

HIGHLY PATHOGENIC AVIAN INFLUENZA STANDARD OPERATING PROCEDURES: 3. SURVEILLANCE

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

File name: HPAI FAD PReP Surveillance SOP	SOP number: 003
Lead section: Preparedness and Incident Coordination	Version number: 3.0
Effective date: September 2015	Review date: September 2016

The Foreign Animal Disease Preparedness and Response Plan (FAD PReP) Standard Operating Procedures (SOPs) provide operational guidance for responding to an animal health emergency in the United States.

These draft SOPs are under ongoing review. This document was last updated in **September 2015**. Please send questions or comments to:

National Preparedness and Incident Coordination
Veterinary Services
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 41
Riverdale, Maryland 20737
Fax: (301) 734-7817
E-mail: FAD.PReP.Comments@aphis.usda.gov

While best efforts have been used in developing and preparing the FAD PReP SOPs, the U.S. Government, U.S. Department of Agriculture (USDA), the Animal and Plant Health Inspection Service and other parties, such as employees and contractors contributing to this document, neither warrant nor assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information or procedure disclosed. The primary purpose of these FAD PReP SOPs is to provide operational guidance to those government officials responding to a foreign animal disease outbreak. It is only posted for public access as a reference.

The FAD PReP SOPs may refer to links to various other Federal and State agencies and private organizations. These links are maintained solely for the user's information and convenience. If you link to such site, please be aware that you are then subject to the policies of that site. In addition, please note that USDA does not control and cannot guarantee the relevance, timeliness, or accuracy of these outside materials. Further, the inclusion of links or pointers to particular items in hypertext is not intended to reflect their importance, nor is it intended to constitute approval or endorsement of any views expressed, or products or services offered, on these outside websites, or the organizations sponsoring the websites.

Trade names are used solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by USDA or an endorsement over other products not mentioned.

USDA prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and telecommunications device for the deaf [TDD]).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Contents

3.1	Introduction.....	1
	3.1.1 Goals	1
	3.1.1.1 Preparedness Goals.....	1
	3.1.1.2 Response Goals	2
	3.1.2 Guidelines	2
	3.1.3 Coordination	3
	3.1.4 Assumed Ongoing or Completed Response Activities	3
3.2	Purpose.....	3
3.3	Responsibilities.....	4
	3.3.1 Operations Section and Planning Section	4
	3.3.2 Disease Reporting Officer.....	5
3.4	Surveillance Planning at the Incident Command Post (ICP).....	5
	3.4.1 Surveillance Parameters.....	5
	3.4.2 Surveillance Plan	7
	3.4.3 Surveillance Objectives by Time Period.....	8
3.5	Activities by Surveillance Personnel	9
	3.5.1 Surveillance Team Field Protocol.....	9
	3.5.1.1 Before Leaving the ICP	10
	3.5.1.2 At the Time of Arrival at the Premises.....	10
	3.5.1.3 Objectives to Accomplish While at Each Premises	10
	3.5.1.4 When Departing from the Premises	11
	3.5.1.5 When Returning to the Vehicle	11
	3.5.1.6 Before Returning to the ICP at the End of the Day	11
	3.5.1.7 Upon Return to the ICP	11
	3.5.1.8 Procedures for Sampling as Part of the Surveillance Sample Team	11
	3.5.1.9 Waiting Period.....	12
	3.5.2 Training.....	12
	Attachment 3.A HPAI Outbreak Surveillance Guidance and Rationale for Poultry	14
	Attachment 3.B Commercial Site Surveillance Equipment List	31
	Attachment 3.C Backyard Site Surveillance Equipment List.....	32
	Attachment 3.D Sentinel Bird Program	34
	Attachment 3.E Abbreviations.....	37

Please note: This SOP is under review by National Preparedness and Incident Coordination (Surveillance, Preparedness, and Response Services) and the Centers for Epidemiology and Animal Health (Science, Technology, and Analysis Services). The guidance provided in this SOP may be updated or edited at any time; outbreak specific guidance for surveillance is available at www.aphis.usda.gov/fadprep.

3.1 Introduction

Surveillance is a critical activity during an outbreak of highly pathogenic avian influenza (HPAI). Surveillance helps to control the spread of the disease and assists with eradication. The U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) will coordinate national surveillance activities. This standard operating procedure (SOP) provides Incident Command (IC) personnel with guidance on developing a surveillance plan for poultry and for conducting surveillance activities in the field. It also may be used for State and Federal planning.

Several APHIS Foreign Animal Disease Preparedness and Response Plan (FAD PReP) documents complement this SOP and provide further detail when necessary. This SOP references the following APHIS documents:

- *FAD Investigation Manual (FAD PReP Manual 4-0)*
- HPAI SOPs:
 - *Cleaning and Disinfection*
 - *Health and Safety/Personal Protective Equipment (PPE)*.

Additionally, the *FAD PReP/ National Animal Health Emergency Management System (NAHEMS) Guidelines: Surveillance, Epidemiology, and Tracing* will discuss surveillance activities. Surveillance guidance for an HPAI outbreak is also found in the *HPAI Response Plan: The Red Book*. These documents are available from www.aphis.usda.gov/fadprep.

In addition, the Secure Food Supply Plans provide guidance for movement in an HPAI outbreak from uninfected premises. These plans include:

- Secure Egg Supply (SES) (<http://www.secureeggsupply.com>)
- Secure Turkey Supply (<http://www.secureturkeysupply.com>)
- Secure Broiler Supply (<http://www.securebroilersupply.com>)

Documents referenced here are available at www.aphis.usda.gov/fadprep.

3.1.1 Goals

3.1.1.1 Preparedness Goals

In an outbreak of HPAI, the preparedness goals of the IC are the following:

-
- Develop capabilities and relationships to produce surveillance plans within 24–48 hours of a confirmed outbreak.
 - Develop effective surveillance plans that can achieve desired outcomes by leveraging available resources, satisfying jurisdictional requirements, and implementing continuity of business plans.

3.1.1.2 Response Goals

In an outbreak of HPAI, the surveillance goals of the IC are the following:

- Implement surveillance plans 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 Infected Premises (IP) quickly.
- Have the surveillance plan consider the susceptible wildlife populations in the area, and coordinate with APHIS Wildlife Services, the U.S. Department of Interior, State wildlife agencies, and State agriculture departments to perform appropriate HPAI surveillance in these populations.
- Provide complete surveillance data summaries and data analysis at intervals as specified by IC.
- Develop effective surveillance plans that can achieve desired outcomes by leveraging available resources, satisfying jurisdictional requirements, and implementing continuity of business measures.

3.1.2 Guidelines

In the first hours following a detection of HPAI, there are multiple requests for surveillance activities. Observe the following guidelines for appropriate surveillance activities in an HPAI outbreak.

Surveillance plans are required to (1) establish priorities for observational surveillance and diagnostic testing based surveillance within the Control Area (CA) (which includes the Infected Zone [IZ] and Buffer Zone [BZ]), and the Surveillance Zone (SZ), (2) establish priorities for Contact Premises (CP) and Suspect Premises (SP), and (3) establish priorities for premises located within the CA that are seeking to demonstrate freedom from HPAI infection. The following are example objectives of surveillance activities:

- Detect HPAI IP during an outbreak.
- Determine the size and extent of an HPAI outbreak.
- Supply information to evaluate outbreak control activities.
- Provide information for animal and product movement within the CA.
- Provide information for animal and product movement out of the CA.
- Prove disease freedom (DF) and regain disease-free status after eradication of the outbreak.

3.1.3 Coordination

The following activities need to be coordinated by IC in the event of an HPAI outbreak. The specific cell or group may vary, depending on the incident.

- *Preparation of current maps of the IZ, BZ, and SZ:* Coordination between the Operation Section and Planning Section. This activity may include IC staff in permitting, epidemiology, GIS (geographical information systems), field surveillance, and other functions.
- *Development of specific surveillance plans for premises and zones:* Coordination between the Operations Section and Planning Section.
- *Biosecurity and safety measures:* Coordination between the Operations Section and Logistics Section.
- *Reporting of accurate disease information:* Coordination between the Operations Section and Planning Section, particularly the Situation Unit and Disease Reporting Cell (or similar).
- *Responding to diagnostic laboratory results through surveillance:* Coordination between the Operations Section and Planning Section.

3.1.4 Assumed Ongoing or Completed Response Activities

These procedures assume the following outbreak response activities are in progress or have been completed before surveillance measures are in place:

- Disease confirmation—completed/ongoing
- Quarantine—ongoing
- Biosecurity procedures—ongoing
- Security measures and crowd control—completed/ongoing
- Health and safety procedures—ongoing.

