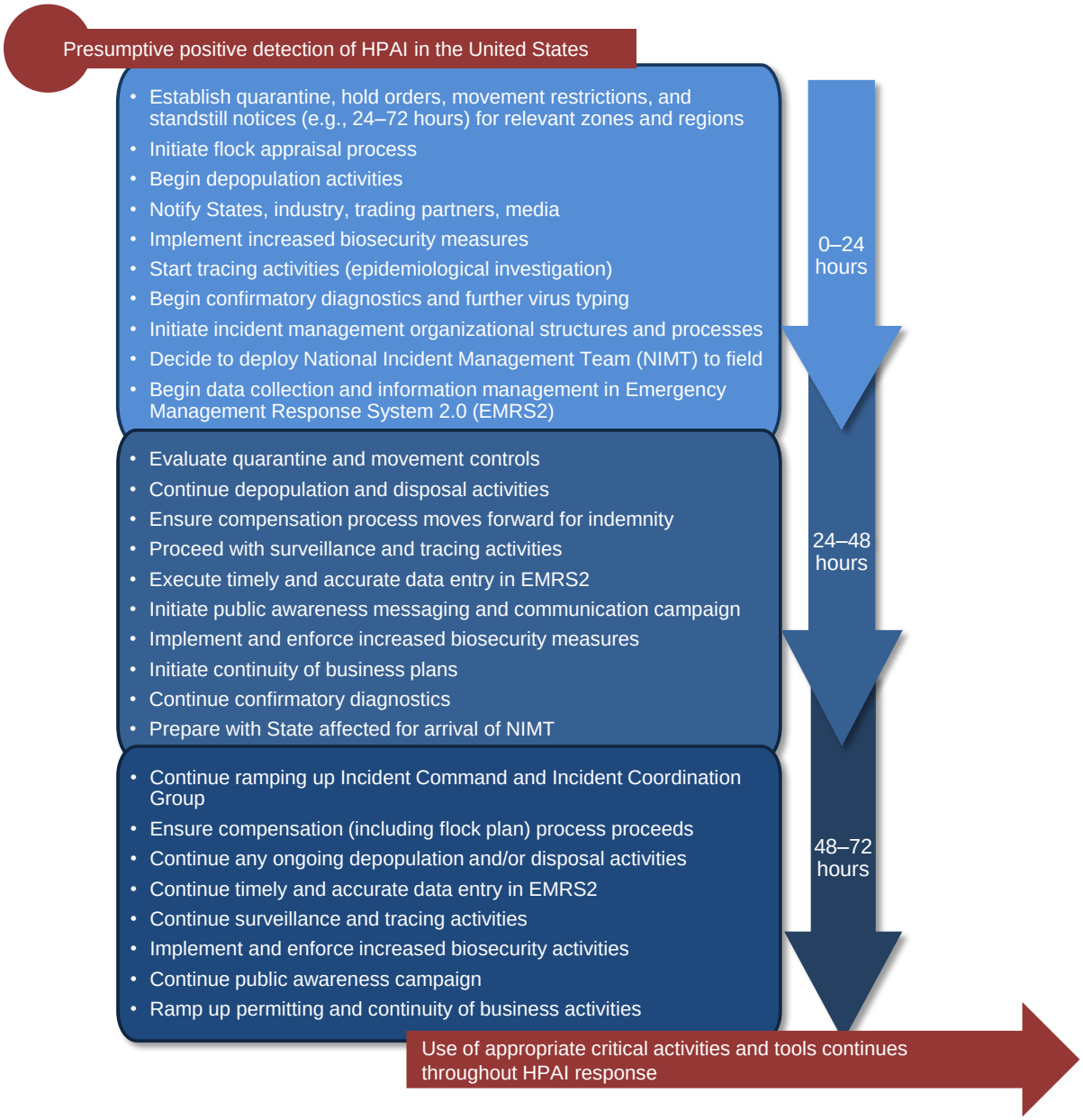
In all HPAI outbreaks, a public awareness campaign must be effectively coordinated with audience-appropriate information both created and distributed. This supports the response strategy by

- engaging and leveraging Federal, State, Tribal, local, and stakeholder relationships to provide unified public messages for local, national, and international audiences;
- addressing issues and concerns relating to food safety, public health, and animal welfare;
- addressing issues and concerns relating to interstate commerce, continuity of business, and international trade; and
- widely disseminating key communication messages to consumers and producers.

## 4.2.4 Timeline in Any HPAI Response for First 72 Hours

In the first 72 hours after the detection of HPAI in the United States, specific actions must occur; as seen in Figure 4-1, these critical tasks are fundamental to the rapid control and containment of HPAI. Figure 4-1 covers many of the most important tasks and activities but is not all-inclusive. Each response effort is different; however, some activities—such as rapid appraisal and depopulation of affected flocks—are of ultimate importance in any HPAI outbreak.

*Figure 4-1. Critical Activities in the First 72 Hours of U.S. HPAI Response*



# 4.3 Response Strategy for Control and Eradication of HPAI in Poultry

The United States' primary control and eradication (response) strategy for HPAI in poultry is stamping-out. If the spread of HPAI outpaces the resources for stamping-out, or if other factors direct the response away from a stamping-out strategy alone, emergency vaccination strategies might be considered.

Currently, it is not possible to delineate *a priori* the specific factors that might signal the need to deviate from an exclusive stamping-out strategy in any given outbreak. A decision to use emergency vaccination will be based on the prevailing epidemiological circumstances during the outbreak, as well as the availability of an appropriate vaccine. Vaccine was not used in the 2014–2015, 2016, or 2017 outbreaks in the United States. Please see Section 5.16 for information on emergency vaccination.

Regardless of the response strategy, critical activities and tools are employed, such as health and safety, biosecurity, surveillance, depopulation, disposal, and movement control (see Chapter 5). This chapter provides general strategic guidance for a response to the detection of HPAI in poultry.

## 4.3.1 Defining Stamping-Out as a Response Strategy for Poultry

For HPAI, stamping-out is the depopulation of clinically affected and in-contact susceptible poultry. Box 4-3 lists the key elements of stamping-out (disposal issues are covered in Section 5.14 in the next chapter). The OIE definition of stamping-out is provided in Section 4.5.1.

*Box 4-3. Strategy of Stamping-Out HPAI*

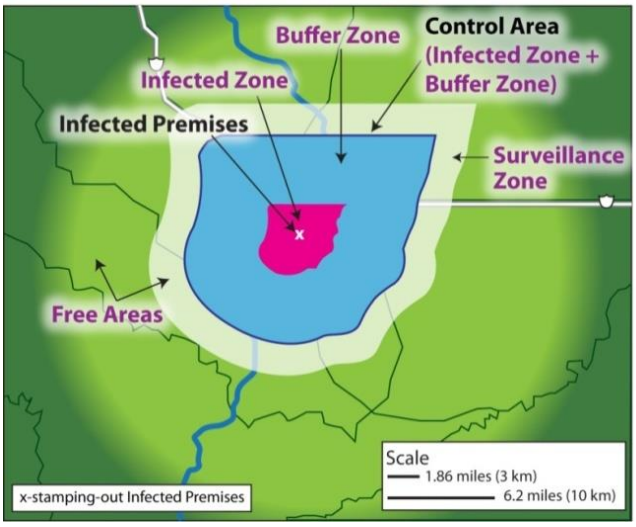
**Stamping-Out: Critical Goals**

- The goal is that, within 24 hours of (or as soon as possible after) a presumptive positive classification, infected poultry are depopulated in the quickest, safest, and most humane way possible. In many cases, poultry on Contact Premises (CP) or those meeting the suspect case definition may also be depopulated as soon as possible.
- Where resources are limited, premises are prioritized so that those with the highest potential for active HPAI spread are 'stamped-out' first.
- Based on the epidemiology of the outbreak, prioritizing which poultry to depopulate first may also be necessary.
- Public concerns about stamping-out require a well-planned and proactive public relations and liaison campaign. Stakeholders, the public, and the international community must be involved.
- Care should be taken to consider mental health implications for owners and responders when implementing a stamping-out strategy.

## 4.3.2 Zones and Areas in Relation to Stamping-Out

Figure 4-2 shows an example of a stamping-out strategy, where Infected Premises (IP) are depopulated. See Section 5.5 in Chapter 5 for more information on zones, areas, and premises for HPAI outbreak response.

*Figure 4-2. Example of Zones and Areas in Relation to Stamping-Out (Infected Premises would be Depopulated)*




## 4.3.3 Assessing a Possible Outbreak

During the investigation of premises suspected of having HPAI, animal health responders use clinical signs, history, and professional judgment to determine the

likelihood that HPAI exists on the premises. Appropriate control measures are initiated based on this rapid assessment. This assessment includes

- a history of clinical and epidemiological findings,
- results of physical examinations,
- necropsy findings,
- specimen collection and submission to an approved laboratory, and
- reporting/situational information.

Incident management includes quarantine and movement control, tracing, activation of response plans, and communication of these actions to all stakeholders, the public, and the international community. Cooperative Federal, State, Tribal, local, and industry response measures are carried out with extreme urgency using the broadest geographic scope appropriate.

If HPAI has not been or cannot be detected on a premises, but epidemiological evidence indicates that the disease has spread beyond the initial premises, the premises should be treated as presumptive positive premises and control and containment measures implemented.

### 4.3.4 Authorization for Response and Associated Activities

When the criteria for a presumptive positive HPAI case have been met (see Chapter 5 for case definitions), the APHIS Administrator or VS Deputy Administrator (Chief Veterinary Officer [CVO] of the United States) can authorize APHIS personnel—in conjunction with State, Tribal, and unified IC personnel—to initiate depopulation, cleaning, and disinfection procedures of the index case (IP) and investigation of CP. Depopulation of poultry on CP, or those meeting the suspect case definition, may also be warranted and conducted depending on the epidemiological information; this action will be authorized by APHIS and SAHOs/Tribal officials.[2] The need to initiate depopulation of poultry and cleaning and disinfection procedures on other poultry flocks in the IZ (which surrounds the index case/IP) may also be assessed.

HPAI may be listed as a disease reportable to animal health or public health officials depending on the laws and policy of the State or Tribal nation. In some States, all FADs or animal diseases of consequence are listed for reporting to a State authority, which would include HPAI. Detection of HPAI may result in emergency intervention by Federal, State, Tribal, and/or local authorities.

[2] Contact Premises that are depopulated because of epidemiological risk factors are often termed "dangerous Contact Premises."

When HPAI is detected, USDA, State, and/or Tribal officials immediately issue a quarantine, hold order, or standstill notice for the IP based on the authority and regulations of the affected State. A Federal quarantine may be issued when requested by SAHOs or as directed by the Secretary of Agriculture; Federal quarantines may not always be issued in HPAI outbreaks. Within the unified IC, the Incident Commander works with the Operations Section and Situation Unit (in the Planning Section) to determine zone, area, and premises designations during an HPAI outbreak. These designations are captured in the Emergency Management Response System 2.0 (EMRS2).

### 4.3.5 Management of Incident

The outbreak response effort should be implemented in a manner consistent with NIMS and ICS, with an appropriate span of control and delegation of authority. Response management and associated critical activities remain as local as possible. Clear, consistent, and timely communication internally (in the unified IC organizational structure and between the unified IC and ICG) and also within the whole community is imperative.

As soon as possible, a National Incident Coordinator (in the ICG) and an Incident Commander should be identified. In addition, a NIMT may be deployed and a unified State-Federal ICP established. There may be co-Incident Commanders in a unified IC, one State and one Federal. In-State resources (whether Federal, State, Tribal, local, or privately owned) should be used to manage the response. If the response requires, out-of-State resources may be used to support the State impacted by the outbreak.

If the outbreak involves wild birds, USDA collaborates with Federal and State agencies, including the DOI, which have jurisdictional authority over wild birds. Due to its zoonotic potential, the USDA also notifies and coordinates with appropriate local, State, and Federal public health agencies in response to an HPAI detection in poultry.

Incident management includes critical activities to prevent further spread of HPAI and implementation of relevant response plans, processes, and procedures. Cooperative Federal, State, Tribal, local, and industry response measures will be carried out with extreme urgency using the most appropriate geographic and jurisdictional scopes required to manage the situation. Response information must be communicated clearly and frequently to the whole community throughout the duration of the outbreak. USDA APHIS incident management is further discussed in the *APHIS Foreign Animal Disease Framework: Roles and Coordination (FAD PReP Manual 1-0).*

### 4.3.6 Control and Eradication Strategy for Other Species

#### 4.3.6.1 Captive Wild Birds

Should detections occur in captive wild birds (e.g., falcons or gyrfalcons used in falconry), these cases are managed individually based on the best information available to Federal and State animal health authorities. Captive wild birds (on premises *without* other poultry) may be quarantined under State authority and allowed to recover; diagnostic testing indicates when those birds are free of HPAI. An epidemiological investigation is conducted for all HPAI detections in captive wild birds. This assessment dictates the extent and duration of surveillance required in the surrounding area/premises.

#### 4.3.6.2 Other Animals

Susceptible animals, as referred to in this response plan, are limited to poultry unless otherwise specified in the case definition used during the outbreak. Additional susceptible animals or species may be determined, as needed, by the current knowledge of the epidemiology of the event. USDA notifies and coordinates with public health agencies and authorities in a response to a detection of HPAI in poultry or other animal species. For more specific information on roles and responsibilities, please see the *APHIS Foreign Animal Disease Framework: Roles and Coordination (FAD PReP Manual 1-0).*

Influenza viruses are typically adapted to a specific animal species and have a relatively high transmission barrier between species. However, interspecies transmission of influenza A viruses can occur. In particular, transmission and genetic re-assortment of influenza A viruses among humans, swine, and avian species have been well documented. In the event of an HPAI outbreak, appropriate biosecurity measures are implemented so that contact between infected poultry and all other susceptible animals is avoided. Should other species, besides poultry, become infected with HPAI virus, these animals are appropriately monitored to ensure that currently infected animals are not sent to slaughter or other premises. Other measures that are appropriate to the given situation may be applied based on the recommendation of the unified Incident Commander(s) and National Incident Coordinator. To limit human exposure, in addition to appropriate biosecurity and health and safety precautions, other strategies may be implemented based on the recommendations of USDA APHIS and public health agencies.

## 4.4 Factors Influencing Response

Previous sections identified the primary response strategy (stamping-out) for an HPAI outbreak. Detection of HPAI may result in emergency intervention by

Federal, State, Tribal, and/or local authorities; the scope of regulatory intervention depends on the following factors:

- *Consequences of the HPAI outbreak.* The consequences of the HPAI outbreak, and the impact of the response, in terms of disruptions to national security, food security, animal health, public health, environment, economy, interstate commerce, international trade, and regulatory issues. This includes short- and long-term impacts for owners and growers, local economies, and intrastate commerce.

- *Acceptance*. Acceptance of response policy and strategy (social and political) by different communities, from local to international. This includes all stakeholders.

- *Scale of outbreak.* The number of poultry infected, species infected, number of premises infected, type of premises affected, and poultry population density for infected areas or high risk area.

- *Rate of outbreak spread.* The rate of spread of infection in terms of number of premises, types of premises, number of susceptible poultry, types of poultry; rate at which each IP leads to infection of one or more new IP.

- *Veterinary countermeasures available.* The availability and efficacy of veterinary countermeasures, particularly HPAI vaccines; the acceptance of any emergency vaccination strategy.

- *Resources available to implement response strategies.* The capabilities and resources available to eradicate HPAI in poultry and to control and eradicate HPAI in potential wildlife reservoirs.

# 4.5 INTERNATIONAL STANDARDS FOR AI

## 4.5.1 OIE Standards for HPAI Response

In terms of general international standards, for countries that have competent veterinary authorities, the initial response eradication policy for HPAI outbreaks is stamping-out. Stamping-out, as defined in the OIE *Terrestrial Animal Health Code (2016)* means

> A policy designed to eliminate an outbreak by carrying out under the authority of the Veterinary Authority the following:
>
> a. The killing of animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact with the causal pathogen; animals should be killed

in accordance with Chapter 7.6.

b. The disposal of carcasses and, where relevant, animal products by rendering, burning or burial, or by any other method described in Chapter 4.12.

c. The cleansing and disinfection of establishments through procedures defined in Chapter 4.13.

## 4.5.2 Recognition of Disease-Free Status

As a member of the OIE, the United States has agreed to abide by standards drafted and approved by member countries. The OIE does not grant official recognition for HPAI-freedom, but OIE members can self-declare their entire country, zone or compartment (within their country) free from certain OIE-listed diseases, including HPAI.

In cases of self-declaration, delegates are advised to consult the OIE *Terrestrial Animal Health Code* for specific requirements for self-declaration of freedom from HPAI. By providing the relevant epidemiological evidence, the OIE member can prove to a potential importing country that the entire country, zone or compartment under discussion meets the provisions of the specific disease chapter. Any submitted self-declaration should contain evidence demonstrating that the requirements for the disease status have been met in accordance with OIE standards. This self-declaration must be signed by the official OIE delegate of the OIE member concerned. As mentioned in Article 10.4.27 of the OIE *Terrestrial Animal Health Code (2016)*, no member can declare itself free from influenza A infection in wild birds; the definitions for AI-free status apply to poultry only.

## 4.5.3 Criteria Needed for AI-Free Status

The OIE has two categories for country recognition for AI: (1) a country, zone, or compartment free from avian influenza (2) a country, zone, or compartment free from infection with high pathogenicity avian influenza viruses in poultry. These determinations are described in the OIE *Terrestrial Animal Health Code (2016)* in Articles 10.4.2, 10.4.3, and 10.4.4.

Per article 10.4.4, the OIE defines a country, zone, or compartment free from infection with high pathogenicity avian influenza viruses in poultry as follows:

> A country, zone, or compartment may be considered free from infection with high pathogenicity avian influenza viruses in poultry when:
>
> 1) It has been shown that infection with high pathogenicity avian influenza viruses in poultry has not been present in the country, zone, or compartment for the past 12 months, although its status with respect to low pathogenicity avian influenza viruses may be unknown; or

2) When based on surveillance in accordance with Articles 10.4.27 to 10.4.33, it does not meet the criteria for freedom from avian influenza but any virus detected has not been identified as high pathogenicity avian influenza virus.

The surveillance may need to be adapted to parts of the country or existing zones or compartments depending on historical or geographical factors, industry structure, population data, or proximity to recent outbreaks.

If infection has occurred in poultry in a previously free country, zone, or compartment, the free status can be regained three months after a stamping-out policy (including disinfection of all affected establishments) is applied, providing that surveillance in accordance with Articles 10.4.27 to 10.4.33 has been carried out during that three-month period.

# Chapter 5
# Specific HPAI Response Critical Activities and Tools

FAD PReP documents identify critical activities and tools to be employed in the event of an HPAI outbreak. These critical activities and response tools assist in controlling, containing, and eradicating HPAI while facilitating continuity of business in an outbreak. This chapter describes key parts of these critical activities and tools.

Documents referenced in this chapter can be found at www.aphis.usda.gov/fadprep.

## 5.1 Etiology and Ecology

Information on the etiology and ecology of HPAI helps promote a common understanding of the disease agent among responders and other stakeholders (see Chapter 1 for HPAI information). The *HPAI Overview of Etiology and Ecology SOP* contains additional information.

## 5.2 Laboratory Definitions and Case Definitions

Laboratory and case definitions provide a common point of reference for all responders. The following definitions are applicable to poultry. If animals other than poultry become significant in the response effort, the case and laboratory definitions may be adapted by the unified IC to fit the prevailing epidemiological findings during an outbreak.

Case definitions and laboratory criteria are developed according to the *Case Definition Development Process SOP* (see Section 5.2.3). The *H5/H7 AI Case Definition* is available in the following sections, and also on www.aphis.usda.gov/fadprep.

### 5.2.1 Laboratory Definitions

The following sections include definitions for H5/H7 AI, dated December 2015. For further information on the diagnostic tests conducted by NVSL in the event of an HPAI outbreak, please see Section 5.4.

### 5.2.1.1 LABORATORY CRITERIA

Subclinical infections identified through active laboratory surveillance or clinical cases with compatible clinical signs and pathologic lesions in a susceptible species are evaluated using laboratory criteria for HPAI and LPAI H5/H7 defined by one or more of the following diagnostic strategies:

1. *Serologic tests:* Demonstration of influenza A antibody by:
    a. Agar gel immunodiffusion (AGID) OR USDA-licensed influenza A enzyme-linked immunosorbent assay (ELISA); AND
    b. Confirmation of antibody to H5 or H7 by hemagglutination inhibition (HI).
2. *Antigen tests:* Detect presence of influenza A virus by:
    a. Antigen capture immunoassays (ACIA): collect tracheal/oropharyngeal and/or cloacal swab samples from clinically ill or dead birds. ACIA (test kits approved by APHIS) are for flock level testing; the ability to detect low levels of infection is enhanced by testing multiple samples. Molecular confirmation of positive results is required; negative results with clinical signs require confirmatory diagnostics as indicated in VS Guidance 12001, "Policy for the Investigation of Potential Foreign Animal Disease/Emerging Disease Incidents (FAD/EDI)." Samples will be forwarded to USDA's NVSL to determine subtype and pathotype.
    b. Direct RNA detection: real-time reverse transcriptase polymerase chain reaction (rRT-PCR) using NVSL-approved molecular assays for influenza A and H5/H7 subtypes, WITH molecular determination of subtype and pathotype direct from swab sample by Sanger sequence methods, OR virus isolation with antigenic and/or molecular characterization.
3. *Virus isolation and identification:* Preferred specimens for virus isolation include tracheal/oropharyngeal and cloacal swabs, fresh feces from live or dead birds, or samples from organs pooled by system (e.g., respiratory-trachea, lungs, air sacs; enteric-intestine, spleen, kidney, liver; reproductive) from dead birds. A preparation of the specimen is inoculated into the allantoic cavity of susceptible embryonated chicken eggs. The eggs are incubated at 37ºC for 4 to 5 days. The amniotic-allantoic fluid is harvested from inoculated embryos and tested for presence of virus by molecular, hemagglutination, or antigen capture methods with subtype (HA and NA) determination by molecular or HI and neuraminidase inhibition (NI) assays.
4. *Strain virulence evaluation:*
    a. Determination of the amino acid sequence at the hemagglutinin cleavage site (of H5 and H7 viruses) to identify viruses that have the

capacity to become highly pathogenic with or without elevated mortality in *in vivo* assays (see b. below).

b. Viruses with an intravenous pathogenicity index (IVPI) greater than 1.2, or that cause at least 75 percent mortality within 10 days in 4- to 8-week-old chickens infected intravenously, are classified as HPAI.

c. If H5 or H7 subtypes do not meet the criteria for HPAI, they are classified as H5/H7 LPAI.

5. *Assumptions:* Influenza virus may be detected 48 hours post-infection (HPAI within 24 hours post-infection) by virus isolation or rRT-PCR (Spackman 2006) and 1–5 days post-infection by antigen capture enzyme immunoassay, when virus is shed at moderate to high levels (Gelb and Ladman 2006). Oropharyngeal/tracheal specimens are preferred for poultry because there generally are fewer inhibitors and therefore higher test sensitivity especially during the early phase of infection. While oropharyngeal/tracheal swabs are preferred for detection of AI in poultry, cloacal swabs are more preferred in wild birds. Presence of blood or fecal material in swab specimens (i.e., cloacal swabs) can result in lower sensitivity on the rRT-PCR assay due to the presence of non-specific inhibitors, and should be processed appropriately.

## 5.2.2 Case Definitions

The following sections include case definitions developed by APHIS VS Science, Technology, and Analysis Services (STAS) CEAH Surveillance Design and Analysis as of December 2015. These definitions may be revised at any time based on current epidemiological information. This case definition is available with the other HPAI materials at www.aphis.usda.gov/fadprep.

### 5.2.2.1 Case Definition

1. *General comments:* AI virus can infect almost all species of birds. Domestic poultry defined as having illness compatible with OIE reportable AI infection (H5/H7 HPAI and LPAI) are those with one or more of the following clinical signs and gross lesions: reduction in normal vocalization; listlessness; conjunctivitis; drops in egg production sometimes with pale, misshapen or thin-shelled eggs; respiratory signs such as rales, snicking, and dyspnea; neurological signs such as incoordination or torticollis; a drop in feed and/or water consumption; swollen or necrotic combs and wattles; swollen head and legs; lungs filled with fluid and blood; tracheitis and airsacculitis; hemorrhages on the unfeathered parts of legs and feet; petechial hemorrhages on internal organs (Easterday et al. 1997); OR flocks within a CA that experience mortality as listed for each compartment as follows (S. Malladi and E. Gingerich, personal communications, 2013):

   a. Commercial broilers: mortality exceeding 3.5 birds/1,000 per day.

b. Commercial layers: mortality exceeding 3 times the normal daily mortality per day (normal: 0.13 birds/1,000 per day for layers from 2 to 50 weeks, and 0.43 birds/1,000 per day for layers over 50 weeks); OR 5 percent drop in egg production for 3 consecutive days.

c. Commercial turkeys: mortality exceeding 2 birds/1,000 per day.

d. Broiler breeders: mortality exceeding 2 birds/1,000 per day.

e. Layer breeders: mortality exceeding 3 times the normal daily mortality per day (normal: 0.2 birds/1,000 per day prior up to 50 weeks, and 0.37 birds/1,000 per day after 50 weeks).

f. Turkey breeders: mortality exceeding 2 birds/1,000 per day; OR a decrease in egg production of 15 percent occurring over a 2-day period.

g. Small volume high-value commercial poultry and backyard flocks: any sudden and significant mortality event or sudden drop in egg production should be investigated.

2. *Suspect case:* Domestic poultry with:

   a. Illness compatible with H5/H7 AI infection; OR

   b. Detection of antibodies to influenza A as determined by AGID or ELISA serological test with or without the presence of compatible illness; OR

   c. Detection of influenza A antigen using a commercially available influenza A antigen test kit (ACIA, approved by USDA) with the presence of compatible illness.

3. *Presumptive positive case:*

   a. A suspect positive case as defined above with detection of antibodies to influenza A as determined by AGID serological test that cannot be explained by vaccination (USDA permission required for use in the United States), and subtyping by HI and NI as H5/H7 with any NA subtype; OR

   b. Domestic poultry with identification of influenza A RNA by rRT-PCR with or without the presence of compatible illness.

4. *Confirmed positive case:* Domestic poultry with influenza A antigen detection (virologic or molecular detection methods) AND the confirmation of the H5/H7 subtype WITH determination of pathogenicity

by NVSL as described in Section 2.2 of the *OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (HPAI or H5/H7 LPAI).

5. *Epidemiological criteria and restrictions:* Surveillance efforts are restricted along the lines of the compartmentalization concept. Compartmentalization is intended to create a functional separation of the commercial poultry industry, the LBMS, backyard poultry flocks, and wild migratory waterfowl through management practices (Scott 2006). The efficacy of compartmentalization can be verified through surveillance information and evaluation.

    a. Commercial poultry breeder and production flock surveillance (including many game bird breeders) is conducted through the NPIP.

    b. Commercial meat-type chicken and meat-type turkey surveillance is an industry initiative of the National Chicken Council and National Turkey Federation that meets or exceeds the NPIP commercial surveillance program.

    c. LBMS surveillance occurs through cooperative agreements between APHIS and participating SAHO. The federally funded and State-administered program is designed to enhance and unify existing State programs and to assist States in meeting their goals for prevention and control of H5/H7 LPAI in the LBMS. State programs often exceed APHIS minimum standards.

    d. Surveillance of the non-traditional backyard compartment occurs through individual State surveillance programs in cooperation with APHIS.

## 5.2.3 Case Definition Development Process

The *Case Definition Development Process SOP* describes the general process for developing and approving animal disease case definitions for use in animal health surveillance and reporting.

CEAH (part of STAS), in cooperation and coordination with SPRS, develops animal disease case definitions for animal health surveillance and reporting. VS units and other stakeholders review draft definitions; the VS Deputy Administrator (U.S. CVO) and VSET approve the case definitions. Case definitions enhance the usefulness of animal disease data by providing uniform criteria for reporting purposes.

In any specific HPAI outbreak, case definitions may be edited within 24 hours of the first presumptive or confirmed positive case (index case). The case definitions are reviewed throughout the outbreak and modified on the basis of additional information or the changing requirements of the eradication effort.

# 5.3 SURVEILLANCE

This section provides an overview of HPAI outbreak surveillance. **It is important to read this section prior to Appendix D.** Appendix D provides surveillance parameter definitions, sampling examples, data to illustrate how different HPAI strains may affect surveillance, and guidance on adjusting surveillance plans accordingly.

The surveillance guidelines presented here do not specifically or comprehensively address surveillance for continuity of business in an outbreak such as surveillance testing for daily bird or product movement from layer, broiler, or turkey flocks. However, when testing and sampling methods comply, test results from business continuity surveillance help to meet outbreak surveillance testing requirements. For more information on the diagnostic testing required for business continuity movements, please see the *Secure Poultry Supply Plan* (includes eggs, broilers, and turkeys).

## 5.3.1 Surveillance Goals and Objectives

Surveillance is a critical activity during an outbreak of HPAI. The following are the goals of surveillance in response to an HPAI outbreak:

- Implement a surveillance plan within 48 hours of the confirmation of an outbreak.
- Implement a surveillance plan that will (1) define the present extent of HPAI and (2) detect unknown IP quickly.
- Consider susceptible wildlife populations in the surveillance plan; coordinate with APHIS WS, DOI, State wildlife agencies, and State agriculture departments to perform appropriate surveillance in wildlife populations.
- Provide complete surveillance data summaries and analyses at intervals specified by the unified IC.

Box 5-1 lists key objectives of surveillance activities during and immediately after an HPAI outbreak in poultry.

*Box 5-1. Surveillance Plan Objectives in an HPAI Outbreak*

**Surveillance Plan Objectives**

- Detect HPAI IP quickly.
- Determine the size and extent of the HPAI outbreak.
- Supply information to assess and modify outbreak response activities.
- Provide information for animal and product movement within the CA.
- Provide information for animal and product movement out of the CA.
- Prove evidence to demonstrate HPAI absence on a premises, or demonstrate HPAI absence in an area during (e.g., in the Surveillance Zone [SZ]) or after (e.g., in the CA) eradication of the outbreak.

## 5.3.2 Surveillance Activities by Time Period and Zone for the Unified Incident Command

There are three key time periods defining surveillance activities in an outbreak, each with distinct implementation priorities.

1. *The initial 72 hours post-HPAI outbreak declaration.* During this period, surveillance-related activities of the unified IC should include the following:

    a. Create the IZ and BZ designations and the boundary of the CA.

    b. Create a list of known premises with susceptible poultry in the CA. Gather additional information for each premises including species, production type, and estimated population size.

    c. Determine CP (this includes direct and indirect exposure, per the definition of a CP) to known IP.

    d. Evaluate surveillance guidance below (Sections 5.3.3 and 5.3.4) and HPAI Response and Policy information on surveillance (available from www.aphis.usda.gov/fadprep, navigate to the HPAI-specific page). Modify existing surveillance guidance with outbreak-specific information to create a surveillance plan for the CA. The initial objectives of surveillance in the CA are to detect infected flocks and premises as quickly as possible, and to determine the size and extent of the HPAI outbreak.

    e. Initiate surveillance within the CA as soon as possible. A common approach is to actively sample all commercial premises and ensure active outreach to all backyard premises with investigation of those deemed high-risk.

f. Determine the boundary of the SZ, which is located in the Free Area (FA), and start developing a surveillance plan for the SZ based on existing HPAI Response and Policy information on surveillance (available from www.aphis.usda.gov/fadprep, navigate to the HPAI-specific page). The objective of surveillance in the SZ is to provide evidence of freedom of disease.

2. *The control period (from initial 72-hour period until last case is detected and depopulated).* The key surveillance activities to accomplish simultaneously in this period are as follows:

   a. Continue CA surveillance. The objectives are to detect IP so that control measures can be immediately implemented and zone/CA boundaries can be adjusted as needed.

   b. Provide evidence that premises are free of HPAI, thereby setting the stage to permit poultry and poultry product movements within and out of the CA. For more information on surveillance testing required for business continuity, please see the *Secure Poultry Supply Plan* (includes guidance for eggs, broilers, and turkeys).[1] These plans provide information on the diagnostic testing required for movement during an HPAI outbreak. Appendix C also provides additional information on the *Secure Poultry Supply Plan*.

   c. Conduct surveillance in the SZ sufficient to demonstrate that the pathogen has not extended its distribution beyond the CA.

   d. Gather information about the epidemiology of the outbreak strain of the virus (virulence, incubation period, etc.) through observation and communication with other agencies, researchers, and partners.

   e. Determine the role of backyard poultry in outbreak spread; if backyard poultry are not implicated in virus transmission, surveillance in this population can be reduced.

   f. Revise or prioritize ongoing control and surveillance activities based on surveillance results and available epidemiologic information. Information may support modification of sampling frequency, movement restrictions, risk factor mitigations, vaccination decisions, or targeted sampling, as examples.

3. *Completion of depopulation to freedom.* The objective is to provide evidence that the CA and FA are free of disease. Multiple streams of

[1] At the time of writing, each commodity had an individual website: www.secureeggsupply.com, www.securebroilersupply.com, and www.secureturkeysupply.com. Work continues to integrate these all the work completed on these three plans into a single Secure Poultry Supply Plan.

surveillance may be considered including sampling through NPIP, LBMS, wild birds, and passive surveillance activities. See Chapter 6 for more information.

## 5.3.3 Outbreak Surveillance Guidance—Passive Surveillance

Passive surveillance is the voluntary reporting of suspect cases by producers and practitioners. Passive surveillance is ongoing in the United States; suspect cases will trigger a FAD investigation (per *VS Guidance Document 12001*). In the event of an HPAI detection, passive surveillance is intensified through rapid and clear communication to all producers in the CA. Though respiratory signs sometimes accompany LPAI infections, especially in association with age (older birds) or stress (e.g., puberty), passive surveillance is most sensitive when used to detect highly pathogenic strains of the virus.

- *Commercial poultry*: Commercial flocks within the CA that exceed the mortality/morbidity thresholds as described in Section 5.2.2.1 should be investigated and sampled for avian influenza as rapidly as possible.

- *Backyard poultry:* The unified IC, in coordination with subject matter experts, should develop species-specific morbidity and mortality criteria that dictate the need for further investigation in backyard flocks. Reports of clinical signs or unusual mortality from backyard producers (sick bird calls) should be investigated as rapidly as possible. However, sick bird calls may overwhelm available resources, particularly when investigation and/or management of the IP and CP are not complete. In this case, the unified IC may recommend triaging disease investigations on backyard premises, using the morbidity and mortality criteria and/or farm risk factors (e.g., close proximity to bodies of water with waterfowl concentrations). These triggers should be based on the best information available and should be developed in coordination with State/Tribal officials.

See HPAI Response and Policy information on surveillance (available from www.aphis.usda.gov/fadprep, navigate to the HPAI-specific page) for further guidance on passive surveillance in the CA.

## 5.3.4 Outbreak Surveillance Guidance—Active Surveillance

It is challenging to develop active surveillance guidelines *a priori* that will be optimal for all HPAI outbreaks. Surveillance plans will vary to address objectives that may differ by zone, area, and premises designations (see Section 5.5 for details on zone, area, and premises designations). Plans may also vary by outbreak type, field capacity, and epidemiologic characteristics that can differ by region, host, and virus.

*Note on active surveillance of backyard flocks:* The role of backyard flocks in the spread and duration of an HPAI outbreak is variable. Due to this variability, it is recommended that active surveillance in backyard premises either follow the general commercial premises sampling guidelines, or follow specific HPAI Response and Policy information on surveillance in backyard flocks (available from www.aphis.usda.gov/fadprep, navigate to the HPAI-specific page).

#### 5.3.4.1 GENERAL ACTIVE SURVEILLANCE PARAMETERS

The core of any surveillance plan describes the frequency, number, and distribution of animals and premises targeted for sampling. Recommendations and decisions regarding these components come from knowledge about, and trade-offs between, surveillance parameters. At the onset of an outbreak, default parameter settings for early detection in the CA and demonstration of disease absence in the SZ can be helpful and are listed below. However, it is critical to note that during an outbreak, parameter estimates and surveillance plans may change as new information about viral characteristics and epidemiology becomes available. Further information on these surveillance parameters and modification instructions are provided in Appendix D.

Common default parameter settings are as follows:

1. *Design (threshold) prevalence*:

    a. *Premises level*: For the SZ, which is part of the FA and assumed to be free of disease, start with 10 percent then adjust as the outbreak progresses and additional information becomes available. The appropriate premises level design prevalence depends on the number of premises in the zone, viral characteristics, mechanisms of spread, public health consequences, and other factors (see Appendix D, Table D-1 and D-2). Note that the recommended surveillance plan requires testing of all commercial premises in the CA (i.e., a 'census', rather than a statistical sample) and thus a design prevalence here is not needed.

    b. *Bird level*: A common setting is 40 percent within the sick and dead bird population in a house, whether located in the CA or a SZ.

2. *Confidence level:* Ninety-five percent is the standard.

3. *Risk-based sampling:* Target sick and dead birds in a house.

4. *Type of tests:* rRT-PCR is ascribed a test sensitivity of 85 to 88 percent for detection of one or more infected bird samples for both the 5-bird and 11-bird pools.

5. *Sampling frequency:* This varies by area/zone and premises type. See Table 5-1 below and Table D-5 (Appendix D) for CA guidance. In the SZ,

frequency of sampling could be limited: e.g., performed once near initiation and once near the close of a CA, or more or less frequently depending on potential pathways of disease introduction. In any case, a sample of premises should be conducted for at least one incubation period beyond the last known exposure. See Table D-5 (Appendix D).

*Table 5-1. Sampling Frequency Guidelines by Control Area Premises Designations*

| Premises Type | Sampling Frequency | Sampling Duration |
|---|---|---|
| Contact Premises (CP) | Every other day | 14 days, then as ARP/MP |
| Suspect Premises (SP) | Once | Temporary designation |
| At-Risk Premises (ARP) | Every 5–7days | 3 rounds minimum for duration of quarantine |
| Monitored Premises (MP) | Every 5–7 days or more often for movement | 3 rounds minimum or more often for movement for duration of quarantine |

6. *Sample size:*

   a. *Premises:* Sample all premises (i.e., conduct a census) in the CA. In the SZ, a subset of premises can be selected for sampling. The target number of premises to sample varies with the total number of premises in the SZ and the value selected for the premises-level design prevalence. See Tables D-1, D-2, and D-5 (Appendix D) for guidance on the number of premises to sample per zone for various design prevalence settings and the number of premises in the zone.

   b. *Birds:* Using the recommended bird-level design prevalence given in 1 above, sample two 5-bird (or 11-bird) pools from the sick and dead-bird group per house; only 5-bird pools are approved for use in backyard flocks. Divide available sick and dead birds approximately equally between the two pools when less than 10 (for 5-bird pools) or less than 22 (for 11-bird pools) birds are available. Sampling apparently healthy gallinaceous birds provides negligible benefit in most cases. In Appendix D, see Table D-3 and D-5 for guidance on the recommended number of pooled samples per house for other design prevalence values.

*Box 5-2. Pooled Sampling Guidelines*

**Pooled Sampling Guidelines for HPAI Surveillance in Gallinaceous Birds**

- **5-Bird (or 11-Bird) Pool:** A swab is taken from each bird, for up to 5 or 11 dead or euthanized sick birds from the house's daily sick and dead birds. The 5 or 11 swabs are placed into one tube and constitute one pooled sample.
- **Choosing the 5-Bird or 11-Bird Pool:** The probability of detection is higher with the 11-bird pool, but 11-bird pools are approved for use in gallinaceous poultry in commercial settings only. Using 2 5-bird or 11-bird pools will detect 1 positive bird if design prevalence is 40 percent within the sick and dead birds, although the 11-bird pool will result in a slightly higher confidence (96 percent and 98 percent respectively). See Figure D-1 and Table D-3 for comparison of detection capabilities of the 5-bird and 11-bird pools.
- **Apparently Healthy Gallinaceous Birds:** In situations where less than 5 or 11 dead or sick birds are available, only the available dead or sick birds should be sampled, but swabs should still be divided approximately equally between the two pooled samples. Sampling apparently healthy gallinaceous birds provides negligible benefit.
- **Additional Sampling Guidelines:** Please see *Avian Sample Collection for Influenza A and Newcastle Disease* at www.aphis.usda.gov/fadprep and navigate to the HPAI-specific page.

