Iowa Highly Pathogenic Avian Influenza Response Plan

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1. Introduction

Highly Pathogenic Avian Influenza (HPAI) is a severe and highly contagious viral disease of birds that is often fatal to domestic poultry and can cause 90-100% mortality rates. HPAI can infect mammals, including people, after close contact with infected poultry [1]. In domestic poultry clinical signs include: marked depression, decreased feed and water intake, respiratory (with or without neurological) signs, or decreased egg production. However, the first indicator may be sudden death in a large percentage of a flock without any other displays of illness [2].

A single HPAI detection could close international export markets for poultry and egg products, causing billions of dollars in lost trade for the U.S. [3]. While there are vaccines against HPAI, the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) has not approved their use in the U.S. at this time [4][5].

Therefore, the primary strategy to mitigate HPAI’s impact on Iowa’s agricultural economy is to prevent it from entering or eradicating it as quickly as possible if it does enter. This may be accomplished through instituting restricted and/or controlled movements of avian species if the virus is detected in the U.S. and stamping-out positive or epidemiologically linked flocks in Iowa. Identifying all premises before a potential outbreak would greatly increase IDALS’ ability to control and mitigate an HPAI introduction.

In the event of an outbreak the primary transmission risk to Iowa flocks is direct transmission from infected birds or indirect transmission from fomites (contaminated people, supplies, or equipment). Transmission from infected birds could occur from domestic poultry or wildlife [2].

During any foreign animal disease (FAD) outbreak IDALS will work collaboratively with USDA to respond. The goals of any FAD response include: (1) detecting, controlling, and containing the disease as quickly as possible; (2) eradicating the disease using strategies that seek to stabilize animal agriculture, food supplies, the economy, and to protect public health and the environment; and (3) providing science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated products.

2. Pre-Outbreak Actions

i. Biosecurity

   a. IDALS places the responsibility of implementing good biosecurity practices on the producers and owners of a premises. At a minimum IDALS recommendations premises utilize existing enhanced biosecurity outbreak guidance available in the NAHEMS Guidelines for Biosecurity [6] and those outlined in the Secure Poultry Supply, and National Poultry Improvement
b. IDALS further recommends:

- Premises utilize USDA Defend the Flock Resources to strengthen biosecurity where appropriate (https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/defend-the-flock-program/dtf-resources);
- All premises implement personnel policies that restrict employees (and visitors) from:
  - entering a premises for a minimum of 5 days after arriving in the U.S. after visiting any country or area of the world experiencing active HPAI cases;
  - bringing any clothing (including footwear) that was worn when hunting fowl, game birds, other birds, or visiting a country or area of the world experiencing active HPAI cases before it is completely washed and laundered;
  - entering a premises without adhering to the premises’ established biosecurity protocols;
  - bringing cellular phones and other outside materials that have not been properly disinfected onto a premises; and
- Controlling potential mechanical vectors (such as flies) that may be present on the premises.

ii. Premises Registration

Premises registration of all poultry premises and assignment of a premises identification number will greatly enhance IDALS’ ability to respond to and mitigate an HPAI outbreak.

3. Classifications of an HPAI Outbreak in relation to Iowa

There are three classifications of an HPAI outbreak in relation to Iowa that would prompt IDALS to initiate a response. Formal notification of confirmed HPAI cases outside of Iowa would be announced by USDA. Any confirmation of HPAI within Iowa would be announced jointly by IDALS and USDA.

The three classifications of an HPAI outbreak in relation to Iowa are:

- **Continental:** HPAI outbreak in Canada or Mexico but not in the U.S.
- **Domestic:** Confirmation of the first HPAI case in the U.S. but not in Iowa.
- **In-State:** Surveillance shows a positive case in Iowa or epidemiologic evidence proves a connection of an Iowa flock to an infected flock.
Iowa Code 163.1 describes IDALS legal authority to control infectious or contagious diseases affecting animals. Therefore during any HPAI outbreak classification, IDALS may take the following actions:

i. Continental: HPAI outbreak in Canada or Mexico but not in the U.S.