3.2 Purpose

This SOP provides USDA APHIS Veterinary Services (VS), the Unified State-Federal IC, and other official response personnel with guidance for conducting surveillance activities in an HPAI outbreak. It may also be used for State and Federal planning. The guidance in this SOP is relevant to HPAI outbreaks of varying sizes, whether the outbreak is isolated to a single premises or spans across a region of numerous premises: the Incident Command System (ICS) from which this SOP is based is both flexible and scalable.

These procedures serve as guidance for the Operations Section, Planning Section, and other associated IC personnel involved in surveillance activities.

These are sample guidelines. This SOP provides recommendations regarding sampling sizes and sampling frequencies for premises located within the IZ, BZ, and SZ and for providing evidence of DF. This SOP does not cover business continuity surveillance schemes for bird or product

movement (such as layer, broiler, or turkey). For these surveillance guidelines, please see the Secure Turkey Supply (<http://www.secureturkeysupply.com>) and Secure Broiler Supply (www.securebroilersupply.com). Business continuity surveillance schemes for eggs and egg products, including layer hatching eggs and day-old chicks, are provided in the SES Plan (www.secureeggssupply.com).

Surveillance is conducted at intervals as specified by the IC using the most current scientific information and best practice guidance available. APHIS will communicate and collaborate with public health agencies regarding the threat of HPAI to humans.

3.3 Responsibilities

At the APHIS level, the Science, Technology, and Analysis Services (STAS) and Surveillance, Preparedness, and Response Services (SPRS) design and implement surveillance plans, respectively. In the ICS, while each incident may have a slightly different structure, typically the Disease Surveillance Branch (Operations Section), in conjunction with the Situation Unit (Planning Section), are responsible for collecting, tabulating, and reporting surveillance information. Surveillance is designed to define the extent of the disease, detect new outbreaks, and establish disease-free zones. It is critical to help control and contain the spread of the disease.

The number of personnel and the organizational structure may vary depending on the size and complexity of the incident. The roles and responsibilities of personnel may also change throughout the incident. Large scale incidents may involve more premises and affect large geographic areas. Personnel requirements may evolve as the response progresses. All responsibilities are designated to available and qualified personnel. Any ICS structure presented here, and associated responsibilities, is presented only as guidance.

3.3.1 Operations Section and Planning Section

Collaboratively, the Operations Section and Planning Section work together to monitor the location and boundaries of the infected poultry to detect new outbreaks and prevent the dissemination of the infectious agent. These activities might be conducted by the disease Surveillance Branch and Situation Unit—or comparable entities with similar functions in an outbreak. Together, these entities work in a coordinated manner to ensure adequate surveillance to support information-based decisions and to regain “HPAI-free” status as soon as possible. These entities have the responsibility to

- establish case definitions and classifications (such as suspect or confirmed);
- identify disease control zones (Infected, Buffer, or Surveillance);
- determine premises classifications (such as Infected, Contact, At-Risk, or Free);
- supervise the implementation of surveillance plans, particularly as they are revised throughout an outbreak, and collect surveillance data;
- assist in ensuring that samples are collected according to a surveillance plan;
- assess information;

-
- support requests for movement permits; and
 - report on findings.

3.3.2 Disease Reporting Officer

The Disease Reporting Officer, frequently located in the Situation Unit (Planning Section), is typically responsible for coordinating surveillance activities with the cooperation of the Operations Section. This individual

- directs disease reporting activities including veterinarians, Emergency Management Response System (EMRS) data entry specialists, and other data entry personnel as well as laboratory specialists;
- supervises the preparation, review, and entry of field investigation data, movement data, and contiguous premises data;
- supervises and organizes the orderly, efficient retrieval of routine and specialized data from EMRS;
- coordinates all reports of animal disease investigations and results of laboratory tests, to assure the completeness and accuracy of data entry into EMRS; and
- cooperates with epidemiologists (for example, in an Epidemiology Cell) to summarize epidemiological information.

The Disease Reporting Officer is supported by individuals in the Disease Surveillance Branch, to supervise activities, ensure that surveillance objectives are achieved, monitor resource and personnel allocation, coordinate EMRS data entry, maintain data quality and consistency in EMRS data, and supervise implementation of surveillance plans in the field.

3.4 Surveillance Planning at the Incident Command Post (ICP)

3.4.1 Surveillance Parameters

The Operations Section in collaboration with the Planning Section is responsible, with input from other personnel as required, for developing a surveillance plan for an HPAI outbreak. A surveillance plan indicates the frequency, number, and distribution of birds and premises to be sampled. Surveillance plans are developed by selecting combinations and levels of the six tools listed below. Developing a HPAI surveillance plan requires tradeoffs to be made between these six surveillance parameters, employing initial information collected, ongoing evaluation of outbreak conditions, and best estimates to the many questions listed below. More specific guidance on a surveillance plan for an HPAI outbreak is found in [Attachment 3.A](#). The six surveillance parameters are:

1. *Design (threshold) prevalence*: The goal is to determine the lowest feasible prevalence that can be used to detect infected flocks on premises. The chosen proportion of birds or premises infected that if exceeded will indicate the disease has been detected for a given confidence level and population size (1 percent vs. 5 percent vs. 15 percent). Factors that influence the design prevalence choice are:

-
- a. Available tests (such as visual inspection and laboratory)?
 - i. The test sensitivity and specificity, and
 - ii. The turn-around time for the test results.
 - b. If visual inspection is the selected detection method, at what flock prevalence can the clinical signs be observed?
 - c. How severe are the clinical signs?
 - d. What is the prevalence of detectable infected poultry on the premises given the test selection?
 - e. How quickly will there be enough detectably infected poultry (such as those with clinical signs) so that the chosen test can detect the infected poultry?
 - i. Has the disease spread throughout the premises?
 - ii. How many birds are detectably ill?
 - iii. How long has the disease been on the premises?
2. *Confidence level:* The selected level (90 percent confident vs. 95 percent confident) that the disease can be detected for the chosen design prevalence, given the population size. Questions to consider are:
- a. At a chosen confidence level, how many samples are required to be taken, given the number of poultry or premises?
 - b. Does sampling more premises less intensively supply more usable outbreak information than a higher confidence level sampling, where more flocks are sampled on fewer premises?
 - c. Can the same level of overall sampling confidence be achieved by more frequent sampling using a sampling scheme with lower confidence level? For example, does sampling every third day with an 85 percent confident sampling scheme equal sampling once a week with a 95 percent confident sampling scheme?
 - d. If an infected bird is easily detected early, will a sampling scheme with a lower confidence level achieve acceptable detection results?
3. *Types of tests:* Test choices—visual inspection (also called observation), polymerase chain reaction testing, serology testing, etc.—and the test cutoff values can influence the design prevalence choice. Each test has a sensitivity and specificity that varies with the cutoff values. Following are questions to consider when selecting tests:
- a. What tests are available?
 - b. What are the test sensitivities (assume that this is a screening test)?
 - c. Can the test detect infection early in the disease process?
 - d. Is the test reliable and test results repeatable?
 - e. Is the test rapid and easy to administer?
 - f. How much labor is required to take samples of the flocks or premises?

-
- g. How many trained personnel are available to administer the test or sample the flocks?
 - h. Is the disease easily transmitted by the sample taker?
 - i. What is the optimum frequency interval at which the test can be applied?
 - j. Does the sampling/testing activity seriously disrupt the normal premises work flow?
 - k. What is the cost of the tests?
4. *Sampling frequency:* Previous negative test results can augment information gained from negative test results if the time period between sampling is short—ideally daily, but definitely less than the incubation period. The value of the previous negative test results decreases as the interval between sampling increases (daily vs. every other day). The following are questions to consider when determining the frequency of sampling:
 - a. How frequently should the premises in each zone (IZ, BZ, SZ and Free Area [FA]) area be inspected?
 - b. How long is the disease incubation period?
 - c. How long is the latent period?
 - d. How long is the infectious period?
 - e. How rapidly is the disease spreading through the premises?
 - f. How likely is the disease to spread to other premises?
 5. *Risk-based sampling:* Selecting populations with a higher proportion of infected birds (1 percent vs. 10 percent) reduces the number of samples needed for a given confidence and population size. The following are several questions to consider:
 - a. How many birds are on the farm?
 - b. Is there a high risk population (assumed higher prevalence rate) that can be sampled to reduce the sample numbers required or is a census or random sample of the premises entire population required?
 6. *Sampling scheme:* Within the selected population (risk-based or total population), a random, convenience, or other scheme may be used, and the choice will influence the number of birds/premises sampled. Questions to consider when developing a sampling scheme include:
 - a. Is it possible to target a high-risk population that should have a higher HPAI prevalence rate, for example, sick or dead birds?
 - b. Will convenience sampling supply the same confidence level as random sampling?
 - c. Is random sampling possible?

3.4.2 Surveillance Plan

The surveillance plan, created based on the six criteria above, will change as new information becomes available by adjusting the combination of these six surveillance tools. It is expected that the surveillance plan will continue to evolve as new information is incorporated by IC personnel.