## 5.3.5 Additional Guidance

At the APHIS level, the CEAH Surveillance Design and Analysis (SDA) Unit is responsible for and assists the unified IC and NIMT in surveillance planning for the CA and SZ. SPRS is responsible for surveillance implementation.

Existing HPAI Response and Policy information on surveillance (available from www.aphis.usda.gov/fadprep, navigate to the HPAI-specific page) describes surveillance conducted in previous outbreaks and provides protocols which distinguish between commercial and backyard premises. These documents can be consulted as templates or starting points to guide immediate outbreak response.

Appendix D in this document contains example active surveillance strategies for commercial premises and introduces assumptions and methods that influence surveillance decisions. On-line calculators are available to assist with certain aspects (e.g., FreeCalc). However, development of a detailed plan should either follow the templates and guidance in existing surveillance documents or involve the help of field or program teams with surveillance planning expertise. CEAH SDA is available to advise, construct, or review outbreak surveillance plans on request.

# 5.4 DIAGNOSTICS

Effective and appropriate sample collection, diagnostic testing, surge capacity, and reporting are critical in an effective HPAI response. These activities may require additional resources in the event of an HPAI outbreak. In particular, flock sampling requires additional personnel. Surge capacity may also be required for diagnostic laboratory testing. Surveillance plan requirements must be fully integrated with current diagnostic sample collection, sample testing, surge capacity, and reporting capabilities. Section 5.2 provides laboratory definitions that are important to this section.

During a suspected or actual HPAI outbreak, the key goals for diagnostics are to (1) provide clear direction to responders on sample collection and processing procedures, if modification from routine standards is required, (2) meet the surge requirements for diagnostic testing at specific intervals, starting at time zero and at 24-hour intervals as the response escalates, and (3) report all diagnostic test results to appropriate personnel *and* information management systems (EMRS2) as soon as possible and within 4 hours of diagnostic test completion.

The *FAD Investigation Manual* (FAD PReP Manual 4-0) offers detailed information on diagnostic sample collection, diagnostic testing, and reporting. This document provides guidance on who is responsible for diagnostic testing, sample packaging and shipping, and roles in FAD investigations. Additional, specific information on how to package and label laboratory submissions is also available here.

Appendix E references *VS Guidance Document 12001* for FAD investigations, and provides the associated ready reference guide. The procedures outlined in this document should be followed in all FAD investigations, including those in which HPAI is a differential diagnosis.

## 5.4.1 Sample Collection and Diagnostic Testing

Trained personnel and field collection kits are required to effectively collect samples from poultry. AI may be presumptively diagnosed on the basis of clinical signs, a sudden and significant increase in mortality, a decrease in egg production, or gross or microscopic pathologic lesions in combination with laboratory diagnostic tests. The rRT-PCR is typically used for early detection of AI because test results can be produced in 4–7 hours. Other types of samples may be required if infection is suspected in species other than poultry.

Confirmatory tests are more specific and used to verify the presence of AI, identify specific viral subtypes, and evaluate pathogenicity. Partial gene sequencing using Sanger technology has allowed more rapid confirmation of subtype and pathotype (determination of LPAI or HPAI) where sufficient viral RNA is present in the samples (~10 hours to conduct partial HA/NA sequencing).

Other definitive tests such as isolating the virus in embryonated chicken eggs and whole genome sequencing can take 5–10 days per procedure. It is typically advantageous to respond to an H5 or H7 presumptive PCR result—in accordance with the case definition—to facilitate the rapid initiation of control and eradication activities.

The confirmation of an HPAI outbreak is made by NVSL-Ames. After positive confirmation of HPAI, subsequent samples from premises inside the established CA may be sent to approved laboratories that are part of the NAHLN (Appendix B provides a link to the NAHLN laboratories approved for HPAI testing). Please follow guidance from the ICG and unified IC on where to send samples (NAHLN, NVSL, or both).

The following sections describe the diagnostic tests performed when HPAI is suspected (e.g., an FAD investigation) in Figure 5-1 and when it has been confirmed in the United States in Figure 5-2. Table 5-2 provides the corresponding legend for these figures.

*Table 5-2. Abbreviations for Diagnostic Figures*

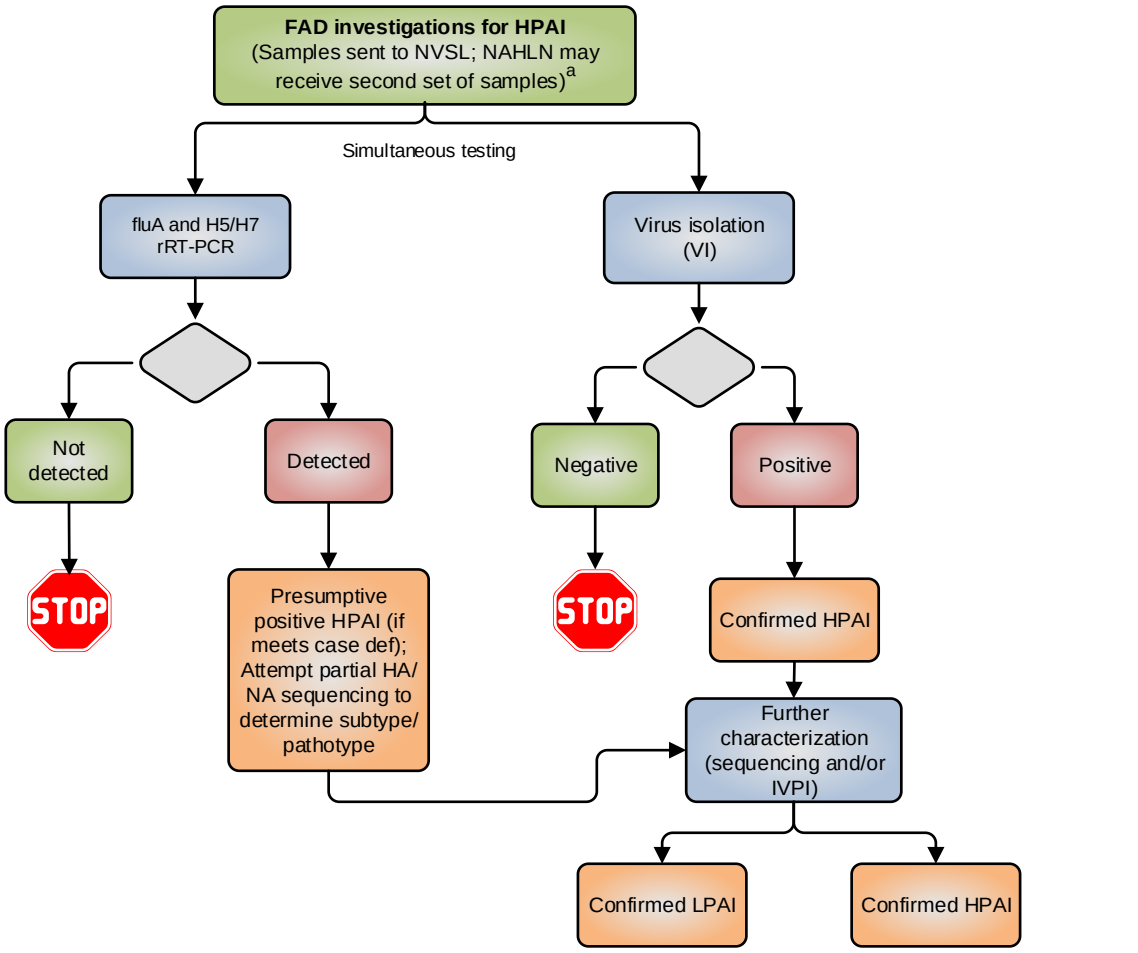
| Abbreviation | Definition |
|---|---|
| fluA | influenza A virus |
| IVPI | intravenous pathogenicity index |
| rRT-PCR | real-time reverse transcriptase polymerase chain reaction |
| VI | virus isolation |

#### 5.4.1.1 Diagnostics for Initial HPAI Detection

Figure 5-1 illustrates the typical diagnostic flow for a suspected case of HPAI via an FAD investigation. For the diagnostic flow after an initial detection, or during an outbreak, see Figure 5-2. Confirmation of HPAI is only made at NVSL-Ames.

In the event that HPAI is suspected as part of routine surveillance activities (rather than through a traditional FAD investigation), samples should be forwarded to NVSL for confirmation and sequencing immediately. This does not change the subsequent response (Section 4.3.4): when criteria for a presumptive positive have been met (per the HPAI case definition), the APHIS Administrator, or VS Deputy Administrator (U.S. CVO) or their designee, will authorize APHIS personnel—in conjunction with State and Tribal officials, and IC personnel—to initiate depopulation, disposal, cleaning, and disinfection procedures on the Infected Premises.

*Figure 5-1. Diagnostic Flow for FAD Investigations of Suspected HPAI*




[a]See VS Guidance Document 12001. The first or best set of samples must be sent to NVSL. A second set may be sent to an approved NAHLN laboratory. This figure describes NVSL testing.

**STOP means not infected, unless there is a circumstantial reason to request additional samples and conduct more diagnostic testing.**

**Estimated Time to Test Completion Under Optimal Conditions**
H5/H7 or Matrix fluA rRT-PCR: 4 hours
Partial HA/NA Sequencing: 10 hours
Whole genome sequencing: 4-5 days
Virus Isolation (VI): 5-10 days
IVPI: 10 days

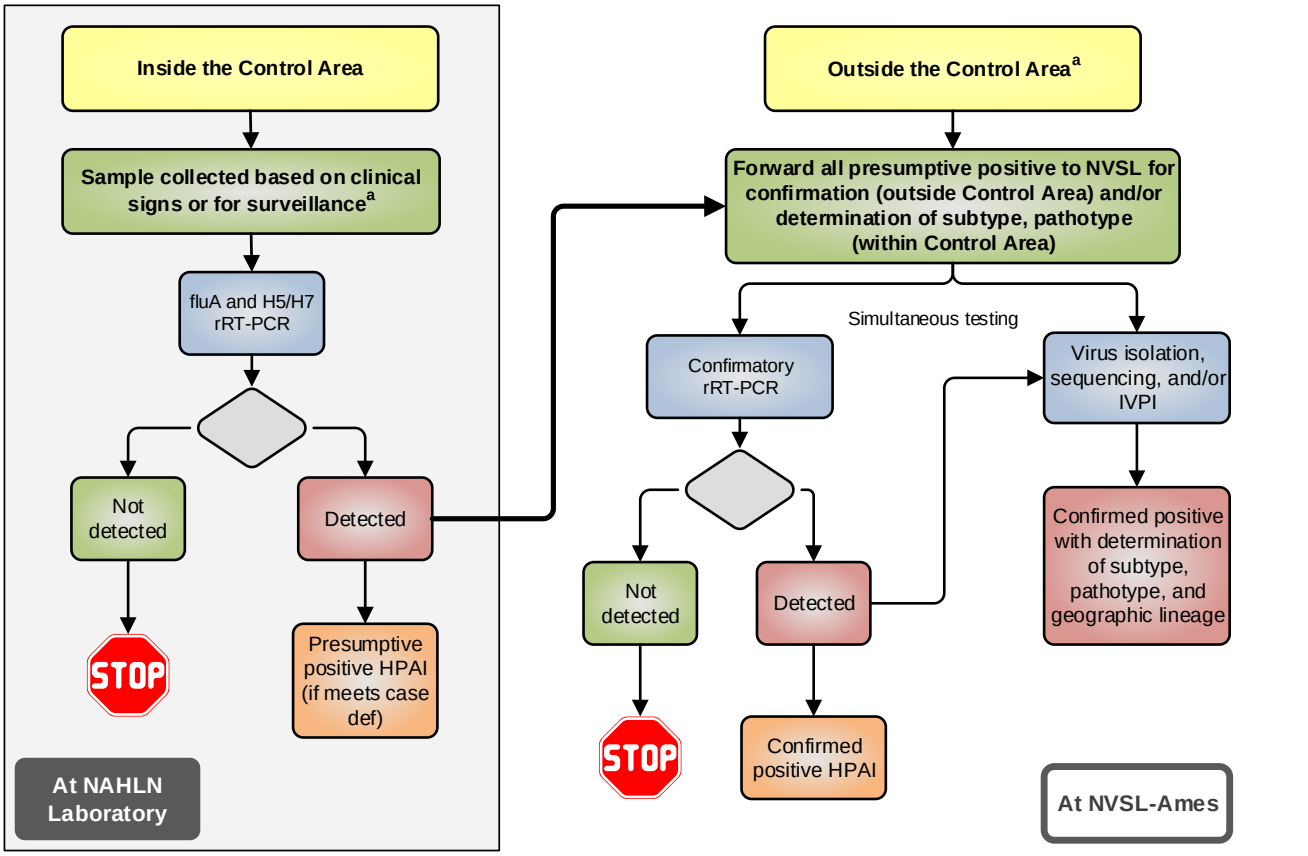
### 5.4.1.2 Diagnostics After HPAI Detection

Figure 5-2 illustrates the diagnostic flow after HPAI has been detected; this is after NVSL-Ames has confirmed HPAI on an index premises. IC provides specific instructions regarding the direction and collection of samples, which is likely to change as the outbreak changes in size or scope.

In all cases, (1) NVSL confirms the index case, (2) presumptive positive samples based upon rRT-PCR results from outside an established CA are tested and

confirmed by NVSL, and (3) NVSL receives samples routinely from *inside* the CA to monitor for changes in the HPAI virus. Based on the recommendation of the IC and ICG, *all* presumptive positive samples from NAHLN laboratories may be forwarded to NVSL for confirmation and subtyping.

*Figure 5-2. Diagnostic Flow During an HPAI Outbreak*




[a] See VS Guidance Document 12001. The first or best set of samples must be sent to NVSL. A second set may be sent to an approved NAHLN laboratory.

**STOP means not infected, unless there is a circumstantial reason to request additional samples and conduct more diagnostic testing.**

**Estimated Time to Test Completion Under Optimal Conditions**
H5/H7 or Matrix fluA rRT-PCR: 4 hours
Partial HA/NA Sequencing: 10 hours
Whole genome sequencing: 4-5 days
Virus Isolation (VI): 5-10 days
IVPI: 10 days

## 5.4.2 Surge Capacity

Surge capacity may be needed in an HPAI outbreak. Additional resources, such as personnel and materials, may be needed for sample collection. Additional capacity may also be required for laboratory sample testing. Surge capacity can help to ensure a rapid response and continuity of business for uninfected

premises. In the event that the State NAHLN laboratory and NVSL-Ames are overwhelmed by the diagnostic testing requirements, NAHLN labs from neighboring States provide surge capacity for diagnostic testing. For more information, please see the *NAHLN Operational and Emergency Activation Plan*.[2] Individual laboratories have independent protocols on how to manage personnel if a surge is required. Appendix B contains a link to the list of the NAHLN labs approved to conduct HPAI diagnostics.

### 5.4.3 Reporting

Box 5-3 clarifies reporting and notification of HPAI. See *VS Guidance Document 12001* and the *FAD Investigation Manual* (FAD PReP Manual 4-0) for further information on HPAI investigation and reporting. This document and a link to this manual are available at www.aphis.usda.gov/fadprep. *VS Guidance Document 8602* also provides information on reporting relating to HPAI in domestic poultry.

*Box 5-3. Reporting and Notification*

**Reporting and Notification**

- Cases considered a presumptive positive for HPAI, based on the current case definition, are reported as appropriate to the affected States, other States, Tribal nations, industry, other Federal agencies, trading partners, and the OIE.
- This includes breeder and commercial poultry flocks, domestic waterfowl and upland game birds, backyard flocks, and LBMS.
- Appropriate Federal-State-Tribal-industry response and containment measures are initiated during HPAI investigations.

## 5.5 Epidemiological Investigation and Tracing

### 5.5.1 Summary of Zones, Areas, and Premises Designations

A critical component of an HPAI response is the designation of zones, areas, and premises. The Incident Commander works with the Operations Section and Planning Section to (1) determine appropriate zones, areas, and premises designations in the event of an HPAI outbreak and (2) reevaluate these designations as needed throughout the outbreak based on the epidemiological situation. These zones, areas, and premises designations are used in quarantine and movement control efforts. For details on the zones, areas, and premises,

[2] Available from https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/ai/nahln-operational-emergency-activation-plan.pdf.

please see the *APHIS Foreign Animal Disease Framework: Response Strategies* (FAD PReP Manual 2-0).

Table 5-3 summarizes the premises designations that are employed in an HPAI outbreak response. Table 5-4 summarizes the zone and area designations that would be used in an HPAI outbreak response. Figure 5-3 illustrates these premises, zone, and area designations.

*Table 5-3. Summary of Premises Designations*

| Premises | Definition | Zone |
|---|---|---|
| Infected Premises (IP) | Premises where a presumptive positive case or confirmed positive case exists based on laboratory results, compatible clinical signs, HPAI case definition, and international standards. | Infected Zone |
| Contact Premises (CP) | Premises with susceptible animals that may have been exposed to HPAI, either directly or indirectly, including but not limited to exposure to animals, animal products, fomites, or people from Infected Premises. | Infected Zone, Buffer Zone |
| Suspect Premises (SP) | Premises under investigation due to the presence of susceptible animals reported to have clinical signs compatible with HPAI. This is intended to be a short-term premises designation. | Infected Zone, Buffer Zone, Surveillance Zone, Vaccination Zone |
| At-Risk Premises (ARP) | Premises that have susceptible animals, but none of those susceptible animals have clinical signs compatible with HPAI. Premises objectively demonstrates that it is not an Infected Premises, Contact Premises, or Suspect Premises. At-Risk Premises may seek to move susceptible animals or products within the Control Area by permit. Only At-Risk Premises are eligible to become Monitored Premises. | Infected Zone, Buffer Zone |
| Monitored Premises (MP)[3] | Premises objectively demonstrates that it is not an Infected Premises, Contact Premises, or Suspect Premises. Only At-Risk Premises are eligible to become Monitored Premises. Monitored Premises meet a set of defined criteria in seeking to move susceptible animals or products out of the Control Area by permit. | Infected Zone, Buffer Zone |
| Free Premises (FP) | Premises outside of a Control Area and not a Contact or Suspect Premises. | Surveillance Zone, Free Area |
| Vaccinated Premises (VP) | Premises where emergency vaccination has been performed. This may be a secondary premises designation. | Containment Vaccination Zone, Protection Vaccination Zone |

[3] The Secure Poultry Supply Plan sets out the "defined criteria" for Monitored Premises for this type of movement during an HPAI outbreak.

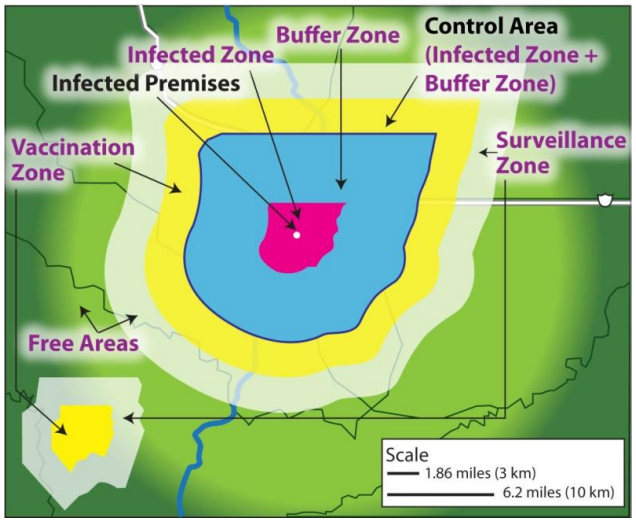
*Table 5-4. Summary of Zone and Area Designations*

| Zone/Area | Definition |
|---|---|
| Infected Zone (IZ) | Zone that immediately surrounds an Infected Premises. |
| Buffer Zone (BZ) | Zone that immediately surrounds an Infected Zone or a Contact Premises. |
| Control Area (CA) | Consists of an Infected Zone and a Buffer Zone. |
| Surveillance Zone (SZ) | Zone outside and along the border of a Control Area. The Surveillance Zone is part of the Free Area. |
| Free Area (FA) | Area not included in any Control Area. Includes the Surveillance Zone. |
| Vaccination Zone (VZ) | Emergency Vaccination Zone classified as either a Containment Vaccination Zone (typically inside a Control Area) or a Protection Vaccination Zone (typically outside a Control Area). This may be a secondary zone designation. |

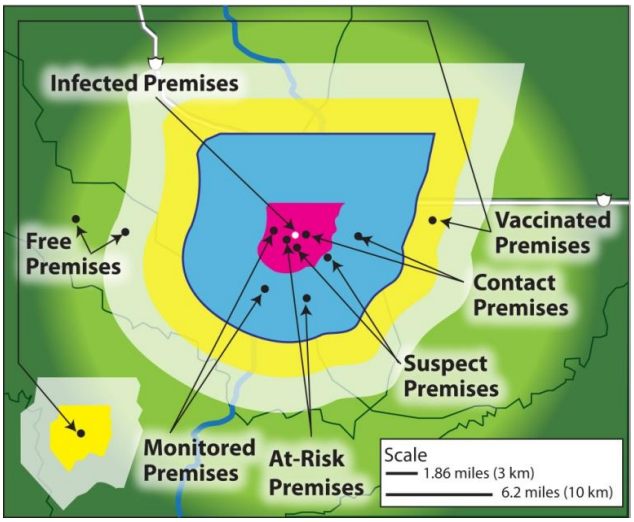
The *Secure Poultry Plan* has specific criteria for poultry premises to meet the definition of a MP. Please refer to the *Secure Poultry Plan* (which covers broilers, eggs, and turkeys) for more information.

*Figure 5-3. Example of Zones, Areas, and Premises in HPAI Outbreak Response*

*Zones and Areas*




*Premises*




Note: The Vaccination Zone can be either a Protection Vaccination Zone or Containment Vaccination Zone. Stamping-out is not pictured in these figures. The Surveillance Zone is part of the Free Area.

## 5.5.2 Epidemiological Investigation

Epidemiological investigation and movement tracing during an outbreak are critical in controlling and eradicating HPAI in poultry. In an HPAI outbreak, the goals are to

- assign a premises designation and priority of investigation within 6 hours of identifying a potential IP or CP through tracing activities.
- identify all CP within 24 hours of identifying the IP or the initial CP.
- enter tracing information into EMRS2 in 24-hour intervals or less.
- determine within 96 hours of identifying the index case, the nature of the HPAI outbreak, identify the risk factors for transmission, and develop mitigation strategies.
- collect trace-back and trace-forward information for at least 14–21 days before the appearance of clinical signs in HPAI infected poultry.
- analyze epidemiological data at routine intervals so that information gathered can apply to response activities to rapidly and effectively control, contain, and eradicate HPAI.

These measures aid in the control of HPAI and lessen the impact during the response effort. Appendix F provides two documents: (1) an epidemiological questionnaire used in turkey flocks in the recent HPAI outbreak, and (2) a case-control questionnaire used in layer flocks in the recent HPAI outbreak.

The scope of any such questionnaire should be based on the circumstances of the outbreak, and is at the discretion of the IC and epidemiological subject matter experts. It is likely that any epidemiological questionnaire will need to be modified and tailored to the specific outbreak.

The *Epidemiological Investigation and Tracing SOP* as well as the *NAHEMS Guidelines: Surveillance, Epidemiology, and Tracing* both provide more information.

## 5.5.3 Tracing

Box 5-4 explains the fundamental importance of movement tracing in an HPAI response effort.

*Box 5-4. Importance of Movement Tracing in HPAI Outbreak*

**Tracing**

One of the single most important and urgent veterinary activities during an HPAI outbreak is to rapidly and diligently trace-back and trace-forward movements from an IP. This tracing aids in the control of the spread of HPAI virus and limits the impact of the outbreak. Tracing should capture all movements to and from the premises including, but not limited to, susceptible poultry and livestock, non-susceptible species, animal products, vehicles, crops/grains, and personnel. Tracing also includes consideration of all potential modes of transmission and possible contact with wild birds.

When resources or personnel are limited in a widespread outbreak, movements considered high-risk by the unified IC should be traced first, so that any necessary action can be rapidly taken to control and contain the spread of HPAI. Recent trace-forwards involving hatching eggs, hatchlings, or live poultry are typically the first priority.

Based on guidance from the unified IC and National ICG, trace-back and trace-forward information should ideally be collected for at least 14–21 days before the appearance of clinical signs in HPAI-infected poultry. Additional tracing information is collected for movements up to the time that quarantine was imposed.

Tracing information is obtained from many sources (such as reports from field veterinarians, producers, industry, farm service providers, or the public). EMRS2 is used to collect and report tracing information; tracing information must be entered routinely, and ideally at 24-hour intervals or less depending on the requirements of the situation.

## 5.5.4 Considerations for Size of Control Area and Minimum Sizes of Other Zones

The perimeter of the CA should be at least 10 km (~6.21 miles) beyond the perimeter of the closest IP. The size of the CA depends on the circumstances of the outbreak, including the IP transmission pathways and estimates of transmission risk, poultry movement patterns and concentrations, distribution of susceptible wildlife in proximity, natural terrain, jurisdictional boundaries, and other factors. The boundaries of the CA can be modified or redefined when tracing and other epidemiological information becomes available.

Table 5-5 provides a description of the minimum sizes of areas and zones. Table 5-6 reviews the factors used to determine the size of the CA.

*Table 5-5. Minimum Sizes of Areas and Zones*

| Zone or Area | Minimum Size and Details |
|---|---|
| Infected Zone (IZ) | Perimeter should be at least 3 km (~1.86 miles) beyond perimeters of presumptive or confirmed Infected Premises. Will depend on disease agent and epidemiological circumstances. This zone may be redefined as the outbreak continues. |
| Buffer Zone (BZ) | Perimeter should be at least 7 km (~4.35 miles) beyond the perimeter of the Infected Zone. Width is generally not less than the minimum radius of the associated Infected Zone, but may be much larger. This zone may be redefined as the outbreak continues. |
| Control Area (CA) | Perimeter should be at least 10 km (~6.21 miles) beyond the perimeter of the closest Infected Premises. Please see Table 5-6 for factors that influence the size of the Control Area. This area may be redefined as the outbreak continues. |
| Surveillance Zone (SZ) | Width should be at least 10 km (~6.21 miles), but may be much larger. |

*Table 5-6. Factors To Consider in Determining Control Area Size for HPAI*

| Factors | Additional Details |
|---|---|
| Jurisdictional areas | ◆ Effectiveness and efficiency of administration<br>◆ Multi-jurisdictional considerations: local, State, Tribal, and multistate |
| Physical boundaries | ◆ Areas defined by geography<br>◆ Areas defined by distance between premises |
| HPAI epidemiology | ◆ Reproductive rate<br>◆ Incubation period<br>◆ Ease of transmission<br>◆ Infectious dose<br>◆ Species susceptibility<br>◆ Modes of transmission (fecal-oral, droplet, aerosol, vectors)<br>◆ Survivability in the environment<br>◆ Ease of diagnosis (for example, no pathognomonic signs; requires diagnostic laboratory testing) |
| Infected Premises characteristics | ◆ Number of contacts<br>◆ Transmission pathways and transmission risk<br>▪ Extent of animal movement<br>▪ Number of animals<br>▪ Species of animals<br>▪ Age of animals<br>▪ Movement of traffic and personnel to and from premises (fomite spread)<br>▪ Biosecurity measures in place at time of outbreak |
| Contact Premises characteristics | ◆ Number and types of premises<br>◆ Susceptible animal populations and population density<br>◆ Animal movements<br>◆ Movement of traffic (fomites) and personnel to and from premises (fomite spread)<br>◆ Biosecurity measures in place prior to outbreak |

*Table 5-6. Factors To Consider in Determining Control Area Size for HPAI*

| Factors | Additional Details |
|---|---|
| Environment | ◆ Types of premises in area or region<br>◆ Land use in area or region<br>◆ Susceptible wildlife and population density<br>◆ Wildlife as biological or mechanical vectors |
| Climate | ◆ Prevailing winds |
| General area, region, or agricultural sector biosecurity | ◆ Biosecurity practices in place prior to outbreak<br>◆ Biosecurity practices implemented once outbreak detected |
| Number of backyard or transitional premises | ◆ Types of premises, animal movements, and network of animal and fomite movements |
| Continuity of business | ◆ Continuity of business plans and processes in place or activated at beginning of outbreak (such as surveillance, negative diagnostic tests, premises biosecurity, and risk-assessments)<br>◆ Permit processes, memorandums of understanding, and information management systems in place or activated at beginning of outbreak |

# 5.6 INFORMATION MANAGEMENT

Information management and reporting during an HPAI incident or outbreak ensures that responders, stakeholders, and decision-makers have access to accurate and timely critical emergency response information. Ideally, Federal, State, Tribal, and local information management systems are compatible for information and data sharing. EMRS2 is the official USDA APHIS system of record in an HPAI outbreak. EMRS2 contains data on IP, permits (including for continuity of business activities), movements, and traces, among other information.

## 5.6.1 Data Entry

In an HPAI outbreak, the goal is to have EMRS2 data entry processes performed in 12-hour or shorter intervals. Data should be entered as quickly as possible. Data must be entered in both an accurate and consistent manner across widespread field operations: this is particularly important when there is more than one ICP. If possible, it may be necessary and/or beneficial to centralize certain data-entry capabilities, particularly when field resources are stretched.

Field personnel should be provided with access to mobile technology devices necessary for collecting, monitoring, and sharing information. EMRS2Go is a mobile application which enables rapid and straightforward data entry into EMRS2 from the field. Rapidly functional, robust, and scalable information technology infrastructure is needed during an HPAI outbreak.

### 5.6.2 Reporting

Data entered into EMRS2 is used for internal and external situation reports produced daily, weekly, and as requested. It is also used to produce specific reports on key aspects of the response, such as permitting or deployments. Both the NIMT and National ICG rely on EMRS2 for producing accurate reports during an outbreak. It is imperative in an HPAI outbreak that information management, data quality, and data integrity is a priority.

### 5.6.3 Information Management Systems and Tools

In an HPAI outbreak, there are key systems which help to facilitate outbreak response. These include the following:

- EMRS2, the USDA APHIS official system of record;
- APHIS Emergency Qualifications System (EQS), managed by APHIS Dispatch personnel, used for requesting and deploying qualified personnel to the incident;
- Laboratory Messaging System, which communicates (messages) laboratory results from NVSL and some NAHLN laboratories, including directly to EMRS2.[4]

Additionally, USDA APHIS leverages and tailors capabilities like ArcGIS and Tableau to communicate, illustrate, and analyze information from an HPAI incident. In addition to internal mapping and visualization capabilities, there is also now a public, online mapping tool—developed by CEAH—for HPAI planning. It is available here: https://www.aphis.usda.gov/aphis/maps/Animal-Health/HPAI-Mapping.

## 5.7 COMMUNICATION

The *HPAI Communications SOP* provides guidance on communication activities during an HPAI outbreak. This SOP covers the responsibilities of personnel and internal and external communication procedures. APHIS LPA serves as the primary liaison with the news media in the event of an HPAI outbreak. Under the ICS, a JIC is established. During an HPAI outbreak, APHIS LPA and the USDA Office of Communications staff the JIC.

[4] Not all NAHLN laboratories currently have messaging capabilities. This is a high priority for USDA APHIS and the NAHLN laboratories.

Effective communication during an HPAI outbreak may be carried out and maintained by achieving the following goals:

- Briefing the media, public, industry, Congress, trading partners, and others on the HPAI outbreak status and the actions being taken to control and eradicate the disease.
- Highlighting the importance of sound biosecurity practices and steps that producers and owners can take to protect their own flocks against HPAI infection.
- Coordinating with Federal, State, and local agencies, Tribal entities, producer groups, and Land Grant University-based Cooperative Extension Services to ensure consistent messaging regarding animal health, public health, and food safety.
- Assuring consumers that USDA is working on HPAI poultry health concerns, in an informed and timely manner.
- Assuring the public that USDA is cooperating with the CDC on real and perceived threats of zoonotic disease.

## 5.7.1 Objectives

All HPAI communications must

- furnish accurate, timely, and consistent information;
- maintain credibility and instill public confidence in the government's ability to respond to an outbreak;
- minimize public panic and fear; and
- address rumors, inaccuracies, and misperceptions as quickly as possible.

## 5.7.2 Key Messages

Five key messages are conveyed in an HPAI outbreak (Box 5-5).

*Box 5-5. HPAI Communication Messages*

**Key Communication Messages**

Four key messages are conveyed to the public:

1. This detection does not signal the start of a human flu pandemic.
2. We are responding quickly and decisively to eradicate the virus.
3. Properly prepared eggs and poultry are safe to eat.
4. We are safeguarding the food supply.

An additional key message is conveyed to producers:

Protect your flocks with good biosecurity practices and be vigilant in reporting signs of illness.

### 5.7.3 Further Communications Guidance

In addition to the *HPAI Communications SOP*, the following resources provide guidance on communication and information about various stakeholder groups:

- USDA AI website: www.usda.gov/birdflu.
- APHIS AI website: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian-influenza-disease.
- A Partial Listing of FAD Stakeholders: www.aphis.usda.gov/animal_health/emergency_management/downloads/documents_manuals/fad_stakeholders_par_list.pdf.
- CDC website on AI: www.cdc.gov/flu/avianflu/.
- For information on the safe handling of poultry and poultry products, please see: www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/poultry-preparation or www.foodsafety.gov.

## 5.8 Health and Safety and Personal Protective Equipment

During an HPAI outbreak, responders are exposed to many hazards. Taking precautions to prevent adverse human health events related to emergency response efforts is important. In an HPAI response, personal protection and safety is particularly essential to protect individuals from HPAI. Even if there have been no documented human infections with the field strain of the outbreak, all strains of HPAI should be treated as potentially zoonotic. Typically, those at increased

risk for HPAI infection are personnel in prolonged and direct contact with infected birds in an enclosed setting.

Upon the confirmation of HPAI, public health authorities should implement appropriate public health measures, including observation, prevention, and case management (as required). Influenza-like illness (ILI) monitoring is implemented for responders deployed to the field. APHIS works closely with the CDC and State/local health departments in developing any ILI protocol or other necessary response measures for responders. Unvaccinated responders are highly encouraged to immediately receive the current season's inactivated influenza virus vaccine to reduce the possibility of dual infection with avian and human influenza A viruses and potential genetic reassortment.

Personal protective equipment (PPE) is fundamental in ensuring personnel are protected from HPAI, as well as other hazards. Disposable or reusable outwear may be acceptable, and all workers involved in the depopulation, transport, or disposal of HPAI virus-infected poultry must be provided with appropriate PPE. All visitors and employees, regardless of their exposure, should be provided with disposable coveralls, boots, hats, and gloves for their use before entering premises. Proper disposal of this PPE is required after leaving.

Daily pre-entry safety briefings should be provided for all response personnel. For further information on health, safety, and PPE, see the *HPAI Health and Safety and PPE SOP*. This SOP provides information on best practices to ensure the well-being and safety of all individuals involved in the response effort. Specific topics covered include the following:

- Procedures to create a site-specific health and safety plan.
- Details of hazard analysis, necessary training, and medical surveillance requirements.
- Information on PPE, including Occupational Safety and Health Administration respirator fit testing.

## 5.8.1 Mental Health Concerns

The health and safety of all personnel is affected by the mental state of those involved in the HPAI response effort. An HPAI outbreak could have a significant psychological effect on both responders and owners of affected poultry. Quarantine and movement restrictions may also impact mental health in populations affected by such controls. Care should be taken in the event of an HPAI outbreak to consider and provide resources and directions for support. Incident Commanders should encourage reporting of such concerns; Safety Officers assigned to ICPs are a key resource for personnel. HHS has developed resources specifically for emergency and disaster responders, State and local planners, health professionals, and the general public at

https://emergency.cdc.gov/coping/index.asp; additional general mental health information is here: www.cdc.gov/mentalhealth.

### 5.8.2 Further Information on Health, Safety, and Personal Protective Equipment

In addition to the resources already listed, more information and guidance can be found in the following documents.

- *APHIS Safety & Health Manual*
- CDC website on AI: www.cdc.gov/flu/avianflu/
- *NAHEMS Guidelines: Health and Safety*
- *NAHEMS Guidelines: Personal Protective Equipment*
- Incident-specific guidance, including PPE recommendations and health and safety guidance, are located at www.aphis.usda.gov/fadprep.

## 5.9 BIOSECURITY

An HPAI outbreak will have a serious impact on the agricultural industry, and could also impact public health. Strict biosecurity measures need to be implemented immediately, ideally before an outbreak, to prevent or slow the spread of HPAI. Enhanced biosecurity procedures should be implemented as quickly and effectively as possible with suspect or presumptive positive cases. Accordingly, veterinarians, owners, and anyone else in contact with enterprises that have poultry or other susceptible species need to observe biosecurity measures.

Proper biosecurity measures have two functions: (1) containing the virus on IP (biocontainment) and (2) preventing the introduction of the virus via movement of personnel and material to naïve poultry and premises (bioexclusion). During an HPAI outbreak, a careful balance must be maintained between facilitating response activities and ensuring personnel do not expose naïve animals and premises to HPAI.

In the 2014–2015 HPAI outbreak in the United States, biosecurity breaches and inadequately implemented biosecurity measures were cited as one of multiple potential reasons for widespread HPAI transmission in the Midwest. Biosecurity is of utmost importance in controlling and containing the virus.

Further information on biosecurity is discussed in the *HPAI Biosecurity SOP* which provides guidance on how to draft a site-specific biosecurity plan and

- identifies the roles and responsibilities of key personnel,

- explains biosecurity training and briefing requirements,
- addresses site security and safety,
- discusses biosecurity practices for shipping and transportation, and
- provides a biosecurity checklist.

In addition to the *HPAI Biosecurity SOP*, information and guidance on appropriate biosecurity measures in an HPAI outbreak can be found in the *NAHEMS Guidelines: Biosecurity*. Additional information for backyard flock owners is available on the Biosecurity for Birds website: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian-influenza-disease/birdbiosecurity. For commercial producers, please refer to the Defend the Flock website: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian-influenza-disease/defend-the-flock/defend-the-flock-bio-info-comm-poultry.

Additionally, NPIP recently announced that the revised NPIP Program Standards document establishes new biosecurity principles. The notice in the Federal Register can be found here. The NPIP Program Standards and associated biosecurity principles can be found at the NPIP website: www.poultryimprovement.org.

## 5.9.1 Biosecurity as Related to Health and Safety

Health and safety of personnel is always the first priority. In outbreaks with zoonotic potential, such as HPAI, appropriate PPE is provided to persons involved in outbreak control and eradication as an additional biosecurity measure. For more information on health, safety, and PPE, see Section 5.8. USDA APHIS coordinates with Federal, State, and local public health agencies to minimize risk to responders and others exposed to HPAI.

## 5.9.2 Biosecurity Hazards and Mitigating Measures

Box 5-6 provides an example of selected biosecurity hazards that are likely to be encountered with an HPAI outbreak and the associated biosecurity measures to mitigate these risks. This list is not exhaustive.

*Box 5-6. HPAI Biosecurity Hazards and Appropriate Biosecurity Measures*

| **Biosecurity Hazards** | **Biosecurity Measures to Mitigate Risk** |
|---|---|
| • Movement of poultry, other livestock, vehicles, equipment, and people.<br>• Contaminated feed and water.<br>• Contact with poultry and other HPAI-susceptible animals. | • Clean and disinfect premises, vehicles, and equipment, and dispose of materials that cannot be disinfected in an appropriate manner.<br>• Account for the movement of all poultry, livestock, and equipment for accurate records.<br>• Provide a location for all individuals to carry out appropriate cleaning and disinfection procedures and insist these measures be followed.<br>• Ensure that housed poultry remain housed and that entry of rodents, ground water, and wild birds is prevented.<br>• Prevent close or direct contact between poultry and other species reared outside. |

In some cases, responders may own poultry or birds at their residence. Incident Commanders should be aware of this possibility, and if personnel are traveling between their residence and their assigned location each day, this risk needs to be immediately mitigated. The unified IC recommends appropriate measures, which may include avoiding contact with their own poultry for the duration of deployment or being assigned to the ICP for other activities that do not involve contact with infected birds or material. Personnel are urged to protect their own flocks from HPAI.