Within the U.S. HPAI was last detected in Tennessee in 2017 and successfully eradicated that same year [7]. However, low pathogenic avian influenza (LPAI) strains with the potential to mutate into a HPAI strain circulate the globe annually [2]. If HPAI was detected in Canada or Mexico IDALS may:

- Receive confirmation of an HPAI outbreak in North America (Canada or Mexico) from USDA and receive reports on trade status with the infected country.
- Notify internal staff of the potential threat and initiate frequent communication to ensure stand-by readiness to deploy if necessary.
- Confer with the Iowa Veterinary Diagnostic Laboratory to review submission procedures for the National Animal Health Laboratory Network (NAHLN), including the National Veterinary Service Laboratory (NVSL) in Ames, Iowa.
- Communicate the threat to stakeholders and the public. IDALS will explain the disease and its effect on avian species, provide a description of the current response, make recommendations on how producers should protect their flocks, explain how to report suspected cases or unusual disease, and provide resources to find more information. Complete details on communication pathways can be found in the IDALS’ Foreign Animal Disease Communications Plan.
- The State Veterinarian may issue quarantine orders or special import rules/orders in cases where there is a potential HPAI threat to Iowa agriculture. Import rules may include:
  - Special import permits or requirements for avian species and products entering Iowa.
  - Negative results to diagnostic tests. Diagnostic tests may be utilized to the highest degree possible to demonstrate a lack of evidence of infection.
- Notify veterinary and other professional associations, licensed and accredited veterinarians, poultry and trade associations, poultry producers, transit companies, and others of any changes to import regulations.
- Conduct historic tracing and surveillance of avian species and products imported from the HPAI-affected country within a minimum of two incubation periods (30 days) prior to the date of onset (or best approximation) of the index case.
Information may be gathered from a number of sources, including Certificates of Veterinary Inspection (CVIs), entry permits, producer records, and poultry market and slaughter facility records. These may include shipments from high-risk areas such as the infected country, production systems associated with the outbreak, or from other states with frequent movements from the infected country (e.g., movements from Mexico into Texas).

- Begin a more aggressive surveillance program to try to determine if HPAI has been introduced into Iowa. Available diagnostic testing will be utilized to the highest degree possible as a tool to help determine the HPAI status of individual birds or flocks.

  - Tests may be conducted on:
    - Poultry based on epidemiological link(s);
    - Poultry showing suspicious clinical signs;
    - Recent samples submitted to the Veterinary Diagnostic Laboratory at Iowa State University for diagnosis of illness (i.e. targeted samples); and/or
    - Samples collected from concentration points, such as slaughter facilities, swap meets, etc.

- If it is anticipated that the incident may require support beyond IDALS resources, IDALS will notify the Governor’s office and coordinate with Iowa Department of Homeland Security and Emergency Management (HSEMD) to review needed resources and purchasing procedures to support a response.

- Continuously update the Governor’s Office and HSEMD, and collectively anticipate future needs and evaluate the need for a Declaration of Emergency.

### ii. Domestic: Confirmation of the first HPAI case in the U.S. but not in Iowa

In addition to the activities and considerations listed for the Continental classification, if HPAI is detected in the U.S. but not Iowa IDALS may:

- Be in frequent communication with USDA to confirm:
  - Situational awareness of the HPAI status of other states, including current response strategy (stamping-out) and epidemiological links to Iowa and other states;
  - The identity of HPAI contacts that may have been transported to Iowa within the last 30 days at a minimum;
  - Status of trade with U.S.’s international trading partners;
If USDA is considering a Secretarial Emergency Declaration for the affected state(s).

If USDA is recommending a national standstill order for poultry.

- Conduct surveillance to provide the highest degree of confidence possible that animal and/or animal product movements can occur to support business continuity without spreading infection. This may include monitoring for clinical signs and testing of live animals including, but not limited to, screening samples stored at the Iowa Veterinary Diagnostic Laboratory and/or testing poultry at packing plants.

- Carefully evaluate the risk of poultry and poultry products to be imported. Imports that pose a high-risk of introducing HPAI will be prohibited from entering Iowa. Imports from certain geographical areas, production systems associated with the outbreak or other locations that may have epidemiological links to HPAI Infected Premises will be carefully screened before being allowed to enter Iowa.