The actions taken and information needed for outbreak management changes throughout the course of the outbreak. Surveillance is ongoing during the outbreak (a continuous activity) until the last area/zone is proven disease free; surveillance for bilateral and international trading partners may continue. The emphasis of surveillance will change during the response, from finding infected flocks to demonstrating that there are no infected flocks/premises in an area/zone.

Ideally, every At-Risk Premises (ARP) would be tested/sampled every day, but this is impossible, given the limited resources at hand in any outbreak. The surveillance plan that is developed must ensure that information needed to control the outbreak is collected despite restrictions on the availability of resources. This is accomplished by choosing realistic combinations of the six surveillance parameters.

To optimize the available resources, surveillance during an outbreak is coordinated by the Unified IC within the affected areas with support and additional guidance as needed from APHIS and other State, Tribal, and Federal officials or the multi-agency coordination groups as needed.

The intervals between inspections or surveys will depend on the maximum observed incubation period of HPAI, the resources available, and the risk of exposure to susceptible flocks. Operationally, the epidemiology, tracing, and surveillance teams in the ICP will work together to accomplish the expected outcomes.

Every effort must be made to educate producers about the clinical signs of HPAI and to encourage them to report suspicious symptoms in poultry. Information is widely disseminated by the Joint Information Center (JIC) and/or Legislative and Public Affairs (LPA) explaining how producers should report suspicious findings. Rapid detection is critical to ensure that appropriate response actions can be taken as quickly as possible to prevent further virus shedding, environmental contamination, and subsequent transmission.

It is likely that a surveillance plan for wildlife could be implemented to determine if HPAI is in that population. A veterinarian or wildlife biologist trained to recognize clinical and pathological signs of the disease of concern will investigate suspect cases in wildlife within 24 hours; additional active and/or passive surveillance may also be conducted depending on the threat of HPAI in specific wild bird populations.

3.4.3 Surveillance Objectives by Time Period

There are three key time segments of surveillance activity in an outbreak. These segments have distinct objectives and goals to aid in the control, containment, and eradication of HPAI from poultry.

1. *The initial 72 hours post-HPAI outbreak declaration:* The objective is to detect existing infected flocks and premises as quickly as possible. During this period, the goals of IC are to:
 - a. Create the initial BZ designation and boundary of the CA.
 - b. Create a list of premises with susceptible flocks (and species) in the CA.
 - c. Determine the boundary of the SZ, which is located in the FA, and start developing a surveillance plan to be used in the SZ.

-
2. *The control period (from initial 72-hour period until the last case is detected and depopulated).* Four key objectives need to be accomplished simultaneously in this period.
 - a. Detect IP, new and existing, so that control measures can be immediately implemented.
 - b. Provide evidence that premises are free of HPAI, thereby permitting poultry and poultry product movements within and out of the CA.
 - c. Evaluate the outbreak management control activities.
 - d. Provide evidence that the FA is free of disease, thereby enabling unrestricted poultry and poultry product movement.

To attain these four key objectives, the goals of IC are the following:

- a. Evaluate control measures by determining the outbreak's epidemiological curve, numbers of newly IP, and the location of the newly detected IP.
 - b. Provide evidence of DF on Monitored Premises (MP) with frequent testing of populations on the premises, ideally targeting populations based on risk disease factors.
 - c. Provide evidence of DF on Free Premises (FP) in the SZ and FA by sampling via diagnostic or observational surveillance.
 - i. Select FP to sample, either randomly or with a risk-based selection process during the quarantine. Sample flocks from the selected premises randomly or sample a targeted population on the premises (sick birds).
 - ii. Reduce the size of the BZ by sampling regions that can be separated from the BZ if test results are negative.
3. *Post eradication (quarantine).* The objective is to prove that the CA and FA are free of disease (using World Organization for Animal Health [OIE] recommendations on surveillance). To achieve this objective, the goals of IC are the following:
 - a. Prove DF on depopulated premises (for example, environmental testing, testing of restocked poultry, and in unique circumstances, the limited use of sentinel birds—see [Attachment 3.D](#)).
 - b. Prove DF on ARP in the CA by random sampling or targeted sampling (choosing populations based on risk) on selected premises and selected flocks.
 - c. Prove DF in the FA, following OIE guidelines, using multiple methods including serological slaughter sampling and passive surveillance by veterinarians and the public.

3.5 Activities by Surveillance Personnel

3.5.1 Surveillance Team Field Protocol

The following protocols are provided as guidance for IC personnel in an HPAI outbreak that are performing surveillance activities. Responders should not enter premises unless instructed specifically to do so by the Incident Management Team (IMT). It is critical to remember that any real or perceived belief that responders are spreading HPAI is incredibly detrimental to the response effort.

3.5.1.1 Before Leaving the ICP

1. Collect all equipment and supplies needed for the day. [Attachment 3.B](#) and [Attachment 3.C](#) contain equipment list for commercial and backyard sites respectively.
2. Obtain maps and decide on route to the designated survey area.
3. Check global positioning system (GPS) unit at designated location.

3.5.1.2 At the Time of Arrival at the Premises

1. Wear appropriate identification.
2. Park the vehicle safely on the roadside in the area to be surveyed.
3. Put on your rubber boots as you exit the vehicle. Rubber boots or foot covers (booties) should be worn.
4. Gather supplies (such as quarantine book, clipboard, quarantine signs, duct tape, cable ties, survey forms, and disinfectant spray).
5. Begin to survey the assigned area.
6. Approach the residence and knock on the door or ring the bell to contact the residents. If there is no response, do not walk around the premises in an attempt to locate the residents.
7. Use caution and common sense when entering premises. Avoid any confrontations with residents.
8. Respect any “Beware of Dog” and “No Trespassing” signs.
9. Make a note on the survey sheet if the owner was uncooperative.

3.5.1.3 Objectives to Accomplish While at Each Premises

1. Introduce yourself as members of the response team.
2. Use an interpreter if needed to communicate with the residents.
3. Explain the program and the reason for being at the premises. Make sure the residents understand the need for correct information for the survey.
4. Complete the survey questionnaire as fully as possible. Add additional comments as necessary. Too much information is better than none.
5. Use neat handwriting on forms. Survey answers will be entered into the database by the interviewer or other administrator.
6. Give information fact sheets to the residents and point out the telephone number to call if they have any questions or notice sick birds.
7. Thank the residents for their cooperation and participation.
8. If you notice birds of any kind and no one is home, complete the survey. Leave contact information and movement restrictions (as applicable) at the front door or gate.
9. If sick and/or dying birds are present, call this information in to the ICP for further guidance, including on the implementation of quarantines or movement controls.

3.5.1.4 When Departing from the Premises

1. Walk off the premises to the Personnel Decontamination Site.
2. Stop and spray rubber boots or remove foot covers (booties) and dispose of them properly. Spray shoes with disinfectant after leaving each premises.
3. Continue to the next premises; and proceed as above, or return to vehicle.
4. Follow any addition biosecurity measures specified by the IMT.

3.5.1.5 When Returning to the Vehicle

1. Upon returning to the vehicle, wash your hands with an alcohol-based hand sanitizer.
2. Sit inside the car with your feet out. Spray your shoes with disinfectant before placing your feet in the car.

3.5.1.6 Before Returning to the ICP at the End of the Day

1. Call the team leader to report that you have completed your task and are returning to the ICP.
2. Run your vehicle through a car wash that cleans the undercarriage. Vacuum the inside of the vehicle, and throw garbage away.

3.5.1.7 Upon Return to the ICP

1. Turn surveys and all other applicable forms in to the designated IMT member upon completion of the assigned task.
2. This individual is responsible for ensuring that surveys are collected from each team and for seeing that the Situation Unit in the Planning Section (or other designated group) receives the completed surveys for data entry in EMRS.

3.5.1.8 Procedures for Sampling as Part of the Surveillance Sample Team

1. If you make a routine visit to a premises and encounter/observe dead or sick birds, leave the premises and call the IC for further instruction. Act as if the premises is infected.
2. A biosecurity line must be established between the premises and the vehicle. Use the biosecurity procedures and PPE outlined in the *HPAI Biosecurity* and *Health and Safety/PPE SOPs*.
3. Two members of the three-person surveillance team will enter the premises. One crew member will hold and handle the bird(s). The other crewmember will collect oropharyngeal and cloacal swabs and handle brain heart infusion (BHI) media tubes.
4. Oropharyngeal and cloacal swabs must be collected according to procedures outlined during training and the appropriate section in the *FAD Investigation Manual (FAD PreP Manual 4-0)*.
5. The third crew member is the clean person who remains at the biosecurity line established between the premises and the vehicle. This crew member calls for the premises identification information and takes the decontaminated samples at the biosecurity line and stores them in the ice chest that is used to transport them. This crew member also processes the trash when

the other two crew members return to decontaminate at the biosecurity line prior to returning to the vehicle at the end of the collection.