## 5.9.3 Closed Flocks

In the event of an HPAI outbreak, one of the most fundamental biosecurity measures is closed flocks. Box 5-7 provides guidance on employing closed flocks as a critical biosecurity measure.

*Box 5-7. Biosecurity Measure—Closed Flocks*

**Biosecurity: Closed Flocks**

- To the fullest extent possible, close the flock or herd to the introduction of new poultry and other livestock (with population increases occurring only from offspring).
- If closing a flock is not possible, isolate newly introduced poultry (from the healthiest possible sources) and those returning from existing flocks or herds for 30 days or more.
- Vaccination status of introduced poultry should be known and well-documented.

### 5.9.4 Waiting Period

Another important biosecurity measure is to ensure personnel are not travelling between IP and unknown or uninfected premises. During an HPAI outbreak, it is important that personnel—in addition to following strict and appropriate biosecurity and cleaning and disinfection protocols—wait the allotted time between premises visits. *Actual waiting periods are recommended by IC on the basis of the outbreak circumstances, and need for personnel.* Typical waiting times may vary between 12 and 72 hours. Regardless of wait time, team members should not travel directly from an IP or SP to an unknown or uninfected premises. However, personnel may travel *between* IP, if proper mitigating procedures are followed. Extended avoidance periods may be unnecessary with stringent biosecurity practices and effective cleaning and disinfection protocols.

Responding veterinarians and other personnel should adhere to the guidance provided by the local IC; it is critical to remember that any real or perceived belief that responders are spreading HPAI is incredibly detrimental to the response effort. For example, when and where possible, responders may be able to avoid the need to enter premises that are not infected and interact with unaffected poultry by meeting producers at the end of their driveway.

## 5.10 Quarantine and Movement Control

By restricting the movement of infected animals, animal products, and contaminated fomites, quarantine and movement control can be a powerful tool in controlling and eradicating an HPAI outbreak. Movement control is accomplished through a permit system that allows entities to make necessary permitted movements without creating an unacceptable risk of disease spread. EMRS2 is the system of record for permits and permitted movements made into, within, and out of the HPAI CAs. Movement control procedures are based on the best scientific information available at the time, and all personnel—premises owners, managers, and responders—should adhere to these measures.

When HPAI is detected, SAHOs and Tribal officials issue a quarantine, hold order, or standstill notice for the IP based on the authority of the affected State.

This action is based on statutes and regulations of the affected State, and varies by State. Within 6 hours of the identification of the index case, the Incident Commander, Operations Section, and Planning Section in a unified IC coordinate to establish an IZ and a BZ (a CA). Once the CA (IZ plus BZ) is established, quarantine and movement controls are implemented as rapidly as possible by the unified IC. Appendix G contains examples of movement control notices.

It is important that quarantine and movement controls, while critical to stopping disease transmission, also consider competing priorities: in implementing measures, the unified IC must weigh the risk of disease transmission against the need for critical movements (e.g., feed trucks) and business continuity.

Each State's animal health emergency response plan should describe the implementation of quarantine and movement controls. In some cases, USDA may impose a Federal quarantine (under the AHPA and CFR authorities) when requested by SAHOs or as directed by the Secretary of Agriculture to restrict interstate commerce from the infected State(s). States may be asked to provide resources to maintain and enforce the quarantine; reimbursement formulas for these activities would be established between the States and USDA via cooperative agreement. Federal quarantines may or may not be issued depending on the outbreak situation; in recent HPAI outbreaks, Federal quarantines have not been implemented. See *Foreign Animal Disease Framework: Roles and Coordination* (FAD PReP Manual 1-0) for further information on authorities and funding.

The *NAHEMS Guidelines: Quarantine and Movement Control* provides information on measures considered necessary to prevent the spread of HPAI through movement, including (1) keeping HPAI out of poultry populations in areas free of HPAI and (2) preventing the spread of HPAI to non-infected poultry in areas where HPAI exists.

## 5.10.1 Zones, Areas, and Premises Designations

In addition to working to establish the boundaries of the CA, the Incident Commander works with the Operations Section and Planning Section to determine appropriate premises designations in the event of an HPAI outbreak. These zone, area, and premises designations are used for quarantine and movement control efforts. Again, refer to Tables 5-3 and 5-4 and Figure 5-3 for the designations used here.

## 5.10.2 Movement Guidance into, within, and out of a Control Area

During an HPAI outbreak, the following guidance in Table 5-7 (movement into a CA), Table 5-8 (movement within a CA), and Table 5-9 (movement out of a CA) is used to issue permits in permitted movement control efforts. For general

information and guidance on permitting, please see the document *Permitted Movement (FAD PReP Manual 6-0)*. This document provides comprehensive information on permits, permitted movements, roles and responsibilities for permitted movement with regard to a CA, information about EMRS2 and permitting, and a detailed review of the permitting process.

The guidance provided in Tables 5-7 to 5-9 is general; as noted in the *Permitted Movement* manual, States and/or APHIS officials, depending on the outbreak situation, may vary how At-Risk and Monitored Premises are managed during an outbreak and what is required for movement to/from these types of premises. This may vary between States as well as between disease outbreaks, depending on the size, scope, and epidemiological situation.

For Secure Food Supply permits and for more information on permit guidance for turkeys, broilers, and eggs, please see the *Secure Poultry Supply Plan*, which covers these commodities, and is further discussed in Section 5.11. Additional information is also provided in Appendix C. Please note that for permitted movement (which, by definition, involves the CA) under the *Secure Poultry Supply Plan*, premises must have a premises identification number (PIN). Premises are encouraged to obtain a PIN prior to an outbreak to facilitate permit requests during an incident.

For movement of susceptible poultry and poultry products out of the CA to an FA, the permit process occurs as described in the document entitled *Permitted Movement (FAD PReP Manual 6-0)*. This includes approval from the origin State, and if interstate, the destination State. Requirements for a permit may vary depending on the permit, which takes into consideration the incident, national standards, state regulations, applicable OIE standards, and conditions for the particular permitted movement(s) such as biosecurity procedures and risk assessment recommendations. In addition, commodity-specific proactive risk assessments, continuity of business plans, movement and marketability plans, and compartmentalization plans (as available or applicable) are considered. Figure 5-4 illustrates premises designations in relation to permitting and movement control.

*Table 5-7. Movement into a Control Area from Outside a Control Area (to Specific Premises)*[a]

| Item Moving into a Control Area to a/an… → | Infected Premises | Suspect Premises[c] | Contact Premises[c] | At-Risk Premises | Monitored Premises |
|---|---|---|---|---|---|
| Poultry[b] | Prohibited, except under certain circumstances as determined by the IC, such as slaughter. | Prohibited, except under certain circumstances as determined by the IC, such as slaughter. | Prohibited, except under certain circumstances as determined by the IC, such as slaughter. | Permit for movement must be approved by the IC with appropriate biosecurity measures. | Permit for movement must be approved by the IC with appropriate biosecurity measures. |
| Poultry products | See continuity of business plans (*Secure Poultry Supply Plan*) for information on susceptible poultry products, or guidance and processes as determined by the unified IC. Please see Section 5.10.5 which contains OIE AI-specific guidance for inactivating AI. In addition, Appendix C contains information on the *Secure Poultry Supply Plan* for commodity-specific movement guidance during an HPAI outbreak. | | | | |
| Other animals (non-susceptible) from premises **with** poultry | Prohibited unless permit approved by IC and appropriate biosecurity measures. | Prohibited unless permit approved by IC and appropriate biosecurity measures. | Prohibited unless permit approved by IC and appropriate biosecurity measures. | Allowed with appropriate biosecurity measures. IC may require a permit for movement depending on HPAI epidemiology and characteristics of destination premises. | Allowed with appropriate biosecurity measures. IC may require a permit for movement depending on HPAI epidemiology and characteristics of destination premises. |
| Other animals (non-susceptible) from premises **without** poultry | IC will determine movement restrictions based on HPAI epidemiology and characteristics of destination premises. | IC will determine movement restrictions based on HPAI epidemiology and characteristics of destination premises. | IC will determine movement restrictions based on HPAI epidemiology and characteristics of destination premises. | Allowed with appropriate biosecurity measures. IC may require a permit for movement depending on HPAI epidemiology and characteristics of destination premises. | Allowed with appropriate biosecurity measures. IC may require a permit for movement depending on HPAI epidemiology and characteristics of destination premises. |
| Equipment, vehicles, and other fomites from premises **with** poultry | Allowed with appropriate biosecurity measures. | Allowed with appropriate biosecurity measures. | Allowed with appropriate biosecurity measures. | Allowed with appropriate biosecurity measures. | Allowed with appropriate biosecurity measures. |
| Semen, embryos from poultry | Prohibited. | Prohibited. | Prohibited. | Allowed with appropriate biosecurity measures. | Allowed with appropriate biosecurity measures. |

[a] Movement control and permitted movement processes may change over time depending on situational awareness and operational capabilities.

[b] May include pet birds and other susceptible species as defined by IC during the outbreak.

[c] Contact Premises and Suspect Premises are intended to be short-term premises designations. Ideally these premises should be re-designated before movements occur.

*Table 5-8. Movement within a Control Area*[a]

| Item Moving within a Control Area from a/an…. → | Infected Premises | Suspect Premises[c] | Contact Premises[c] | At-Risk Premises | Monitored Premises |
|---|---|---|---|---|---|
| Poultry[b] | Prohibited, except under certain circumstances as determined by the IC, such as slaughter. | Prohibited, except under certain circumstances as determined by the IC, such as slaughter. | Prohibited, except under certain circumstances as determined by the IC, such as slaughter. | Allowed to move by permit approved by the IC; surveillance, negative diagnostic tests, premises biosecurity, and risk-assessment may be required for permit. | Allowed to move by permit approved by the IC; surveillance, negative diagnostic tests, premises biosecurity, and risk-assessment may be required for permit. |
| Poultry products | See continuity of business plans (*Secure Poultry Supply Plan*) for information on susceptible poultry products, or guidance and processes as determined by the unified IC. Please see Section 5.10.5 which contains OIE AI-specific guidance for inactivating AI. In addition, Appendix C contains information on the *Secure Poultry Supply Plan* for commodity-specific movement guidance during an HPAI outbreak. | | | | |
| Other animals (non-susceptible livestock or poultry) from premises **with** poultry | Prohibited unless specific permit granted by IC and appropriate biosecurity measures. | Prohibited unless specific permit granted by IC and appropriate biosecurity measures. | Prohibited unless specific permit granted by IC and appropriate biosecurity measures. | Allowed to move by permit approved by the IC; surveillance, negative diagnostic tests, premises biosecurity, and risk-assessment may be required for permit. | Allowed to move by permit approved by the IC; surveillance, negative diagnostic tests, premises biosecurity, and risk-assessment may be required for permit. |
| Other animals (non-susceptible) from premises **without** poultry | Not Applicable (N/A) (Infected Premises have poultry) | N/A (Suspect Premises have poultry) | N/A (Contact Premises have poultry) | N/A (At-Risk Premises have poultry) | N/A (Monitored Premises have poultry) |
| Equipment, vehicles, and other fomites from premises **with** poultry | Prohibited unless specific permit granted by IC and appropriate biosecurity measures. | Prohibited unless specific permit granted by IC and appropriate biosecurity measures. | Prohibited unless specific permit granted by IC and appropriate biosecurity measures. | Allowed by permit approved by IC and appropriate biosecurity measures. | Allowed by permit approved by IC and appropriate biosecurity measures. |
| Semen, embryos from poultry | Prohibited. | Prohibited. | Prohibited. | Allowed by permit approved by IC and appropriate biosecurity measures. | Allowed by permit approved by IC and appropriate biosecurity measures. |

[a] Movement control and permitted movement processes may change over time depending on situational awareness and operational capabilities.

[b] May include pet birds and other susceptible species as defined by IC during the outbreak.

[c] Contact Premises and Suspect Premises are intended to be short-term premises designations. Ideally these premises should be re-designated before movements occur.

*Table 5-9. Movement from Inside a Control Area to Outside a Control Area (from Specific Premises)*[a]

| Item Moving out of a Control Area from a/an… → | Infected Premises | Suspect Premises[c] | Contact Premises[c] | At-Risk Premises | Monitored Premises[d] |
|---|---|---|---|---|---|
| Poultry[b] | Prohibited, except under certain circumstances as determined by the IC. | Prohibited, except under certain circumstances as determined by the IC. | Prohibited, except under certain circumstances as determined by the IC. | At-Risk Premises must become Monitored Premises to move susceptible poultry out of a Control Area. | Allowed to move by permit approved by IC; surveillance, negative diagnostic tests, premises biosecurity, and risk-assessment may be required for permit. |
| Poultry products | See continuity of business plans (*Secure Poultry Supply Plan*) for information on susceptible poultry products, or guidance and processes as determined by the unified IC. Please see Section 5.10.5 which contains OIE AI-specific guidance for inactivating AI. In addition, Appendix C contains information on the *Secure Poultry Supply Plan* for commodity-specific movement guidance during an HPAI outbreak. | | | | |
| Other animals (non-susceptible) from premises **with** poultry | Prohibited unless specific permit approved by IC and appropriate biosecurity measures and risk-assessment. | Prohibited unless specific permit approved by IC and appropriate biosecurity measures and risk-assessment. | Prohibited unless specific permit approved by IC and appropriate biosecurity measures and risk-assessment. | Allowed to move by permit approved by IC; surveillance and negative diagnostic tests for susceptible poultry on premises, premises biosecurity, and risk-assessment may be required for permit. | Allowed to move by permit approved by IC; surveillance and negative diagnostic tests for susceptible poultry on premises, premises biosecurity, and risk-assessment may be required for permit. |
| Other animals (non-susceptible) from premises **without** poultry | N/A (Infected Premises have poultry) | N/A (Suspect Premises have poultry) | N/A (Contact Premises have poultry) | N/A (At-Risk Premises have poultry) | N/A (Monitored Premises have poultry) |
| Equipment, vehicles, and other fomites from premises **with** poultry | Prohibited unless permit approved by IC and appropriate biosecurity measures. | Prohibited unless permit approved by IC and appropriate biosecurity measures. | Prohibited unless permit approved by IC and appropriate biosecurity measures. | Allowed by permit approved by IC and appropriate biosecurity measures. | Allowed by permit approved by IC and appropriate biosecurity measures. |
| Semen, embryos from poultry | Prohibited. | Prohibited. | Prohibited. | At-Risk Premises must become Monitored Premises to move semen, embryos from susceptible poultry out of a Control Area. | Monitored Premises only allowed by permit approved by IC and appropriate biosecurity measures. |

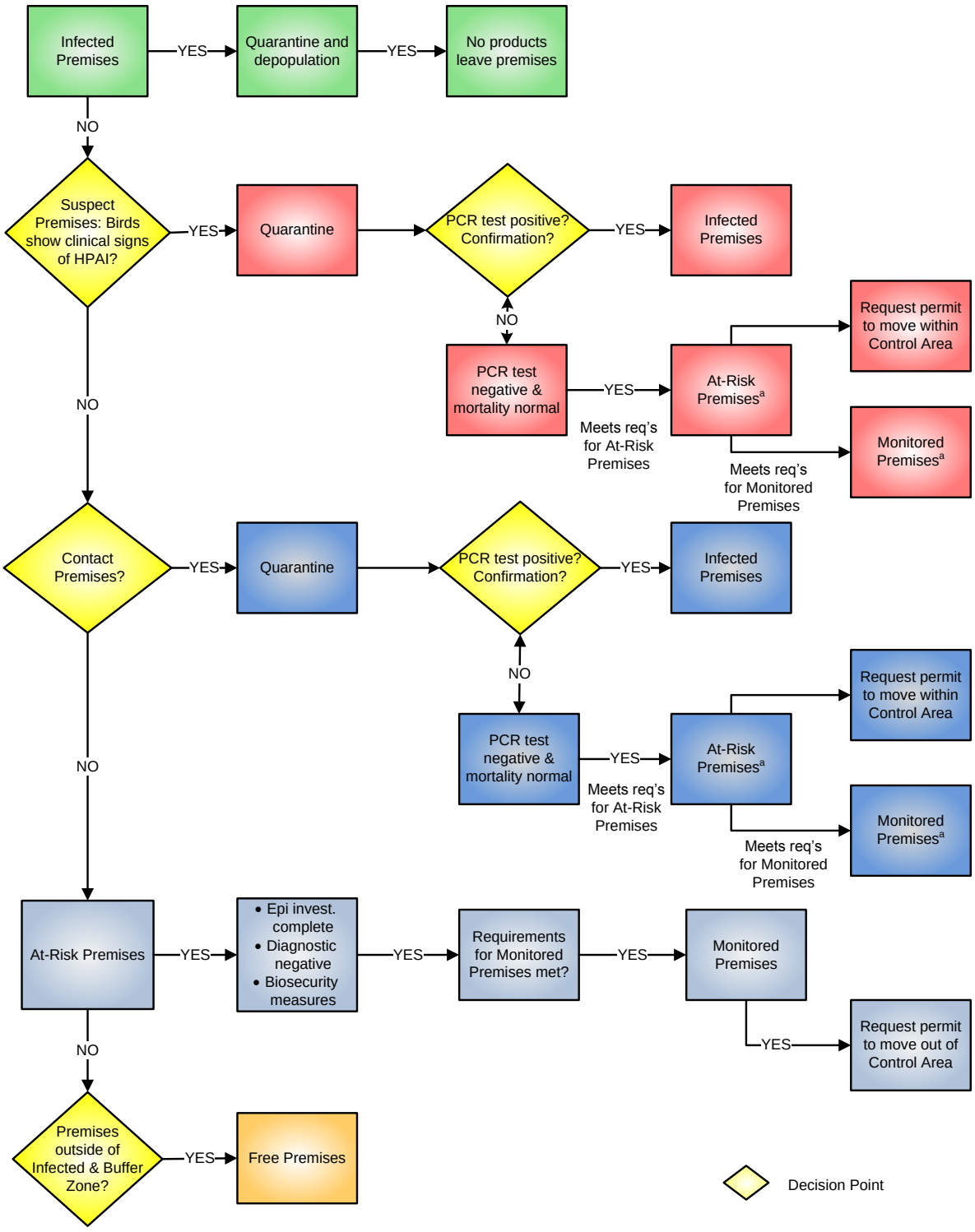
[a] Movement control and permitted movement processes may change over time depending on situational awareness and operational capabilities.

[b] May include pet birds and other susceptible species as defined by IC during the outbreak.

[c] Contact Premises and Suspect Premises are intended to be short-term premises designations. Ideally these premises should be re-designated before movements occur.

[d] Continuity of business plans (the Secure Poultry Supply Plan) may apply.

*Figure 5-4. Premises Designations in Relation to Permitting and Movement Control*




[a] Continuity of business plans (the Secure Poultry Supply Plan) may apply.

## 5.10.3 Moving Commodities, Poultry, and Conveyances in an HPAI Outbreak

Any movement of commodities, animals, and conveyances brings some level of risk of HPAI transmission from a known or unknown IP to non-infected premises. The risk of moving commodities, poultry, and conveyances depends on the nature of the item being moved and its ability to transmit or be contaminated with HPAI. HPAI can be transmitted via items that contain biological material (such as manure), through infected animals, or via a contaminated fomite or person.

## 5.10.4 Guidance for All Premises

Because of the variation in the risk of the commodities, animals, and conveyances which move regularly in the poultry industries, it is possible that movements of one type of commodity, animal, or conveyance are allowed, but other types are not—even from the same premises. In making decisions regarding permit requests, substantial consideration is given to critical movements (to ensure animal welfare, such as feed trucks) and essential movements (related to response activities like depopulation and disposal). Please see *Permitted Movement (FAD PReP Manual 6-0)* for more information.

## 5.10.5 OIE Treatment Guidelines for HPAI

The OIE *Terrestrial Animal Health Code (2016)* provides guidance for the inactivation of AI virus in eggs, egg products, and meat. The Code also provides extensive information on the importation of various poultry products, including feather meal, down, meat products, and other products of poultry origin, including those intended for animal feeding or industrial use. The procedures for inactivating AI virus in eggs, egg products, and meat are reproduced here for easy reference, and should be considered in any movement control and permitting during an outbreak.

### 5.10.5.1 Procedures for the Inactivation of the AI Virus in Eggs and Egg Products (Article 10.4.25)

Table 5-10 lists times for industry standard temperatures suitable for the inactivation of AI virus present in eggs and egg products:

*Table 5-10. Inactivation of AI in Eggs and Egg Products*

| | Temperature (°C) | Time |
|---|---|---|
| Whole egg | 60.0 | 188 seconds |
| Whole egg blends | 60.0 | 188 seconds |
| Whole egg blends | 61.1 | 94 seconds |
| Liquid egg white | 55.6 | 870 seconds |
| Liquid egg white | 56.7 | 232 seconds |
| 10% salted yolk | 62.2 | 138 seconds |
| Dried egg white | 67.0 | 20 hours |
| Dried egg white | 54.4 | 513 hours |

Note: The listed temperatures are indicative of a range that achieves a 7-log kill. Where scientifically documented, variances from these times and temperatures may also be suitable when they achieve the inactivation of the virus.

#### 5.10.5.2 Procedures for the Inactivation of the AI Virus in Meat (Article 10.4.26)

Table 5-11 lists times for industry standard temperatures are suitable for the inactivation of AI virus present in meat.

*Table 5-11. Inactivation of AI in Meat*

| | Temperature (°C) | Time |
|---|---|---|
| Poultry meat | 60.0 | 507 seconds |
| | 65.0 | 42 seconds |
| | 70.0 | 3.5 seconds |
| | 73.9 | 0.51 seconds |

Note: The listed temperatures are indicative of a range that achieves a 7-log kill. Where scientifically documented, variances from these times and temperatures may also be suitable when they achieve the inactivation of the virus.

## 5.10.6 Surveillance Required for Poultry and Poultry Product Movement

Surveillance measures are required for movement of poultry and poultry products for premises located in the CA (IZ and BZ). These steps include visual surveillance and monitoring of production parameters, as well as diagnostic testing as specified in the *Secure Poultry Supply Plan* or directed by the unified IC. Depending on the specific type of movement and item moved, diagnostic testing is often required for 2 days prior to movement; one sample with negative diagnostic results is typically required 24-hours prior to movement. For more information on poultry and poultry product movement, and the specific surveillance requirements, see Section 5.11 and the *Secure Poultry Supply Plan.*

In some cases (e.g., widespread HPAI infection) States or the unified IC may elect to implement additional surveillance and testing measures—beyond those required by continuity of business plans—for specific movements, such as those involving live birds or other high-risk movements. In some situations, additional requirements may extend to include premises residing in the FA.

## 5.11 CONTINUITY OF BUSINESS

Continuity of business is the management of non-infected premises and non-contaminated animal products in the event of an HPAI outbreak. Continuity of business provides science- and risk-based approaches and systems as a critical activity in an HPAI response. This helps to facilitate agriculture and food industries maintain typical business, or return to business during a disease response, while the risk of disease spread and threat to public health is effectively managed. Continuity of business planning can help to minimize unintended consequences on producers and consumers impacted by HPAI. During an HPAI outbreak, permitting, movement control, and prioritized disruptions—all based on science- and risk-based approaches—are critical measures to ensure continuity of business during an HPAI outbreak. USDA APHIS uses EMRS2 to record permitted movement during an FAD incident. EMRS2 may be used to issue permits for permitted movements, including those for continuity of business. For more information on permitting in EMRS2, and an overview of the EMRS2 Customer Permit Gateway that producers can use to request permits, please see *Permitted Movement (Manual 6-0).*

The *NAHEMS Guidelines: Continuity of Business* covers topics such as

- preparedness and response goals,
- key roles and responsibilities in continuity of business planning,
- details of continuity of business as part of an FAD response, and
- potential components required for a continuity of business plan.

For more information on continuity of business for an HPAI outbreak, please refer to the *Secure Poultry Supply Plan* which provides guidance for eggs, egg products, turkeys, and broilers, including surveillance, biosecurity, cleaning and disinfection, and other procedures for movement during an HPAI outbreak.[5]

[5] These plans were previously known individually as the Secure Egg Supply Plan, Secure Broiler Supply Plan, and Secure Turkey Supply Plan. They have been unified under the Secure Egg Supply Plan, though individual guidance is still available for each of the different commodities and products.

# 5.12 REGIONALIZATION FOR INTERNATIONAL TRADE (FOR A U.S. HPAI RESPONSE)

In the event of an HPAI outbreak in the United States, international trade of animals and animal products may be adversely affected for a significant period of time. This would have serious economic implications for the affected industries and the United States. Therefore it is important to identify, prior to an outbreak, potential procedures and plans that may mitigate the consequences and reestablish international trade as rapidly as possible.

As defined by the OIE, regionalization, also known as zoning, is the concept of separating subpopulations of animals in order to maintain a specific health status in one or more disease-free regions or zones. Disease-free regions can be created to facilitate continuity of business and reestablish international trade from the regions demonstrated to be disease-free. Regionalization recognizes that risk may be tied to factors that are not reflected by political boundaries of the nation or individual States, especially when the outbreak has been confined to specific areas within an individual State or group of States. Providing information to the OIE, its member countries and our trading partners, which clearly identifies the boundaries of the disease-free areas, can be used to inform our trading partners' decisions whether to receive or reject our exports. This risk-based process, based on sound science, can mitigate the adverse economic effects of an HPAI outbreak.

In the widespread 2014–2015 HPAI outbreak, many (but not all) trading partners—based on the evidence the United States provided to the OIE and other countries—did decide to regionalize the United States and ban exports only from affected counties or States. This allowed exports from unaffected regions to continue, mitigating the overall economic impact of the outbreak and indicating the importance of regionalization efforts with trading partners.

## 5.12.1 Compartmentalization

Another tool that may potentially mitigate the economic consequences of a disease outbreak is compartmentalization. Compartmentalization, which defines an animal subpopulation by management and husbandry practices related to biosecurity, could be used by the veterinary authorities to demonstrate and maintain disease freedom in certain commercial establishments whose practices have prevented the introduction of the disease. The disease-free status of these compartments could enable trade movement of poultry and poultry products. Compartmentalization has not been fully implemented by the United States for any disease agent to-date, and will depend on the recognition of the status of these compartments by international trading partners. Implementation of compartmentalization will rely on producers, industry, and State and Federal animal health authorities. By working closely together to develop and strengthen relationships and implementing the agreed upon procedures proceeding an FAD outbreak, compartmentalization may be a useful tool.

## 5.12.2 Further Guidance

The OIE *Terrestrial Animal Health Code (2016)* also offers guidance on regionalization and compartmentalization in Chapters 4.3 and 4.4. Currently there are no internationally accepted or fully implemented HPAI-free compartments in the United States.

# 5.13 Mass Depopulation and Euthanasia

## 5.13.1 Overview

When the criteria for a presumptive positive have been met (per the HPAI case definition), the APHIS Administrator or VS Deputy Administrator (U.S. CVO) or their designee authorizes APHIS personnel—in conjunction with State and Tribal officials, and unified IC personnel—to initiate depopulation on IP. Investigation of CP is also authorized at this time. Depopulation of poultry on CP, or poultry meeting the suspect case definition, may also be authorized by APHIS officials in coordination with State and Tribal officials and the unified IC—depending on epidemiological information and outbreak characteristics. Preemptive depopulation of poultry on other premises in the Infected Zone (typically 3 km around the IP) may also be authorized.

Indemnity for depopulated poultry is authorized by APHIS as funds are available. The final determination to depopulate entire Infected Premises, or specific houses/barns on Infected Premises, or depopulate Contact Premises, is made by SAHOs/Tribal officials and APHIS.

Best practices for containment and eradication of HPAI require rapid depopulation of infected poultry. Swift-stamping-out is required to prevent the amplification of HPAI virus and subsequent environmental contamination. In all cases, depopulation activities must incorporate excellent biosecurity practices to control the HPAI virus and prevent further transmission.

## 5.13.2 APHIS Stamping-Out and Depopulation Policy

Based on the experiences of the 2014–2015 outbreak, USDA APHIS developed a document *HPAI Outbreak: Stamping-Out & Depopulation Policy* (available from www.aphis.usda.gov/fadprep). In addition to this section, please refer to this document for further information.

### 5.13.2.1 Best Practice Guidance

Mass depopulation and euthanasia are not synonymous, and APHIS recognizes a clear distinction. Euthanasia involves transitioning an animal to death as painlessly and stress-free as possible. Mass depopulation is a method by which large numbers of animals must be destroyed quickly and efficiently with as much consideration given to the welfare of animals as practicable, given extenuating

circumstances. Mass depopulation is employed in an HPAI outbreak as a response measure to prevent or mitigate the spread of HPAI through the elimination of infected or potentially infected poultry.

As stated by the American Veterinary Medical Association (AVMA) on their website, "mass depopulation refers to methods by which large numbers of animals must be destroyed quickly and efficiently with as much consideration given to the welfare of the animals as practicable, but where the circumstances and tasks facing those doing the depopulation are understood to be extenuating."[6] AVMA is currently developing guidelines specifically on depopulation activities, which "aim to ensure as much consideration is given to animal welfare as practicable given the constraints of an emergency event."[7]

In the event of an HPAI outbreak, euthanasia or mass depopulation should be provided to affected poultry as safely, quickly, efficiently, and humanely as possible. In addition, the emotional and psychological impact on animal owners, caretakers, their families, and other personnel should be minimized.

Qualified personnel should perform mass depopulation in the event of an HPAI outbreak using the safest, quickest, and most humane procedures available. In an HPAI outbreak, it is likely that contactor support for 3D (depopulation, decontamination, and disposal) activities is required for both personnel and materials. This should be coordinated with the SPRS Logistics Center through the ICG.

#### 5.13.2.2 OIE Definition of Stamping-Out

The United States' primary control and eradication strategy for HPAI in domestic poultry, as defined by international standards and the OIE, is "stamping-out." "Stamping-out" is defined in the *OIE Terrestrial Animal Health Code (2016)* as the

> killing of animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact with the casual pathogen; animals should be killed in accordance with OIE Chapter 7.6.

#### 5.13.2.3 Depopulation Goal & Methods

Due to the risk of virus amplification in infected poultry, poultry that meet the HPAI presumptive positive case definition are depopulated as soon as possible, with the depopulation goal of 24-hours or less. Infected poultry shed large

[6] American Veterinary Medical Association. (2017). Poultry Depopulation. Retrieved from https://www.avma.org/KB/Policies/Pages/Poultry-Depopulation.aspx.

[7] American Veterinary Medical Association. (2017). Depopulation. Retrieved from https://www.avma.org/KB/Resources/Reference/AnimalWelfare/Pages/Depopulation.aspx.

amounts of HPAI virus, making control and eradication of HPAI more difficult and increasing the potential for environmental contamination.

In almost all cases, water-based foam or carbon dioxide are the depopulation methods available to rapidly stamp-out the HPAI virus in poultry. Each premises is evaluated individually, considering epidemiological information, housing and environmental conditions, currently available resources and personnel, and other relevant factors. However, to meet the goal of depopulation within 24 hours and halt virus production, other alternative methods may also be considered by State and APHIS officials.

### 5.13.3 Additional Information

Please refer to the APHIS FAD PReP website for current HPAI response and policy guidance on depopulation, including the document *Ventilation Shutdown Evidence & Policy* (www.aphis.usda.gov/fadprep).

The *NAHEMS Guidelines: Mass Depopulation and Euthanasia* also contains additional information on euthanasia and mass depopulation methods for poultry, including the following:

- carbon dioxide or other gas,
- water-based foam concentrate, and
- other methods.

## 5.14 DISPOSAL

Appropriate disposal of animal carcasses and materials is a critical component of a successful HPAI response. HPAI can survive for long periods on both organic and inorganic materials. The *Disposal SOP* discusses how to dispose of thousands of bird carcasses, contaminated and potentially contaminated materials, poultry products, items that cannot be properly cleaned and disinfected (such as manure, litter, and bedding), products of the response effort (such as PPE), and products of vaccination response. Disposal occurs as soon as possible after flock depopulation.

There are multiple options for disposal. Composting and disposal by managed landfill are two methods that address the need to minimize negative environmental impact while also mitigating virus spread. Composting was implemented in the 2014–2015 HPAI outbreak on many premises; it can be performed on-site, either “in-house” or outdoors (with the appropriate cleaning and disinfection/biosecurity measures implemented in either case). Composting materials are likely to be readily available (e.g., a carbon source, in particular). Managed landfills may be equipped to handle such waste appropriately, though their ability or willingness to accept carcasses may vary. Incineration is another

option, though fuel requirements, lower capacities, and smoke discharge can be challenging. On-site burial has been a commonly accepted means of disposal, though it may present significant issues related to potential environmental contamination. Off-site burial may also be considered in a large HPAI incident. In a widespread outbreak, multiple means of disposal may be required.

Please see the *Disposal SOP* for more details on any of the disposal methods mentioned. Other methods such as digestion, rendering, and hydrolysis may be considered, as indicated by the circumstances of the outbreak and disposal requirements. Disposal methods should always be assessed and applied appropriately, given the facility location, type of housing, premises characteristics, and other situational factors. Subject matter experts (i.e., for composting) are available to assist field personnel to ensure disposal methods are efficient and effective.

Disposal must always occur in a biosecure way that does not allow HPAI virus to spread and minimizes negative environmental impact. In addition, local and State regulations must be observed or memorandums of understanding must be obtained to ensure disposal capability. The unified IC coordinates closely with local authorities in deciding how to dispose of carcasses and other items. Cost effectiveness and stakeholder acceptance must also be considered in disposal decisions. If movement is required for disposal, the unified IC must permit such movement. In the event that available personnel are insufficient for disposal requirements in an HPAI outbreak, the Incident Commander can request emergency 3D contractor support from the SPRS Logistics Center through the ICG. The *NAHEMS Guidelines: Disposal* contains further guidance on disposal.

# 5.15 Cleaning and Disinfection

## 5.15.1 Cost Effective Virus Elimination from Infected Premises

Because of HPAI's high survival rate on both organic and inorganic materials, aggressive cleaning and disinfection practices are required for both ongoing biosecurity measures to contain the HPAI virus to IP and to eliminate virus from contaminated equipment, materials, and all other fomites. Cleaning and disinfection steps are necessary to control and eliminate HPAI during an outbreak.

Cleaning is the removal of gross contamination, organic material, and debris from the premises and their structures. This can be conducted through a mechanical means like sweeping (dry cleaning) and/or the use of water and a soap or detergent (wet cleaning). The goal is to minimize the remaining organic material so disinfection can be effective. Disinfection refers to the methods that are used on surfaces to destroy or eliminate HPAI virus. This can be physical (e.g., heat) or chemical (e.g., disinfectant). A combination of methods may be required; generally a premises must be both cleaned *and* disinfected, based on the recommendation of the unified IC. All disinfectants must be Environmental

Protection Agency (EPA)-approved for AI; off-label use of disinfectants is illegal. The ICG and unified IC provide guidance on the available options for both cleaning and disinfection.

Cleaning and disinfection practices during an outbreak should focus on virus elimination in a cost effective manner. While traditionally wet cleaning and disinfectant have been performed in many incidents, dry cleaning and heating of the houses/barns may be a preferred approach during a widespread HPAI outbreak. Any method selected should consider the characteristics of the premises/houses and other factors which may impact the effectiveness of the virus elimination activities. For example, freezing or sub-zero temperatures may make certain techniques impractical and unsuccessful. USDA continues to seek novel methods for cleaning and disinfection activities, and modify recommendations based on new scientific information on virus elimination methods.

Depending on the disposal method, initial cleaning and disinfection may occur prior to final cleaning and disinfection—for example, if compost piles are set inside a house, the house cannot be cleaned and disinfected until those compost piles are removed. However, the initial cleaning and disinfection on vehicles, equipment, and outdoor areas can be completed prior to the final cleaning and disinfection of the entire premises. Any cleaning and disinfection steps on Infected Premises need to account for water and feeding systems, ventilation, slats, nest box material, egg packing machines, egg storage areas, floor areas, the exterior of the house, and other materials and areas must be cleaned and disinfected (this is not an all-inclusive list).

## 5.15.2 Premises that Can't Be Cleaned and Disinfected

In the unusual circumstance in which commercial premises cannot be cleaned and disinfected, fallowing for 120-days—or a period recommended by the unified IC—is prescribed. The length of this period varies depending on ambient temperature and season. Fallowing should be reserved for premises that would need to be completely repaired or destroyed in order to be effectively cleaned and disinfected. An inspection may be required by the SAHO or APHIS at the end of the fallow period.

## 5.15.3 Further Information

The *Cleaning and Disinfection SOP* provides information on

- the HPAI cleaning and disinfection effort,
- optimal cleaning and disinfection methods for HPAI,
- processes used to inactivate HPAI from organic materials,
- how to clean and disinfect equipment and premises after HPAI detection, and

- EPA antimicrobial products registered for use against avian influenza A viruses: http://www.epa.gov/sites/production/files/2015-09/documents/list-m-avianflu.pdf.

The *NAHEMS Guidelines: Cleaning and Disinfection* and associated educational materials contain additional information on cleaning and disinfection.

# 5.16 VACCINATION

Although stamping-out is the preferred and primary strategy for controlling and eradicating HPAI in the event of an outbreak, emergency vaccination may be considered in specific circumstances. However, even if some type of emergency vaccination strategy is implemented, stamping-out will always be part of any HPAI response policy.

## 5.16.1 Emergency Vaccination Strategies for Poultry

There are two distinct purposes of emergency vaccination:

1. *Emergency vaccination to kill*
    a. A suppressive emergency vaccination strategy.
    b. The goal is to suppress virus replication in high-risk susceptible poultry using emergency vaccination and then killing vaccinates at a later date as determined by unified IC and the VS Deputy Administrator (U.S. CVO).
    c. Target vaccination of high-risk susceptible poultry in an IZ, CA, or VZ. Ring or regional vaccination around an IP or an IZ is a frequently cited example of this strategy.
2. *Emergency vaccination to live*
    a. A protective emergency vaccination strategy.
    b. The goal is to protect susceptible poultry from infection using emergency vaccination with the deliberate intent to maintain vaccinates for the duration of their usefulness.
    c. Targeted vaccination may include layers, valuable genetic stock, or endangered birds.

Appendix H contains information on available HPAI vaccine. The *NAHEMS Guidelines: Vaccination for Contagious Diseases—Appendix C: Vaccination for HPAI* contains more information.

## 5.16.2 Differentiating Infected from Vaccinated Animals and Surveillance of Vaccinated Flocks

Emergency vaccination requires vaccinated animal traceability and the diagnostic capability to differentiate infected and vaccinated animals (also known as a DIVA strategy) for movement between zones, interstate commerce, and international trade. In addition, even if a vaccine is used, surveillance must be continued to detect any antigenic change of the circulating influenza virus.

The DIVA strategy can help to control an HPAI outbreak and is fundamental to safeguarding international trade. It may employ

- serological and viral detection in unvaccinated sentinels placed in a vaccinated flock, and
- viral detection in vaccinated or non-vaccinated nondomestic avian species by diagnostic test, and
- use of a licensed recombinant vaccine containing only the AI hemagglutinin gene and detection of infection by the presence of antibodies to nucleoprotein or matrix protein, or
- use of inactivated oil emulsion heterologous vaccine containing the same H subtype as the field virus but a different N subtype.

## 5.16.3 Assessment and Overview

Federal, State, and other advisors evaluate whether to vaccinate if vaccine has been requested; emergency vaccine use is a critical strategic decision that will be deliberated by the offices of the Administrator and Secretary of APHIS and USDA, respectively. The SAHO or Tribal official and the APHIS VS Deputy Administrator (the U.S. CVO) must agree on the decision to vaccinate. A decision-tree matrix may also be employed to help decision-makers.

H5 and H7 vaccines are for use only under the supervision or control of USDA APHIS VS, and only as part of an official USDA Animal Disease Control Program (see VS Memorandum 800.85 www.aphis.usda.gov/animal_health/vet_biologics/publications/memo_800_85.pdf). Other subtypes are under the authority of the SAHO. USDA APHIS Center for Veterinary Biologics implements the provisions of the Virus-Serum-Toxin Act to ensure that veterinary biologics used to treat animal diseases are pure, potent, and effective.

Please refer to the AZA for more information on vaccinating zoo animals: www.zooanimalhealthnetwork.org/ai/Home.

### 5.16.3.1 DECIDING TO VACCINATE FOR HPAI

The decision for emergency vaccination will be based on the consideration of the following elements:

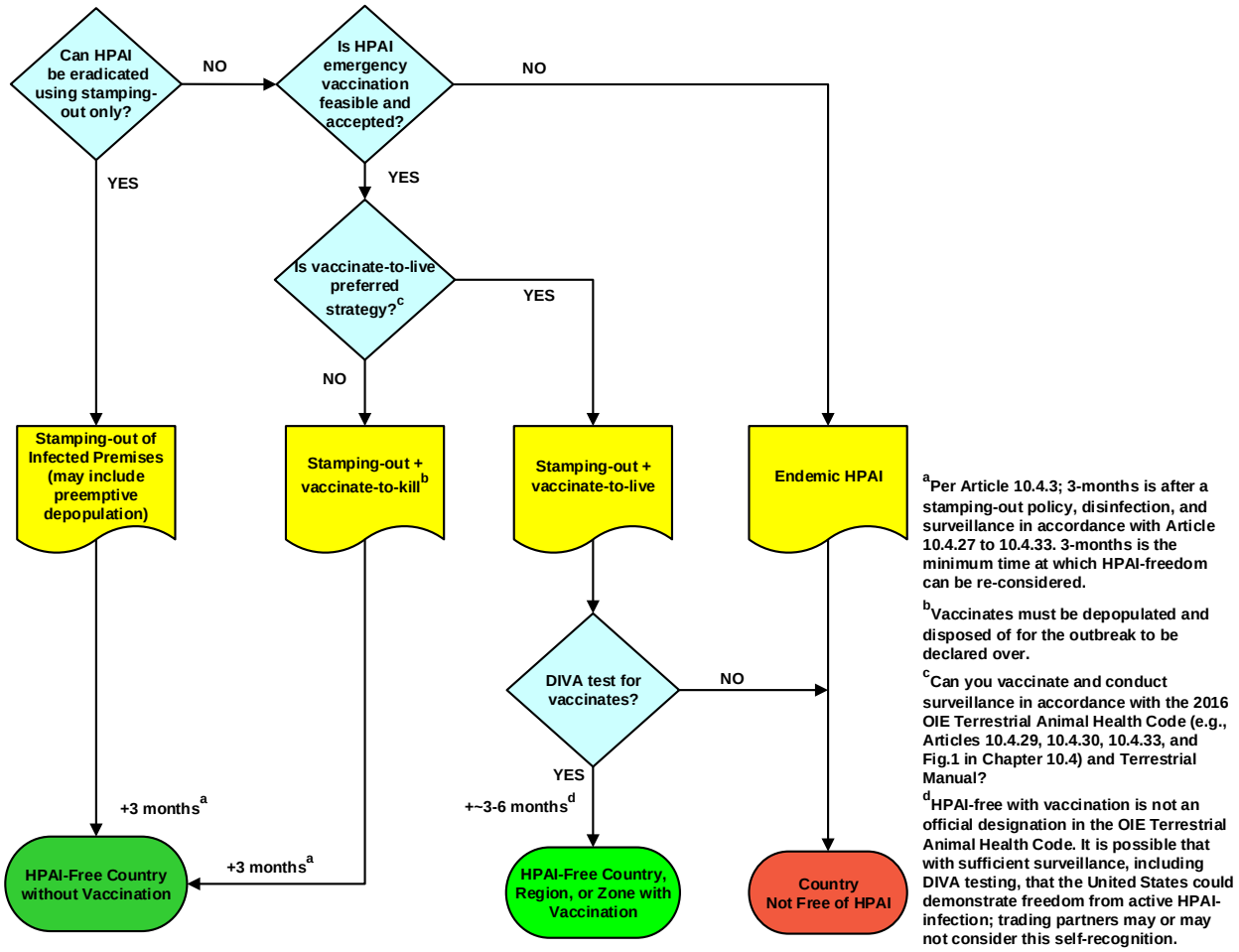
- Probability that the disease can or cannot be rapidly contained;
- Proximity of high-value genetic birds to the rapidly spreading disease focal point;
- Risk of infection of valuable, rare, or endangered nondomestic species;
- Poultry density in an area;
- Impact on international trade;
- Increased risk of introduction due to the presence of HPAI in neighboring countries;
- The extent to which disease is found in waterfowl, other wild birds, backyard flocks, or in live bird markets;
- Availability of physical and human resources;
- Sociopolitical factors (public confidence in commercial poultry products);
- Acceptance of industry stakeholders;
- Potential risk of zoonotic infection of the public from exhibition birds; and
- Economic consequences of failure to control the disease.

The safety and health of vaccination personnel must be considered in any vaccination effort, and appropriate PPE must be used.

### 5.16.3.2 EXAMPLE DECISION TREE FOR HPAI VACCINE USE

Figure 5-5 shows a possible decision tree for emergency vaccine use in domestic poultry in the event of an HPAI outbreak.

*Figure 5-5. Example Decision Tree for Emergency Vaccination in Domestic Poultry*




## 5.16.4 Strategic Vaccine Distribution

Typically, if emergency vaccination is employed for the purposes of disease control, it is strategically implemented to create a ring or "firebreak" of vaccinated poultry around the IZ, creating a Containment Vaccination Zone (CVZ). A second option is to vaccinate susceptible poultry on premises that are farthest from known IP as a priority, and then vaccinate progressively closer to the IP. A third option is to vaccinate susceptible poultry only on premises that are closest to an IP. Vaccination may also be used (as a protection strategy) to protect valuable, rare, or endangered non-domestic species of birds, creating a Protection Vaccination Zone (PVZ).

An emergency vaccination strategy will be carefully tailored to the epidemiology and threats of the specific outbreak. Genetically valuable birds, including breeding stock, may be a priority in an emergency vaccination strategy with the concurrence of the unified IC, SAHO, and APHIS. The priority in which other birds are vaccinated will be determined at the time of an outbreak, and will also be based on many of the factors listed in Section 5.16.3.1.

## 5.16.5 Vaccination Zone Designations

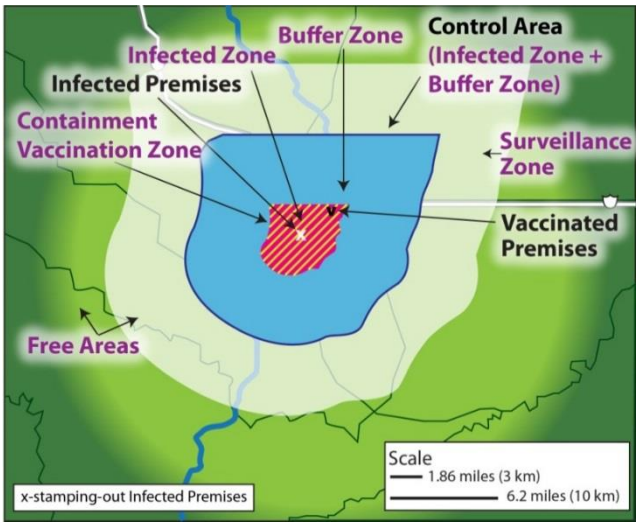
The following sections present illustrations of the VZ designations.

### 5.16.5.1 Containment Vaccination Zone

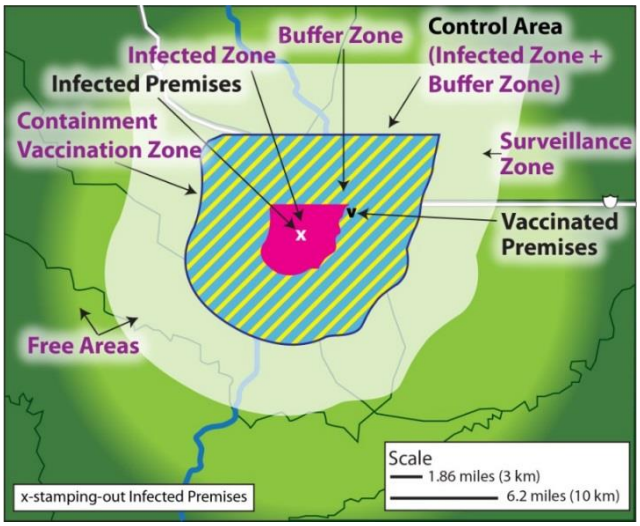
The CVZ is an emergency vaccination zone typically inside the CA, and may include the IZ or the BZ. A CVZ is typically observed with stamping-out modified with emergency vaccination to kill. Figure 5-6 shows examples of CVZs. Please note that the SZ is part of the FA.

*Figure 5-6. Examples of Containment Vaccination Zones*

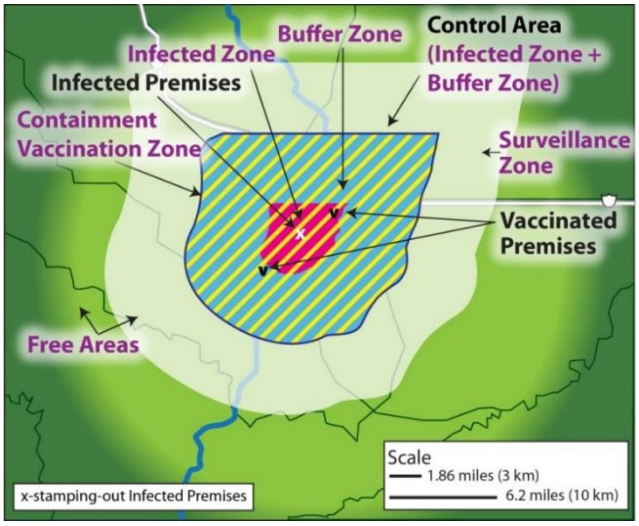
*Emergency Vaccination in IZ*



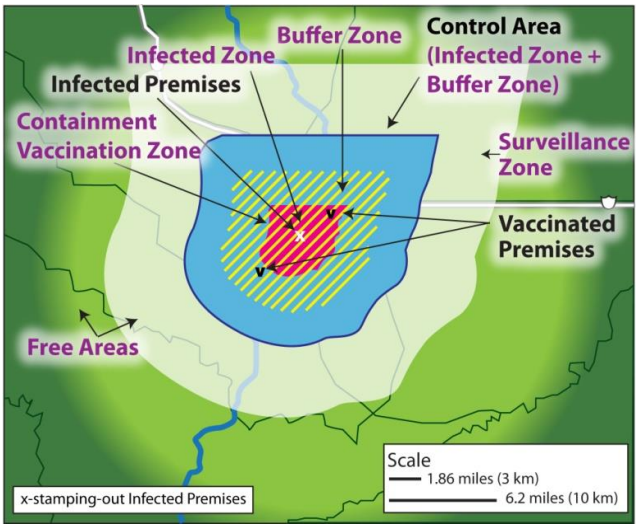

*Emergency Vaccination in BZ*




*Emergency Vaccination in CA*




*Emergency Vaccination in IZ and Partial BZ*



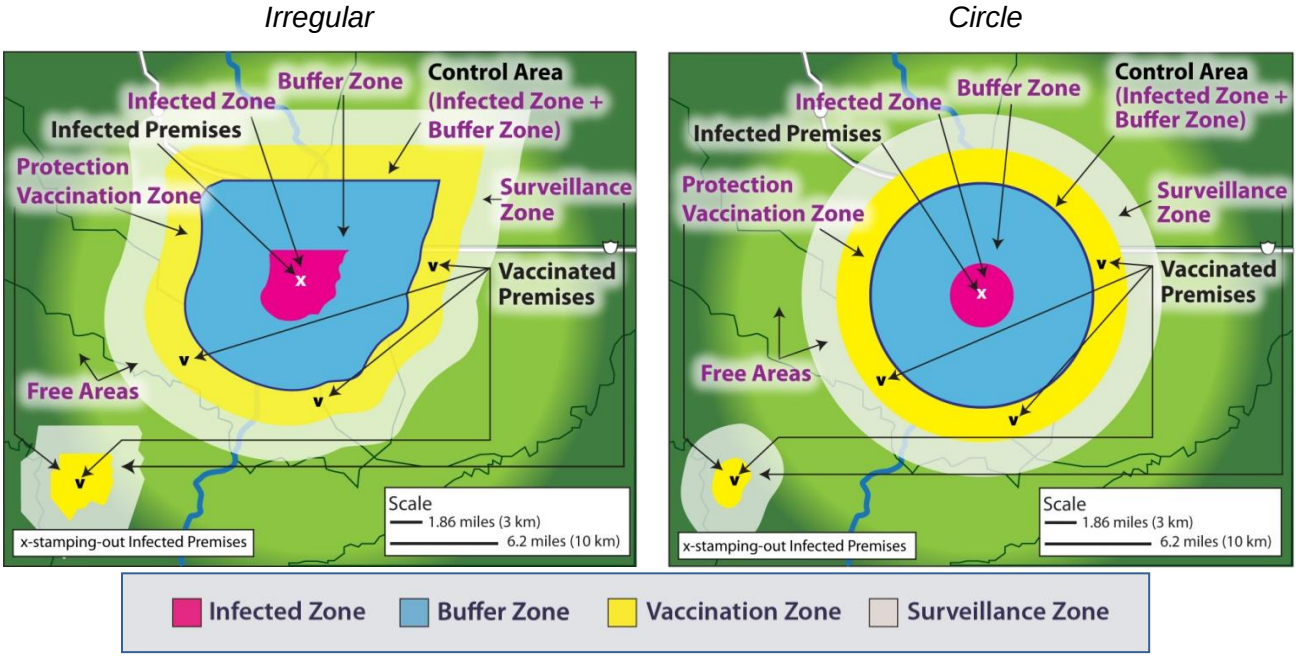

### 5.16.5.2 PROTECTION VACCINATION ZONE

The PVZ is an emergency vaccination zone typically outside the CA. It is consistent with the OIE *Terrestrial Animal Health Code (2016)* definition for a Protection Zone:

> A zone established to protect the health status of animals in a free country or free zone, from those in a country or zone of a different animal health status, using measures based on the epidemiology of the disease under consideration to prevent spread of the causative pathogenic agent into a free country or free zone. These measures may include, but are not limited to, vaccination, movement control and an intensified degree of surveillance.

Typically, a PVZ is observed with stamping-out modified with emergency vaccination to live. Figure 5-7 shows examples of PVZs. Please note that the SZ is part of the FA.

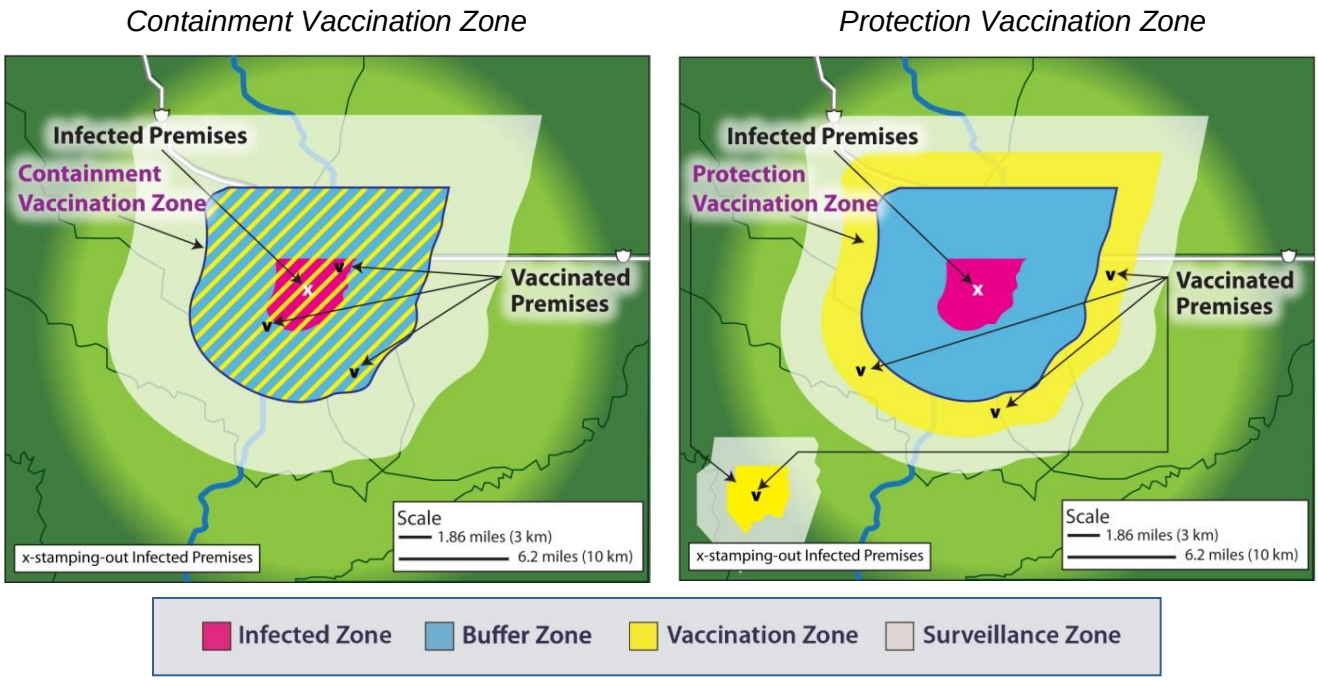
*Figure 5-7. Examples of Protection Vaccination Zones*




## 5.16.6 Vaccinated Premises

VP is typically a secondary designation to another premises designation, and is only used if vaccination is employed in an outbreak. A VP may be located in a CVZ, typically inside a CA (an IZ or BZ), or in a PVZ, typically outside a CA. Figure 5-8 shows VP in a CVZ (left) and a PVZ (right).

*Figure 5-8. Examples of Vaccinated Premises*




## 5.16.7 Movement Restrictions for Vaccinates

Vaccination occurs within a CVZ or a PVZ. If vaccination is used, a vaccination plan will define procedures to prevent the spread of HPAI by vaccination teams. All vaccinated animals will be identified with specific and permanent (tamper-proof) identification. When vaccine is used, surveillance must continue to assess vaccination effectiveness and detect any antigenic change.

VP will be subject to the risk assessments, surveillance requirements, and biosecurity procedures established for the primary premises or zone designation. In addition to the movement and permit process outlined by the unified IC, consideration must be given to any national or international (OIE) standards or conditions for such movement. EMRS2 will be used as the system of record for all permits and permitted movements, including those issued for vaccinates.

## 5.16.8 Cessation of Vaccination

AI vaccination should cease as soon as possible to allow the region or State to return quickly to a favorable trade status. While IC, SAHOs, and APHIS will indicate when vaccination must cease, it is likely that no new vaccinations will be given more than 42 days (2 times the 21 day OIE-incubation period) after the last known new case of HPAI is detected. The best epidemiological evidence available will be taken into consideration in making this decision.

## 5.17 LOGISTICS

During an HPAI outbreak, getting resources and personnel where they are needed when they are needed is a critical activity that grows in complexity based on the size and scope of the response operation. Contractor support for these operations is available if required, and can be requested through the unified IC and ICG. The SPRS Logistics Center (which includes the NVS) works with the unified IC through the ICG to coordinate APHIS resources and resources contracted by APHIS (both personnel and equipment) for field operations. Personnel can be on-site in 24 hours and ramped up quickly. However, in a widespread outbreak, personnel shortages can still occur.

The *Overview of the NVS SOP* also provides information on NVS capabilities and lays out the required steps to request resources from the NVS. In addition, State, Tribal, and local responders should refer to the NVS website, where State preparedness officials and responders can find additional information regarding the NVS, its capabilities, and past exercises. Upon request and approval from the NVS, Federal, State, and local authorities can request planning guides and other templates.

## 5.18 WILDLIFE MANAGEMENT AND VECTOR CONTROL

USDA APHIS works in close collaboration, communication, and coordination with DOI and other Federal, State, Tribal, and local wildlife agencies that have primary jurisdictional authority and subject matter expertise for wildlife. This collaboration, communication, and coordination occurs in both the unified IC as well as in MAC Groups.

The *NAHEMS Guidelines: Wildlife Management and Vector Control for an FAD Response in Domestic Livestock* discusses personnel and equipment required for wildlife management, quarantine and movement control for wildlife, wildlife risk assessment, wildlife surveillance, and related activities. Please see VS Memorandum 573.1 for additional information on VS animal health policy in relation to wildlife.

### 5.18.1 Wildlife Management

In any HPAI response, wildlife surveillance and other management must be conducted by persons trained and proficient in wildlife health, capture, collection, biosecurity, and restraint.

A wildlife management plan that addresses transmission of HPAI in wildlife (in particular, wild birds) is developed as soon as possible after identification of the index case in domestic poultry. If there is evidence of HPAI transmission between wild birds and domestic poultry in either direction, this plan should aim to

mitigate this transmission pathway, preventing the exposure of wild birds to poultry and other livestock. Additionally, an assessment of the risk that wildlife poses for HPAI transmission to susceptible birds, poultry, and other animals should be conducted within 7 days of confirmation of the index case.

Importantly, HPAI in wild birds does not impact OIE HPAI-free status. As stated in the OIE *Terrestrial Animal Health Code (2016)*, in Article 10.4.1,

> Infection with influenza A viruses of high pathogenicity in birds other than poultry, including wild birds, should be notified in accordance with Article 1.1.3. However, a Member Country should not impose bans on the trade in poultry and poultry commodities in response to such a notification, or other information on the presence of any influenza A virus in birds other than poultry, including wild birds.

### 5.18.2 Vector Control

HPAI can be transmitted mechanically by mice, vultures, and other vectors. Appropriate biosecurity measures should be in place during an HPAI outbreak to ensure that mechanical vectors do not have contact with infected flocks or other infected material. These biosecurity measures must also prevent the contamination of food and water by all vectors.

## 5.19 Animal Welfare

During an HPAI outbreak, humane treatment must be provided to poultry given the specific circumstances of the outbreak, particularly from the time they are identified for depopulation or vaccination activities until they are depopulated, or euthanized, as prescribed by veterinary authorities of the affected States or Tribal nations. The *Overview of Animal Welfare SOP* contains additional information.

## 5.20 Modeling and Assessment Tools

The development of models and risk assessments are critical to HPAI preparedness and in a successful HPAI response, by giving decision-makers valuable insight into potential epidemiological spread, economic impact, and geospatial risk factors. During an outbreak, one or more multidisciplinary teams (consisting of epidemiologists, disease agent experts, economists, affected commodity experts, and others) may be established to perform risk assessments and other relevant analyses as needed. An appropriate, scientific, and rapid ad-hoc risk assessment on any issue of concern will be provided within 72 hours after a request from the Incident Commander or ICG.

The *Overview of Modeling and Assessment Tools SOP* provides information on modeling and risk assessment, covering the following:

- Key roles and responsibilities in modeling and risk analysis;

- Uses of epidemiological models;
- Proactive risk assessments;
- Risk assessment during and after an outbreak; and
- Examples of current models and assessment tools.

# 5.21 APPRAISAL AND COMPENSATION

Indemnity payments are to encourage disease reporting, reduce the spread of animal disease, and compensate owners on the basis of fair market value during an HPAI incident or outbreak.

## 5.21.1 Authority

The AHPA gives APHIS authority to establish and implement an indemnification program to prevent or eradicate an HPAI outbreak; 9 CFR 53 provides additional regulations. Indemnity is a key component of APHIS's disease control programs in that the promise of fair compensation for losses helps to ensure cooperation from the owners of affected poultry. Such cooperation is important for rapid disease control and eradication. In addition to the depopulation of IP, in many cases, poultry on CP or those meeting the suspect case definition may also be depopulated as soon as possible. This helps to ensure that HPAI does not spread.

The Secretary of Agriculture has the authority to pay up to 100 percent of the fair market value of the poultry, as well as for disposal, cleaning, and disinfection. However, compensation is only paid in cases where State and Federal animal health officials concur with the recommendations to order the destruction of poultry, whether those recommendations emerged from industry, State, or Federal authorities. Title 9 CFR 53 provides regulations for indemnifying the owner (and or grower, as applicable) of animals or materials requiring destruction.[8]

## 5.21.2 Appraisal and Compensation Procedures during an Outbreak

State and APHIS officials approve depopulation prior to its occurrence. This requires rapid communication between producer, company, State officials, APHIS, and laboratory officials. During an HPAI outbreak, poultry may be depopulated based on a presumptive positive (consistent with the case definition) from a diagnostic test conducted at a NAHLN laboratory. Depopulation of poultry on Contact Premises, or poultry meeting the suspect case definition, may also be authorized by APHIS officials—in coordination with State and Tribal officials

[8] Title 9 CFR Chapter 1, Part 53, www.access.gpo.gov/nara/cfr/waisidx_10/9cfr53_10.html.

and the unified IC—depending on epidemiological information and outbreak characteristics.

Best practices for rapid containment and eradication of HPAI means that in many instances, 3D activities must commence immediately, making slow or deliberate appraisal processes unsuitable. While it is ideal to provide an accurate fair market appraisal to owners and flock managers prior to depopulation, in emergency situations, appraisals are not be required to be signed prior to depopulation if APHIS and the cooperating State agree that the poultry must be destroyed immediately to mitigate the potential spread or amplification of HPAI virus on a presumptive or confirmed positive premises. Depopulation can occur immediately after the *USDA APHIS Appraisal & Indemnity Request Form* is signed; however, every attempt should be made to collect inventory information and other relevant data prior to depopulation.

Appraisal and compensation documents released by the ICG or unified IC during the incident specify personnel responsibilities, appraisal procedures, assessment of compensation eligibility, payment of indemnity, and required forms and reports during an HPAI outbreak. The Operations Section in the ICG is responsible for calculating indemnity payments and appraisal processing.

Please refer to the HPAI policy guidance documents on the FAD PReP website (www.aphis.usda.gov/fadprep) for additional finance and administration procedures, including on appraisal and compensation. The *Appraisal & Indemnity Request Form* is also available at that link.

## 5.22 FINANCE

During an HPAI outbreak, funding may be rapidly required. For responding to specific emergency situations, VS has access to a variety of sources for funding. The two most common sources are the APHIS Contingency Fund (CF) and the Commodity Credit Corporation (CCC).

APHIS CF takes care of unforeseen, unpredictable problems requiring temporary programs. The following four conditions must exist to qualify for the release of agency contingency funds:

1. The outbreak must pose an economic threat.
2. Eradication technology must be feasible and cost effective.
3. No program or no effective program must currently exist.
4. The proposed program must have industry support.

For funds in excess of $1 million, CCC funding is typically requested. During an emergency, the Secretary is authorized to transfer funds from the CCC. The funds are provided to APHIS as no-year funds. Before APHIS can ask the Secretary to

transfer funds, however, it must consider whether it can redirect funds from a budget line item or if other funding sources are available. APHIS considers the total estimated amount of funding needed to address the issue and whether there is political support before deciding whether or not to seek a CCC transfer.

The *Overview of Finance SOP* contains additional guidance on

- key roles and responsibilities in finance,
- emergency funding processes for FAD outbreaks, and
- triggering events for APHIS emergency funding.

## 5.23 INCIDENT MANAGEMENT

In any HPAI outbreak, the capability to rapidly scale up the size of a unified IC and other structures, as well as to effectively integrate veterinary functions and countermeasures is critical for a successful response. The principles of the NRF and NIMS, already discussed in this plan, allow such scalability and govern the entire HPAI response.

The *Overview of NRF and NIMS SOP* provides additional information on the relation of NRF and NIMS to APHIS and lists the responsibilities of Federal, State, Tribal, and local governments in an HPAI outbreak. The *APHIS Foreign Animal Disease Framework: Roles and Coordination* also provides further details on high-level incident management for incidents.

The SOPs and NAHEMS Guidelines referenced in this chapter can be found at www.aphis.usda.gov/fadprep.

# Chapter 6
# Recovery after an HPAI Outbreak

## 6.1 PROOF-OF-FREEDOM

### 6.1.1 Recognition of Disease-Free Status

The OIE does not grant official recognition for AI-freedom or HPAI-freedom, but as a member of the OIE, the United States can self-declare the entire country, zone, or compartment free from AI and HPAI. The *OIE Terrestrial Animal Health Code* contains specific requirements for self-declaration of freedom from AI and HPAI. Any submitted self-declaration should contain evidence demonstrating that the requirements for the disease status have been met in accordance with OIE standards. By providing relevant epidemiological evidence, the United States can demonstrate to potential importing countries that the entire country, zone, or compartment under discussion meets the provisions of the avian influenza chapter. As mentioned in Article 10.4.27 of the OIE *Terrestrial Animal Health Code (2016)*, no member can declare itself from influenza A infection in wild birds; the definitions for AI-free status apply to poultry only.

#### 6.1.1.1 CRITERIA NEEDED FOR AI-FREE STATUS

The OIE defines an AI-free country, zone, or compartment as follows (Article 10.4.3):

> A country, zone, or compartment may be considered free from avian influenza when it has been shown that infection with avian influenza viruses in poultry has not been present in the country, zone or compartment for the past 12 months, based on surveillance in accordance with Articles 10.4.27 to 10.4.33.
>
> If infection has occurred in poultry in a previously free country, zone, or compartment, avian influenza free status can be regained:
>
> 1. In the case of infections with high pathogenicity avian influenza viruses, three months after a stamping-out policy (including disinfection of all affected establishments) is applied, providing that surveillance in accordance with Articles 10.4.27 to 10.4.33 has been carried out during that three-month period.

2. In the case of infections with low pathogenicity avian influenza viruses, poultry may be kept for slaughter for human consumption subject to conditions specified in Article 10.4.19 or a stamping-out policy may be applied; in either case, three months after the disinfection of all affected establishments, providing that surveillance in accordance with Articles 10.4.27 to 10.4.33 has been carried out during that three-month period.

#### 6.1.1.2 CRITERIA NEEDED FOR HPAI-FREE STATUS

The OIE defines an HPAI-free country, zone, or compartment as follows (Article 10.4.4):

> A country, zone or compartment may be considered free from infection with high pathogenicity avian influenza viruses in poultry when:
>
> 1. it has been shown that infection with high pathogenicity avian influenza viruses in poultry has not been present in the country, zone or compartment for the past 12 months, although its status with respect to low pathogenicity avian influenza viruses may be unknown; or
>
> 2. when, based on surveillance in accordance with Articles 10.4.27 to 10.4.33, it does not meet the criteria for freedom from avian influenza but any virus detected has not been identified as high pathogenicity avian influenza virus.
>
> The surveillance may need to be adapted to parts of the country or existing zones or compartments depending on historical or geographical factors, industry structure, population data, or proximity to recent outbreaks.
>
> If infection has occurred in poultry in a previously free country, zone or compartment, the free status can be regained three months after a stamping-out policy (including disinfection of all affected establishments) is applied, providing that surveillance in accordance with Articles 10.4.27 to 10.4.33 has been carried out during that three-month period.

#### 6.1.1.3 HPAI-FREE COMPARTMENTS

There are no HPAI-free compartments in the United States that have been fully implemented and internationally accepted; compartmentalization/compartments have not been established in recent HPAI outbreaks in the United States or in other OIE-member countries.

### 6.1.2 Surveillance for Recognition of Disease Freedom

Surveillance is fundamental in proving disease freedom to gain or regain self-declared disease-free status or to support a resumption of business activities after an HPAI outbreak. According to the OIE, a country re-declaring for country, zone, or compartment freedom from HPAI virus should show evidence of an

effective surveillance program considering the epidemiological circumstances of the outbreak, to demonstrate absence from infection in susceptible poultry populations. This requires surveillance that incorporates virus detection and antibody tests as described in the OIE *Terrestrial Animal Health Code (2016)* Articles 10.4.27 to 10.4.33. If vaccination is used, surveillance must incorporate the diagnostic ability to differentiate infected and vaccinated animals (see Section 5.16.2).

Evidence of disease freedom in the United States may involve information from multiple surveillance streams including the NPIP[1], LBMS, wild bird surveillance, as well as other passive surveillance activities.

For countries that are regaining freedom from AI or HPAI after an outbreak, the OIE states (Article 10.4.31):

> In addition to the general conditions described in the above-mentioned articles, a Member Country declaring that it has regained country, zone or compartment freedom from avian influenza or from infection with high pathogenicity avian influenza viruses in poultry should show evidence of an active surveillance program depending on the epidemiological circumstances of the outbreak to demonstrate the absence of the infection. This will require surveillance incorporating virus detection and antibody tests. The use of sentinel birds may facilitate the interpretation of surveillance results.
>
> A Member Country declaring freedom of country, zone or compartment after an outbreak of avian influenza should report the results of an active surveillance program in which the susceptible poultry population undergoes regular clinical examination and active surveillance planned and implemented in accordance with the general conditions and methods described in these recommendations. The surveillance should at least give the confidence that can be given by a randomized representative sample of the populations at risk.

## 6.1.3 Country Freedom Declaration

The United States will self-declare disease freedom after meeting the OIE requirements outlined in the *OIE Terrestrial Animal Health Code (2016)* in Articles 10.4.27 to 10.4.33. Individual trading partners may require additional information including HPAI response policy, eradication measures, surveillance, and monitoring activities of vaccinates, as well as evidence of veterinary infrastructure, industry organization, and, if vaccination has been used, the tracing system for vaccinates. Acceptance of the claim for country freedom may also involve an inspection by an international panel to review the eradication program and all available information to verify HPAI freedom.

[1] The NPIP (9 CFR 145) provides additional information on surveillance for H5/H7 surveillance for LPAI.

## 6.1.4 Release of Quarantine and Movement Control

### 6.1.4.1 Release of Control Area

IC and SAHOs need to plan for the release of the CA (and associated movement controls) when the CA is established under a State-Federal unified IC. The specifics of CA release may be refined based on the epidemiology of the outbreak. Typically, the following conditions must be met and these criteria may be modified during an incident:

- The last IP in the CA has been depopulated; the compost pile has been started (temperature monitoring has commenced), or mortality buried, or mortality removed from premises for appropriate disposal.
- Initial cleaning and disinfection/virus elimination activities on all IP and dangerous Contact Premises, as applicable, have been completed (including, but not limited to, outside areas of premises, equipment, trucks, and other potential fomites used in depopulation activities). This does not include barn interiors.
- Required outbreak surveillance tests indicate no HPAI infection in the CA.
- Surveillance requirements for international or bilateral trade are conducted and continue to be conducted (based on the density of poultry, epidemiological information, species, and commodity).

Upon meeting these criteria, the CA can be released if there are no positive diagnostic results for HPAI in the CA for 21 days since the initial cleaning and disinfection of the last IP, and all specified conditions have been met designated by the unified IC. Please note, based on these conditions, it is possible that a CA could be released before the date in which restocking activities are approved on the last diagnosed IP.

Release of a CA is a unified IC decision; trading partners may require enhanced surveillance procedures prior to and after the release of the CA.

### 6.1.4.2 Release of Federal Quarantine

Federal quarantines have not been established in recent HPAI outbreaks in the United States. However, in the event that a Federal quarantine is implemented under Federal authority, a Federal Register notice must be published notifying of quarantine release. The Federal quarantine area or region may or may not be the same as the CA, and may be released by sections, by risk, or in its entirety.

#### 6.1.4.3 RELEASE OF QUARANTINE ON INFECTED PREMISES

IP may remain under quarantine even when the CA has been released. If IP are under quarantine based on State authority, the SAHO is responsible for releasing the quarantine based on the evidence and requirements established by the State. This process should consider how quarantined premises are evaluated for HPAI freedom, any restocking activities, and other critical risk factors.

### 6.1.5 Disposition of Vaccinates

While HPAI vaccine has not been used in recent HPAI outbreaks, in the event vaccination strategies are implemented, HPAI vaccinates may still be subject to movement control and monitoring measures under State and/or Federal authority.

## 6.2 RESTOCKING OF PREVIOUSLY INFECTED PREMISES

The total time in which it takes a premises to go from an IP with sick birds, to a premises that has finished virus elimination, to a restocked premises is based on many factors, including: the type of premises, epidemiology of the outbreak, location of other HPAI IP, evidence provided to State and APHIS officials, and method of disposal. Restocking on previously IP may take place before the end of the outbreak has been declared, under conditions established by the unified IC.

A primary goal of the HPAI response is to ensure that the response efforts and activities do not cause more damage and disruption than the disease outbreak itself. Restocked premises that subsequently become infected with HPAI a second time place significant additional stress on constrained resources and continue the risk of ongoing HPAI transmission. Therefore, appropriate caution is urged in restocking premises. Depending on outbreak-specific circumstances, APHIS may not indemnify premises that are restocked without APHIS and State approval that subsequently become re-infected.

### 6.2.1 Environmental Sampling

Environmental sampling is required of the premises prior to restocking activities. It usually occurs during the typical 21 day fallow (vacant) period that begins upon completion of virus elimination activities. Personnel taking environmental samples should continue to follow biosecurity and PPE procedures as indicated by the IC. In the event that houses are left vacant for an extended fallow period (often 120 days, but as determined by the unified IC), State and APHIS officials may decide environmental sampling may or may not be required, depending on ambient temperature, outbreak epidemiology, and other factors.

## 6.2.2 Commercial Premises that Can't Be Cleaned

In the unusual circumstance in which commercial premises cannot be cleaned and disinfected, fallowing for 120-days—or a period recommended by the unified IC—is prescribed. The length of this period will vary depending on ambient temperature and season, as well as premises condition and circumstances. The fallowing period may need to be longer than 120 days, or can be shorter than 120 days, depending on the factors just noted. Fallowing is often reserved for premises that would need to be completely repaired or destroyed in order to be effectively cleaned and disinfected. An inspection may be required by the State Animal Health Official or APHIS at the end of the fallow period. Premises that cannot be cleaned would still need to meet the requirements set by the unified IC to be eligible to restock, and their restocking would need to be approved by State and APHIS officials. Environmental testing may be required at the discretion of the unified IC.

## 6.2.3 Restocking Guidance and Approval Process

Following official approval of all cleaning and disinfection (virus elimination) procedures, IP remain fallow (vacant without birds) for a minimum of 21 days to ensure that any residual virus has been eliminated from the houses and other areas of the premises. Under certain conditions, the unified IC may decide this 21-day period following disinfection procedures can be slightly decreased based on ambient temperature, length of time before disinfection was completed, type of disinfection procedures carried out on the premises, and further assessment of risk. However, 21 days remains the common standard for fallowing after HPAI virus elimination procedures.

In order to gain restocking approval, a previously Infected Premises must (1) meet all the requirements of any State Quarantine Notice/Hold Order and USDA flock plan, (2) fallow for the minimum prescribed time, and (3) have conducted environmental sampling with no evidence of HPAI infection. Risk factors are also evaluated in consultation with State officials. A premises is "approved" for restocking when it has met all the criteria required to restock *and* State and APHIS officials approve restocking. In some cases, additional criteria may be imposed by the unified IC and/or State and APHIS officials prior to restocking: this may include stringent, additional biosecurity measures. Requirements may vary by State. Restock approval may be delayed by ongoing HPAI activity or transmission.

## 6.2.4 Approved Sources of Poultry

Birds used for restocking must be from flocks tested for HPAI. These flocks must be tested for HPAI prior to movement; the minimum standard is 2 negative rRT-PCR tests at least 24 hours apart, with one negative test within 24 hours of movement.

### 6.2.5 Testing Requirements after Restocking

Birds placed into previously infected houses or premises may be subjected to further diagnostic testing at the discretion of State and/or APHIS officials.

### 6.2.6 Additional Guidance

For more specific guidance on restocking after HPAI-infection, please refer to the HPAI policy guidance and procedures that is provided on www.aphis.usda.gov/fadprep.

# Appendix A
# Foreign Animal Disease Preparedness and Response Plan Materials to Support HPAI Response

This appendix provides a broad overview of the Foreign Animal Disease Preparedness and Response Plan (FAD PReP), and lists the FAD PReP documents that support this *Highly Pathogenic Avian Influenza (HPAI) Response Plan (2017)*. The new and revised documents may be useful for stakeholders in preparedness and response planning related to HPAI. Most of these documents have been released, others are forthcoming. These resources are found online at www.aphis.usda.gov/fadprep.