6. The two crew members who collect the samples should complete the following procedures before transferring the samples across the biosecurity line to the third team member.
 - a. Complete the Exam Form with owner prior to taking samples.
 - b. Complete the Laboratory Submission form.
 - c. Attach a label to each of the Laboratory Submission forms.
 - d. Label the BHI tubes with the premises identification number, date, species (if there are multiple species on same premises), and bird owner's name.
 - e. Complete a yellow tag. Each yellow tag should include the premises identification number, and the name of the bird owner. Insert the yellow tag into the bags with the BHI tubes.
 - f. Triple bag the BHI tubes.
7. Photocopy the Laboratory Submission form.
8. Ensure all data and information from the Surveillance Team is entered into EMRS at no less than 24-hour intervals. If any data entry (e.g., critical elements) can be done in the field, this is ideal.

3.5.1.9 Waiting Period

An 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 the IMT 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. Where possible, particularly for backyard surveillance sampling, producers can meet responders at the end of the driveway or private road with dead birds for sampling. This avoids the need of responders to enter the premises and interact with unaffected poultry. 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.

3.5.2 Training

Having the appropriate training is an important part of responding to an HPAI outbreak. There are many options for surveillance training, including AgLearn and APHIS, VS, Professional Development Staff (PDS) Training Courses. In addition, there is FAD PReP and NAHEMS training on www.aphis.usda.gov/fadprep.

All of the following courses are both AgLearn and PDS Training Courses, and have surveillance components:

- *VS Field Epidemiologist Training*: This course is appropriate for VS epidemiologists, and provides them with epidemiological methods and preventive medicine strategies. At the end of this training, participants should know how to conduct epidemiological investigations and conduct disease control.
- *Outbreak Investigations*: This course is split into multiple modules. In particular, Module 4, “Establish Disease Monitoring and Surveillance” helps participants learn how to use the VS Outbreak Surveillance Toolbox to complete a disease surveillance plan.
- *Avian Health Field Training*: For State and Federal Veterinary Medical Officers, as well as other regulatory personnel, this course provides a wide range of information relating to responding to incidents in avian populations. It includes information on avian surveillance, as well as biosecurity measures.

Attachment 3.A HPAI Outbreak Surveillance Guidance and Rationale for Poultry¹

These guidelines are updated recommendations for highly pathogenic avian influenza (HPAI) outbreak surveillance, prepared by Veterinary Services, Animal and Plant Health Inspection Service (APHIS). These guidelines take into account lessons learned from the 2014–2015 HPAI outbreak, and may be updated at any time. These guidelines are to serve as an example, and provide sample surveillance schemes that can be used by Incident Command (IC) to develop appropriate surveillance plans using the most current scientific information and best practice guidance available.

Purpose

The purpose of these guidelines is to provide recommendations for surveillance activities in poultry. These are sample guidelines.

These are strategies regarding sampling sizes and sampling frequencies for premises located in the Infected Zone (IZ), Buffer Zone (BZ), Surveillance Zone (SZ), and for proof of disease freedom (DF). Business continuity surveillance schemes for eggs and egg products, turkeys, and broilers are provided in the Secure Food Supply Plans as follows:

- *Secure Egg Supply*: www.secureeggssupply.com
- *Secure Turkey Supply*: www.secureturkeysupply.com
- *Secure Broiler Supply*: www.securebroilersupply.com.

Definitions

There are four key definitions that are important in outbreak surveillance.

- *Dead Birds* are the dead or euthanized sick birds found each day in every house on a premises.
- *50-Dead Bird Group* consists of 50 or fewer dead birds (and each multiple of 50 or fewer dead birds) from each house on the premises each day.
- *5-Bird or 11-Bird Pool* combines samples taken from 5 or 11 dead or euthanized sick birds out of the house's (flock's) daily dead birds into one sample. In all cases where a 5-bird pool is mentioned, an 11-bird pool (samples taken from 11 dead or euthanized sick birds) may be collected instead. This is an additional option for sampling.

¹ This guidance is also found in Appendix D of the *HPAI Response Plan: The Red Book*; this SOP may be more current. Please use the guidance with the most recent date.

-
- *Detection Probability* is the probability that the sampling scheme will detect at least 1 infected bird of each 50-dead bird group (at the 95 percent confidence level) if there are 20 or more infected birds (40 percent prevalence) in the target population of daily dead birds, where the real-time reverse transcriptase polymerase chain reaction (rRT-PCR) test sensitivity of the 5-bird pool is 86.5 percent.

Rationale for the 20-Bird Detection Prevalence

The following reasons provide the rationale for the 20-bird detection prevalence threshold:

- It is rapidly exceeded because HPAI quickly spreads throughout a house, killing many birds.
- It may reduce the number of days that the premises are infectious by at least 48 hours.²
- It is logistically feasible, flexible, simple, and standardized.
- Is consistent with surveillance schemes used for disease detection, business continuity, and proof of DF.

Sampling Scheme Procedures for Poultry

1. Start sampling as quickly as possible upon HPAI outbreak response authorization.
2. Implement sampling schemes for rapid disease detection.

Surveillance Sampling Schemes

The following sampling unit is used for both commercial and backyard premises:

- *Sampling unit:* Flock or house.
- *Sample:* A pooled sample that combines swabs taken from 5 or 11 dead or euthanized sick birds out of the house's (flock's) daily dead or ill birds.
 - The frequency recommendations for premises (that are not moving birds or products daily) are based on
 - the short incubation period (2–3 days) of HPAI;
 - sufficient available personnel for surveillance activities;
 - decreased probability of spreading HPAI with frequent inspection or sampling;
 - recommendations for changing frequency of premises inspection or sampling are listed in Table 3A-3 of this Attachment; and
 - recommendations for sampling frequency of live birds without clinical signs, in instances where flock sizes are small and daily mortality is limited are listed in Table 3A-4 of this Attachment.

² For the currently mortality triggers for HPAI, please see the Case Definition of H5/H7 Avian Influenza at www.aphis.usda.gov/fadprep.

Example Disease Detection Surveillance Scheme

This information is also summarized in Table 3A-1.

Commercial Premises

Infected Zone

- Census of premises within zone; sample premises as prioritized by epidemiological investigation and continuity of business requirements.
- If HPAI compatible signs are observed or epidemiological links found: collect swabs for the 5-bird or 11-bird pool(s) from each 50-dead bird group from each flock on the premises.
- Sampling frequency:
 - SP is a temporary designation; where possible, these premises should be reclassified prior to sampling activities.
 - Contact Premises (CP), Suspect Premises (SP), and Monitored Premises (MP):
 - Collect swabs for the 5-bird or 11-bird pool sample(s) on each premises every other day for 14 days, or similar sampling frequency depending on resources available.³
 - CP, SP, or MP that test negative in the above sampling may be sampled as described for At-Risk Premises (ARP).
 - MP may be sampled more frequently depending on the need to ship product but at the minimum must be sampled as listed above.
 - ARP:
 - Collect swabs for the 5-bird or 11-bird pool(s) on each premises once every 5–7 days for the duration of the quarantine⁴, or similar sampling frequency depending on resources available.

Buffer Zone

- Census of premises within zone; sample premises as prioritized by epidemiological investigation and continuity of business requirements.
- Sampling frequency:
 - SP is a temporary designation; where possible, these premises should be reclassified prior to sampling activities.
 - CP, SP, and MP:

³ This assumes an HPAI viral strain with a shorter incubation period of an average 2–3 days. However, some HPAI strains suggest a week-long incubation period, so to be conservative it is best to use the 14-day period. If the incubation period of the strain is longer, this sampling frequency will need to be adapted in reflection of the incubation period. Please see Table 3A-3.

⁴ Throughout this SOP, “quarantine” refers to the establishment of the Control Area.

-
- Collect swabs for the 5-bird or 11-bird pool sample(s) on each premises every other day for 14 days, or similar sampling frequency depending on resources available.⁵
 - CP, SP, or MP that test negative in the above sampling regime may be sampled as described for ARP.
 - MP may be sampled more frequently depending on need to ship product but at the minimum must be sampled as listed above.
 - ARP:
 - Collect swabs for the 5-bird or 11-bird pool(s) on each premises once every 5–7 days for the duration of the quarantine, or similar sampling frequency depending on resources available.⁶

Surveillance Zone

- SZ is in FA, and includes as much of the FA as necessary by epidemiological situation.
- Number of premises to be sampled:
 - Calculate the number of premises to be sampled:
 - The number of premises to be sampled may be based on detecting at least one IP with 95 percent confidence, where the IP prevalence equals or exceeds 5 percent of all premises with susceptible birds;
 - A census approach can be used if the number of premises within the zone is small.
 - Premises should be sampled as prioritized by epidemiological investigation and continuity of business requirements.
- Sampling frequency:
 - Collect swabs for the 5-bird or 11-bird pool(s) on each of the selected premises once during the first 2- or 3-week period of the quarantine.
 - Sample an equal number of premises (as calculated above) once during each additional 2- to 3-week period of the quarantine.
 - For example, randomly select and sample 60 premises once during the first 2 to 3-week period, then reselect (with replacement) another 60 premises to be sampled in the second 2 to 3-week period for the duration of quarantine.
- OR, active surveillance can be conducted on any movement of live poultry in the SZ (within the FA) as determined by the IC, APHIS, and State officials for 3-weeks or as indicated by the epidemiological situation.