## OVERVIEW OF FAD PREP

### FAD PReP Mission and Goals

The significant threat and potential consequences of foreign animal diseases (FADs) and the challenges and lessons-learned of effective and rapid FAD response have led to the development of FAD PReP. The mission of FAD PReP is to raise awareness, build expectations, and develop capabilities surrounding FAD preparedness and response. The goal of FAD PReP is to integrate, synchronize, and deconflict preparedness and response capabilities as much as possible before an outbreak by providing goals, guidelines, strategies, and procedures that are clear, comprehensive, easily readable, easily updated, and that comply with the National Incident Management System.

*In the event of an FAD outbreak, the three key response goals are to: (1) detect, control, and contain the FAD in animals as quickly as possible; (2) eradicate the FAD using strategies that seek to stabilize animal agriculture, the food supply, the economy, and that protect public health and the environment; and (3) provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products. In summary, achieving these three goals will allow individual livestock and poultry facilities, States, Tribes, regions, and industries to resume normal production as quickly as possible. They will also allow the United States to regain FAD-free status without the response effort causing more disruption and damage than the disease outbreak itself.*

## FAD PReP Documents and Materials

FAD PReP is a comprehensive U.S. preparedness and response strategy for FAD threats, both zoonotic and non-zoonotic. Types of FAD PReP documents include:

- Strategic Plans—Concept of Operations
- National Animal Health Emergency Management System (NAHEMS) Guidelines
- Industry Manuals
- Disease Response Plans
- Standard Operating Procedures (SOPs) for Critical Activities
- Continuity of Business/Secure Food Supply Plans (commodity specific plans developed by public-private-academic partnerships)
- Ready Reference Guides.

## Lessons Learned from Past Outbreaks

The foundation of FAD PReP is lessons learned in successfully managing past FAD incidents. FAD PReP is based on the following:

- Achieving rapid FAD detection and tracing.
- Providing processes for emergency planning that respect local knowledge.
- Integrating State-Federal-Tribal-industry planning processes.
- Ensuring that there are clearly defined, obtainable, and unified goals for response.
- Having a unified Incident Command with a proper delegation of authority that is able to act with speed and certainty.
- Employing science and risk-based management approaches to FAD response.
- Ensuring that all guidelines, strategies, and procedures are communicated effectively to responders and stakeholders.
- Identifying resources and trained personnel required for an effective incident response.

- Trying to resolve competing interests prior to an outbreak and addressing them quickly during an outbreak.

# HPAI Response and Policy Information

In light of the recent HPAI outbreaks, lessons learned were incorporated into existing and new policy and response guidance. This guidance is more specific and granular than the guidance provided within this *HPAI Response Plan.* It is also updated as required based on ongoing or recent HPAI outbreaks.

These documents fall within the following general topics:

- Initial Response
- Finance and Administration Processes
- Surveillance & Diagnostics
- Quarantine, Movement Control, and Continuity of Business
- Disposal & Cleaning/Disinfection (Virus Elimination)
- Recovery and Restocking
- Health and Safety Information
- Other outbreak related information.

These documents are all available on the HPAI page of the FAD PReP website and should be consulted in any HPAI response for further information.

# HPAI Continuity of Business Planning

- *Secure Poultry Supply Plan* (www.securepoultrysupply.com).

# HPAI Critical Activities & SOPs

There are 23 critical activities conducted during a response to HPAI. Many of these activities have associated SOPs. These SOPs are templates to provide a common picture or set of procedures for the following 23 tools and strategies:

1. Overview of Etiology and Ecology
2. Case Definition Development Process
3. Surveillance

4. Diagnostics (Sample Collection, Surge Capacity, and Reporting)
5. Epidemiological Investigation and Tracing
6. Overview of Information Management
7. Communications
8. Health and Safety and Personal Protective Equipment
9. Biosecurity
10. Quarantine and Movement Control
11. Continuity of Business
12. Overview of Regionalization for International Trade
13. Mass Depopulation and Euthanasia
14. Disposal
15. Cleaning and Disinfection
16. Vaccination
17. Logistics
18. Overview of Wildlife Management and Vector Control
19. Overview of Animal Welfare
20. Overview of Modeling and Assessment Tools
21. Appraisal and Compensation
22. Overview of Finance
23. Overview of Incident Management.

# READY REFERENCE GUIDES

- HPAI Response
  - Overview of the HPAI Response Plan
  - Etiology and Ecology
  - Reported H5 HPAI in 2016

- HPAI Zones and Premises
- Common Operating Picture
- Quarantine, Movement Control, and Continuity of Business
- Overview of Diagnostics
- Emergency Management Response System 2.0 (EMRS2) Customer Permit Gateway
- Additional Information

- General Response for all FADs
  - Introduction to FAD PReP
  - Introduction to EMRS2
  - Understanding the EMRS2 Interface
  - FAD Framework: Roles and Coordination
  - FAD Framework: Response Strategies
  - Critical Activities and Tools During an FAD Response
  - Overview of Continuity of Business and the Secure Food Supply Plans
  - Zones, Areas, and Premises in an FAD Outbreak
  - Movement Control in an FAD Outbreak
  - Defining Permitted Movement
  - Permitting Process
  - VS Guidance 12001.2: Procedures and Policy for the Investigation of Potential FAD/Emerging Disease Incidents

# INDUSTRY MANUAL

- Poultry

## NATIONAL ANIMAL HEALTH EMERGENCY MANAGEMENT SYSTEM GUIDELINES

- Biosecurity
- Cleaning and Disinfection
- Continuity of Business
- Disposal
- Health and Safety
- Mass Depopulation and Euthanasia
- Personal Protective Equipment
- Surveillance, Epidemiology, and Tracing
- Quarantine and Movement Control
- Vaccination for Contagious Diseases
- Wildlife Management and Vector Control for an FAD Response in Domestic Livestock

## STRATEGIC PLANS—CONCEPT OF OPERATIONS

- *APHIS Foreign Animal Disease Framework: Roles and Coordination* (FAD PReP Manual 1-0)
- *APHIS Foreign Animal Disease Framework: Response Strategies* (FAD PReP Manual 2-0)
- *Information Management and Reporting* (FAD PReP Manual 3-0) (forthcoming at time of publication)
- *FAD Investigation Manual* (FAD PReP Manual 4-0)
- *A Partial List of FAD Stakeholders* (FAD PReP Manual 5-0)
- *Permitted Movement* (FAD PReP Manual 6-0).

# Appendix B
# Laboratory Network List for Avian Influenza

National Animal Health Laboratory Network (NAHLN) laboratories are listed at www.aphis.usda.gov/animal_health/nahln/downloads/ai_lab_list.pdf. The listed laboratories are those that can currently perform testing for avian influenza. During an outbreak, the National Veterinary Services Laboratories must confirm highly pathogenic avian influenza. Please see Chapter 5 for more information on diagnostics.

# Appendix C
# Overview of Secure Poultry Supply Plan

More information about the *Secure Poultry Supply (SPltryS) Plan* is located at www.securepoultrysupply.com and www.aphis.usda.gov/fadprep. This appendix provides a brief overview of the *SPltryS Plan.*

## SUMMARY

The *SPltryS Plan* encompasses the *Secure Egg Supply (SES) Plan*, *Secure Turkey Supply (STS) Plan*, and *Secure Broiler Supply (SBS) Plan*; together these plans promote food security and animal health through continuity of market planning for a highly pathogenic avian influenza (HPAI) outbreak. Each plan makes specific science- and risk-based recommendations that emergency decision makers (such as Incident Commanders) can use to rapidly decide whether to issue or deny permits for the movement of poultry and egg products during an HPAI outbreak. These plans have been used successfully in the 2014–2015, 2016, and 2017 HPAI outbreaks.

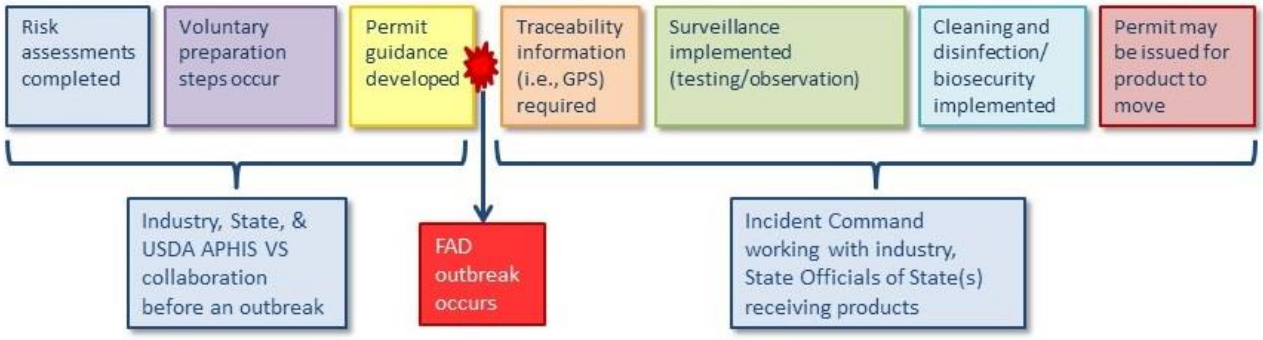
The *SPltryS Plan* is one of several Secure Food Supply Plans, which have resulted from a collaboration between public, private, and academic partners. The team for the *SPltryS* includes representatives of the following organizations (in alphabetical order):

- Association of Veterinarians in Broiler Production
- Association of Veterinarians in Turkey Production
- Egg sector veterinarians, officials, and representatives
- Iowa State University, Center for Food Security and Public Health
- State Animal Health Officials
- University of Minnesota, Center for Animal Health and Food Safety
- USDA Animal and Plant Health Inspection Service, Veterinary Services
- United Egg Association
- United Egg Producers.

The *SPltryS Plan* is based on current research and practice in fields including virology, flock husbandry, epidemiology, and risk-assessment. The *SPltryS Plan*

uses science- and risk-based preparedness and response components (see Figure C-1) to provide guidance on permitting the movement of poultry and egg industry products from a Control Area during an HPAI outbreak. Simultaneously, these recommendations effectively manage the risk of HPAI transmission to naïve premises. Through the integrated implementation of the components listed in Figure C-1, this plan provides a high degree of confidence that poultry and egg industry products moved into market channels do not contain HPAI virus.

*Figure C-1. Process of the Secure Poultry Supply Plan and Secure Food Supply Plans*




The *SES Plan* focuses on permit guidance for pasteurized liquid egg, non-pasteurized liquid egg, washed and sanitized shell eggs, nest run shell eggs, layer hatching eggs, and layer day-old chicks (Table C-1). Guidance for other products, such as dry eggshells, is also found in the *SES Plan.*

The *SBS Plan* provides guidance for moving hatching eggs and broiler industry products within, out of, and into an HPAI Control Area. Product-specific guidance is available for hatching eggs, day-old chicks, broilers to market, and other products.

The *STS Plan* is under development to minimize exposure and transmission of HPAI during an outbreak and give consumers a high degree of confidence that turkeys are free of HPAI virus. A final draft plan is available with input from stakeholders, Federal and State authorities, and academic partners.

Specific criteria must be fulfilled to qualify for movement permits.[1] Movement is allowed, by permit, for movements from inside a Control Area that meet epidemiological and biosecurity standards, which for most movements includes one or more negative rRT-PCRs for HPAI.

Additional components, including surveillance guidelines, product specific biosecurity practices, cleaning and disinfection guidelines, cleaning and disinfection checklists, proactive product-specific risk assessments, permit examples, and the voluntary preparedness components (epidemiological assessment and biosecurity checklist), can be found at

[1] For detailed information on permitted movements, please see the document *Permitted Movement (FAD PReP Manual 6-0).*

www.securepoultrysupply.com. Currently, the focus is on simplifying existing guidance to facilitate implementation during an outbreak, and creating a unified *SPltryS Plan* across the poultry industries.

*Table C-1. Summary of SES Plan Permitting*

| Product | The proactive risk assessment for movement is: | And traceability information (premises ID, GPS coordinates, or other) is available: | And production parameters are normal: | And the following biosecurity measures are in place (please see the product-specific sections for the list of steps involved in each of these measures): | And the premises biosecurity is acceptable? | And the epidemiological assessment is acceptable? | And the rRT-PCR result is negative? | Action: | Permit guidance to move product: | And the second rRT-PCR result is negative? | Action: | Permit guidance to move product: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pasteurized liquid egg** | Negligible | YES | YES | 1. Truck and driver biosecurity | *These steps are not required for this product.* | | | | | | | Issue PERMIT to move to market |
| **Non-pasteurized liquid egg** | Negligible | YES | YES | 1. Truck and driver biosecurity | NA (not applicable) | NA | YES | → | Issue PERMIT to move to pasteurization | Non-pasteurized liquid egg becomes pasteurized liquid egg | | |
| **Washed and sanitized shell eggs (to premises without poultry)** | Negligible | YES | YES | 1. Truck and driver biosecurity<br>2. Product-specific biosecurity | YES | YES | YES | → | Issue PERMIT to move off premises to a storage or holding area | YES | → | Issue PERMIT to move to market for eggs collected 2 days earlier |
| **Washed and sanitized shell eggs (to premises with poultry)** | Low | YES | YES | 1. Truck and driver biosecurity<br>2. Product-specific biosecurity | YES | YES | YES | → | Issue PERMIT to move off premises to a storage or holding area | YES | → | Issue PERMIT to move to market for eggs collected 2 days earlier |
| **Nest run shell eggs** | Low | YES | YES | 1. Truck and driver biosecurity<br>2. Product-specific biosecurity | YES | YES | YES | → | No PERMIT issued until 2 negative rRT-PCR tests | YES | → | Issue PERMIT to move to processing for eggs collected 2 days earlier (can move immediately to market after processing) |
| **Layer hatching eggs** | Low | YES for both the breeder farm and the hatchery | YES | 1. Truck and driver biosecurity<br>2. Product-specific biosecurity | YES | YES | YES | → | No PERMIT issued until 2 negative rRT-PCR tests | YES | → | Issue PERMIT to move to hatchery or processing for eggs collected 2 days earlier |
| **Layer day-old chicks** | Low | YES for both the hatchery and the pullet farm | NA | 1. Truck and driver biosecurity<br>2. Product-specific biosecurity<br>3. No eggs from rRT-PCR positive breeder flocks in hatchery egg room | YES | YES | NA | | NA | NA | | Issue PERMIT to move layer day-old chicks to pullet farm; 21-day quarantine at pullet premises |

# Appendix D
# HPAI Active Outbreak Surveillance Guidance for Poultry

## INTRODUCTION

Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center for Epidemiology and Animal Health (CEAH) Surveillance Design and Analysis (SDA) Unit prepared the following outbreak surveillance guidelines for highly pathogenic avian influenza (HPAI) in poultry. These guidelines take into account lessons learned from the recent HPAI outbreaks and may be updated at any time. Based on current scientific and best practice information, these guidelines may serve as examples for use by the unified Incident Command (IC) in developing incident-specific surveillance plans. For further detail on previous outbreak-specific sampling strategies, also see the HPAI policy guidance documents under "Surveillance" on the HPAI page of www.aphis.usda.gov/fadprep.

*Box D-1. Important Note on Appendix D*

**Important Note Concerning Guidance Found in Appendix D**

- **Information contained within is intended to be ancillary to that in Section 5.3 in this response plan.**
- During the initial stages of an outbreak, use the default surveillance parameters provided in Section 5.3 unless otherwise directed by the unified IC or State Animal Health Official.
- Review this appendix when time allows or when new information becomes available during an outbreak. This appendix contains definitions for surveillance parameters, sampling examples, data to illustrate how different HPAI strains may affect surveillance, and guidance on adjusting surveillance plans accordingly.

## PURPOSE

This guidance expands upon the information presented in Section 5.3 and offers recommendations for the design of HPAI active outbreak surveillance focused on disease detection. These guidelines do not specifically or comprehensively address surveillance for continuity of business in an outbreak, such as surveillance

testing for daily bird or product movement from layer, broiler, or turkey flocks. However, when testing and sampling methods comply, test results from business continuity surveillance for bird and product movement may help to meet outbreak surveillance testing requirements. For more information on surveillance testing required for business continuity, please see the *Secure Poultry Supply Plan* which includes guidance for egg, broiler, and turkey flocks (www.securepoultrysupply.com).

# ASSUMPTIONS

Several assumptions are embedded in the design of surveillance plans and analyses of surveillance data. The accuracy of these assumptions impacts the strength of conclusions drawn from surveillance activities. For the example HPAI surveillance schemes discussed in this appendix, the following assumptions apply:

1. Passive surveillance activities are routine and ongoing in all commercial and backyard flocks.
2. HPAI rapidly manifests clinically in gallinaceous species.[1]
3. In commercial premises, the producer places all sick and dead birds into a group from which pooled surveillance samples are drawn.
4. The proportion of HPAI infected birds is much higher among the sick and dead group than among apparently healthy birds in the same house.
5. Outbreak response field personnel visiting premises with ill birds will suspect HPAI if compatible signs are present, and will initiate testing.
6. The rRT-PCR [real-time reverse transcriptase polymerase chain reaction] test sensitivity for detection of one or more infected bird samples in a 5-bird or 11-bird pool is 85 to 88 percent.

# SURVEILLANCE PARAMETERS

At the core of any surveillance plan is a description of the frequency, number, and distribution of animals and premises to be targeted for sampling. Recommendations and decisions regarding these core components often derive from knowledge about and trade-offs between surveillance parameters. The seven surveillance parameters are discussed below. *Default settings for these surveillance parameters are provided in Section 5.3 in this HPAI Response Plan.*

[1] A noted exception occurred during the Texas 2004 HPAI outbreak where clinical signs in poultry were absent.

1. *Design (threshold) prevalence.* Design prevalence describes the minimum prevalence of infection we aim to detect in a population or a targeted subgroup of that population. Surveillance sample size calculations are directly tied to design prevalence, with larger sample sizes required for detection of lower prevalences. Design prevalence values are typically lower for insidious diseases or diseases with public health consequences and much higher for acute presentations or if highly susceptible subgroups are targeted (e.g., 40-50 percent). Design prevalence can also vary based upon mechanisms for disease spread. There are two design prevalence levels to consider for a surveillance plan: premises level design prevalence and bird level design prevalence.

    a. Premises level. Start with a design prevalence of 10 percent in the Surveillance Zone (SZ), which is part of the Free Area (FA) and assumed to be free of disease. A design prevalence is not needed in the Control Area (CA) where testing of all commercial premises is required. Spread by vector, wind, or another environmental pathway with wide distribution may justify a higher design prevalence. In contrast, spread by company networks or directed movements may lead to a more clustered distribution and justify a lower design prevalence. In either case, sampling of all trace-out (animal movements) or indirect contacts (shared company, management or service providers) can help to balance the need for an otherwise more intensive (lower design prevalence) sampling strategy. The total number of premises in the zone may also influence choice of design prevalence; one may want to design the surveillance to detect infection by considering the absolute number of potentially Infected Premises (IP) rather than the proportion of potentially IP.

    b. Bird level. In cases where infection manifests clinically, a higher design prevalence, such as 40 percent, can be used when sampling focuses on sick or recently dead birds. However, a lower design prevalence may be required for early detection in the case of imminent animal movement for a premises in the CA, for example, than would be required to provide evidence of disease freedom for a premises in a SZ. A lower design prevalence may also be desirable in houses with higher than normal mortality (due to breed and/or production type) because it may take longer to reach the design prevalence in the sick and dead birds in those houses compared to houses with lower levels of normal mortality.

2. *Confidence level*. The confidence level is typically set at 95 percent. The confidence level provides a quantitative measure of the assurance

in disease absence achieved through surveillance. Also called surveillance system sensitivity, confidence level describes the system's ability to detect infection at or above design prevalence.[2] When consequences of failing to detect infection are particularly high, the confidence level is occasionally set at 99 percent. If the sampling scheme is not carried out according to plan, the actual confidence derived through surveillance (a function of sample size, population size, test accuracy and the selected design prevalence) may not reach the desired level.

3. *Risk-based sampling*. Selectively targeting populations or subgroups expected to have higher-than-average pathogen exposure or higher-than average pathogen prevalence can minimize the number of samples required to detect infection or substantiate its absence. Preferential sampling of sick or recently dead birds is an example of risk-based sampling. If affected by HPAI, sick/dead birds in the flock are expected to exhibit a higher prevalence of infection than those appearing healthy. By focusing on the sick/dead subpopulations, we can use a higher value for design prevalence and lower sample sizes accordingly.

4. *Population or target group size.* Sample sizes are also a function of the size of the population (or subgroup) from which the sample is selected. The population may comprise premises within a zone, birds within a house, or daily mortalities.

5. *Types of tests.* Sample sizes are a function of the accuracy of selected diagnostic tests (also see Section 5.4), whether clinical inspection, polymerase chain reaction, serology, etc. Test sensitivity and specificity also vary with a diagnostic test's cutoff values. Test sensitivity and specificity are used in calculating the surveillance sample sizes.

6. *Sampling frequency.* Optimum sampling frequency depends on surveillance objectives and the epidemiology of the pathogen and is probably the most difficult of surveillance parameters to assign. Previous test results, for example, can augment information gained from current test results if the time period between sampling is short—ideally less than an incubation period—and the introduction risk is minimal. However, surveillance objectives will also play a role in this decision. A strain with a short incubation period (see Table D-5) may require frequent sampling if the objective is early detection (prior to clinical signs) in an area that may have been recently exposed. Alternatively, an extended sampling interval may suffice for strains with long incubation periods if the objective is to demonstrate disease

[2] When using Bayesian models or simulation studies, a system's ability to detect infection can be computed as a probability and may be called the detection probability or credibility.

freedom and sampling occurs at least one incubation period beyond the most recent exposure.

7. *Sample size.* Surveillance plans provide sample sizes for (1) the number of premises in a zone/area to be tested and (2) the number of pooled bird samples to collect at each premises.

    a. The sample size for number of premises. In a CA, where HPAI is known to be present and the goal is to find every IP, sampling all premises will typically be required. Outside of the CA, the number of premises to sample is set to ensure the surveillance system's ability to identify an infected region, presuming that the proportion of premises infected in the region equals or exceeds design prevalence. This number will vary with the total number of premises in the area and the value selected for the premises level design prevalence (see Tables D-1 and D-2). The sensitivity of the bird level surveillance system also affects the number of premises sampled; D-2 assumes 95 percent bird level sensitivity.

    b. The sample size for the number of birds. This is set to ensure the surveillance system can successfully identify an infected house or sick and dead bird group, presuming that the proportion of infected birds in the house or sick and dead birds equals or exceeds design prevalence. This number will vary with the total number of birds in the group, the diagnostic sensitivity and specificity of the test, and the value selected for the design prevalence within the house or mortality group (bird level). Initially, sample sizes are computed to achieve the desired confidence in one round of testing, but they can be adjusted to incorporate multiple rounds of testing over short time periods (see Box D-2).

All HPAI surveillance plans should aim to achieve or exceed 95 percent confidence of detection. Similarly, high-risk flocks and highly susceptible subgroups should typically be prioritized for sampling in any HPAI outbreak. However, the other surveillance parameters, as well as factors driving risk categorization, will likely vary by outbreak. If there isn't an example plan that fits the parameter settings, further help designing the surveillance and sampling plans may be required. APHIS CEAH SDA can provide this assistance.

*Box D-2. Surveillance Design Assistance*

**Surveillance Design Assistance**

If circumstances prevent achieving 95 percent confidence in a single round of testing (e.g., unable to collect the recommended number of pooled samples), contact APHIS VS CEAH SDA unit for assistance to determine how many additional rounds of testing are required.

# COMMERCIAL PREMISES EXAMPLES

APHIS and/or State officials will determine the appropriate time period for active surveillance. Critical decisions in active surveillance include the criteria for selection of premises, the sample size and targets for sampling birds on selected premises, and the optimum frequency and duration of sampling. Guidance and rationale for selection of these surveillance planning parameters is provided below.

## Selection of Premises

Criteria for selection of premises for sampling will vary by region and objective. In the Infected Zone and Buffer Zone (which comprise the CA), the objective is to detect all IP as quickly as possible. In the SZ, the objective is typically to demonstrate that HPAI has not moved outside the CA. In other words, the objective of surveillance in the SZ is to demonstrate freedom.

### INFECTED ZONE AND BUFFER ZONE (THE CONTROL AREA)

Include all premises within the CA in active surveillance, prioritizing by epidemiological investigation and continuity of business requirements.

### SURVEILLANCE ZONE (IN THE FREE AREA)

Include a subset of premises within the SZ in active surveillance, prioritized by epidemiological investigation or other requirements.[3] The number of premises necessary to sample will vary by total number of premises in the zone and the premises level design prevalence. Table D-1 provides sample sizes to achieve 95 percent confidence of detection based on the number of premises in the zone and choice of design prevalence. Table D-2 provides guidance on selecting a design prevalence. For example, in designing a sampling scheme for a zone with 150 premises, a 10 percent premises level design prevalence may seem appropriate

[3] In a disease outbreak, permits are issued to move specific transports/items into, within, and out of a regulatory CA. Movement exclusively in a FA are not managed by the unified IC, though affected State(s) may have additional surveillance and/or testing criteria in FAs.

and based on Table D-1, the plan is to sample 27 premises. As shown in Table D-2, a surveillance scheme designed to detect infection at a 10 percent premises level design prevalence in a zone with 150 premises may have up to 14 infected premises go undetected. If this seems too high, then a lower design prevalence should be selected, say 5 percent or up to 7 undetected premises. With this lower design prevalence, using Table D-1, the new scheme should be to sample 51 premises.

*Table D-1. Minimum Number of Premises to Select for Sampling from a Zone or Area (to achieve 95 percent confidence[1] in detecting at least one infected premises for the chosen premises level design prevalence)*

| Number of Premises in Zone or Area | Premises Level Prevalence | | | | |
|---|---|---|---|---|---|
| | 1% | 3% | 5% | 10% | 15% |
| **11 or less** | All | All | All | All | 9* |
| **12 to 15** | All | All | All | 13* | 11 |
| **16 to 40** | All | All | 32* | 21* | 16 |
| **41 to 50** | All | 45* | 36 | 23 | 16 |
| **51 to 75** | All | 58 | 43 | 25 | 17 |
| **76 to 100** | All | 66 | 47 | 26 | 18 |
| **101 to 150** | 136* | 76 | 51 | 27 | 18 |
| **151 to 200** | 163* | 82 | 53 | 28 | 19 |
| **201 to 500** | 236* | 94 | 58 | 29 | 19 |
| **>500** | 309 | 103 | 61 | 30 | 20 |

[1] These sample sizes assume that a sufficient number of pooled-bird samples are collected and tested within a barn to achieve a 95 percent confidence in detection at an appropriate bird level prevalence.
*Select all premises if number of premises within the zone or area is less than the value given.

*Table D-2. Number of Infected Premises in Zones or Areas with Differing Numbers of Premises for Different Premises Level Prevalence Values*[1]

| Number of Premises in Zone or Area | Premises Level Prevalence | | | | |
|---|---|---|---|---|---|
| | 1% | 3% | 5% | 10% | 15% |
| **10 or less** | <1 | <1 | <1 | 1 | 2 |
| **11 to 14** | <1 | <1 | 1 | 2 | 2 |
| **15 to 20** | <1 | <1 | 1 | 2 | 3 |
| **21 to 30** | <1 | 1 | 2 | 3 | 5 |
| **31 to 50** | <1 | 2 | 3 | 5 | 8 |
| **51 to 75** | <1 | 3 | 4 | 8 | 12 |
| **76 to 100** | <1 | 3 | 5 | 10 | 15 |
| **101 to 150** | 1 | 5 | 8 | 15 | 23 |
| **151 to 200** | 2 | 6 | 10 | 20 | 30 |
| **201 to 500** | 5 | 15 | 25 | 50 | 75 |
| **>500** | >5 | >15 | >25 | >50 | >75 |

[1] Infected premises values have been rounded up to the nearest whole number for the maximum area of the size range. For example, a surveillance system designed to detection 10 percent prevalence in a zone with 150 premises has a 95 percent chance of detecting at least one infected premises if there are 15 or more infected premises in the zone. In other words, the zone could go undetected using this sample size if less than 15 premises were infected.

## Sampling Birds within Selected Premises

Guidance for sampling birds on selected premises will vary by HPAI strain and host characteristics (see Figures D-1, D-2a and D-2b later in this Appendix). If the strain is expected to manifest clinically in the affected host population, sampling can center on sick or recently dead birds and use smaller sample sizes. If the strain may not manifest clinically in the affected host population, sampling may need to be more intensive. Guidelines for bird level sampling are the same whether the selected premises falls within the CA or the SZ.

### Species Likely to Manifest Clinical Signs

From each house on the premises where sick or dead birds are observed, or epidemiological links are found, collect swabs for two 5- or 11-bird pool(s). This ensures 95 percent confidence of detecting at least 1 infected pool from each house if 40 percent of the sick and dead birds (design prevalence in the target group) are infected.

When the number of sick or dead birds is small, it may not be possible to detect the desired design prevalence. It is not unusual in turkey breeder houses or smaller houses to have fewer than 5 or 11 sick or dead birds daily. In situations where

fewer than 5 or 11 dead or sick birds are available, only available dead or sick birds should be sampled but swabs should still be divided approximately equally between the two pooled samples. Sampling apparently healthy gallinaceous birds provides negligible benefit.

For cases where it is desired to detect at a target prevalence less than 40 percent within the sick and dead bird group, see Table D-3 for the number of pooled samples to collect in each house. For example, when the epidemiologic curve of the strain progresses slowly (compare strains shown in Figures D-2.a and D-2.b), selecting a lower bird-level design prevalence can result in more rapid detection. However, a lower bird-level design prevalence requires more than 2 pooled samples per house (see Table D-3). *Note that testing for business continuity purposes will likely require collecting 5- or 11-bird pool(s) from each group of 50 sick and dead birds from each house on the premises.*

*Table D-3. Number of Pooled Samples to Collect per House to Achieve 95 Percent Confidence in Detecting at Least One Infected Pool (assuming the design prevalence given on the left)* [1]

| Design prevalence in target population | Target population size | Number of 5-bird pooled samples | Number of 11-bird pooled samples |
|---|---|---|---|
| 5% | **>650 birds** | 14 | 7 |
| | **400 - 650** | 13 | 6 |
| | **250 - 399** | 13 | 6 |
| | **150 - 249** | 12 | 6 |
| | **100 - 149** | 11 | 6 |
| | **40* - 99** | 10 | 6 |
| 10% | **>200 birds** | 7 | 4 |
| | **20* - 200** | 7 | 3 |
| **15%** | **>13*** | 5 | 3 |
| **20%** | **>9*** | 4 | 2 |
| **30%** | **>6*** | 3 | 2 |
| **40%** | **>4*** | 2 | 2 |

[1] When the target population contains fewer birds than what is recommended, divide them approximately equally between the number of pools recommended.
*For target population sizes below these lower bounds, the design prevalence (for that row) cannot be achieved with 95% confidence. Sample all birds, dividing approximately equally among tubes.

### PREMISES/SPECIES UNLIKELY TO MANIFEST CLINICAL STUDIES

There are three exceptions to the 'sampling sick or dead birds only' rule. The rule does not apply to

1. Outbreaks in which LPAI is also a concern (e.g., Indiana 2016 or Tennessee 2017),
2. Facilities lacking species known to respond clinically to HPAI, such as waterfowl, and
3. HPAI outbreaks that do not cause clinical signs in gallinaceous birds.

In these cases, if sick or dead birds total less than the described sample size, swab apparently healthy birds to make up the difference and *consider increasing the sample size to meet a lower design prevalence*. Target sampling of apparently healthy birds to stressed animals (e.g., puberty), and distribute effort across each house with preference given to areas near doorways, vents, or with higher potential traffic of fomites.

As an example, in the Indiana 2016 incident, a sample size of 20–22 turkeys was designed to detect AI with 95 percent confidence, presuming a detection prevalence of 20 percent at any single visit or closer to 10 percent detection prevalence from accumulated sampling of two consecutive sampling visits. In contrast, a sample size of 30–33 broilers and layers was designed to detect AI with 95 percent confidence, presuming a detection prevalence of 10 percent at any single visit or closer to 5 percent detection prevalence from accumulated sampling of two consecutive sampling visits. These targets presume a higher expected susceptibility to AI viruses in turkeys than in broilers or layers. See Box D-1 for obtaining surveillance design assistance when sampling does not reach 95 percent confidence.

## Frequency of Sampling

Frequency of sampling is determined by classification of premises, the objective of surveillance (to detect disease or to demonstrate freedom), resource availability, and the type of behavior of the virus (e.g., its incubation period[4], infectious period[5], and potential routes of new exposure). Sampling frequency is highest when there are continuing opportunities for virus introduction. Sampling frequency is also highest early in an outbreak, when little is known of the behavior of the virus. In these cases, in which early detection is the primary objective, repeat visits to high-risk premises (e.g., Contact Premises [CP]) may be necessary to detect the virus during its incubation period. Frequency may be adjusted based on virus transmission characteristics (see Table D-4) and by premises designation (see Table D-5). Sampling frequency can be reduced in

[4] Incubation period: The period between exposure and onset of clinical signs.
[5] Infectious period: The period during which an infected animal can transmit the pathogen to other hosts. The infectious period varies by pathogen.

situations in which exposure opportunities are resolved and demonstration of disease freedom is the goal. In these cases, the final sampling should occur at least one incubation period following the last opportunity for exposure.

### IN THE CONTROL AREA

1. *Suspect Premises (SP):* SP is a temporary designation determined by State Animal Health Official, APHIS, and/or the unified IC. These premises should be immediately investigated. SP should be reclassified after investigation is complete and testing results are received.

2. *Contact Premises (CP):* Collect samples on each premises every other day for 14 days, or similar sampling frequency depending on resources available. Collect samples following the recommended sampling guidance above. CP that test negative in the above sampling regime may be sampled as described for the Monitored Premises (MP) and At-Risk Premises (ARP) below.

3. *Monitored Premises (MP) and At-Risk Premises (ARP):* Collect samples on each premises once every 5–7 days for the duration of the quarantine period with a minimum of three sampling rounds or similar sampling frequency depending on the resources available and guidance provided by the unified IC. Sampling may occur more frequently depending on pre-movement surveillance guidelines. Samples collected and tested for pre-movement may be used to meet the requirements of routine active surveillance if samples and tests meet criteria given in Recommended Sampling Scheme above.

### OUTSIDE OF THE CONTROL AREA

1. *Surveillance Zone (SZ):* Sample selected premises as directed by IC. Sampling selected premises once near the initiation and once near the close of the CA will help to ensure that outbreak response was appropriately targeted. Sampling every 2 to 3 weeks throughout the duration may be necessary if the outbreak is extensive, ongoing, or exposure risk is considered high.

Recommendations for selection of premises, sampling within all selected premises and frequency of sampling are summarized in Table D-5.

*Table D-4. Simulated Mean Time to Detection with 90 Percent Prediction Intervals (for various frequencies of sampling for different strains representing varying latent and infectious periods)[1]*

| HPAI Strain (species) | Latent period[2] (days) | Infectious period[3] (days) | Predicted time to detect via simulation (days) | | |
|---|---|---|---|---|---|
| | | | Daily testing | Every other day testing | Every 5 days testing |
| East Asian/American H5N2 (Turkeys)[4] | 1.41 (0.2-3.5) | 3.87 (2-6.3) | 5.3(3-8) | 6 (3-9) | 7 (3-11) |
| Netherlands H7N7 (Broilers)[5] | 0.7 (.1-1.7) | 4.1 (2.7-5.4) | 5.3 (4-7) | 6 (4-8) | 7.6 (5-11) |
| 1983 Pennsylvania H5N2 (Table egg layers)[6] | 0.7 (.1-1.7) | 3.8 (0.9-7.4) | 4.7 (2-7) | 5.6 (3-9) | 7(4-11) |
| Guangdong lineage H5N1 (Broilers)[7] | 0.7 (0.1-1.7) | 1.8(0.2-4.7) | 2.7(1-4) | 3.5(2-6) | 5.1 (2-9) |
| Italy H7N1 (Turkeys)[8] | 0.42 (0.1-0.9) | 1.5 (0.4-2.8) | 2.7 (1-4) | 3.4 (2-6) | 4.5 (2-7) |

[1]This provides context for changing frequency of testing to address new strains, for differing objectives by zone, or when resources are limited.
[2]Latent period: The period between exposure and first detection of infection (not necessarily concurrent with onset of clinical signs).
[3]Infectious period: The host may become infectious (i.e. able to transmit the pathogen to other hosts) at any moment of the infection. This moment will vary per pathogen.
[4]Spackman, personal communication
[5]Maas et al. 2009; van der Groot et al. 2005.
[6]Swayne, Eggert, Beck 2012; van der Groot et al. 2003.
[7]Bouma et al. 2009; Das et al. 2008; Pfeiffer et al. 2009; Spekreijse et al. 2011.
[8]Saenz et al. 2012.

*Table D-5. Outbreak Surveillance for Disease Detection in Commercial Poultry*[1]

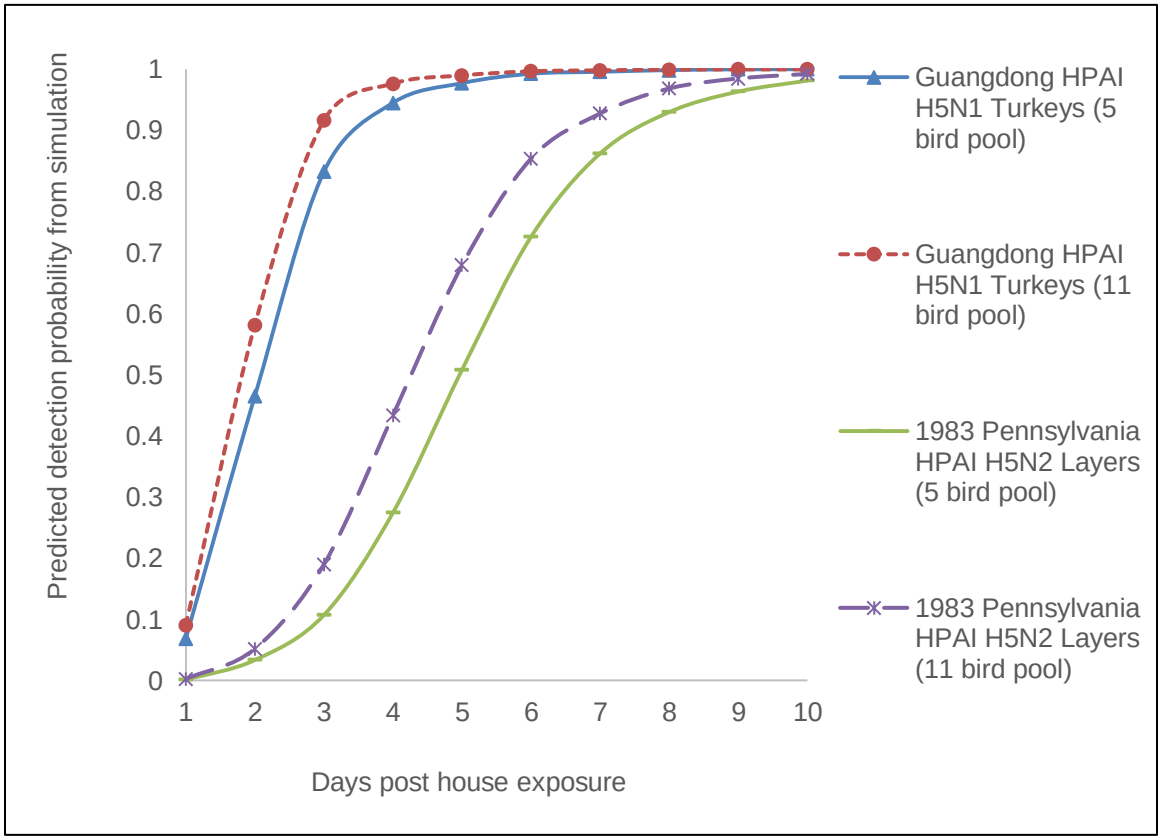
| Sampling | Infected Zone and Buffer Zone | Surveillance Zone |
|---|---|---|
| **Number of premises** | All | Sample for a selected design prevalence (Table D-2), or as unified IC recommends. |
| **Number of samples per house** | **For clinical strains and hosts**:<br>Collect two 5- or 11-bird pooled samples from daily sick and dead from each house on the premises. Do NOT include apparently healthy birds in sampling.<br><br>**For non-clinical strains or hosts**:<br>Pool as described above. But, set an elevated minimum sample size and include apparently healthy birds when sick and dead do not meet target above. | |
| **Frequency** | | |
| **Free Premises** | | Once to investigate spread. Consider repeating again prior to release of the Control Area. Or, repeat every 14–21 days if the unified IC/State/APHIS recommends. |
| **Suspect Premises** | Immediately investigate and sample as described. Consider repeating every other day through a full incubation period if unified IC recommends. Although a Suspect Premises can exist briefly in the Surveillance Zone, confirmation of a positive will create a new Control Area around the new Infected Premises. | |
| **Monitored Premises** | Consider sampling every 5-7 days until the Control Area is released, or more frequently as required for movement testing. Optimum frequency depends on incubation period and exposure risk (Table D-4). Also see "Poultry and Product Movement." | |
| **At-Risk Premises** | Consider sampling every 5-7 days until the Control Area is released, or as IC recommends. Optimum frequency depends on incubation period and exposure risk (Table D-4). Also see "Poultry and Product Movement." | |
| **Contact Premises** | Every other day for 14 days, or as unified IC recommends. | |
| **Specific Poultry and Product Movement** | Refer to Secure Poultry Supply plans. Only applies to MPs and ARPs. | |

[1] Backyard surveillance should follow commercial guidelines or specific policy guidance documents developed for an outbreak, which may be provided by the unified IC or posted to the HPAI page on www.aphis.usda.gov/fadprep.

# ADDITIONAL FIGURES & INFORMATION

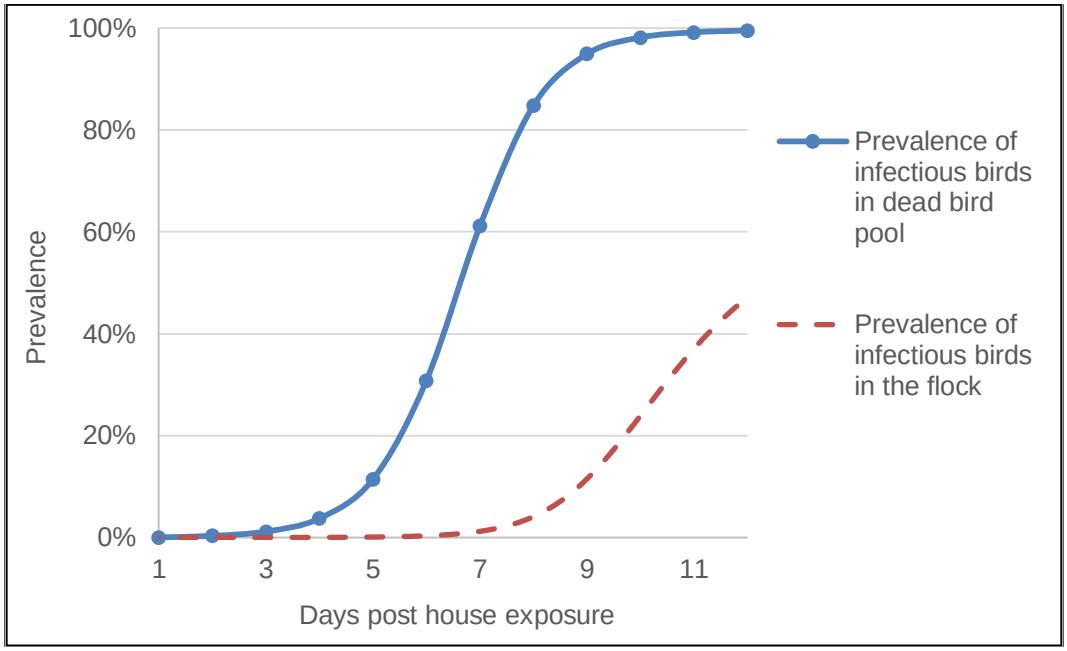
The figures below provide examples of HPAI strains and how they behave in different hosts. This information can be used to help adjust sampling guidelines or to show impacts of altering sampling guidelines.

*Figure D-1. Detection Probability When Testing Occurs "x" Number of Days Post-Poultry House Exposure to HPAI[1]*



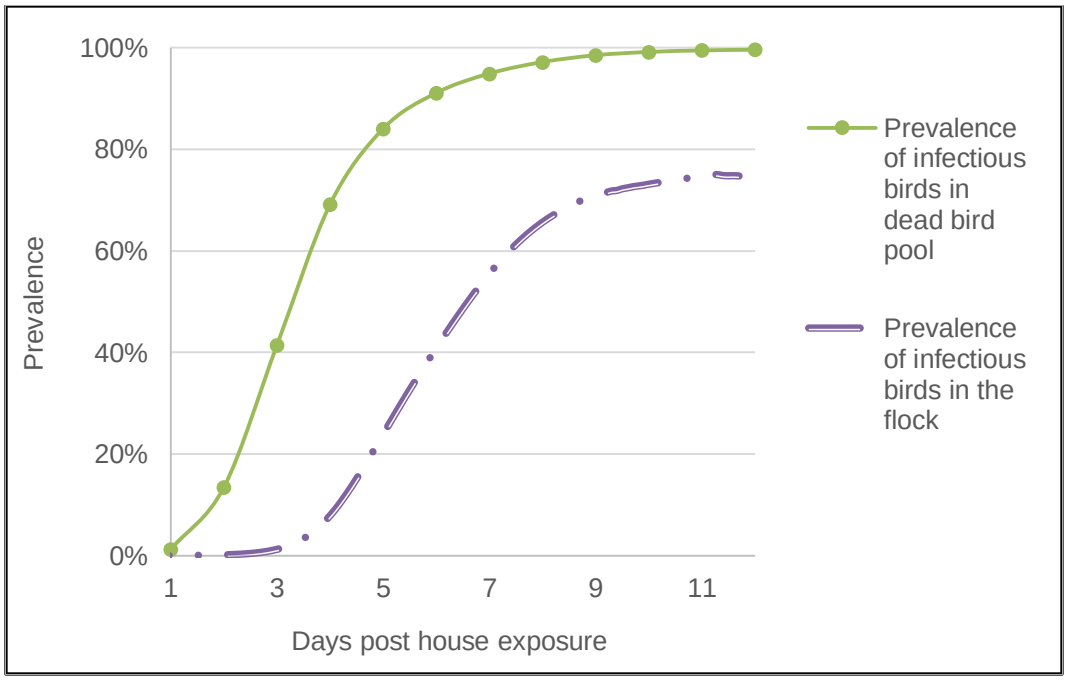

[1] Calculations presume a total of 2 pooled samples obtained by the selected date. These predictions are based on the behavior of the Guangdong lineage H5N1 virus in turkeys (see Aldous et al. 2010) and the 1983 Pennsylvania H5N2 in chickens (see Swayne et al. 2012 & van der groot et al. 2003). Disease spread dynamics for these HPAI strains could vary depending on factors such as housing, environmental conditions, management practices, and bird breeds.

*Figure D-2a. Prevalence of Infection in Dead and Apparently Health Birds Over Time Since Exposure (simulated in a layer flock using characteristics of the 1983 Pennsylvania HPAI H5N2 strain)[1]*




[1] See Swayne et al. 2012 & van der Groot et al. 2003.

*Figure D-2b. Prevalence of Infection in Dead and Apparently Healthy Birds Over Time Since Exposure (simulated in a turkey flock using characteristics of the Guangdong lineage HPAI H5N1 strain) [1]*




[1] See Aldous et al. 2010.

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# Appendix E
# Procedures for HPAI Investigations and Specimen Submission

Veterinary Services (VS) Guidance Document 12001 provides guidance for the investigation of potential foreign animal disease/emerging disease incidents. This document is available under "APHIS and VS Emergency Management Resources" at www.aphis.usda.gov/fadprep.

# READY REFERENCE GUIDE: PROCEDURES AND POLICY FOR THE INVESTIGATION OF POTENTIAL FOREIGN ANIMAL DISEASE (FAD)/EMERGING DISEASE INCIDENTS (EDI) (VS GUIDANCE 12001.2)

USDA United States Department of Agriculture

## FAD INVESTIGATION IS INITIATED

**AD** and **SAHO** will:

- Assign an FADD.
- Ensure FAD Referral Control Number is assigned in EMRS.
- Assign FAD/EDI Case Coordinator(s).
- Ensure that initial case report is prepared and transmitted to the FADD.
- Consult with FADD, NVSL, and NAHLN lab to determine a diagnostic sample submission plan. Include AD and SAHO for State of NAHLN lab, if different from the State of sample origin.
- Consult with FADD to ensure that an investigation classification and a diagnostic sample submission priority are assigned.
- If AD, SAHO, and FADD designate Priority 1 or A, immediately call VS District and NPIC.

**NPIC** or **DISTRICT OFFICE**

Coordinates conference call within 2 hours if Priority 1 or A.

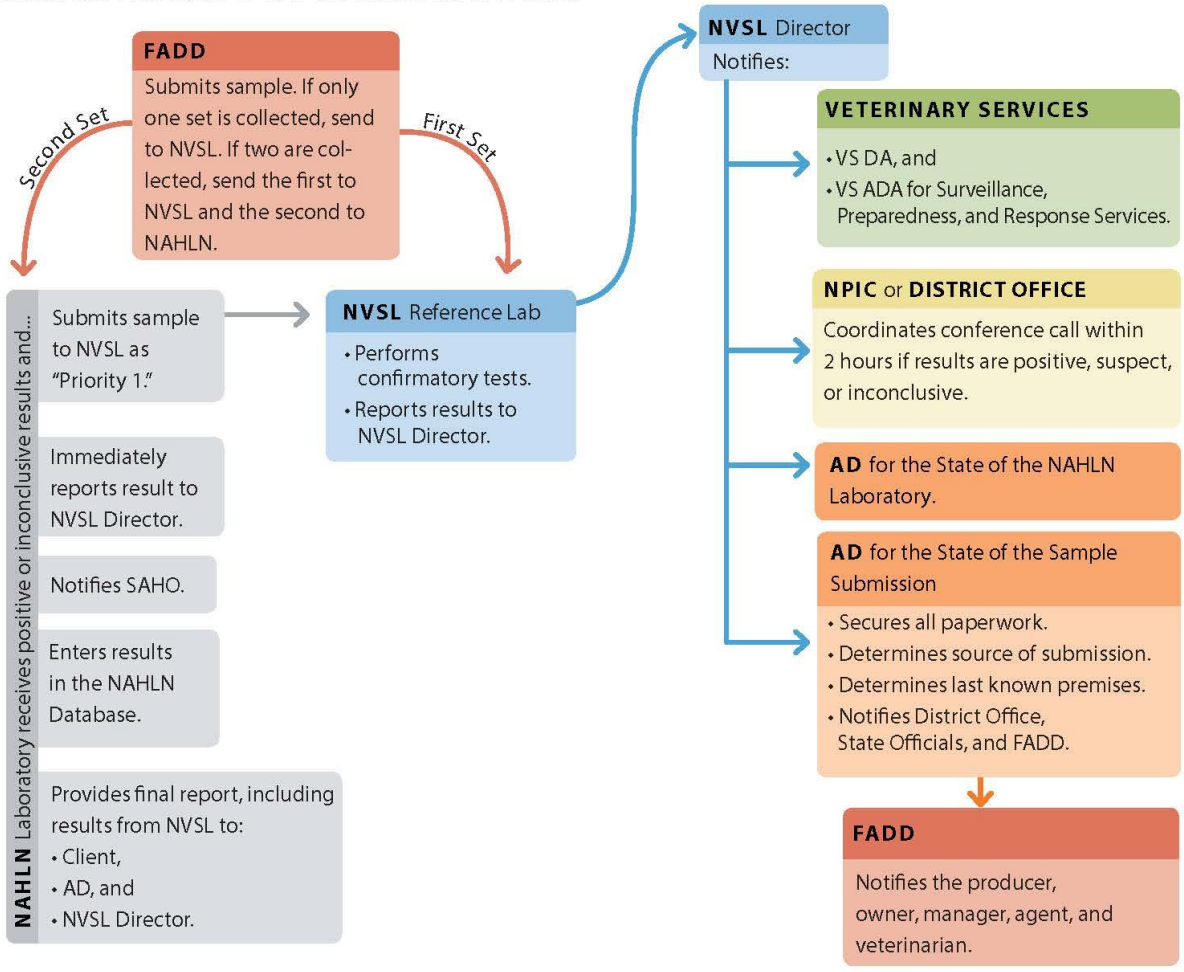
**FADD** will:

- Contact producer/owner/veterinary practitioner within 8 hours, and conduct a site visit within 24 hours. Situations involving interstate or international commerce must be investigated immediately.
- Contact NVSL Ames/NVSL FADDL and the NAHLN lab by phone prior to sample shipment/transport with the following:
  - Tracking number or transport identification,
  - Estimated time of arrival, and
  - Classification and priority.
- Ensure VS 10-4 Specimen Submission Form is completed for all diagnostic samples.
- Contact AD, SAHO, and Tribal Officials with quarantine or hold order recommendations.
- Along with AD, ensure that EMRS data entry and follow-up forms are completed.

| PRIORITY 1 | PRIORITY 2 | PRIORITY 3 | PRIORITY A |
|---|---|---|---|
| • High Suspicion<br>• NPIC or District Office coordinates conference call within 2 hours<br>• Rapid or extraordinary methods for sample collection and transport<br>• Testing conducted immediately upon arrival (overtime services as needed) | • Intermediate Suspicion<br>• Rapid methods for sample collection and transport<br>• Testing conducted as necessary (overtime services as needed)<br>• If sample arrives before close of business test immediately; after close of business test the following day; Saturday test on weekends only with prior notification and approval | • Low Suspicion<br>• Routine methods for sample collection and transport<br>• Testing conducted in accession order (no overtime services) | • Intermediate or Low Suspicion<br>• NPIC or District Office coordinates conference call within 2 hours<br>• Potential circumstances of investigation indicate need for rapid or extraordinary methods for sample collection and transport<br>• Testing conducted immediately upon arrival (overtime as needed) |

September 2016

## DIAGNOSTIC SAMPLE REPORTING PROCEDURES




| NVSL FADDL | |
|---|---|
| Main Office | (631) 323-3256 |
| **AFTER HOURS AND WEEKENDS** | |
| Diagnostic Services Section Head | (631) 375-5314 |
| Acting Diagnostic Services Section Head | (631) 405-0218 |
| Courier | (631) 566-0073 |
| **NPIC (M-F, 8:00 AM – 4:30 PM ET)** | |
| Jon Zack | (240) 252-8074 |
| Julie Gauthier | (919) 219-8433 |
| Barbara Porter-Spalding | (919) 637-4409 |
| Nathan Birnbaum | (240) 508-9888 |
| **AFTER HOURS AND WEEKENDS** | |
| NPIC/NVS 24/7 Emergency Answering Service | (800) 940-6524 |

| NVSL AMES | |
|---|---|
| NVSL Director | (515) 337-7301 |
| Diagnostic Virology | (515) 337-7551 |
| Pathobiology | (515) 337-7526 |
| Diagnostic Bacteriology | (515) 337-7568 |
| **AFTER HOURS AND WEEKENDS** | |
| Nat'l Centers for Animal Health Dispatch | (515) 337-7200 |
| **APHIS VS DISTRICT OFFICES** | |
| District One | (508) 363-2290 |
| District Two | (352) 313-3060 |
| District Three | (517) 337-4700 |
| District Four | (512) 383-2400 |
| District Five | (970) 494-7400 |
| District Six | (916) 854-3950 |

September 2016

# Appendix F
# Epidemiological Investigation Questionnaire

This appendix contains two documents (1) a sample epidemiological questionnaire used in the 2014–2015 highly pathogenic avian influenza (HPAI) outbreak for turkey flocks and (2) the survey used in the epidemiological case control study for layer flocks. In addition, you can find an *Initial Contact Epi Report* on the HPAI page at www.aphis.usda.gov/fadprep. This document is significantly shorter than a full epidemiological questionnaire and can be used initially in an outbreak to identify critical information from premises.

The purpose of the epidemiological investigation is twofold: first, it works to assess pathways of initial introduction of the HPAI virus on to premises; second, the data collected helps to examine potential routes for lateral (infected premises to non-infected premises) transmission.

In any epidemiological investigation, it is important that the individual filling out the questionnaire or responding to the survey is highly knowledgeable about the premises management and operations. When possible, on-farm observation can help to augment the information provided by the manager or owner (e.g., watching required biosecurity procedures).

Based on the epidemiological situation or the types of premises involved in any HPAI outbreak, it may be appropriate to modify the questionnaire or add other questions regarding additional risk factors that may play a role in transmission. It is not unusual for each HPAI outbreak to result in one or more epidemiological questionnaires specific to that outbreak; however, existing questionnaires and questions can be a good foundation from which to start.

USDA

Animal and
Plant Health
Inspection
Service

Veterinary
Services

# HPAI Investigation - Questionnaire

**INSTRUCTIONS**

The purposes of these investigations are to assess potential pathways of initial introduction of HPAI viruses onto commercial poultry operations and potential lateral transmission routes of HPAI viruses from infected premises to noninfected premises.

Following confirmation of an HPAI virus introduction into a commercial flock, an investigation should be initiated as soon as possible, no later than 1 week following detection. The investigator(s) assigned should be integrated into other response activities but their primary focus is on completion of the introduction investigation.

The investigation form provided is a guide for conducting a systematic and standardized assessment of potential pathways of initial virus movement onto the farm and potential movement of the virus off the farm. All sections of the form should be completed through direct conversation with the individual(s) most familiar with the farm's management and operations and questions are to be answered for the period 2 weeks prior to the detection of HPAI. Where applicable, direct observation of the biosecurity or management practice asked about should be conducted. This is not a box-checking exercise but an in-depth review of the current biosecurity and management practices and exposure risks on an affected farm. For example, direct observation of the farm employee donning and doffing procedures and compliance with company biosecurity practices is more important than checking the box on the form that indicates workers wear coveralls into the poultry houses. Investigators are encouraged to take notes and include them with the investigation form when completed.

An investigation form should be completed for the infected house or farm and **at least one** noninfected house or farm within the same complex as near as possible to the index infected flock.

Date: _____

Interviewer name/organization: _____

Interviewee name/organization: _____

## A. PREMISES INFORMATION

Farm name: _____

Farm address: _____

Farm (premises) ID: _____ County: _____

Township: _____ Range: _____ Section: _____

Is facility enrolled in NPIP?..... ☐$_1$ Yes ☐$_3$ No

## B. PREMISES CONTACT INFORMATION

1. Contact name: _____

   Phone: _____ Cell phone: _____ Email: _____

2. Contact name: _____

   Phone: _____ Cell phone: _____ Email: _____

3. Contact name: _____

   Phone: _____ Cell phone: _____ Email: _____

4. Flock Veterinarian: _____

   Phone: _____ Cell phone: _____ Email: _____

## C. PREMISES DESCRIPTION

1. Poultry type: ☐$_1$ Broiler ☐$_2$ Layer ☐$_3$ Turkey ☐$_4$ Other (specify: _____)

2. Production type: ☐$_1$ Meat ☐$_2$ Egg ☐$_3$ Breeding ☐$_4$ Other (specify: _____)

3. Age: ☐$_1$ Multiple age ☐$_2$ Single age

4. Sex: ☐$_1$ Hen ☐$_2$ Tom ☐$_3$ Both

5. Flock size: ..... _____ # birds

6. Facility type: *[Check all that apply]*

   ☐ Brood

   ☐ Grow

   ☐ Other (specify: _____)

   ☐ Both brooder & grower houses are present on the same premises

   ☐ Breeder

   ☐ Commercial

7. If brooder and grower houses are present on the same premises, are there multiple stages of management (brooding and growing), in the same house? ..... ☐$_1$ Yes ☐$_3$ No

8. Farm capacity ..... _____ # birds

   Number of barns ..... _____ # barns

   Barn capacity ..... _____ # birds

9. What is the **primary** barn type/ventilation: *[Check one only.]*

   ☐$_1$ Curtain sided

   ☐$_2$ Environmental control

   ☐$_3$ Side doors

   ☐$_4$ Other (specify: _____)

10. Are cool cell pads used? ..... ☐$_1$ Yes ☐$_3$ No

    If Yes, what is the source of water for these pads? _____

11. Distance in yards of closest body of water near farm: ..... _____ yd

12. Water body type: *[Check all that apply.]*

☐ Pond

☐ Lake

☐ Stream

☐ River

☐ Other (specify: _____)

13. What other types of animals are present on the farm?

| | | | |
|---|---|---|---|
| a. | Beef cattle | ☐$_1$ Yes | ☐$_3$ No |
| b. | Dairy cattle | ☐$_1$ Yes | ☐$_3$ No |
| c. | Horses | ☐$_1$ Yes | ☐$_3$ No |
| d. | Sheep | ☐$_1$ Yes | ☐$_3$ No |
| e. | Goats | ☐$_1$ Yes | ☐$_3$ No |
| f. | Pigs | ☐$_1$ Yes | ☐$_3$ No |
| g. | Dogs | ☐$_1$ Yes | ☐$_3$ No |
| h. | Cats | ☐$_1$ Yes | ☐$_3$ No |
| i. | Poultry or domesticated waterfowl | ☐$_1$ Yes | ☐$_3$ No |
| j. | Other (specify: _____) | ☐$_1$ Yes | ☐$_3$ No |

14. What is the **primary** water source for poultry? *[Check one only.]*

☐$_1$ Municipal

☐$_2$ Well

☐$_3$ Surface water (e.g., pond)

☐$_4$ Other (specify: _____)

15. Is water treated prior to delivery to poultry? ☐$_1$ Yes ☐$_3$ No

If Yes, how is it treated and with what? _____

## D. FARM BIOSECURITY

1. Is there a house with a family living in it on the property? ..... ☐1 Yes ☐3 No
2. Is there a common drive entrance to farm and residence?..... ☐1 Yes ☐3 No
3. Do you have signage of "no admittance" or "biosecure area" on this property? .. ☐1 Yes ☐3 No
4. Is there a gate to this farm entrance?..... ☐1 Yes ☐3 No
5. Is the gate secured/locked? ..... ☐1 Yes ☐3 No
   If Yes, what hours is it secured? _____
6. Is the farm area fenced in?..... ☐1 Yes ☐3 No
7. How frequently is vegetation mowed/bush hogged on the premises?..... _____ times/month
8. Is facility free of debris/clutter/trash piles? ..... ☐1 Yes ☐3 No
9. Is there a wash station/spray area available for vehicles? ..... ☐1 Yes ☐3 No
   If Yes, what disinfectant is used? _____
10. Is there a designated parking area for workers and visitors away from the barns/pens? ..... ☐1 Yes ☐3 No
11. Is there a changing area for workers?..... ☐1 Yes ☐3 No
    Do they shower?..... ☐1 Yes ☐3 No
12. Do workers don dedicated laundered coveralls before entering each house on the premises?..... ☐1 Yes ☐3 No
13. Do worker wear rubber boots or boot covers in poultry houses?..... ☐1 Yes ☐3 No
14. Are the barn/pen doors lockable?..... ☐1 Yes ☐3 No
    Are they routinely locked? ..... ☐1 Yes ☐3 No
15. Are foot pans available at barn/pen entrances?..... ☐1 Yes ☐3 No
    Are they in use?..... ☐1 Yes ☐3 No
16. Are foot baths dry (powdered or particulate disinfectant)? ..... ☐1 Yes ☐3 No
17. Are foot baths liquid disinfectant? ..... ☐1 Yes ☐3 No
18. Frequency foot pan solutions are changed? ..... _____ times/month

What disinfectant is used? _____

19. Is there an entry area in the barns/pens before entering the bird area? ..... ☐1 Yes ☐3 No

20. What pest and wildlife control measures are used on this farm?

    a. Rat and mouse bait stations ..... ☐1 Yes ☐3 No

    b. Bait stations checked at least every 6 weeks ..... ☐1 Yes ☐3 No

    c. Fly control used..... ☐1 Yes ☐3 No

    If Yes, type and frequency: _____

    d. Houses are bird proof..... ☐1 Yes ☐3 No

    e. Wild birds seen in house..... ☐1 Yes ☐3 No

    If Yes, type, number and frequency: _____

    f. Raccoons, possums, foxes seen in or around poultry houses ..... ☐1 Yes ☐3 No

    g. Wild turkeys, pheasants, quail seen around poultry..... ☐1 Yes ☐3 No

21. Are biosecurity audits or assessments (company or third party) conducted on this farm? ..... ☐1 Yes ☐3 No

    If Yes, when was the last audit or assessment conducted? _____
    (Obtain a copy of the result of the audit or assessment if available.)

22. Has this farm been confirmed positive for HPAI? ..... ☐1 Yes ☐3 No

## E. FARM HELP/WORKERS

1. Total number of persons working on farm ..... _____ #

2. Number of workers living on the farm premises who are:

    a. Family..... _____ #

    b. Nonfamily..... _____ #

3. Workers are assigned to: *[Check one only.]*

    ☐1 Entire farm

    ☐2 Specific barns/areas

4. Do the workers have a common break area? ..... ☐1 Yes ☐3 No

    If Yes, location: _____

5. Are workers employed by other poultry operations?..... ☐1 Yes ☐3 No

6. How often are training sessions held on biosecurity for workers?..... _____ times/year

7. Are family members employed by other poultry operations or processing plants? ☐1 Yes ☐3 No

   If Yes, poultry operation or processing plant: _____

8. Do part-time/weekend help and other extended family members on holidays and vacations? ..... ☐1 Yes ☐3 No

9. Are workers (full & part-time) restricted from being in contact with backyard poultry?..... ☐1 Yes ☐3 No

   How is this communicated? _____

## F. FARM EQUIPMENT

Is the equipment used on this premises farm specific, under joint ownership that remains on this premises, or under joint ownership and used on other farm premises? A list of equipment follows.

1. Company vehicles/trailers:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

2. Feed trucks (excess feed):

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

3. Gates/panels:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

4. Lawn mowers:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

5. Live haul loaders:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

6. Poult trailers: Farm specific?

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

7. Pre-loaders:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

   Describe pre-loader cleaning and disinfection procedures:

   _____

   _____

8. Pressure sprayers/washers:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

9. Skid-steer loaders:

   Farm specific? ..... ☐1 Yes ☐3 No

   If No, by whom is equipment jointly used: _____

   Dates: _____

10. Tillers:

    Farm specific? ..... ☐1 Yes ☐3 No

    If No, by whom is equipment jointly used: _____

    Dates: _____

11. Trucks:

    Farm specific? ..... ☐1 Yes ☐3 No

    If No, by whom is equipment jointly used: _____

    Dates: _____

12. Other equipment: _____

    Farm specific? ..... ☐1 Yes ☐3 No

    If No, by whom is equipment jointly used: _____

    Dates: _____

## G. LITTER HANDLING

1. Litter type: _____
2. Supplier/source: _____
3. Is a litter shed present?..... ☐1 Yes ☐3 No
4. Do you do partial cleanouts?..... ☐1 Yes ☐3 No

   If Yes, give dates of last partial cleanout: _____

5. Date of last cleanout: ..... _____ date

   Frequency of cleanout:..... _____ times/month

6. Who does the cleanout?

   ☐1 Grower

   ☐2 Contractor

   If contractor, name and location_____

7. Litter is disposed of:

   ☐1 On farm

   ☐2 Taken off site

   If taken offsite, name and location: _____

## H. DEAD BIRD DISPOSAL

1. Approximate normal daily mortality ..... _____ # birds
2. How is daily mortality handled?
   a. On-farm: Burial pit/incinerator/composted/other (specify: _____)
   b. Off-farm: Landfill/rendering/other (specify: _____)
   c. Off-farm disposal performed by: Owner/employee/other (specify: _____)
   d. If burial or compost pits are used, are carcasses covered with soil on a daily basis? ..... ☐1 Yes ☐3 No
3. Contact name of company or individual responsible for disposal:

   _____

   If rendering is used, include location of carcass bin on the farm map.
4. What is the pickup schedule? _____
5. Does the carcass bin have a cover? ..... ☐1 Yes ☐3 No

   Is it routinely kept closed? ..... ☐1 Yes ☐3 No

## I. FARM VISITORS

1. How many visitors do you have on a daily basis? ..... _____ #
2. Is there a visitor log to sign in? ..... ☐1 Yes ☐3 No

   Is it current? ..... ☐1 Yes ☐3 No
3. Do you provide any outer clothing to visitors entering the farm? ..... ☐1 Yes ☐3 No

   If Yes, identify items of clothing provided: _____
4. Mark the following services that were on the farm when this flock was on the farm. List date of service and name of person (or contract company) and if they had contact with the birds.

| Service | | Dates | Name | Contact? |
|---|---|---|---|---|
| Service person | ☐Yes ☐No | _____ | _____ | ☐1 Yes ☐3 No |
| Vaccination crew | ☐Yes ☐No | _____ | _____ | ☐1 Yes ☐3 No |

Moving crew (moving from brood to grow, or pullet house to layer house)

☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Processing plant load out

☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Load-out crew (positive flock) ☐$_1$ Yes ☐$_3$ No ☐Yes ☐No

If load-out took more than one night, was returning crew the same crew? ..... ☐$_1$ Yes ☐$_3$ No

Truck #/#'s _____

Trailer #/#'s _____

What plant did flock go to? _____

Load-out crew (flock previous to positive flock)

☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

If load-out took more than one night, was returning crew the same crew? ..... ☐$_1$ Yes ☐$_3$ No

Truck #/#'s _____

Trailer #/#'s _____

What plant did flock go to? _____

Poult delivery ☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Rendering pickup ☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Litter services ☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Cleanout services ☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Equipment shared/rented/loaned/borrowed (each of the categories of visitor is likely to be accompanied by equipment of some sort or another)

☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

Feed delivery ☐Yes ☐No _____ _____ ☐$_1$ Yes ☐$_3$ No

5. Who makes sure covers are closed after delivery? _____

6. Are feed covers kept closed? ..... ☐$_1$ Yes ☐$_3$ No

## J. WILD BIRDS

1. Do you see wild birds around your farm? ..... ☐$_1$ Yes ☐$_3$ No

   If Yes, what type of birds? *[Check all that apply.]*

   ☐ Waterfowl

   ☐ Gulls

   ☐ Small perching birds (sparrows, starlings, swallows)

   ☐ Other water birds (egrets, cormorants)

   ☐ Other _____

2. Do you see birds all year round? ..... ☐$_1$ Yes ☐$_3$ No

   If Yes, what type of birds? _____

3. Is there seasonality to the presence of some types of birds? ..... ☐$_1$ Yes ☐$_3$ No

   If Yes, what type of birds and what seasons do you see them? _____

   _____

4. Where are wild birds seen in relation to the farm?

   ☐$_1$ On adjacent habitats away from facilities and equipment (identify location of habitat on photos)

   ☐$_2$ On the farm but not in the barns (identify facilities or equipment birds have contact with)

   ☐$_3$ On the farm and sometimes in the barns (identify facilities or equipment birds have contact with)

**K. NARRATIVE/COMMENTS**

**FARM DIAGRAM -Attach a download from satellite imagery if possible. In addition, draw a simple schematic map of the farm site centering with the poultry houses/pens. Identify where the HPAI positive flocks were housed. Also include: fan banks on houses, residence, driveways, public roads, bodies of water, feed tanks, gas tanks, out buildings, waster dumpsters, electric meters, dead bird disposal, parking areas, other poultry sites. Digital photographs, if allowed, are excellent supporting documentation.**

*North*

USDA

Animal and Plant Health Inspection Service

Veterinary Services

National Animal Health Monitoring System

2150 Centre Ave., Bldg B
Fort Collins, CO 80526

Form Approved
OMB Number 0579-0376
Approval Expires: 9/30/2017

**Study ID: _____ frmid**

**Farm (premises) ID: _____**

**Date: _____ mm/dd/yy**

## A. PREMISES INFORMATION

Farm name: _____frmname

Farm address: _____frmadd

County: _____frmcty

Township: _____ frmtshp Range: _____ frmrng Section: _____frmsec

1. Supervisor Contact name: _____h201

   Phone: _____ h202 Cell phone: _____ h203 Email: _____ h204

2. Farm manager Contact name: _____ h205

   Phone: _____ h206 Cell phone: _____ h207 Email: _____ h208

3. Flock Veterinarian: _____ h213

   Phone: _____ h214 Cell phone: _____ h215 Email: _____ h216

## B. INTERVIEWER INFORMATION

Interviewer name/organization: _____ intrname

Interviewee name/organization: _____ intename

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USDA

Animal and Plant Health Inspection Service

Veterinary Services

# HPAI Case-Control Questionnaire

National Animal Health Monitoring System

2150 Centre Ave., Bldg B
Fort Collins, CO 80526

Form Approved
OMB Number 0579-0376
Approval Expires: 9/30/2017

**Study ID: _____ frmid**

**Date: _____mm/dd/yy**

**INSTRUCTIONS**

The Iowa Poultry Association, Iowa State University, and the United States Department of Agriculture APHIS (USDA APHIS) are conducting a case-control study as part of the highly pathogenic avian influenza (HPAI) investigation efforts to identify factors that may contribute to transmission of H5N2 influenza virus to poultry.

We are asking you to fill out this survey, which includes questions about things done daily on the farm, facility and premises condition, deliveries to the farm, and ill birds. We will be asking you questions about a 2 week (14 day) period on the farm starting on a particular date that we will provide. It might be difficult to remember back that far, so please use a pocket calendar or other agenda manager, and any feed and other delivery records that might be available to you.

| Term | Case Definition | Control Definition |
|---|---|---|
| Premises | Farm location with flocks confirmed to be HPAI H5N2 infected by NVSL, including all barns and buildings; even if not all barns and buildings contain infected birds. | Farm location with no infected birds in any barn or building, in close proximity (less than 10 miles) of the case farm. |
| Barn | Barn or building that houses HPAI H5N2 infected birds. | On case premise, a barn or building that does not house any infected birds. |

**Dates of Study Focus:**

**Case farms** answer questions for the timeframe of 14 days prior to the onset of clinical signs or increased mortality. All questions that ask about the past 14 days are referring to this time period.

**Control farms** answer questions for the timeframe of 14 days prior to date of first detection on the matched case farm. All questions that ask about the past 14 days are referring to this time period.

## A. CASE OR CONTROL

1. Is this a case or control farm? e100 ☐$_1$ Case – ***Go to Question 2.***
   ☐$_3$ Control – ***Go to Question 3.***

2. If this is a **case** farm,
   a. When were clinical signs or increased mortality first observed? ..... e101 _____ mm/dd/yy
   b. 14 days prior to the date of first detection (clarifying timeframe of study focus)..... e102 _____ mm/dd/yy
      **All questions regarding the past 14 days are referring to the 14 days prior to this reference date (i.e., the time between "a" and "b").**
   c. When was the flock diagnosed as positive?.....e103_____ mm/dd/yy
   d. As of today, how many of the barns on this farm have been confirmed or are suspected to be infected with HPAI?.....e104 _____ # barns
   e. On the reference date, was this farm in an existing control zone?.....e105 ☐$_1$ Yes ☐$_3$ No

   **Go to Question 4.**

3. If this is a **control** farm,
   a. Enter reference date here (enter date of matched case farm prior to interview).....e106 _____ mm/dd/yy
   b. Enter the date 14 days prior to the reference date.....e107 _____ mm/dd/yy
      **All questions regarding the past 14 days are referring to the 14 days prior to this reference date (i.e., the time between "a" and "b").**
   c. Is this farm located in a control zone?..... e108 ☐$_1$ Yes ☐$_3$ No
      i. If "Yes," how long has it been in a control zone? ..... e109d/e109w _____ days
         OR
         _____ weeks
   d. What is the distance (in miles) from this farm to the nearest case farm?.....e110 _____ miles

4. How many birds were on this farm on this reference date? .....h313 _____ # birds

## B. PREMISES DESCRIPTION

1. Is this a: [*Check one only.*] e201

   ☐1 Company farm?

   ☐2 Contract farm?

   ☐3 Lease farm?

   ☐4 Independent farm?