⁵ This assumes an HPAI viral strain with a shorter incubation period of an average 2–3 days. However, some HPAI strains suggest a week-long incubation period, so to be conservative it is best to use the 14-day period. If the incubation period of the strain is longer, this sampling frequency will need to be adapted in reflection of the incubation period. Please see Table 3A-3.

⁶ The ARP in the BZ and IZ are sampled with the same frequency because infected but undetected premises in the BZ have higher consequences when not detected than those in the IZ (see *Assumptions for Example Surveillance Schemes* section later in this document).

Backyard Premises

The same sampling unit and sample is used in backyard premises as in commercial premises. However, please note the following:

- Oropharyngeal swabs should be collected for gallinaceous birds.
- If domestic waterfowl are sampled, take cloacal swabs.
- Do not pool swabs from any species other than domestic chickens and domestic ducks.
- Do not pool swabs from different species together.
- All other species (besides domestic chickens and ducks) must be sampled one swab per vial.
- Prepare, package, and process swabs for laboratory submission according to the guidance found in the *FAD Investigation Manual*.

IC may provide further guidance on how many birds should be sampled on a premises, given the desired confidence levels, estimated prevalence, and other epidemiological information. For small backyard flocks, 5-bird pools (rather than 11-bird pools) are generally collected.

Infected Zone

- Census of premises within zone; sample premises as prioritized by epidemiological investigation and continuity of business requirements.
- If HPAI compatible signs are observed or epidemiological links found, collect swabs for the 5-bird or 11-bird pool(s) from each 50-dead-bird group from each flock on the premises (many backyard flocks have less than 50 birds, thereby requiring one 5-bird pool).
- Observation and sampling frequency:
 - SP:
 - If a premises has been identified as an SP, (e.g., through a sick bird call or other means), collect swabs for the 5-bird or 11-bird pool as quickly as possible.
 - If necessary, sampling of SP may be prioritized based on guidance from IC, including risk factors (e.g., proximity to bodies of water), specific morbidity/mortality triggers, or other epidemiological information.
 - CP:
 - Sample flock every other day for 14 days, or similar sampling frequency.
 - Frequency of sampling may depend on available personnel, number of premises to be sampled, owner resistance (hostility), owners volunteering for testing, and other factors.
 - The Incident Commander must balance premises' transmission risks and detection costs in deciding on observation/sampling frequency.

-
- CP and SP that test negative or have no signs of HPAI in the above sampling regime, and no further epidemiological links identified, may be observed as described for ARP.
 - ARP:
 - Select a minimum number of flocks to observe/sample in the Control Area (CA) (Table 3A-5).
 - Refer to IMT for further guidance on which premises to be sampled, though high-risk premises (such as those near a body of water) should be included.
 - Observe these premises.
 - Observation includes contacting premises by phone.
 - If the premises reports/has clinical signs, unusual morbidity/mortality, or other risk factors requiring investigation, collect samples.
 - At a minimum, the selected premises should be observed/sampled once per the duration of the CA.
 - IC may have further guidance based on the epidemiological situation, known risk factors, and resources available.
 - State/Tribal officials may choose to conduct site visits on apparently healthy backyard flocks within the CA.

Buffer Zone

- Census of premises within zone; sample premises as prioritized by epidemiological investigation and continuity of business requirements.
- If HPAI compatible signs are observed or epidemiological links found, collect swabs for the 5-bird or 11-bird pool(s) from each 50-dead-bird group from each flock on the premises (many backyard flocks have less than 50 birds, thereby requiring one 5-bird pool).
- Observation and sampling frequency:
 - SP:
 - If a premises has been identified as an SP, (e.g., through a sick bird call or other means), collect swabs for the 5-bird or 11-bird pool as quickly as possible.
 - If necessary, sampling of SP may be prioritized based on guidance from IC, including risk factors (e.g., proximity to bodies of water), specific morbidity/mortality triggers, or other epidemiological information.
 - CP:
 - Sample flock every other day for 14 days, or similar sampling frequency.
 - Frequency of sampling may depend on available personnel, number of premises to be sampled, owner resistance (hostility), owners volunteering for testing, and other factors.

-
- The Incident Commander must balance premises’ transmission risks and detection costs in deciding on observation/sampling frequency.
 - CP and SP that test negative or have no signs of HPAI in the above sampling regime, and no further epidemiological links identified, may be observed as described for ARP.
 - ARP:
 - Select a minimum number of flocks to observe/sample in the CA (Table 3A-5).
 - Refer to IMT for further guidance on which premises to be sampled, though high-risk premises (such as those near a body of water) should be included.
 - Observe these premises.
 - Observation includes contacting premises by phone.
 - If the premises reports/has clinical signs, unusual morbidity/mortality, or other risk factors requiring investigation, collect samples.
 - At a minimum, the selected premises should be observed/sampled once per the duration of the CA.
 - IC may have further guidance based on the epidemiological situation, known risk factors, and resources available.
 - State/Tribal officials may choose to conduct site visits on apparently healthy backyard flocks within the CA.

Surveillance Zone

- SZ is in FA, and includes as much of the FA as necessary by epidemiological information.
- Observe the flock for HPAI compatible signs.
- If HPAI compatible signs are observed or epidemiological links found, collect swabs for the 5-bird or 11-bird pool from the dead birds in each flock on the premises.
- Number of premises to be observed/sampled:
 - Calculate the number of premises to be observed/sampled:
 - The number of premises to be observed/sampled is based on detecting at least one IP with 95 percent confidence, where the IP prevalence equals or exceeds 5 percent of all premises with susceptible birds;
 - A census can be used if the number of premises within the zone is small.
 - Premises should be sampled as prioritized by epidemiological investigation and continuity of business requirements.
- Sampling frequency:
 - Collect swabs for the 5-bird or 11-bird pool on each of the selected premises once during the first 2- or 3-week period of the quarantine.

-
- Sample an equal number of premises (as calculated above) once during each additional 2 to 3-week period of the quarantine.
 - For example, randomly select and sample 10 backyard premises once during the first 2 to 3-week period, then reselect (with replacement) another 10 backyard premises to be sampled in the second 2 to 3-week period for the duration of quarantine.

Example Proof of Disease Freedom Surveillance Scheme

The definitions of “dead birds,” “50-dead bird group,” “5-bird or 11-bird pool,” and “detection probability” remain the same. Also see Table 3A-2 which summarizes proof of DF surveillance for HPAI in poultry.

- Surveillance for proof of DF starts 21 days (OIE incubation period, as this is the international standard) after depopulation of last IP.
- Surveillance may continue after the CA has been released for international or bilateral trading partners.
- The goal is to identify sero-positive farms that lack clinical signs. Clinically ill flocks are detected via increased surveillance methods listed below and investigation of flocks with suspicious signs.
- OIE recommends intensifying surveillance schemes. This is conducted in conjunction with surveillance of the CA through:
 - increasing the frequency of testing as stated in the National Poultry Improvement Plan,
 - active investigation of flocks with suspicious clinical signs,
 - increase the slaughter sero-surveillance, and
 - in some cases, the use of sentinel flocks.

Commercial Premises Disease Freedom

Infected Zone, Buffer Zone, and Surveillance Zone as One Unit

- This may be modified at any time based on surveillance information required for bilateral and international trading partners or IC guidance.
- Calculate the number of premises to sampled (serology and swabs of dead and euthanized sick birds):
 - The number of premises to be sampled is based on detecting at least one IP with 95 percent confidence, where
 - the IP prevalence equals or exceeds 5 percent of all premises with susceptible birds in the IZ.
 - Further guidance may be provided by IC on the number of premises to be sampled.
- Calculate the number of samples per flock:

-
- The IP prevalence equals or exceeds 15 where the maximum birds sampled doesn't exceed 60 birds per flock, and
 - one 5-bird or 11-bird pool sample is submitted for each 50-dead bird group.
 - Sampling Frequency:
 - Sample the number of premises calculated above (for example, 60 premises one time each) during a 3-month period that begins not sooner than 21 days after depopulation of the last IP.
 - Sampling for DF may continue beyond this 3-month period.