2. What type(s) of poultry are present on this farm?

   a. Turkey ..... e202 ☐1 Yes ☐3 No

   b. Broiler ..... e203 ☐1 Yes ☐3 No

   c. Layer ..... e204 ☐1 Yes ☐3 No

   d. Other (specify: _____) ..... e205/e205oth ☐1 Yes ☐3 No

3. What poultry production type(s) are present on this farm?

   a. Meat ..... e206 ☐1 Yes ☐3 No

   b. Egg ..... e207 ☐1 Yes ☐3 No

   c. Breeding ..... e208 ☐1 Yes ☐3 No

   d. Other (specify: _____) .....e209/e209 oth ☐1 Yes ☐3 No

4. Is this farm certified organic? e210 ☐1 Yes ☐3 No

5. Is this facility enrolled in NPIP? npip ☐1 Yes ☐3 No

6. Is this farm multiple age or single age? h303

   ☐1 Multiple age

   ☐2 Single age

7. What stage(s) of production is on this farm?

   a. Pullets ..... e211 ☐1 Yes ☐3 No

   b. Layers ..... e212 ☐1 Yes ☐3 No

   c. Breeders ..... e213 ☐1 Yes ☐3 No

   d. Other (specify: _____)..... e214 ☐1 Yes ☐3 No

8. How many barns are on this farm? .....h314 _____ # barns

9. Do any birds on the farm have access to the outdoors? ..... e215 ☐1 Yes ☐3 No

10. How many barns are:
    a. Conventional cage housing?.....e216 _____ #
    b. Enriched caged housing? .....e217 + _____ #
    c. Cage free (certified organic)? .....e218 + _____ #
    d. Cage free (not certified organic)?.....e219 + _____ #
    **Total** (*must equal Question 8 response*) e219a = _____ #

11. Are any poultry on this farm pastured?.....e220 ☐1 Yes ☐3 No

12. What is the distance (in yards) of the closest body of water (e.g., pond, lake, stream, river, wetland) to this farm? h319 _____ yards

    a. Specify this water body type: _____ h319spe

13. Approximately how many wild waterfowl might have been seen on this body of water at one time? Try to answer the question for the past 14 days. e221

    ☐1 None – ***Skip to Question 15.***
    ☐2 Tens
    ☐3 Hundreds
    ☐4 Thousands

14. What type(s) of waterfowl were seen on the water in the 14 days?
    a. Ducks.....e222 ☐1 Yes ☐3 No ☐4 Don't Know
    b. Geese.....e223 ☐1 Yes ☐3 No ☐4 Don't Know
    c. Shorebirds (e.g., wading birds, gulls).....e224 ☐1 Yes ☐3 No ☐4 Don't Know
    d. Other (specify: _____)e225/e225oth ☐1 Yes ☐3 No ☐4 Don't Know

15. Are the following water body type(s) visible or within 350 yards (about 3 football fields) of this farm?
    a. Pond ..... e226 ☐1 Yes ☐3 No
    b. Lake ..... e227 ☐1 Yes ☐3 No
    c. Stream ..... e228 ☐1 Yes ☐3 No
    d. River ..... e229 ☐1 Yes ☐3 No
    e. Wetland or swamp ..... e230 ☐1 Yes ☐3 No
    f. Wastewater lagoon ..... e231 ☐1 Yes ☐3 No
    g. Other (specify: _____) ..... e234/e234oth ☐1 Yes ☐3 No

16. What is the distance (in yards) to the closest field where crops are harvested?..... e235 _____ yards

17. What crop was last grown in this field? .....e236

☐1 Corn

☐2 Soybeans

☐3 Alfalfa or grass intended for livestock feed

☐4 Other (specify: _____)e236oth

18. Was this field tilled last fall?.....e237 ☐1 Yes ☐3 No ☐4 Don't Know

19. Was this field actively worked (e.g., tilled or disced) in the past 14 days?.....e238 ☐1 Yes ☐3 No ☐4 Don't Know

20. What was the approximate concentration of wild waterfowl observed at a single view in this field in the past 14 days? e239

☐1 None – ***Skip to Question 22***

☐2 Tens

☐3 Hundreds

☐4 Thousands

21. What type(s) of waterfowl were observed?

a. Ducks .....e240☐1 Yes ☐3 No ☐4 Don't Know

b. Geese .....e241☐1 Yes ☐3 No ☐4 Don't Know

c. Shorebirds .....e242☐1 Yes ☐3 No ☐4 Don't Know

d. Other (specify: _____)e243/e243oth☐1 Yes ☐3 No ☐4 Don't Know

22. What other types of animals are present on the farm premises?

a. Beef cattle .....h325 ☐1 Yes ☐3 No

b. Dairy cattle .....h326 ☐1 Yes ☐3 No

c. Horses .....h327 ☐1 Yes ☐3 No

d. Sheep .....h328 ☐1 Yes ☐3 No

e. Goats .....h329 ☐1 Yes ☐3 No

f. Pigs .....h330 ☐1 Yes ☐3 No

g. Dogs .....h331 ☐1 Yes ☐3 No

h. Cats .....h332 ☐1 Yes ☐3 No

i. Poultry or domesticated waterfowl .....h333 ☐1 Yes ☐3 No

j. Other (specify: _____) .....h334/h334oth ☐1 Yes ☐3 No

23. What is the water source for poultry?

a. Municipal .....e244 ☐1 Yes ☐3 No

b. Well .....e245 ☐1 Yes ☐3 No

c. Surface water (e.g., pond) .....e246 ☐1 Yes ☐3 No

d. Other (specify: _____)...e247/247oth ☐1 Yes ☐3 No

24. Are the following water treatments used in the drinking water for the poultry on this farm?

a. Chlorination ..... e248 ☐1 Yes ☐3 No

b. Acidifiers ..... e249 ☐1 Yes ☐3 No

c. Iodine ..... e250 ☐1 Yes ☐3 No

d. Peroxide ..... e251 ☐1 Yes ☐3 No

e. Other (specify: _____)..... e252/e252oth ☐1 Yes ☐3 No

25. Are windbreaks present on this farm? If "Yes," what is the distance (in yards) from the windbreak to the closest poultry barn?

| Windbreak type | Present? | If "Yes,", distance to closest poultry barn | |
|---|---|---|---|
| a. Evergreen or juniper windbreak | ☐1 Yes ☐3 No | _____ yards | e253/e256 |
| b. Deciduous tree windbreak | ☐1 Yes ☐3 No | _____ yards | e254/e257 |
| c. Structural (e.g., hill, natural break) | ☐1 Yes ☐3 No | _____ yards | e255/e258 |

26. Excluding driveways on farm, what is the distance (in yards or miles) from this farm to the nearest public gravel or dirt road?.....e259y/e259m _____yards OR _____ miles

## C. FARM BIOSECURITY

1. Is there a house with people living in it on the property? h401 ☐1 Yes ☐3 No – ***Skip to Question 3***

2. Is there a common drive entrance to farm and residence?.....h402 ☐1 Yes ☐3 No

3. How many entrances are there to the farm that could provide access to the poultry area?.....e301 _____ #

4. Which best describes the road surface on this farm that vehicles coming onto the operation drive on? *[Check one only.]* e302

☐$_1$ Hard top/asphalt

☐$_2$ Gravel

☐$_3$ Dirt

☐$_4$ Other (specify: _____)e302oth

5. In general, do the following types of vehicles:

| Codes for Question 5 |
|---|
| 1 = come to the perimeter of the farm only |
| 2 = enter the farm but not near the barns |
| 3 = come near the barns |
| 4 = do not come at all |

**Enter the codes that apply**

a. Garbage/dumpster pick-up? ..... e303 _____ code

b. Propane delivery? ..... e304 _____ code

c. Feed delivery? ..... e305 _____ code

d. Renderer? ..... e306 _____ code

e. Company personnel (e.g., processing plant and barn workers, service person, veterinarian)? ..... e307 _____ code

f. Egg trucks moving eggs *off* the farm (e.g., to processing, for breaking, to the consumer market)? ..... e308 _____ code

g. Egg trucks moving eggs *to* the farm (i.e., sideloading)? ..... e309 _____ code

h. Other business visitors (e.g., meter reader, repairman)? ..... e310 _____ code

6. Is there a gate to this farm entrance?..... h404 ☐$_1$ Yes ☐$_3$ No – ***Skip to Question 8***

7. Is the gate secured/locked? ..... h405 ☐$_1$ Always ☐$_2$ After hours only ☐$_3$ Never

8. Is the farm area perimeter surrounded by a security fence? ..... h407 ☐$_1$ Yes ☐$_3$ No

9. How frequently is vegetation mowed/bush hogged on the premises (answer for when vegetation is present, e.g., spring and summer) ..... h408 _____ times/month

10. Is the facility free of debris/clutter/trash piles? ..... h409 ☐$_1$ Yes ☐$_3$ No

11. Is there a wash station/spray area being used for vehicles?..... h410 ☐$_1$ Yes ☐$_3$ No – ***Skip to Question 13***

12. If "Yes:"
    a. Is it located on the farm? ..... e311 ☐1 Yes ☐3 No
    b. Are the tires washed? ..... e312 ☐1 Yes ☐3 No
    c. Is the vehicle exterior washed? ..... e313 ☐1 Yes ☐3 No
    d. Is the vehicle interior cleaned (e.g., floor mats) ..... e314 ☐1 Yes ☐3 No
    e. Which vehicles are washed:
        i. Worker vehicles? ..... e315 ☐1 Yes ☐3 No
        ii. Feed trucks? ..... e316 ☐1 Yes ☐3 No
        iii. Egg trucks? ..... e317 ☐1 Yes ☐3 No
        iv. Other (specify: _____)? e318/e318oth ☐1 Yes ☐3 No
    f. What disinfectant is used? _____ h411
    g. Was the wash station: [*Check one only.]* e319
        ☐1 Recently put into use as a response to heightened biosecurity concerns?
        ☐1 A permanent station (i.e., in use prior to the HPAI incident)?

13. Do workers and visitors always, sometimes or never park in a restricted area away from the poultry barns?
    a. Workers..... e320 ☐1 Always ☐2 Sometimes ☐3 Never
    b. Visitors ..... e321 ☐1 Always ☐2 Sometimes ☐3 Never

14. What pest and wildlife control measures were used on this farm in the past 14 days?
    a. Rat and mouse bait stations? ..... h426 ☐1 Yes ☐3 No
    If "Yes," how frequently are they checked? ..... e322 _____times/month

    b. Beetle control? ..... e323 ☐1 Yes ☐3 No
    If "Yes," type:
        i. Sprays ..... e324 ☐1 Yes ☐3 No
        ii. Boric acid ..... e325 ☐1 Yes ☐3 No
        iii. Baits ..... e326 ☐1 Yes ☐3 No
        iv. Other (specify: _____)e327/e327oth ☐1 Yes ☐3 No

c. Fly control (other than manure removal)? ..... h428 ☐1 Yes ☐3 No

If "Yes," type:

i. Residual spray ..... e328 ☐1 Yes ☐3 No

ii. Baits ..... e329 ☐1 Yes ☐3 No

iii. Larvacide (spot treatment) ..... e330 ☐1 Yes ☐3 No

iv. Larvacide in feed ..... e331 ☐1 Yes ☐3 No

v. Space sprays/fogger ..... e332 ☐1 Yes ☐3 No

vi. Biological predators ..... e333 ☐1 Yes ☐3 No

vii. Other (specify: _____). e334/e334oth ☐1 Yes ☐3 No

15. Overall, how severe of a problem were rodents during the past 14 days? e335

[*Check one only.*]

☐1 High (e.g., significant damage to building, significant impact on layer health or feed efficiency)

☐2 Moderate (e.g., moderate damage to building, moderate impact on layer health or feed efficiency)

☐3 Low (e.g., minor impact on building or feed efficiency)

☐4 No problem

16. Do you monitor rodent index as part of your rodent control program?..... e336 ☐1 Yes ☐3 No – ***Skip to Question 18***

**Note:** Rodent index (RI) is the equivalent of number of mice caught in 7 days with 12 traps using the formula:
RI = (number of mice caught) x (7 / days trapped) x (12 / number of traps)

17. Which of the following ranges best describes your rodent index in the past 14 days? [*Check one only.*] e337

☐1 Low (0 to 10 mice)

☐2 Moderate (11 to 25 mice)

☐3 High (26 or more mice)

18. Were wild mammals such as raccoons, opossums, coyotes, or foxes (or evidence of their presence), seen in or around poultry houses in the past 14 days?..... e338 ☐1 Yes ☐3 No

19. Prior to feeding, how frequently do wild birds, wild animals, and rodents have access to poultry feed (i.e., feed spillage, open bag, cover left open)?

| | Always/ Nearly always | Most of the time | Sometimes | Never | |
|---|---|---|---|---|---|
| a. Wild birds | ☐1 | ☐2 | ☐3 | ☐4 | e339 |
| b. Wild animals such as raccoons, opossums, coyotes or foxes | ☐1 | ☐2 | ☐3 | ☐4 | e340 |
| c. Rodents | ☐1 | ☐2 | ☐3 | ☐4 | e341 |

20. Describe the protocol or plan for when feed spills on your farm? e342 _____

_____

21. What form of feed is fed to the poultry?

a. Mash ..... e343 ☐1 Yes ☐3 No
b. Pellets ..... e344 ☐1 Yes ☐3 No
c. Other (specify: _____)e345/e345oth ☐1 Yes ☐3 No

22. Is the feed treated with:

a. Formaldehyde (i.e., Termin-8)? ..... e346 ☐1 Yes ☐3 No
b. Antimicrobial (e.g., ionophores)? ..... e347 ☐1 Yes ☐3 No
c. Other (specify: _____)? e348/348oth ☐1 Yes ☐3 No

23. Is the feed heat treated? ..... e349 ☐1 Yes ☐3 No

## D. WILD BIRDS

1. How frequently have the following types of wild birds been seen on habitats adjacent to the farm (but not on the farm) in the past 14 days?

| Bird type | Daily | Less than daily | Never | |
|---|---|---|---|---|
| a. Waterfowl (e.g., ducks, geese) | ☐1 | ☐2 | ☐3 | e401 |
| b. Gulls | ☐1 | ☐2 | ☐3 | e402 |
| c. Small perching birds (e.g., sparrows, starlings, swallows) | ☐1 | ☐2 | ☐3 | e403 |
| d. Blackbirds and crows | ☐1 | ☐2 | ☐3 | e404 |
| e. Other water birds (e.g., egrets, cormorants) | ☐1 | ☐2 | ☐3 | e405 |
| f. Wild turkeys, pheasants, quail | ☐1 | ☐2 | ☐3 | e406 |
| g. Raptors (e.g., eagles, hawks, owls) | ☐1 | ☐2 | ☐3 | e407 |
| h. Pigeons and doves | ☐1 | ☐2 | ☐3 | e408 |
| i. Other (specify: _____) | ☐1 | ☐2 | ☐3 | e409/e409oth |

a. Do wild waterfowl use this area at other times of the year? ..... e410 ☐1 Yes ☐3 No

2. How frequently have the following types of wild birds been seen on the farm, but outside of the barns (within 100 yards) in the past 14 days?

| Bird type | Daily | Less than daily | Never | |
|---|---|---|---|---|
| a. Waterfowl (e.g., ducks, geese) | ☐1 | ☐2 | ☐3 | e411 |
| b. Gulls | ☐1 | ☐2 | ☐3 | e412 |
| c. Small perching birds (e.g., sparrows, starlings, swallows) | ☐1 | ☐2 | ☐3 | e413 |
| d. Blackbirds and crows | ☐1 | ☐2 | ☐3 | e414 |
| e. Other water birds (e.g., egrets, cormorants) | ☐1 | ☐2 | ☐3 | e415 |
| f. Wild turkeys, pheasants, quail | ☐1 | ☐2 | ☐3 | e416 |
| g. Raptors (e.g., eagles, hawks, owls) | ☐1 | ☐2 | ☐3 | e417 |
| h. Pigeons and doves | ☐1 | ☐2 | ☐3 | e418 |
| i. Other (specify: _____) | ☐1 | ☐2 | ☐3 | e419/e419oth |

3. How frequently have the following types of wild birds been seen in the barns in the past 14 days?

| Bird type | Daily | Less than daily | Never | |
|---|---|---|---|---|
| a. Large birds (e.g., pigeons, crows) | ☐1 | ☐2 | ☐3 | e420 |
| b. Small birds (e.g., finches, sparrows, starlings) | ☐1 | ☐2 | ☐3 | e421 |
| c. Other (specify: _____) | ☐1 | ☐2 | ☐3 | e422/e422oth |

4. Have you observed any of the following types of ***dead*** wild birds *in* the barns or *outside* of the barns in the past 14 days?

| Dead bird type | Inside the barns? | Outside the barns? | |
|---|---|---|---|
| a. Large birds (e.g., pigeons, crows) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e423 |
| b. Small birds (e.g., finches, sparrows, starlings) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e424 |
| c. Other (specify: _____) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e425/e425oth |

## E. FARM HELP/WORKERS

*Questions in this section refer to persons such as the producer, employees, farm help, crews, etc.*

1. What is the total number of employees working on this farm that have access to or directly work with poultry (including family, both paid and unpaid)? ..... e501 _____ #

2. Are the following measures always/nearly always, sometimes, or never required for workers entering the poultry houses?

| Measure | Always/ Nearly always | Most of the time | Sometimes | Never | |
|---|---|---|---|---|---|
| a. An established clean/dirty line | ☐1 | ☐2 | ☐3 | ☐4 | e502 |
| b. Shower | ☐1 | ☐2 | ☐3 | ☐4 | e503 |
| c. Wash hands before entering and/or before leaving the barn | ☐1 | ☐2 | ☐3 | ☐4 | e504 |
| d. Different personnel for different houses | ☐1 | ☐2 | ☐3 | ☐4 | e505 |
| e. Wear disposable coveralls | ☐1 | ☐2 | ☐3 | ☐4 | e506 |
| f. Change of clothing (washable) | ☐1 | ☐2 | ☐3 | ☐4 | e507 |
| g. Change of shoes or use of shoe covers | ☐1 | ☐2 | ☐3 | ☐4 | e508 |
| h. Foot bath (liquid) | ☐1 | ☐2 | ☐3 | ☐4 | e509 |
| i. Foot bath (dry) | ☐1 | ☐2 | ☐3 | ☐4 | e510 |
| j. Scrub footwear (bucket and brush) | ☐1 | ☐2 | ☐3 | ☐4 | e511 |

3. Do workers on this farm work on other company farms?.....e512 ☐1 Yes ☐3 No

4. Are workers or members of their household employed by other poultry operations, rendering plants, or processing plants? .....e513 ☐1 Yes ☐3 No

   If "Yes," list the poultry operation(s), rendering plant(s), or processing plant(s): e514

   _____

5. Do any employees own their own poultry, including small backyard flocks?.....e515 ☐1 Yes ☐3 No ☐4 Don't Know

6. Are employees required to stay off farm after exposure to other poultry?.....e516 ☐1 Yes ☐3 No
   If "Yes," for how long (hours)?.....e517 _____ hours

## F. FARM VISITORS

1. Did any of the following types of people visit the farm in the past 14 days? If "Yes," how many times did they visit and did they enter the poultry barn?

| Visitor type | Did they visit the farm? | If "Yes," | | |
|---|---|---|---|---|
| | | How many times did they visit? | Did this visitor enter the poultry barn? | |
| a. Federal/state veterinary or animal health worker | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e601/e619/e637 |
| b. Extension agent or university veterinarian | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e602/e620/e638 |
| c. Private or company veterinarian | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e603/e621/e639 |
| d. Company service person | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e604/e622/e640 |
| e. Nutritionist or feed company consultant | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e605/e623/e641 |
| f. Pullet delivery | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e606/e624/e642 |
| g. Vaccination crew | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e607/e625/e643 |
| h. Catch crew | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e608/e626/e644 |
| i. Feed delivery personnel | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e609/e627/e645 |
| j. Egg truck personnel | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e610/e628/e646 |
| k. Litter services (delivery, pick-up) | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e611/e629/e647 |
| l. Customer (private individual) | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e612/e630/e648 |
| m. Wholesaler, buyer, or dealer | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e613/e631/e649 |
| n. Renderer | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e614/e632/e650 |
| o Occasional worker (e.g., family member, part time help over holiday) | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e615/e633/e651 |
| p. Construction workers | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e616/e634/e652 |
| q. Other business visitors (including other producers, meter readers, package delivery (UPS), repair person, wildlife services, and service personnel) | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e617/e635/e653 |
| r. Other nonbusiness visitors (including neighbors, friends, and school field trips) | ☐1 Yes ☐3 No | _____ # visits | ☐1 Yes ☐3 No | e618/e636/e654 |

2. Is a visitor log used to record visitor traffic onto the farm?..... e655 ☐1 Yes ☐3 No

3. For those visitors who entered the poultry barn in the past 14 days, did you always/nearly always, sometimes or never require the following?

| | Always/ Nearly always | Sometimes | Never | |
|---|---|---|---|---|
| a. Change of outer clothing/farm specific clothing | ☐1 | ☐2 | ☐3 | e656 |
| b. Foot covers or change of footwear | ☐1 | ☐2 | ☐3 | e657 |
| c. Mask | ☐1 | ☐2 | ☐3 | e658 |
| d. Hand sanitizing or gloves | ☐1 | ☐2 | ☐3 | e659 |
| e. Not visit multiple farms in the same day | ☐1 | ☐2 | ☐3 | e660 |
| f. Other (specify:_____) | ☐1 | ☐2 | ☐3 | e661/e661oth |

## G. FARM VEHICLES AND EQUIPMENT

1. Were the following vehicles on this farm in the past 14 days? If "Yes," was the vehicle shared with another farm? If "Yes," was it disinfected prior to returning to this farm and who was the vehicle shared with?

| Vehicle type | On farm in past 14 days? | If "Yes", was it shared with another farm? | If "Yes," | | |
|---|---|---|---|---|---|
| | | | Was it disinfected prior to returning to this farm? | Who was it shared with? [*Enter DK if don't know.*] | |
| a. Company trucks/trailers (e.g., pickup truck, trailer with supplies, supervisor truck, etc.) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e662/e671/ e680/e689 |
| b. Feed trucks | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e663/e672/ e681/e690 |
| c. Pullet delivery vehicles (i.e., placing pullets) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e664/e673/ e682/e691 |
| d. Bird removal vehicles | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e665/e674/ e683/e692 |
| e. Egg delivery vehicles | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e666/e675/ e684/e693 |
| f. Egg removal vehicles | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e667/e676/ e685/e694 |
| g. Manure/litter hauling | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e668/e677/ e686/e695 |
| h. ATV/4-wheeler | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e669/e678/ e687/e696 |
| i. Other (specify: _____) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e670/e670oth e679/e688/e697 |

2. Were the following pieces of equipment on this farm in the past 14 days? If "Yes," was the equipment shared with another farm? If "Yes," was it disinfected prior to returning to this farm and who was the equipment shared with?

| Equipment type | On farm in past 14 days? | If "Yes", was it shared with another farm? | If "Yes," | | |
|---|---|---|---|---|---|
| | | | Was it disinfected prior to returning to this farm? | Who was it shared with? [*Enter DK if don't know.*] | |
| a. Gates/panels | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e698/e708/ e718/e728 |
| b. Lawn mowers | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e699/e709/ e719/e729 |
| c. Live haul loaders | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e700/e710/ e720/e730 |
| d. Egg racks or pallets | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e701/e711/ e721/e731 |
| e. Egg flats | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e702/e712/ e722/e732 |
| f. Pressure sprayers/washers | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e703/e713/ e723/e733 |
| g. Skid-steer loaders | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e704/e714/ e724/e734 |
| h. Litter handling | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e705/e715/ e725/e735 |
| i. Manure handling | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e706/e716/ e726/e736 |
| j. Other (specify: _____) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | | e707 e717/ e727/e737/ e707oth |

## H. EGG HANDLING

1. Were any eggs from this farm marketed in the past 14 days as:

   a. Shell eggs?.....e801 ☐1 Yes ☐3 No – ***Skip to 1b***
      i. Washed and sanitized eggs?.....e802 ☐1 Yes ☐3 No
      ii. Nest runs?.....e803 ☐1 Yes ☐3 No
   b. Liquid eggs (sent to further processing)?.....e804 ☐1 Yes ☐3 No

2. Which best describes the ***primary*** location for shell egg processing (washing, grading, and packing into cartons)? [*Check one only.*].....e805

   ☐1 On-farm
   ☐2 Off-farm – ***Skip to Question 4***

3. Are shell eggs from other farms processed on this farm (i.e., side-loading)?.....e806 ☐1 Yes ☐3 No

   **Go to Section I.**

4. When shell eggs are processed off-farm, what is the:

   a. Average number of days between egg pickups from the farm?.....e807 _____ days
   b. Distance (in miles) to the processing plant where the majority of the eggs are processed?.....e808 _____ miles
   c. What is name of the processing plant?.....e809 _____

## I. LITTER AND MANURE HANDLING

1. Is litter (bedding) used on this farm?.....e901 ☐1 Yes ☐3 No – ***Skip to Question 10***

2. What was the last day that litter was brought onto the farm?.....e902 _____ mm/dd/yy

3. Who brought the litter onto the farm: e903
   ☐1 Company personnel?
   ☐2 Litter provider?
   ☐3 Other (specify: _____)? e903oth

4. What is the source (i.e., company name) of the litter? e904
   _____

5. Is the litter heat treated prior to delivery?.....e905 ☐1 Yes ☐3 No ☐4 Don't Know

6. Is litter stored on the farm prior to use:
   a. Outside? ..... e906 ☐1 Yes ☐3 No
      i. If "Yes," is it covered? ..... e907 ☐1 Yes ☐3 No
   b. In a shed? ..... e908 ☐1 Yes ☐3 No
      i. If "Yes," is the shed closed? .....e909 ☐1 Yes ☐3 No

***If both 6a and 6b are "No," skip to Question 8.***

7. What is the minimum distance (in yards) from the on-site litter storage area to the nearest barn?.....e910 _____ yards

8. Prior to use, is litter accessible to:
   a. Wild birds? ..... e911 ☐1 Yes ☐3 No
   b. Wild animals (e.g., raccoons, opossum, coyotes, foxes)?..... e912 ☐1 Yes ☐3 No
   c. Domestic animals (e.g., dogs, cats)? ..... e913 ☐1 Yes ☐3 No

9. What was the date that litter was last removed from any barn on this farm? ..... e914 _____ mm/dd/yy

10. Has manure or used litter from other farms been spread on this farm or adjacent farms? ..... e915 ☐1 Yes ☐3 No ☐4 Don't Know

    If "Yes," what was the last date: ..... e916 _____ mm/dd/yy

11. Which of the following manure handling methods are used for barns on this operation?

| | | |
|---|---|---|
| a. | High rise (pit at ground level with house above)....e917 | ☐1 Yes ☐3 No |
| b. | Deep pit (below ground)....e918 | ☐1 Yes ☐3 No |
| c. | Shallow pit (ground level)....e919 | ☐1 Yes ☐3 No |
| d. | Raised slats over floor (no manure belt)....e920 | ☐1 Yes ☐3 No |
| e. | Flush system to a lagoon or slurry pit....e921 | ☐1 Yes ☐3 No |
| | i. If "Yes," is lagoon water used to flush barns?....e922 | ☐1 Yes ☐3 No |
| f. | Manure belt....e923 | ☐1 Yes ☐3 No |
| g. | Scraper system (not flush or pit)....e924 | ☐1 Yes ☐3 No |
| h. | Drop board....e925 | ☐1 Yes ☐3 No |

12. Excluding belt system, how often is manure removed from the barn?..e926m/e926y _____ # / month
OR
_____ # / year

13. Is manure stored on farm (not including high rise pits)?....e927 ☐1 Yes ☐3 No – ***Skip to Question 16***

14. Is manure stored:

| | | |
|---|---|---|
| a. | In an enclosed building?....e928 | ☐1 Yes ☐3 No |
| b. | In an open structure (e.g., 3 sided building)?....e929 | ☐1 Yes ☐3 No |
| c. | In a lagoon?....e930 | ☐1 Yes ☐3 No |
| d. | Outside other than lagoon?....e931 | ☐1 Yes ☐3 No |

15. What is the minimum distance (in yards) from the on-site manure storage area to the nearest barn?....e932 _____ yards

16. How was manure most recently disposed of?

| | | |
|---|---|---|
| a. | Composted on farm....e933 | ☐1 Yes ☐3 No |
| | If "Yes," | |
| | i. What is the distance (in yards) to the nearest poultry house?....e934 | ____ yards |
| | ii. Is manure composted in a composting building?....e935 | ☐1 Yes ☐3 No |
| b. | Applied to land on this farm....e936 | ☐1 Yes ☐3 No |
| | If "Yes," what was the date manure was applied to land?....e937 | _____ mm/dd/yy |
| c. | Taken off site....e938 | ☐1 Yes ☐3 No |
| | If "Yes," name and location: _____ | h711 |

## J. DEAD BIRD DISPOSAL

1. What is the approximate normal daily mortality on this farm?....e1001 _____ # / 1000 birds

2. What are the method(s) of dead bird (daily mortality) disposal on this farm?
   a. Composting .....e1002 ☐1 Yes ☐3 No
   b. Burial .....e1003 ☐1 Yes ☐3 No
   c. Incineration .....e1004 ☐1 Yes ☐3 No
   d. Rendering .....e1005 ☐1 Yes ☐3 No
   e. Landfill .....e1006 ☐1 Yes ☐3 No
   f. Other (specify:_____) ..e1007/ e1007oth ☐1 Yes ☐3 No

3. If 2a (composting) or 2b (burial) are "Yes," how frequently are carcasses covered with:
   a. Soil? .....e1008 ☐1 Daily ☐2 Every 2 or more days ☐3 Never
   b. Manure? .....e1009 ☐1 Daily ☐2 Every 2 or more days ☐3 Never

4. If 2d (rendering) is "Yes,"
   a. Is the carcass bin kept covered? .....e1010 ☐1 Yes ☐3 No
   b. Are carcasses *[Check one only.]* e1011
      ☐1 Taken by the producer/worker to the renderer?
      ☐2 Picked up by the renderer from the farm?
   c. How frequently are carcasses moved to the renderer?.....e1012 _____ # times/week
   d. What were the dates of the pick-ups in the past 14 days?
      _____ mm/dd/yy e1013
   e. What is the name of the company that handles this farm's rendering?
      _____ e1014

5. What do workers do after handling the carcass bin before returning to the live poultry area? e1015
   _____
   _____
   _____

6. Have any wild birds or wild mammals been observed around the dead bird collection area (i.e., burial, compost pile, rendering, etc.) in the past 14 days?
   a. Wild birds.....e1016 ☐1 Yes ☐3 No
   b. Wild mammals.....e1017 ☐1 Yes ☐3 No

7. Is there a common collection point (i.e., located off the farm) for dead bird disposal?.....e1018 ☐1 Yes ☐3 No

   If "Yes," where is the common collection point located? _____e1019

## K. WEATHER CONDITIONS

1. In the past 14 days, how would you describe the wind? e1101

   ☐1 Windier than normal ☐2 Normal ☐3 Less windy than normal ☐4 Not sure

2. In the past 14 days, how would you describe the humidity? e1102

   ☐1 Drier than normal ☐2 Normal ☐3 Wetter than normal ☐4 Not sure

## BARN LEVEL QUESTIONS

**INSTRUCTIONS:**

1. **Control farm**: Select one barn to complete this section. Answer questions for the 14 days prior to the reference date specified on page 4. Complete *only* the "Control Barn" column.

2. **Case farm:** 1) Select the *first* barn on this premises that was confirmed to be HPAI positive. Answer questions in the "Case Barn" column for the 14 days prior to the onset of clinical signs or increased mortality. 2) Select one barn at random on this premises that is not HPAI positive. Select a barn that has birds present and is experiencing normal mortality. The Control Barn should physically be a separate structure from any infected barns. Answer questions in the "Control Barn" column for the same 14 day time period (i.e., the 14 days prior to the onset of clinical signs or increased mortality in any barn on this premises). If all barns on the premises are infected, leave "Control Barn" column blank.

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| 1. What is the barn ID? | | | e1201/ e1300 |
| 2. What type(s) of poultry are present in this barn? | | | e1202/ e1302 |
| a. Pullet | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1203/ e1303 |
| b. Layer | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1204/ e1304 |
| c. Breeder | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1205/ e1305 |
| d. Other | ☐1 Yes ☐3 No If "Yes," specify: _____ | ☐1 Yes ☐3 No If "Yes," specify: _____ | e1206/ e1206oth e1306/ e1306oth |
| 3. How many birds were placed in this barn? | _____ # birds | _____ # birds | e1207/ e1307 |
| 4. What was the date of placement in this barn? | _____ mm/dd/yy | _____ mm/dd/yy | e1208/ e1308 |
| 5. How old were birds when placed in this barn? | _____ weeks | _____ weeks | e1209/ e1309 |
| 6. Which of the following strains were in the layer flock? [*Check one only.*] | ☐1 White egg strain ☐2 Brown egg strain | ☐1 White egg strain ☐2 Brown egg strain | e1210/ e1310 |
| 7. Which of the following breeds were in the layer flock? [*Check one only.*] | ☐1 Hyline ☐2 Lohmann ☐3 Centurion ☐4 Other (specify: _____) | ☐1 Hyline ☐2 Lohmann ☐3 Centurion ☐4 Other (specify: _____) | e1211/ e1311 |
| 8. Has this flock been molted? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1212/ e1312 |

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| 9. Did birds in this barn have outside access? | ☐$_1$ Yes ☐$_3$ No | ☐$_1$ Yes ☐$_3$ No | e1213/ e1313 |
| 10. What was the bird density in the barn? | _____ sq in/bird | _____ sq in/bird | e1214/ e1314 |
| 11. Was there another health concern in this flock in the past 14 days? | ☐$_1$ Yes ☐$_3$ No<br>If "Yes," specify condition:<br>_____<br>_____ | ☐$_1$ Yes ☐$_3$ No<br>If "Yes," specify condition:<br>_____<br>_____ | e1215/ e1215sp e1315/ e1315spe |
| 12. Was this flock being treated for a condition or health concern in the past 14 days? | ☐$_1$ Yes<br>☐$_3$ No | ☐$_1$ Yes<br>☐$_3$ No | e1216/ e1316 |
| 13. Was this flock vaccinated in the past 14 days? | ☐$_1$ Yes ☐$_3$ No | ☐$_1$ Yes ☐$_3$ No | e1217/ e1317 |
| 14. How are birds housed in this barn?<br>*[Enter code 1, 2, or 3.]*<br>1. Conventional cage<br>2. Enriched cage<br>3. Cage free | _____ code<br>**If "3, Cage free," Skip to Question 16.** | _____ code<br>**If "3, Cage free," Skip to Question 16.** | e1218/ e1318 |
| 15. Are cages curtain backed? | ☐$_1$ Yes ☐$_3$ No | ☐$_1$ Yes ☐$_3$ No | e1219/ e1319 |
| 16. Do birds have access to droppings from other birds (e.g., manure belt running across top tier of cage)? | ☐$_1$ Yes ☐$_3$ No | ☐$_1$ Yes ☐$_3$ No | e1220/ e1320 |
| 17. How old is this barn structure? | _____ years | _____ years | e1221/ e1321 |
| 18. How long has it been since the last remodel of the barn structure? | _____ years | _____ years | e1222/ e1322 |

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| 19. How well has the barn structure been maintained? [*Enter code 1, 2, or 3.*]<br>1. Well<br>E.g., Concrete foundation, no visible daylight, the barn is tight, intact inlet vent screens, doors well sealed<br><br>2. Moderate<br>E.g., Barn tin could have rust or small holes, intact inlet vent screens, doors not completely sealed<br><br>3. Poor<br>E.g., Holes in walls are apparent, tin is rusted, may have leaks in roof, there might be some holes large enough for wild birds to enter, multiple areas with daylight visible, inlet vent screens not intact, doors not sealed | _____ code | _____ code | e1223/<br>e1323 |
| 20. Is there a buffer area between the barn and the outdoors which limits movement of air flow from the outside to the birds? | ☐$_1$ Yes ☐$_3$ No | ☐$_1$ Yes ☐$_3$ No | e1224/<br>e1324 |
| 21. What is the type of ventilation for this barn? *[Enter Code 1-4.]*<br><br>1. Curtain ventilated<br>2. Sidewall inlet<br>3. Ceiling or eaves inlet<br>4. Tunnel ventilation (may have side wall or ceiling inlets) | _____ code | _____ code | e1225/<br>e1325 |
| 22. Where are fans located? | ☐$_1$ Sidewall<br>☐$_2$ End of barn<br>☐$_3$ Both | ☐$_1$ Sidewall<br>☐$_2$ End of barn<br>☐$_3$ Both | e1226/<br>e1326 |
| 23. Is intake air filtered? | ☐$_1$ Yes ☐$_3$ No<br><br>If "Yes," specify type of filter:<br>_____ | ☐$_1$ Yes ☐$_3$ No<br><br>If "Yes," specify type of filter:<br>_____ | e1227/<br>1227spe<br>e1327/<br>e1327spe |

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| 24. Describe ventilation protocol for the past 14 days. | | | e1228/ e1328 |
| 25. Which best describes the ground surface immediately surrounding (within 1 yard) this barn (excluding vehicle approach and loading area)? *[Enter Code 1-4.]*<br><br>1. Gravel or hard surface<br>2. Dirt<br>3. Short grass<br>4. Tall grass or brush | _____ code | _____ code | e1229/ e1329 |
| 26. Does this barn have a hard surface entry pad (e.g., concrete, asphalt)? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1230/ e1330 |
| If "Yes,"<br>a. Is the entry pad cleaned and how frequently? | ☐1 Yes, ☐3 No<br>If "Yes," specify frequency:<br>_____ | ☐1 Yes, ☐3 No<br>If "Yes," specify frequency:<br>_____ | e1231/ e1231spe e1331/ e1331spe |
| b. Is disinfectant used? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1232/ e1332 |
| 27. Does this barn have: | | | |
| a. Locks on the doors? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1233/ e1333 |
| b. A service room that personnel must enter through that separates "outside area" from "inside area"? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1234/ e1334 |
| c. Changing area for employees | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1235/ e1335 |
| d. A shower for employees? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1236/ e1336 |
| e. Cool cell pads? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1237/ e1337 |
| f. Misters? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1238/ e1338 |
| 28. What type of footbath is in use at this barn? *[Enter Code 1-4.]*<br>1. Dry (i.e., powdered or particulate)<br>2. Liquid<br>3. Other<br>4. None | _____ code<br>*If "3-Other," specify:*<br>_____<br>***If "4 – None," Skip to Question 31.*** | _____ code<br>*If "3-Other," specify:*<br>_____<br>***If "4 – None," Skip to Question 31.*** | e1239/ e1239oth e1339/ e1339oth |

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| 29. What is the frequency that footbath solutions are changed? | _____ times/ ☐1 day, ☐2 week, or ☐3 month | _____ times/ ☐1 day, ☐2 week, or ☐3 month | e1240t/ e1240u e1340t/ e1340u |
| 30. What disinfectant is used in the footbaths? | specify: _____ | specify: _____ | e1241/ e1341 |
| 31. Does this barn have drop boards? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1242/ e1342 |
| 32. Is litter used in this barn? | ☐1 Yes ☐3 No ***If "No," skip to Question 38.*** | ☐1 Yes ☐3 No ***If "No," skip to Question 38.*** | e1243/ e1343 |
| 33. What type(s) of litter is used in this barn? *[Enter Code 1-4.]* 1. Wood shavings 2. Hulls (e.g., oat, rice, sunflower, other) 3. Straw 4. Other | _____ code *If "4 - Other," specify:* _____ | _____ code *If "4 - Other," specify:* _____ | e1244/ e1244oth e1344/ e1344oth |
| 34. Is the litter bagged (i.e., bailed) or bulk (i.e., load from shavings mill)? | ☐1 Bag ☐3 Bulk | ☐1 Bag ☐3 Bulk | e1245/ e1345 |
| 35. Who are the supplier(s)/source(s) of litter? | | | e1246/ e1346 |
| 36. Was litter "tilled" since it was placed in the barn? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1247/ e1347 |
| If "Yes," when was it tilled? | _____ mm/dd/yy | _____ mm/dd/yy | e1248/ e1348 |
| 37. How many times was litter added to the barn in the past 14 days? | _____ times | _____ times | e1249/ e1349 |
| 38. When was the last full clean out of litter or manure? | _____ mm/dd/yy | _____ mm/dd/yy | e1250/ e1350 |
| 39. Were birds present during the last full cleanout? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1251/ e1351 |
| 40. Who performed the last full cleanout? *[Enter Code 1 or 2.]* 1. Producer 2. Contractor | _____ code | _____ code | e1252/ e1352 |
| If contractor, specify name and location. | specify: n_____ l_____ | specify: n_____ l_____ | e1253n/ e1253l e1353n/ e1353l |

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| 41. Were the following wild birds seen in this barn in the past 14 days? | | | |
| a. Large birds (e.g., pigeons, crows) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1254/ e1354 |
| b. Small birds (e.g., finches, sparrows, starlings) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1255/ e1355 |
| 42. What is the distance (in yards) of the closest body of water to this barn? | _____ yards | _____ yards | e1256/ e1356 |
| 43. Were wild waterfowl observed on this body of water in the past 14 days? | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1257/ e1357 |
| 44. How far is this barn (in yards) from: | | | |
| a. Dead bird disposal/holding area including carcass bin for rendering | ____ yards | ____ yards | e1258/ e1358 |
| b. Nearest road | ____ yards | ____ yards | e1259/ e1359 |
| 45. Did any of the following types of people enter this barn in the past 14 days? | | | |
| a. Federal/state veterinary or animal health worker | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1260/ e1360 |
| b. Extension agent or university veterinarian | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1261/ e1361 |
| c. Private or company veterinarian | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1262/ e1362 |
| d. Company service person | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1263/ e1363 |
| e. Nutritionist or feed company consultant | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1264/ e1364 |
| f. Pullet delivery | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1265/ e1365 |
| g. Vaccination crew | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1266/ e1366 |
| h. Catch crew | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1267/ e1367 |
| i. Feed delivery personnel | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1268/ e1368 |
| j. Egg truck personnel | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1269/ e1369 |
| k. Litter services (delivery, pick-up) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1270/ e1370 |
| l. Customer (private individual) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1271/ e1371 |
| m. Wholesaler, buyer, or dealer | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1272/ e1372 |
| n. Renderer | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1273/ e1373 |

| | CASE BARN | CONTROL BARN | |
|---|---|---|---|
| o Occasional worker (e.g., family member, part time help over holiday) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1274/ e1374 |
| p. Construction workers | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1275/ e1375 |
| q. Other business visitors (including other producers, meter readers, package delivery (UPS), repair person, wildlife services, and service personnel) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1276/ e1376 |
| r. Other nonbusiness visitors (including neighbors, friends, and school field trips) | ☐1 Yes ☐3 No | ☐1 Yes ☐3 No | e1277/ e1377 |
| 46. Where specifically in this barn did increased mortality or clinical signs first appear (e.g., near entry, near vents, back of barn. Diagram may help)? | | NA | e1278 |
| 47. Was there a pattern of spread in the barn? If "Yes," describe. | ☐1 Yes ☐3 No<br>If "Yes," describe:_____<br>_____ | NA | e1279/ e1279d |
| 48. What was the *first* indication of infection within the barn? | | NA | |
| a. Surveillance testing | ☐1 Yes ☐3 No | | e1280 |
| b. Increased mortality | ☐1 Yes ☐3 No | | e1281 |
| c. Clinical signs | ☐1 Yes ☐3 No<br>If "Yes," (specify:<br>_____<br>_____) | | e1282/ e1282spe |

**COMMENT SECTION:**

**Please use this section for anything else that you would like to add. For example, how do you think HPAI is spreading within your geographic area?**

## CHECKLIST

**INSTRUCTIONS**
This section refers to data that can be acquired through other sources.

1. Please verify grayed areas from the questionnaire.

2. If possible, attach a diagram, farm map or photographs showing orientation of barn(s) including barn numbers, water location, feed storage, rendering bin, litter storage, ventilation, and windbreaks.