Backyard Premises (Disease Freedom)

Infected Zone, Buffer Zone, and Surveillance Zone as One Unit

- This may be modified at any time based on surveillance information required for bilateral and international trading partners or IC guidance.
- Calculate the number of premises to observed/sampled (serology and swabs of dead and euthanized sick birds):
 - The number of premises to be sampled is based on detecting at least one IP with 95 percent confidence, where
 - the IP prevalence equals or exceeds 5 percent of all premises with susceptible birds in the IZ.
 - Further guidance may be provided by IC on the number of premises to be sampled.
- Calculate the number of samples per flock:
 - Premises may be observed and swabbed upon observation of clinical signs; swabs may also be collected based on guidance provided by IC.
 - The IP prevalence equals or exceeds 15 where the maximum birds sampled doesn't exceed 60 birds per flock, and
 - one 5-bird or 11-bird pool sample is submitted for each 50-dead bird group.
- Sampling Frequency:
 - Sample the number of premises calculated above (for example, 60 premises one time each) during a 3-month period that begins not sooner than 21 days after depopulation of the last IP.
 - Sampling for DF may continue beyond this 3-month period.

Example Surveillance for Bird/Product (Non-Daily Movement Requirement)

- These are only guidelines, and may be modified by IC, State Animal Health Officials, and APHIS officials based on the prevailing epidemiological situation and movement requirements.
- The Secure Food Supply Plans may also provide guidance for bird/product movement.

-
- Premises in the IZ or BZ that wish to move live poultry or poultry products may be required to be inspected and/or sampled prior to movement.
 - The following is required *prior* to movement of live birds or poultry products from within the CA:
 - Two, consecutive, negative 5-bird pool tests of birds to be moved or of the birds that produced the products to be moved.
 - One sample must be taken (with a negative test result) within 24 hours of movement.
 - If product is moving every day, customarily sampling is required every other day. Please see the Secure Food Supply Plans for further information on specific products that move daily (such as table eggs).

Further Surveillance Information

Table 3A-1 summarizes the example outbreak surveillance scheme for disease detection.

Table 3A-1. Outbreak Surveillance for Disease Detection

Example for Disease Detection						
Post Outbreak Response Authorization						
	Commercial			Backyard		
Sampling	Infected Zone	Buffer Zone	Surveillance Zone ^a	Infected Zone	Buffer Zone	Surveillance Zone ^a
Number of Premises	Census	Census	5% Prevalence Threshold ^c	Census	Census	5% Prevalence Threshold ^c
Unit ^b	5- or 11-bird Pool	5- or 11-bird Pool	5- or 11-bird Pool	Observation and/or 5- or 11-bird Pool ^d	Observation and/or 5- or 11-bird Pool ^d	Observation and/or 5- or 11-bird Pool ^d
Frequency						
Free Premises	—		14–21 Days	—		14–21 Days
Monitored Premises	Every other day for 14 days, or as IC recommends		—	—		—
At-Risk Premises	Once every 5 to 7 days for duration of quarantine, or similar scheme ^e		—	Observe once per duration of Control Area; sample on signs or unusual morbidity/mortality ^e		—
Suspect Premises ^a	Every other day for 14 days, or as IC recommends		—	Immediate investigation/sampling; treat as ARP with negative results		—
Contact Premises	Every other day for 14 days, or as IC recommends		—	Sample every other day for 14 days, or as IC recommends		—
Product Movement	2 consecutive negative tests; one sample taken (with negative result) within 24 hours of movement ^f		May be required by SAHO(s) during outbreak	2 consecutive negative tests one sample taken (with negative result) within 24 hours of movement ^f		May be required by SAHO(s) during outbreak

^a SP in a SZ will be subject to surveillance procedures and diagnostic testing as indicated by relevant authorities.

^b Sampling Unit used in all Surveillance Schemes: One 5-bird or 11-bird pool (pooled swabs from five or eleven dead or euthanized sick birds) selected from each group of 50 or less daily dead or euthanized sick birds (and for each multiple of 50 or less dead or euthanized sick birds). For backyard premises, 5-bird pool rather than 11-bird pool samples are typically collected.

^c Prevalence threshold is a predetermined proportion of IP (for example, 5 percent) used to calculate the number of premises to be sampled at a specific confidence level (for example, 95 percent) in a population of a given size (for example, 1,000 premises) based on detecting at least one IP.

^d Varies by type of premises: Free and At-Risk Premises are typically observed and swabbed upon observation of compatible clinical signs; swabs are collected from Suspect and Contact Premises.

^e Identical frequency of sampling in the IZ and BZ due to the need to detect undetected but IP in the BZ due to the high consequences of undetected IP in the BZ.

^f Two consecutive negative 5-bird or 11-bird pool tests are required before movement of birds or of the birds that produced the product to be moved to achieve the 95 percent confidence level of detecting infection.

Table 3A-2 summarizes the surveillance requirements to prove HPAI-freedom.

Table 3A-2. Surveillance for Proof of Disease Freedom

Example for Proof of Disease Freedom ^a						
Post Outbreak Eradication						
	Commercial			Backyard		
Sampling	Infected Zone ^b	Buffer Zone ^b	Surveillance Zone ^b	Infected Zone ^b	Buffer Zone ^b	Surveillance Zone ^b
Number of Serology Samples per Premises	15% Prevalence Threshold ^c	15% Prevalence Threshold ^c	15% Prevalence Threshold ^c	15% Prevalence Threshold ^c	15% Prevalence Threshold ^c	15% Prevalence Threshold ^c
Number of Premises	5% Prevalence Threshold ^d	5% Prevalence Threshold ^d	5% Prevalence Threshold ^d	5% Prevalence Threshold ^d	5% Prevalence Threshold ^d	5% Prevalence Threshold ^d
Unit ^e	5- and 11-bird Pool	5- and 11-bird Pool	5- and 11-bird Pool	Observation 5- and 11-bird Pool	Observation 5- and 11-bird Pool	Observation 5- and 11-bird Pool
Frequency	Sample the number of premises calculated above (for example, 60 premises one time each) during a 3-month period that begins not sooner than 21 days after depopulation of the last Infected Premises.					

^a Sero-surveillance conducted in the area to be proved disease free in addition to dead bird sampling.

^b Infected, Buffer, and SZs combine as one unit for proof of DF.

^c Number of birds sero-sampled based on 15 percent prevalence in flock at the 95 percent confidence level where the maximum number of birds sampled per house does not exceed 60 birds.

^d Prevalence threshold is a predetermined proportion of IP (for example, 5 percent) used to calculate the number of premises to be sampled at a specific confidence level (for example, 95 percent) in a population of a given size (for example, 1000 premises) based on detecting at least one IP. A census of the premises in a zone will be sampled if there are few premises. Sample premises in order as by epidemiological investigation and continuity of business requirements.

^e Sampling Unit used in all Surveillance Schemes: One (1) 5-bird or 11-bird pool (pooled swabs from five or eleven dead or euthanized sick birds) selected from each group of 50 or less daily dead or euthanized birds (and for each multiple of 50 or less dead or euthanized sick birds).

Table 3A-3 shows the complexity of sampling based on the incubation period of the HPAI virus and feasible sampling frequency.

Table 3A-4 shows the number of live birds that need to be sampled (the sample size) in order to detect at least one infected bird with 95 percent confidence assuming that exposure to the virus has been at least 3, 7, or 10 days past (as indicated in the table).

Table 3A-3. Influence of Incubation Period on Feasible Sample Collection Frequency

Estimated Incubation Period Based on Field Information ^a			
Incubation Period	Frequency of Sampling (days between sampling)		Sampling Duration (one week minimum)
	Minimum (Days)	Maximum (Days)	Days
1–2 days	1	1	7
3–4 days	2	3	8
5–7 days	4	6	14
8–14 days	7	10	28
> 14 days	10	n/a	42

^a The incubation periods for H7 and H5 HPAI viruses can vary widely. For example, H7 incubation periods are longer than H5 incubation periods.

**Table 3A-4. Sampling Live Birds without Clinical Signs
(with 95 Percent Confidence)**

flock size	Sample size on day 3, 7, 10 after exposure		
	day 3	day 7	day 10
10	4	1	1
20	8	2	1
30	12	2	1
50	20	2	2
100	40	5	2
200	80	11	2
400	160	22	4
500	200	28	5
600	240	33	7
800	320	44	9
1,000	401	56	11
2,000	802	113	23
3,000	1203	170	36
4,000	1604	227	48
5,000	2006	284	60

These estimates are based on a Reed-Frost transmission model where contact rate is defined as the 5th percentile of an expert opinion distribution [RiskPert (2.1,4.7,10.4)]⁷ (that is having 95 percent confidence that the disease would have progressed to the point that enough birds would shed virus to allow detection of at least one if the test diagnostic sensitivity is 95 percent or greater.) The calculation is based on approximation of the hypergeometric distribution⁸ assuming 0 positive detected out of the sample size shown above, where the number of birds shedding or dead equals the output of the transmission model.

⁷ National Avian Influenza Surveillance Plan, APHIS, December 15, 2006.

⁸ Cannon, R. M., and R. T. Roe, 1982: Livestock Disease Surveys: A Field Manual for Veterinarians. Australian Bureau of Animal Health, Canberra. Also see Cannon, R.M. 2001. Sense and Sensitivity—Designing Surveys Based on an Imperfect Test. *Preventive Veterinary Medicine*, 49, 141–163.

Table 3A-5 shows the minimum number of backyard operations to sample from in a CA.

Table 3A-5. Number of backyard operations to contact or sample from each Control Area^a

Total number of flocks in Control Area	Minimum number of flocks for active surveillance activity
11 or less	All flocks in Control Area
12 to 15	11
16 to 39	15
40 to 84	17
85 or greater	19

^a This presumes 15% design prevalence among premises, 95% confidence, and 95% within-flock sensitivity (or capability of detection).

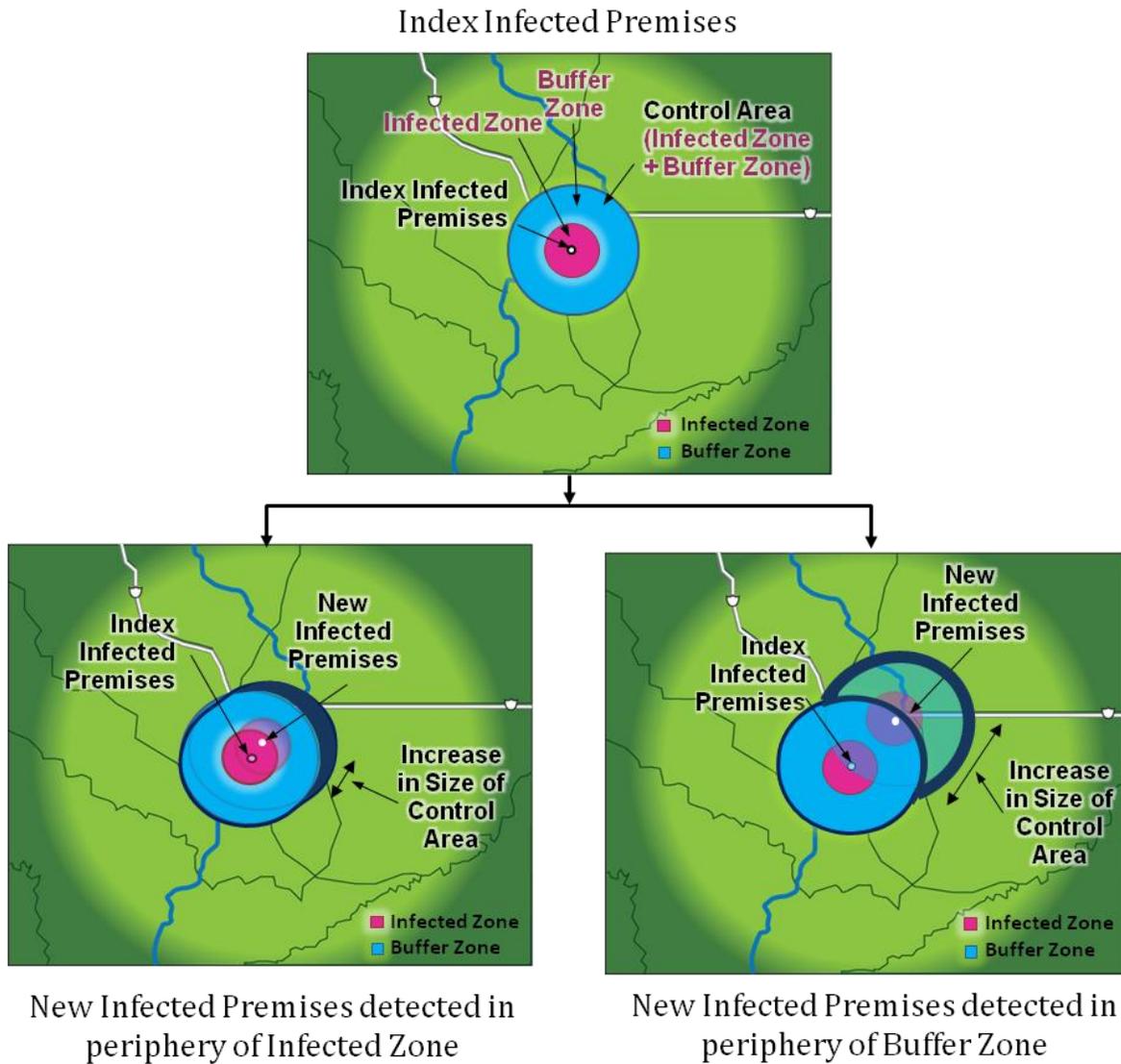
Assumptions for Example Surveillance Schemes

1. The 5-bird rRT-PCR test sensitivity is 86.5 percent.
2. Confidence level: The probability of detecting at least one infected bird in the target population is 86.5 percent, which is limited by the sensitivity of the rRT-PCR test on the 5-bird sample.
3. HPAI infected birds die within 2–3 days post infection and rapidly infects the flock, thereby increasing the probability of quickly detecting IP.
4. In commercial premises, the producer detects, collects, and places all dead birds into the target population from which the 5-bird or 11-bird pool is drawn.
5. The 20 infected HPAI bird prevalence for each 50-dead bird group is reached early in the disease spread in a house and is a logical feasible sample size.
6. All HPAI infected birds are included in each house’s daily dead bird target population.
7. Outbreak response field personnel visiting backyard premises, with observation, will detect ill birds with HPAI compatible signs.
8. The majority of backyard flocks have less than 100 birds; sampling frequently and sampling the daily dead birds maximizes the probability of detection, minimizes the trauma and disruption to the owner, and increases efficiency because less time is spent capturing live birds.
9. Sampling a 5-bird or 11-bird pool per 50 dead birds will sample a majority of daily dead birds in commercial broiler operations, commercial turkey premises, and backyard premises because the dead bird number varies from 5.1 to 27 birds per day (see daily death rate and house sizes of commercial producers in the Updated Background Information section below.)
10. Production parameters are monitored for indications of HPAI intrusion.
11. The consequences of an infected but undetected premises is greater if it is located at the periphery of the BZ vs. the periphery of the IZ:
 - a. Increased opportunity of disease spread due to less stringent movement requirements in the BZ.

- b. Increased difficulty of surveillance.
 - i. A larger number of ARP that require sampling.
 - ii. A larger geographic area over which to sample ARP.
- c. Increased size of the CA: An IP will increase the size of the CA by the radius of the IZ. However, if the newly detected IP is located on the periphery of the BZ, the size of the CA will increase by the radius of the IZ and the BZ.

Figure 3A-1 shows that the size of the CA depends on where the new IP is located.

Figure 3A-1. Infected Premises' Effect on Size of Control Area



Updated Background Information

- *House Size*: The number of birds per house varies from 7,000 in tom turkeys to 10,000 in hen turkeys, but a high of 27,000 broilers per barn. In layers, barn sizes of 300,000 to 350,000 birds have become the norm.
- *Daily Mortality Rate*: Major factors influencing the daily mortality rate are: bird strain, bird age (early, mid, or late cycle), and house construction and age. Mortality over the following should be investigated, based on the case definition (the mortality triggers):
 - Commercial broilers: mortality exceeding 3.5 birds/1,000 per day.
 - 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.
 - Commercial turkeys: mortality exceeding 2 birds/1,000 per day.
 - Broiler breeders: mortality exceeding 2 birds/1,000 per day.
 - Layer breeders: mortality exceeding 3 times the normal daily mortality per day (normal: 0.2/1,000 per day prior up to 50 weeks, and 0.37 birds/1,000 per day after 50 weeks).
 - 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.
 - Small volume high-value commercial poultry and backyard flocks: any sudden and significant mortality event or sudden drop in egg production should be investigated.

References for this Attachment

Materials developed for the 2014–2015 HPAI outbreak in the United States (available at www.aphis.usda.gov/fadprep).

National Avian Influenza Surveillance Plan, APHIS, June 29, 2007.

Cannon, R.M. 2001. Sense and Sensitivity—Designing Surveys Based on an Imperfect Test. *Prev Vet Med*, 49, 141–163.

Cannon, R.M. and Roe, R.T., 1982, *Livestock Disease Surveys—A Field Manual for Veterinarians*. Bureau of Rural Science, Department of Primary Industry. Australian Government Publishing Service, Canberra.

Doye, D., Freking, B., and Payne, J. *Broiler Production: Considerations for Potential Growers*, Oklahoma Cooperative Extension Service, <http://www.oces.okstate.edu>.