3. For the first infected barn, attach a diagram including proximity of initial infection to vents, doors, personnel entrances, manure storage, and other potential contributing factors.

4. How many commercial poultry farms (of any production type) are located:
   a. Within 1 mile of this farm? ..... e1401 _____ #

   b. Within 3 miles of this farm? ..... e1402 _____ #

5. How far (in yards or in miles) is the nearest backyard flock to this farm? ..e1403y/e1403m _____ yards
   OR
   _____ miles

6. How far (in yards or in miles) is the nearest HPAI positive premises to this farm? ..... e1404y/e1404m _____ yards
   OR
   _____ miles

7. Inquire about truck routing. Are feed trucks, egg trucks, and live haul trucks routed in particular way? E.g., to avoid driving past a known positive farm, to avoid delivering to a known positive farm, or to visit known positive farms last? Please explain.

8. Collect mortality sheets from both case and control barns.

9. Collect ventilation control records from both case and control barns for the past 14 days.

10. Which feed mill supplies feed to this farm? ..... e1405 _____

# Appendix G
# Examples of Movement Control Notices

This appendix provides examples, both Federal and State, of halting movement of animals during a disease outbreak. Each State has different authorities and processes regarding movement controls—frequently called a "stop movement order" or a "hold order"—in response to an animal health emergency.

## EXAMPLE—KANSAS (2015)

Manhattan, Kansas – In an effort to protect the Kansas poultry industry and to promote stronger biosecurity practices throughout the state, Kansas Department of Agriculture Division of Animal Health has issued a stop movement order, signed by Secretary of Agriculture Jackie McClaskey, targeting Kansas poultry and live birds, effectively cancelling all poultry-related shows and events through calendar year 2015. This includes all types of poultry activities where birds from different flocks are co-mingled.

This will include, but is not limited to: regional and county fairs, festivals, the Kansas State Fair, swap meets, exotic sales and live bird auctions. This measure is being implemented in an effort to prevent the spread of highly pathogenic H5N2 avian influenza (HPAI). Kansas experienced a positive case of HPAI in Leavenworth County in March 2015.

This decision was made after careful consideration and consultation with the K-State Research and Extension, Kansas 4-H, Kansas State Fair representatives and other poultry industry officials. Dr. Justin Smith, Deputy Animal Health Commissioner made the announcement.

"The decision to issue movement restrictions regarding poultry and bird events has been made in an effort to protect the poultry industry in Kansas and the economic contribution that the industry makes to our agricultural economy. It is a difficult decision, as I know youth and adults would soon be exhibiting their projects at local fairs," said Smith. "This decision was not made lightly, but it is necessary we do everything possible to protect the Kansas poultry flock."

K-State Research and Extension and Kansas 4-H, along with the Kansas State Fair, is working to identify options for youth enrolled in poultry projects to showcase their learning and participate in fairs in ways other than having their birds present.

It is important that all poultry producers continue to monitor their flocks for symptoms of the virus, and notify KDA immediately if they suspect any problems. All bird owners, whether commercial producers or backyard enthusiasts, should prevent contact between their birds and other birds including wild fowl.

If you see sickness in birds, please contact KDA Division of Animal Health at (785) 564-6601 or email HPAI@kda.ks.gov. Additional information about HPAI can be found online at www.agriculture.ks.gov/avianinfluenza.

Source: http://agriculture.ks.gov/AllNewsItems/2015/06/09/movement-restrictions-for-poultry-events-exhibitions-and-sales-issued-in-kansas

# EXAMPLE—NORTH DAKOTA (2015)

BISMARCK, N.D. – To protect North Dakota's poultry industry from potential exposure to H5 avian influenza virus, the State Board of Animal Health (BOAH) has halted bird movement to shows, exhibitions and public sales within the state in which birds from different locations are intermingled at an event. This does not apply to approved private sales that meet North Dakota importation requirements.

"The state board is taking this precaution to reduce the risk of avian influenza exposure to North Dakota birds," State Veterinarian Dr. Susan Keller said. "Mixing birds could unnecessarily increase the risk of exposure."

This board action prohibits the specified poultry/bird movements until further notice. BOAH is continuing to monitor and assess the disease threat, which will be reviewed at their June 10 quarterly meeting.

North Dakota has had two confirmed cases of avian influenza in commercial poultry operations in Dickey and LaMoure counties affecting over 100,000 birds. Nationally, the outbreak has affected nearly 10 million birds in 13 states.

Bird owners should immediately report death loss to their local and state veterinarian, restrict access to their property, prevent contact between their birds and wild birds and practice enhanced biosecurity.

State Veterinarian Dr. Susan Keller is reminding anyone bringing birds into North Dakota to contact the North Dakota Department of Agriculture's Animal Health Division at 701-328-2655 to ensure they are meeting all importation requirements.

More information about avian influenza and biosecurity is available at www.nd.gov/ndda/disease/avian-influenza and from the USDA-APHIS at www.aphis.usda.gov.

Source: www.nd.gov/ndda/news/poultrybird-movements-limited-control-spread-avian-influenza.

# EXAMPLE—WEST VIRGINIA (2007)

**Commissioner of Agriculture Halts Poultry Shows and Sales after AI-Positive Flock Discovered in Virginia**

Commissioner of Agriculture Gus R. Douglass has ordered a halt to poultry shows and sales throughout West Virginia in response to a turkey flock that tested positive for low pathogenicity avian influenza (LPAI) in Mt. Jackson, Va., just across the West Virginia border.

The strain is not the "bird flu" that has been plaguing Southeast Asia and parts of Europe and poses no threat to human health.

The order applies to any gathering of live birds, including shows at fairs and festivals and sales of poultry. The order is effective Monday, July 9, and will be in place for 30 days unless another positive flock is discovered.

The order does not apply to the commercial industry, which tests every flock for AI before it is moved off the farm to ensure that infected birds are not trucked past other poultry farms.

"Having already dealt with a positive flock in West Virginia earlier this year, we want to take every precaution to protect our poultry industry from a potentially devastating situation," said Commissioner Douglass.

He also noted that the West Virginia Department of Agriculture is on high alert for any signs of the disease here, and that the industry has been exercising enhanced surveillance protocols since a 2002 AI outbreak that affected West Virginia and Virginia.

Poultry companies on both sides of the border have instructed their growers not to spread litter or move it from their farms until further notice.

According to the Virginia Department of Agriculture and Consumer Services (VDACS), testing over the weekend by the USDA's National Veterinary Services Laboratory (NVSL) in Ames, Iowa, confirmed the presence of AI antibodies, which indicates possible prior exposure to the virus. The turkeys did not show any signs of illness prior to testing.

Virginia is closely monitoring all poultry operations within a six-mile radius of the affected farm.

NVSL is doing further testing to help identify the virus and hopefully determine its source. VDACS, USDA and the poultry owner are working cooperatively to minimize the possibility that the virus will move beyond this farm.

The affected flock contains 54,000 birds, which will be euthanized as a precaution as soon as possible and composted on-site. While LPAI poses no risk to human health, federal and state policy is to eradicate H5 and H7 subtypes because of their potential to change into more serious types, which have a higher mortality rate among birds.

Source: www.wvagriculture.org/news_releases/2007/7-9-07.html.

# EXAMPLE—FEDERAL (2003)

Source: www.federalregister.gov/articles/2003/04/16/03-9322/exotic-newcastle-disease-additions-to-quarantined-area#p-3.

18531

# Rules and Regulations

Federal Register
Vol. 68, No. 73
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DEPARTMENT OF AGRICULTURE

Animal and Plant Health Inspection Service

9 CFR Part 82

[Docket No. 02–117–5]

## Exotic Newcastle Disease; Additions to Quarantined Area

**AGENCY:** Animal and Plant Health Inspection Service, USDA.

**ACTION:** Interim rule and request for comments.

**SUMMARY:** We are amending the exotic Newcastle disease regulations by quarantining El Paso and Hudspeth Counties, TX, and Dona Ana, Luna, and Otero Counties, NM, and prohibiting or restricting the movement of birds, poultry, products, and materials that could spread exotic Newcastle disease from the quarantined area. This action is necessary on an emergency basis to prevent the spread of exotic Newcastle disease from the quarantined area.

**DATES:** This interim rule was effective April 10, 2003. We will consider all comments that we receive on or before June 16, 2003.

**ADDRESSES:** You may submit comments by postal mail/commercial delivery or by e-mail. If you use postal mail/commercial delivery, please send four copies of your comment (an original and three copies) to: Docket No. 02–117–5, Regulatory Analysis and Development, PPD, APHIS, Station 3C71, 4700 River Road Unit 118, Riverdale, MD 20737–1238. Please state that your comment refers to Docket No. 02–117–5. If you use e-mail, address your comment to *regulations@aphis.usda.gov*. Your comment must be contained in the body of your message; do not send attached files. Please include your name and address in your message and "Docket No. 02–117–5" on the subject line.

You may read any comments that we receive on this docket in our reading room. The reading room is located in room 1141 of the USDA South Building, 14th Street and Independence Avenue SW., Washington, DC. Normal reading room hours are 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. To be sure someone is there to help you, please call (202) 690–2817 before coming.

APHIS documents published in the **Federal Register**, and related information, including the names of organizations and individuals who have commented on APHIS dockets, are available on the Internet at *http://www.aphis.usda.gov/ppd/rad/webrepor.html*.

**FOR FURTHER INFORMATION CONTACT:** Dr. Aida Boghossian, Senior Staff Veterinarian, Emergency Programs Staff, VS, APHIS, 4700 River Road Unit 41, Riverdale, MD 20737–1231; (301) 734–8073.

**SUPPLEMENTARY INFORMATION:**

### Background

Exotic Newcastle disease (END) is a contagious and fatal viral disease affecting the respiratory, nervous, and digestive systems of birds and poultry. END is so virulent that many birds and poultry die without showing any clinical signs. A death rate of almost 100 percent can occur in unvaccinated poultry flocks. END can infect and cause death even in vaccinated poultry.

The regulations in "Subpart A—Exotic Newcastle Disease (END)" (9 CFR 82.1 through 82.15, referred to below as the regulations) were established to prevent the spread of END in the United States in the event of an outbreak. In § 82.3, paragraph (a) provides that any area where birds or poultry infected with END are located will be designated as a quarantined area, and that a quarantined area is any geographical area, which may be a premises or all or part of a State, deemed by epidemiological evaluation to be sufficient to contain all birds or poultry known to be infected with or exposed to END. Less than an entire State will be designated as a quarantined area only if the State enforces restrictions on intrastate movements from the quarantined area that are at least as stringent as the regulations. The regulations prohibit or restrict the movement of birds, poultry, products, and materials that could spread END from quarantined areas. Areas quarantined because of END are listed in § 82.3, paragraph (c).

On October 1, 2002, END was confirmed in the State of California. The disease was confirmed in backyard poultry, which are raised on private premises for hobby, exhibition, and personal consumption, and in commercial poultry.

In an interim rule effective on November 21, 2002, and published in the **Federal Register** on November 26, 2002 (67 FR 70674–70675, Docket No. 02–117–1), we amended the regulations in § 82.3(c) by quarantining Los Angeles County, CA, and portions of Riverside and San Bernardino Counties, CA, and restricting the interstate movement of birds, poultry, products, and materials that could spread END from the quarantined area.

In a second interim rule effective on January 7, 2003, and published in the **Federal Register** on January 13, 2003 (68 FR 1515–1517, Docket No. 02–117–2), we further amended § 82.3(c) by adding Imperial, Orange, San Diego, Santa Barbara, and Ventura Counties, CA, and the previously non-quarantined portions of Riverside and San Bernardino Counties, CA, to the list of quarantined areas. Because the Secretary of Agriculture signed a declaration of extraordinary emergency with respect to the END situation in California on January 6, 2003 (see 68 FR 1432, Docket No. 03–001–1, published January 10, 2003), that second interim rule also amended the regulations to provide that the prohibitions and restrictions that apply to the interstate movement of birds, poultry, products, and materials that could spread END will also apply to the intrastate movement of those articles in situations where the Secretary of Agriculture has issued a declaration of extraordinary emergency (new § 82.16).

On January 16, 2003, END was confirmed in backyard poultry on a premises in Las Vegas, NV. Therefore, in a third interim rule effective January 17, 2003, and published in the **Federal Register** on January 24, 2003 (68 FR 3375–3376, Docket No. 02–117–3), we amended § 82.3(c) by quarantining Clark County, NV, and a portion of Nye County, NV, and prohibiting or restricting the movement of birds, poultry, products, and materials that

could spread END from the quarantined area. On January 17, 2003, the Secretary of Agriculture signed a declaration of extraordinary emergency because of END in Nevada (see 68 FR 3507, Docket No. 03–001–2, published January 24, 2003).

On February 4, 2003, END was confirmed in backyard poultry on a premises in the Colorado River Indian Nation in Arizona. Therefore, in a fourth interim rule effective February 10, 2003, and published in the **Federal Register** on February 14, 2003 (68 FR 7412–7413, Docket No. 02–117–4), we amended § 82.3(c) by quarantining La Paz and Yuma Counties, AZ, and a portion of Mohave County, AZ, and prohibiting or restricting the movement of birds, poultry, products, and materials that could spread END from the quarantined area. On February 7, 2003, the Secretary of Agriculture signed a declaration of extraordinary emergency because of END in Arizona (see 68 FR 7338, Docket No. 03–001–3, published February 13, 2003).

On April 9, 2003, END was confirmed in backyard poultry on a premises in El Paso County, TX. Therefore, in this interim rule, we are amending § 82.3(c) by designating El Paso and Hudspeth Counties, TX, and Dona Ana, Luna, and Otero Counties, NM, as a quarantined area and prohibiting or restricting the movement of birds, poultry, products, and materials that could spread END from the quarantined area. As provided for by the regulations in § 82.3(a), this quarantined area encompasses the area where poultry infected with END were located and a surrounding geographical area deemed by epidemiological evaluation to be sufficient to contain all birds or poultry known to be infected with or exposed to END.

**Emergency Action**

This rulemaking is necessary on an emergency basis to prevent the spread of END. Under these circumstances, the Administrator has determined that prior notice and opportunity for public comment are contrary to the public interest and that there is good cause under 5 U.S.C. 553 for making this rule effective less than 30 days after publication in the **Federal Register**.

We will consider comments that we receive during the comment period for this interim rule (see **DATES** above). After the comment period closes, we will publish another document in the **Federal Register**. The document will include a discussion of any comments we receive and any amendments we are making to the rule.

**Executive Order 12866 and Regulatory Flexibility Act**

This rule has been reviewed under Executive Order 12866. For this action, the Office of Management and Budget has waived its review under Executive Order 12866.

This rule amends the regulations by quarantining El Paso and Hudspeth Counties, TX, and Dona Ana, Luna, and Otero Counties, NM, and prohibiting or restricting the movement of birds, poultry, products, and materials that could spread END from the quarantined area. This action is necessary on an emergency basis to prevent the spread of END from the quarantined area.

This emergency situation makes timely compliance with section 604 of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) impracticable. We are currently assessing the potential economic effects of this action on small entities. Based on that assessment, we will either certify that the rule will not have a significant economic impact on a substantial number of small entities or publish a final regulatory flexibility analysis.

**Executive Order 12372**

This program/activity is listed in the Catalog of Federal Domestic Assistance under No. 10.025 and is subject to Executive Order 12372, which requires intergovernmental consultation with State and local officials. (See 7 CFR part 3015, subpart V.)

**Executive Order 12988**

This rule has been reviewed under Executive Order 12988, Civil Justice Reform. This rule: (1) Preempts all State and local laws and regulations that are in conflict with this rule; (2) has no retroactive effect; and (3) does not require administrative proceedings before parties may file suit in court challenging this rule.

**Paperwork Reduction Act**

This rule contains no new information collection or recordkeeping requirements under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*).

**List of Subjects in 9 CFR Part 82**

Animal diseases, Poultry and poultry products, Quarantine, Reporting and recordkeeping requirements, Transportation.

■ Accordingly, 9 CFR part 82 is amended as follows:

## PART 82—EXOTIC NEWCASTLE DISEASE (END) AND CHLAMYDIOSIS; POULTRY DISEASE CAUSED BY SALMONELLA ENTERITIDIS SEROTYPE ENTERITIDIS

■ 1. The authority citation for part 82 continues to read as follows:

**Authority:** 7 U.S.C. 8301–8317; 7 CFR 2.22, 2.80, and 371.4.

■ 2. In § 82.3, paragraph (c) is amended by adding, in alphabetical order, entries for New Mexico and Texas to read as follows:

**§ 82.3 Quarantined areas.**

* * * * *

(c) * * *

* * * * *

**New Mexico**

*Dona Ana County.* The entire county.
*Luna County.* The entire county.
*Otero County.* The entire county.

**Texas**

*El Paso County.* The entire county.
*Hudspeth County.* The entire county.

Done in Washington, DC, this 10th day of April 2003.

**Bobby R. Acord,**

*Administrator, Animal and Plant Health Inspection Service.*

[FR Doc. 03–9322 Filed 4–15–03; 8:45 am]

BILLING CODE 3410–34–P

## FARM CREDIT ADMINISTRATION

### 12 CFR Part 615

**RIN 3052–AC05**

### Funding and Fiscal Affairs, Loan Policies and Operations, and Funding Operations; Capital Adequacy

**AGENCY:** Farm Credit Administration.

**ACTION:** Final rule.

**SUMMARY:** The Farm Credit Administration (FCA or agency) amends its capital adequacy regulations to add a definition of total liabilities for the net collateral ratio calculation, limit the amount of term preferred stock that may count as total surplus, clarify the circumstances in which we may waive disclosure requirements for an issuance of equities by a Farm Credit System (FCS, Farm Credit or System) institution, and make several nonsubstantive technical changes. These amendments update, modify, and clarify certain capital requirements.

**EFFECTIVE DATE:** This regulation will become effective 30 days after publication in the **Federal Register** during which either or both houses of

# Appendix H
# Available Avian Influenza Vaccines

## INFORMATION ABOUT VACCINE

This section is provided to be a quick reference appendix for general information on avian influenza (AI) vaccine; this appendix may be updated at any time. For further information on AI vaccines, please see *National Animal Health Emergency Management System (NAHEMS) Guidelines: Vaccination for Contagious Diseases Appendix C: Vaccination for High Pathogenicity Avian Influenza* at www.aphis.usda.gov/fadprep.

In the event of a highly pathogenic avian influenza (HPAI) outbreak in the United States, stamping-out is the primary response strategy. Other strategies may be considered for implementation by the USDA, such as emergency vaccination, but there are a multitude of factors that need to be carefully considered before deciding to vaccinate U.S. poultry flocks. Vaccination against HPAI is not currently a primary response strategy in the United States, in part because it can mask infection, complicate detection and eradication, and also has international trade implications.

Effective vaccination can decrease transmission between animals by 1) decreasing the susceptibility of animals to infection, and 2) reducing virus shedding, if a vaccinated animal becomes infected. In addition to reducing transmission between flocks, decreased virus shedding reduces contamination of the environment and the risk to humans. However, vaccination may allow birds to survive longer without clinical signs, and if virus shedding is not substantially reduced, transmission could be enhanced. Advancements have been made in vaccine development and research continues.

### Inactivated Avian Influenza Vaccines

For poultry, inactivated (killed) vaccines are usually supplied as oil emulsions. Generally, inactivated vaccines contain field strains of low pathogenicity avian influenza viruses (either naturally occurring or engineered) that are cross-reactive with the same hemagglutinin subtype that is causing the infection. Inactivated vaccines are not for use in poultry less than 2–3 weeks of age (i.e., for first dose), due to dosage volume as well as the potential interference of maternal antibody. Two doses of inactivated vaccine are required (a priming dose plus a booster 2–4 weeks later). Vaccination of short production span birds (i.e., broilers) is generally impractical, but in birds with extended life-spans, such as turkeys, layers, genetic stock, and multiplier flocks, vaccination may be warranted. After

the initial prime/booster doses, the birds must be re-vaccinated every 6 months throughout their production lifespan. These vaccines have been used in other avian species, though this does not imply associated efficacy testing has been completed. Use in any animal besides chickens or turkeys must be considered experimental.

A pre-vaccination AI test may be required. Withdrawal prior to slaughter is 42 days (6 weeks). The inactivated vaccine may provide protection to an outbreak virus of the same hemagglutinin type, but this must always be evaluated at the time of the outbreak. Maternal antibodies can be passed to progeny, resulting in seropositive test results in progeny for a period.

It would be possible to use inactivated vaccine and a companion diagnostic test for differentiating infected and vaccinated animals (DIVA),[1] if the neuraminidase of the vaccine was different than the field strain: a DIVA strategy would monitor for N antibodies matching the field strain, indicating infection in vaccinated animals. However, neuraminidase DIVA testing has not been validated or recognized as an accepted DIVA strategy for purposes of international trade.

## Live Recombinant Vaccine

### FOWLPOX-VECTORED H5 VACCINE

Another possibility is a live, fowlpox-vectored H5 vaccine. Fowlpox vaccines replicate well only in chickens and have been licensed for emergency use in this species. However, experimental evidence is needed to demonstrate how well these vaccines protect against a current H5 outbreak strain. In addition, use in any animal besides chickens must be considered experimental. It would be possible to use this vaccine as a DIVA vaccine.

Fowlpox-vectored AI vaccines must be given individually to birds by injection, and can be given to chicks 1 day or older. Chickens to be vaccinated, and hens which produced the hatching eggs, should not have received a prior fowlpox vaccination nor have been exposed to indigenous fowlpox viruses transmitted by mosquitoes, since pre-existing fowlpox virus antibodies can interfere with the vaccine. A booster vaccination with an homologous inactivated virus vaccine must be applied 2–3 weeks later to ensure sufficient protection. Withdrawal time prior to slaughter for this vaccine is 21 days (3 weeks). However, the withdrawal time for the inactivated vaccine booster is 42 days. If the bird's production lifespan is lengthy, it must receive a booster with a homologous inactivated vaccine every 6 months.

[1] This is sometimes also called detecting infection in vaccinated animals.

## MAREK'S DISEASE VECTOR VACCINE

In addition to fowlpox-vectored H5 vaccine, live turkey herpesvirus (HVT) vectored H5 vaccine is also available for potential emergency use in the United States. This vaccine protects against both Marek's disease and homologous H5 HPAI viruses. Current labeling allows injection of 1 day-old chicks, and it could also be used *in ovo* 2–3 days before hatching. The vaccine is to be handled with care, as it is supplied frozen, must be thawed and mixed, and must be administered in a timely manner. HVT-vectored H7 vaccines are in experimental stages and not currently available.

Each serological DIVA strategy is appropriate only with certain types of avian influenza vaccines and have not yet been validated with vectored avian influenza vaccines.

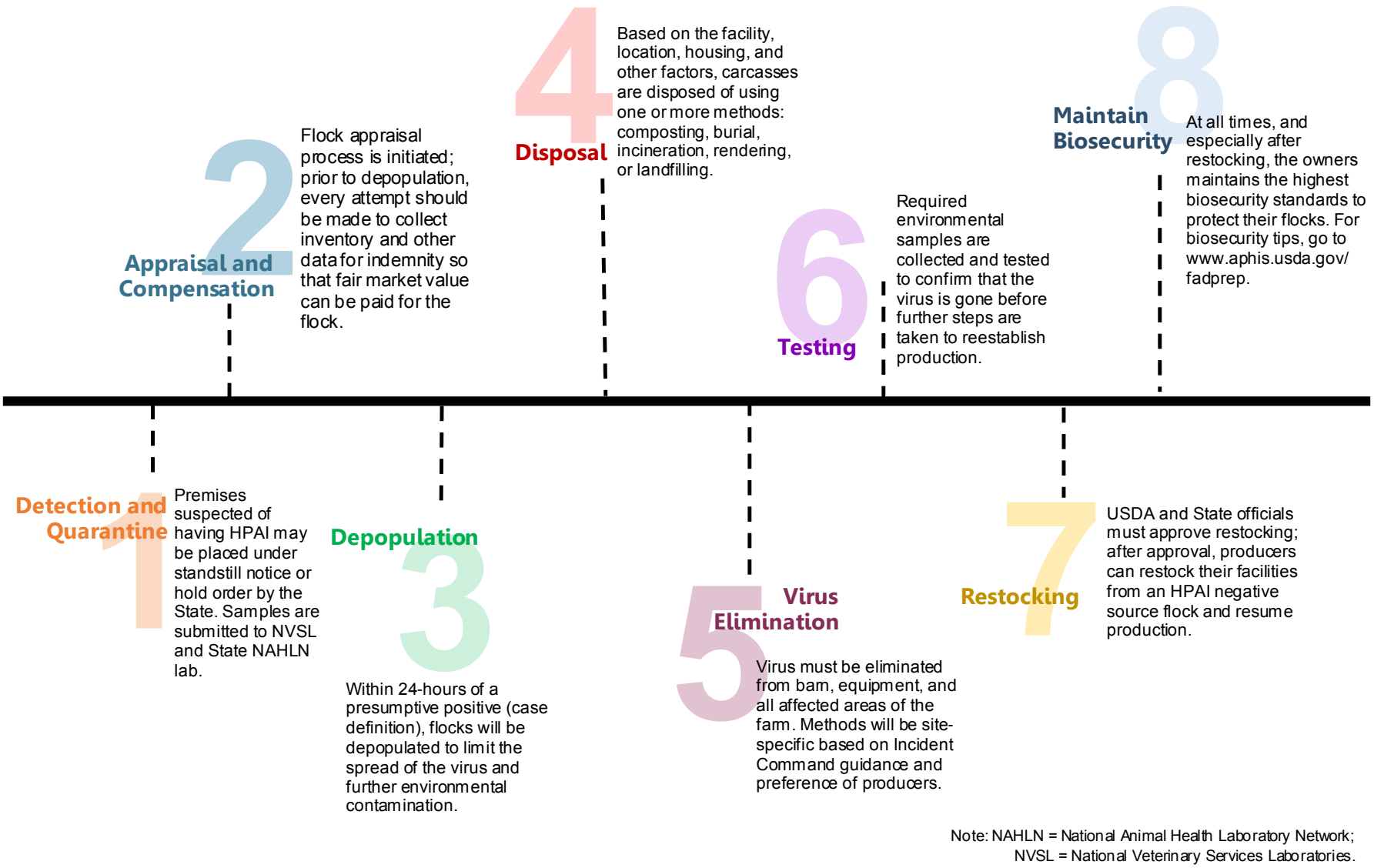
# Appendix I
# USDA Response Process for Infected Premises

This attachment contains succinct guidance about the step-by-step process of U.S. Department of Agriculture (USDA) highly pathogenic avian influenza (HPAI) response. It highlights the entire response process for an Infected Premises, from detection to restocking.

USDA United States Department of Agriculture

# Highly Pathogenic Avian Influenza

## USDA Response Process




Note: NAHLN = National Animal Health Laboratory Network;
NVSL = National Veterinary Services Laboratories.

# Appendix J
# Glossary

| | |
|---|---|
| Animal product | Blood or any of its components, bones, bristles, feathers, flesh, offal, skins, and any by product containing any of those components that originated from an animal or bird. |
| Anseriformes | An order of birds that includes ducks, geese, and swans. There are about 150 living species of birds in three extant families: the Anhimidae (the screamers), Anseranatidae (the Magpie Goose), and the Anatidae, which includes more than 140 species of waterfowl. |
| Case | Any individual animal infected by HPAI virus, with or without clinical signs. |
| Charadriiformes | A diverse order of small to medium-large birds including those commonly known as shorebirds. There are about 350 species in all parts of the world. Most live near water and eat invertebrates or other small animals. |
| Compartment (compartmentalization) (OIE) | An animal subpopulation contained in one or more establishments under a common biosecurity management system with a distinct health status with respect to a specific disease or specific diseases for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade. |
| Control Area | A Control Area (an Infected Zone and Buffer Zone) has individual premises quarantine for Infected Premises, Suspect Premises, and Contact Premises and movement restrictions for At-Risk Premises and Monitored Premises. |
| Domestic poultry | See poultry. |
| Emergency vaccination | A disease control strategy using the immunization of susceptible animals through the administration of a vaccine comprising antigens appropriate to the disease to be controlled. |
| Etiology | The causes or origin of disease, or the factors that produce or predispose toward a certain disease or disorder. |
| Euthanasia (OIE) | Means the act of inducing death using a method that causes a rapid and irreversible loss of consciousness with minimum pain and distress to animal. |

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| FAD PReP (Foreign Animal Disease Preparedness and Response Plan) | Documents used to identify overall strategies, veterinary functions, organization, and countermeasures necessary to contain and control an FAD outbreak. It is also used to integrate functions and countermeasures with emergency management systems and operations conducted in joint and unified command by Federal, State, Tribal, and local personnel. |
| Fomites | Inanimate objects that can transmit infectious agents from one animal or person to another. |
| Foreign animal disease | A transboundary animal disease not known to exist in the U.S. animal population. |
| Galliformes | An order of birds containing turkeys, grouse, chickens, quails, and pheasants. Common names are gamefowl or gamebirds, landfowl, gallinaceous birds, or galliformes. |
| Highly pathogenic avian influenza (HPAI) (9 CFR 53) | (1) "Any influenza virus that kills at least 75 percent of eight 4- to 6-week-old susceptible chickens within 10 days following intravenous inoculation with 0.2ml of a 1:10 dilution of a bacteria-free, infectious allantoic fluid;<br>(2) Any H5 or H7 virus that does not meet the criteria in paragraph (1) of this definition, but has an amino acid sequence at the hemagglutinin cleavage site that is compatible with highly pathogenic avian influenza viruses; or<br>(3) Any influenza virus that is not an H5 or H7 subtype that kills one to five chickens and grows in cell culture in the absence of trypsin." |
| Highly pathogenic avian influenza (HPAI) (OIE) | "High pathogenicity avian influenza viruses have an IVPI [intravenous pathogenicity index] in six-week-old chickens greater than 1.2, or as an alternative, cause at least 75 percent mortality in four- to eight-week-old chickens infected intravenously. H5 and H7 viruses which do not have an IVPI of greater than 1.2 or cause less than 75 percent mortality in an intravenous lethality test should be sequenced to determine whether multiple basic amino acids are present at the cleavage site of the haemagglutinin molecule (HA0); if the amino acid motif is similar to that observed for other HPAI isolates, the isolate being tested should be considered as high pathogenicity avian influenza virus." |

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| Incident Command System | A standardized, on-scene, all-hazards incident management approach that<br>◆ allows for the integration of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure;<br>◆ enables a coordinated response among various jurisdictions and functional agencies, both public and private; and<br>◆ establishes common processes for planning and managing resources. |
| Incubation period (OIE) | For the purposes of the OIE *Terrestrial Code (2016)* the incubation period for AI shall be 21 days. The incubation period is the longest period which elapses between the introduction of the pathogen into the animal and the occurrence of the first clinical signs of the disease. |
| Index case | The first or original case identified in a disease outbreak. |
| Low pathogenicity avian influenza (LPAI) (OIE) | All influenza A viruses of H5 and H7 subtype that are not HPAI viruses. |
| Mass depopulation | Method by which large numbers of animals must be destroyed quickly and efficiently with as much consideration given to the welfare of the animals as practicable, but where the circumstances and tasks facing those doing the depopulation are understood to be extenuating. |
| Mutation (genetic) | Change in the sequence of a cell's genome caused by radiation, viruses, transposons, and mutagenic chemicals, as well as errors that occur during meiosis or replication. |
| National Animal Health Laboratory Network (NAHLN) | NAHLN is a cooperative effort between two U.S. Department of Agriculture agencies and the American Association of Veterinary Laboratory Diagnosticians. It is a national network of State and University laboratories, which use common testing methods and software platforms to perform diagnostics and share information. |
| Non-susceptible animal | Animal that does not develop a particular disease when exposed to the causative infectious agent of that disease. |
| OIE (World Organization for Animal Health) | Organization that collects and publishes information on animal diseases from approximately 180 member countries and develops standards for animal health. |
| Outbreak | The occurrence of cases of a disease that are in excess of what is normally expected in a given population. |

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| Poultry | Chickens, and any of the following birds, if these other birds are kept, raised, captured, bred, or otherwise used for a commercial purpose: turkeys, ducks, geese, swans, pheasants, partridges, grouse, quail, guinea fowl, pea fowl, pigeons, doves, ostriches, emus, rheas, cassowaries. Commercial purposes include the production or sale of birds, or of their meat, eggs, or feathers. Does not include chickens or other birds displayed in a licensed exhibition or zoo. |
| Personal protective equipment (PPE) | Clothing and equipment to prevent occupational injuries and diseases through control of exposure to potential hazards in the work place after engineering and administrative controls have been implemented to the fullest extent. |
| Preemptive depopulation | Depopulation under the competent authority of susceptible animal species in herds or flocks on premises that have been exposed to infection by direct animal-to-animal contact or by indirect contact of a kind likely to result in the transmission of HPAI virus prior to the expression of clinical signs. |
| Premises | A geographically and epidemiologically defined location, including a ranch, farm, stable, or other establishment. |
| Reassortment (genetic) | The mixing of the genetic material of a species into new combinations in different individuals. In particular, reassortment occurs among influenza viruses, whose genomes consist of eight distinct segments of RNA. These segments act like mini-chromosomes, and each time a flu virus is assembled, it requires one copy of each segment. |
| Regionalization (also known as zoning) | An animal subpopulation defined primarily on a geographical basis (using natural, artificial, or legal boundaries). |
| Slaughter | The killing of an animal or animals for food. |
| Stamping-out (OIE) | Means a policy designed to eliminate an outbreak by carrying out under the authority of the Veterinary Authority the following: a) the killing of the animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact with the causal pathogen animals should be killed in accordance with Chapter 7.6; b) the disposal of carcasses and, where relevant, animal products by rendering, burning or burial, or by any other method described in Chapter 4.12; and c) the cleansing and disinfection of establishments through procedures defined in Chapter 4.13. |
| Susceptible animal | Any animal that can be infected with and replicate the disease pathogen of concern. The susceptible animals of primary concern to this plan are poultry. |
| Susceptible species | See susceptible animal. |

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| Trace back | The identification of the origin and movements of all animals, animal products, possible fomites, people, possible vectors, and so on that have entered onto an infected premises. |
| Trace forward | The tracing of all animals, people, fomites, and so on that have left an infected premises. The premises that received the animals or goods should be investigated and kept under surveillance or quarantine. |
| Vector (OIE) | Means an insect or any living carrier that transports an infectious agent from an infected individual to a susceptible individual or its food or immediate surroundings. The organism may or may not pass through a development cycle within the vector. |
| Wild birds | Migratory game birds, upland game birds, and all undomesticated feathered vertebrates. |
| Zoonotic | Any disease or infection that is naturally transmissible from animals to humans. |

# Appendix K
# Abbreviations

| | |
|---|---|
| 3D | depopulation, decontamination, and disposal |
| AC | Area Command |
| ACIA | antigen capture immunoassay |
| AD | Assistant District Director |
| ADA | Associate Deputy Administrator |
| ADSM | Animal Disease Spread Model |
| AEOC | APHIS Emergency Operations Center |
| AGID | agar-gel immunodiffusion |
| AHPA | Animal Health Protection Act |
| AI | avian influenza |
| AMT | APHIS Management Team |
| APHIS | Animal and Plant Health Inspection Service |
| APHIS WS | Animal and Plant Health Inspection Service Wildlife Services |
| ARP | At-Risk Premises |
| ARS | Agricultural Research Service |
| AVMA | American Veterinary Medical Association |
| AZA | American Zoological Association |
| BZ | Buffer Zone |
| CA | Control Area |
| CCC | Commodity Credit Corporation |
| CDC | Centers for Disease Control and Prevention |
| CEAH | Center for Epidemiology and Animal Health |
| CF | Contingency Fund |
| CFR | Code of Federal Regulations |
| CP | Contact Premises |
| CVO | Chief Veterinary Officer of the United States (VS DA) |
| CVZ | Containment Vaccination Zone |
| DA | Deputy Administrator |

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|---|---|
| DHS | Department of Homeland Security |
| DIVA | differentiation of infected from vaccinated animals |
| DOI | Department of Interior |
| EDI | emerging disease incidents |
| ELISA | enzyme-linked immunosorbent assay |
| EMRS2 | Emergency Management Response System 2.0 |
| EPA | Environmental Protection Agency |
| EQS | Emergency Qualifications System |
| ESF | Emergency Support Function |
| FA | Free Area |
| FAD | foreign animal disease |
| FADD | Foreign Animal Disease Diagnostician |
| FAD PReP | Foreign Animal Disease Preparedness and Response Plan |
| FADDL | Foreign Animal Disease Diagnostic Laboratory (Plum Island, NY) |
| FEMA | Federal Emergency Management Agency |
| FFS | Federal-to-Federal support |
| fluA | influenza A virus |
| FP | Free Premises |
| GIS | geographic information system |
| aH or HA | hemagglutinin |
| HHS | Department of Health and Human Services |
| HI | hemagglutination inhibition |
| HPAI | highly pathogenic avian influenza |
| HVT | turkey herpesvirus |
| IC | Incident Command |
| ICG | Incident Coordination Group |
| ICP | Incident Command Post |
| ICS | Incident Command System |
| ILI | influenza-like illness |
| IMT | Incident Management Team |
| IP | Infected Premises |
| IVPI | intravenous pathogenicity index |

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|---|---|
| IZ | Infected Zone |
| JIC | Joint Information Center |
| LBMS | Live Bird Marketing System |
| LPA | Legislative and Public Affairs |
| LPAI | low pathogenic avian influenza |
| MAC | Multiagency Coordination |
| MP | Monitored Premises |
| N or NA | neuraminidase |
| NAHEMS | National Animal Health Emergency Management System |
| NAHERC | National Animal Health Emergency Response Corps |
| NAHLN | National Animal Health Laboratory Network |
| NASAHO | National Association of State Animal Health Officials |
| NASDA | National Association of State Departments of Agriculture |
| NI | neuraminidase inhibition |
| NIES | National Import Export Services |
| NIMS | National Incident Management System |
| NIMT | National Incident Management Team |
| NPIC | National Preparedness and Incident Coordination |
| NPIP | National Poultry Improvement Plan |
| NRF | National Response Framework |
| NVS | National Veterinary Stockpile |
| NVSL | National Veterinary Services Laboratories |
| NVSL-Ames | National Veterinary Services Laboratories-Ames, IA |
| NVSL-FADDL | National Veterinary Services Laboratories-Foreign Animal Disease Diagnostic Laboratory Plum Island, NY |
| OIE | World Organization for Animal Health |
| PCR | polymerase chain reaction |
| PIN | premises identification number |
| PMV-1 | Paramyxovirus |
| PPE | personal protective equipment |
| PVZ | Protection Vaccination Zone |
| RNA | ribonucleic acid |
| rRT-PCR | real-time reverse transcriptase polymerase chain reaction |

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|---|---|
| SAHO | State Animal Health Official |
| SBS | Secure Broiler Supply |
| SDA | Surveillance Design and Analysis |
| SES | Secure Egg Supply |
| SITC | Smuggling Interdiction and Trade Compliance |
| SOP | standard operating procedure |
| SP | Suspect Premises |
| SPltryS | Secure Poultry Supply |
| SPRS | Surveillance, Preparedness, and Response Services |
| STAS | Science, Technology, and Analysis Services |
| STS | Secure Turkey Supply |
| SZ | Surveillance Zone |
| USDA | U.S. Department of Agriculture |
| USFS | U.S. Forest Service |
| VDACS | Virginia Department of Agriculture and Consumer Services |
| VERRC | Volunteer Emergency Ready Response Corps |
| VI | virus isolation |
| VP | Vaccinated Premises |
| VS | Veterinary Services |
| VSET | VS Executive Team |
| VZ | Vaccination Zone |
| WHO | World Health Organization |

# Appendix L
# Selected References and Resources

**Note**: all related FAD PReP documents listed in Appendix A are also references to this APHIS USDA *HPAI Response Plan: The Red Book.*


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