Flock, D.K., Laughlin, K.F., and Bentley, J., 2006, Minimizing losses to poultry breeding and production; how breeding companies contribute to poultry welfare, *Lohmann Information*, 41:20–28.

Personal communication between Dr. Alex Thompson (National Surveillance Unit) and Drs. Simon Shane (international poultry consultant), Gregg Cutler (private poultry veterinarian working in a three-person poultry practice in California), Ken Anderson (poultry veterinarian, North Carolina State University College of Agriculture and Life Sciences, Extension Poultry Science), and Dave Halvorson (poultry veterinarian, University of Minnesota, School of Veterinary Medicine).

“The North Carolina Layer Performance and Management Test” (2009).

The “United Egg Producers” (www.uepcertified.com and www.unitedegg.org).

The Outbreak Surveillance Toolbox, available to people with access to the Inside APHIS webpage (<http://inside.aphis.usda.gov/vs/ceah/nsu/toolbox/>), or to those outside APHIS by e-mailing (FAD.PReP.Comments@aphis.usda.gov).

Attachment 3.B Commercial Site Surveillance Equipment List

The surveillance teams need the following supplies:

- Two 5-gallon water jugs (filled with water)
- One garden sprayer
- Tub of appropriate disinfectant (see *HPAI Cleaning and Disinfection SOP* for list of approved HPAI disinfectants)
- Disinfectant sprayer
- Three plastic coolers
- Large plastic bags
- Box of zip-lock bags
- Duct tape
- Sponge
- Bucket
- Safety triangles
- Plastic container for water jugs, sprayer, and bucket
- Two felt-tip markers
- Pens
- Clipboard
- Laboratory submission forms
- Maps
- Flashlight
- Cell phone
- Biosecurity clothing pack (note size), containing one Tyvek suit, two Tyvek boots, dust mask, one bonnet, and two pairs of exam gloves
- Two bottles of waterless hand cleaner
- One roll of paper towels, and
- Drinking water.

Attachment 3.C Backyard Site Surveillance Equipment List

The surveillance teams need the following supplies:

- Task assignment
- Maps (county and task)
- Global positioning system (GPS) unit
- Extra batteries for GPS unit
- Highly pathogenic avian influenza (HPAI) information brochures
- Survey forms
- Quarantine forms
- Clipboards
- Appropriate personal protective equipment (PPE) (see *HPAI Health and Safety/PPE SOP*)
- Rubber boots
- Disinfectant sprayer
- Disinfectant (see *HPAI Cleaning and Disinfection SOP* for list of approved HPAI disinfectants)
- Waterless hand cleaner
- Paper towels
- Quarantine signs in plastic sleeves (in multiple languages if needed)
- Duct tape
- Scissors
- Plastic cable ties
- Stapler
- Highlighter
- Pens
- Response personnel phone numbers
- Biosecurity measures
- Garbage bags
- Emergency medical facilities for USDA staff
- Official vehicle identification (to be removed at the end of the day)

-
- Bag to carry quarantine signs and informational brochures, scissors, tape, etc.
 - Flashlight
 - Cell phone
 - Gatorade or water to drink
 - Plastic cooler
 - Vehicle accident report kit, and
 - Rubber bands or a binder clip to keep papers together.

Attachment 3.D Sentinel Bird Program

In specific circumstances, sentinel birds may be obtained and used in an HPAI response. While such use is not routine, the procedures provided below offer guidance in the event that Incident Command indicates that the use of sentinel birds is needed or desired on a premises. This guidance may change at any time, based on the recommendation of APHIS and State/Tribal Officials and Incident Command.

Sentinel birds have not been used to date in the United States 2014–2015 HPAI outbreak.

Procedure for Obtaining Sentinel Birds

1. Prospective sentinel birds must be healthy, unvaccinated against highly pathogenic avian influenza (HPAI), old enough to ensure good survivability, and tested for HPAI antibodies prior to placement with the exception of Specific Pathogen Free birds.
2. Sentinel birds are ordered from a provider specified by Incident Command. Specific contact and point of pick up information will be provided.
3. Only “clean” personnel will handle birds. Response team personnel handling sentinel birds should wear protective clothing.
4. All equipment used with sentinel birds, including but not limited to cages, transport boxes, feeders, and waterers, must be cleaned and disinfected.
5. Clean feeders, waterers, and shavings are placed for the birds prior to their arrival.

Procedures for Selecting Premises for Sentinel Birds

1. Sentinel birds are placed on selected backyard Infected and Contact Premises. The decision to place sentinels on other premises depends on a premises’ type and location, an owners’ willingness not to repopulate for at least 90 days, and the effectiveness of cleaning and disinfection on a premises.
2. Sentinel birds may be placed no sooner than 21 days after cleaning and disinfection/virus elimination activities have been completed. There should be no free roaming chickens left in the area.
3. The status of premises associated with sentinel birds should be tracked in EMRS.
4. The Case Manager (a Case Manager is assigned to each Infected Premises) for the premises may collaborate with those on the Incident Management Team (IMT) regarding which premises may be under consideration for placement of sentinel birds, and any special characteristics of the premises.
5. Premises may be mapped by IMT personnel from the Operations Section in coordination with the Situation Unit. The interior (rooms, stalls, etc.) of each house is mapped to determine how many sentinels may be placed on the premises and at which locations.

Procedure for Placing Sentinel Birds on Premises

1. Case Managers will calculate the number of birds for each premise. The number of birds to be placed on each individual premises is determined on a case-by-case basis by the epidemiology group. For example,
 - a. open premises that had free-running chickens may require a minimum of five birds placed in cages;
 - b. or premises with houses could require a minimum of three birds per room.
2. Premises with two horse barns containing six stalls in each would require 36 birds. If conditions permit, birds may be given free access to the interior of the rooms. That is, cages may be left open, and birds just placed in the room. If there are no doors, etc., birds may need to be placed in cages and moved from cage to cage each day.
3. In addition, at least five birds in cages may be placed on the premises outside of the buildings in such a manner as to prevent predation.
4. Program managers will place wing bands on the birds, and record the tag numbers used for each premises EMRS.
5. Clean and secure housing is required to maintain the birds from the time that they are delivered to the response team until they are placed on premises. Biosecurity standard operating procedures are followed when response team personnel handle and transport the birds.
6. Feed and water for the birds at each premises is assured.
7. The Cooperative Compliance Agreement and Flock Plan will cover the agreement between the owners and USDA APHIS on the usage and disposition of sentinel birds.
8. Response team members will place birds in planned locations.
9. Those placing the birds will leave adequate feed for a week, and leave a procedure handout with the owner after reviewing it with them using an interpreter as needed.

Procedures Following the Placement of Sentinel Birds

1. Premises owners may monitor the health of sentinel birds. If monitoring is performed by owners, response team members will conduct random oversight. Bird health should be monitored by response team personnel at least once per week.
2. Sick or dead birds need to be promptly picked up (implementing appropriate biosecurity measures) and submitted for diagnostics.
3. Status of the sentinel birds should be promptly recorded in EMRS, including any mortality or sample submission.
4. Program managers will dispatch crews to premises periodically to visually inspect the birds, to feed and water them as needed (some owners refuse to care for the birds), and to deliver additional feed as needed.
5. Typically, the sentinel program is terminated for a given premises if birds survive a 21-day period, or amount of time indicated by Incident Command.

-
6. Program managers will collect oropharyngeal swabs and blood samples from the birds for submission to the laboratory. If more than 30 birds are located on premises, a statistically valid sample of birds may be collected.

Attachment 3.E Abbreviations

APHIS	Animal and Plant Health Inspection Service
ARP	At-Risk Premises
BHI	brain heart infusion
BZ	Buffer Zone
CA	Control Area
CP	Contact Premises
DF	disease freedom
EMRS	Emergency Management Response System
FA	Free Area
FAD	foreign animal disease
FAD PReP	Foreign Animal Disease Preparedness and Response Plan
FP	Free Premises
GIS	geographic information system
GPS	global positioning system
HPAI	highly pathogenic avian influenza
IC	Incident Command
ICP	Incident Command Post
ICS	Incident Command System
IMT	Incident Management Team
IP	Infected Premises
IZ	Infected Zone
LPA	Legislative and Public Affairs
MP	Monitored Premises
NAHEMS	National Animal Health Emergency Management System
OIE	World Organization for Animal Health
PDS	Professional Development Staff
PPE	personal protective equipment
rRT-PCR	real-time reverse transcriptase polymerase chain reaction

SES	Secure Egg Supply
SOP	standard operating procedure
SP	Suspect Premises
SPRS	Surveillance, Preparedness, and Response Services
STAS	Science, Technology, and Analysis Services
SZ	Surveillance Zone
USDA	U.S. Department of Agriculture
VS	Veterinary Services
VSCP	Veterinary Services Careers Program