- Consider implementation of all, or aspects of, the IDALS' General Standstill Protocol.

- Investigate imports into Iowa within the last 30 days that may pose a risk to Iowa poultry.

- Continue the surveillance program for HPAI to determine any epidemiological links to premises in Iowa.

- Activate a Departmental Operations Center.

- Ready the premises identification database to facilitate the identification of premises that may be at-risk or infected.

- Communicate with veterinary and other professional associations, licensed and accredited veterinarians, poultry and trade associations, poultry producers, transit companies, and others concerning the elevated threat, and provide information on monitoring the health of poultry, and implementing enhanced biosecurity.

- Re-evaluate the threat and take action to protect Iowa poultry. In addition to movement controls, actions may include epidemiological investigations, reminders of reporting requirements, and enhanced surveillance at poultry markets and slaughter facilities, among other activities.

- Confer with USDA to evaluate federal resources that may be available, if needed.

- Request HSEMD to notify appropriate personnel from supporting local and state agencies and alert local jurisdictions housing fanciers to increase readiness.

- Reassign and/or pre-position IDALS staff members to locations of anticipated need,
such as to the Departmental Operations Center (DOC), the State EOC, the Joint Information Center (JIC), or an existing Incident Command Post.

- Coordinate with HSEMD to anticipate needed resources and purchasing procedures to support a response to a potential outbreak.

- Request specific agencies provide support for response activities, which may include implementing a call center to respond to questions from veterinarians, producers, allied businesses, and the public, instituting Just-In-Time Training for response tasks, providing outreach to a variety of audiences to keep them aware of the threat and mitigation measures, and requesting supporting agencies send representatives to the JIC to develop and distribute messages to appropriate stakeholders.

- Notify all producers, processors, and transit companies about the changes to Iowa’s import and movement criteria, and provide information about the permitting system and requirements.

- Continue to monitor all states.

- Closely monitor any epidemiologically linked premises to determine what, if any, additional actions need to occur on that premises to stop the outbreak. This would designate a transition from the Continental to In-State classification.

iii. In-State: Confirmation of HPAI in Iowa or Epidemiologic link of Iowa flock to infected flock

In the event of confirmation of HPAI in Iowa or the epidemiologic link of an Iowa flock to an infected flock, IDALS is the lead agency for the emergency response to eradicate the disease and initiate recovery. In addition to the activities and considerations listed for the Continental and Domestic classifications, if HPAI is suspected or detected in Iowa IDALS may:

- Receive notification of an epidemiological contact from an Infected Premises, or may be notified of suspicious clinical signs in a susceptible animal in Iowa.

- Conduct epidemiological investigations (with or without the assistance of the USDA) to identify Infected Premises and Contact Premises.

- Collaborate with USDA to dispatch a state or federal Foreign Animal Disease Diagnostician (FADD) to conduct an investigation and collect diagnostic samples for laboratory submission. Divided samples will be provided to the Iowa State University Veterinary Diagnostic Laboratory in Ames, Iowa and to the USDA National Veterinary Services Laboratory (NVSL) (also in in Ames, Iowa) for confirmation and virus isolation. An FADD investigation is conducted according to VS Guidance Document 12001.2 - Policy for the Investigation of Potential Foreign Animal Disease/Emerging Disease Incidents (FAD/EDI).
• Collaborate with the U.S. Department of Homeland Security (DHS) and Federal Bureau of Investigation (FBI) to determine if HPAI was intentionally introduced into Iowa.

• Initiate containment activities on the Infected (or Suspect) Premises. Initially, in most cases this will include quarantine, setting up premises biocontainment, and a review of producer records to trace recent animal movements into and out of the flock (see Appendix 3: Mitigation, subsection ii. Quarantine).

• Discuss the advantages and disadvantages of vaccination strategies with USDA APHIS (see Appendix 3: Mitigation, subsection vii. Vaccination).

• Form a Unified Command with USDA to exercise state and federal authority to protect animal health. Initially, local USDA representatives will participate. Positions may rotate to other USDA representatives over time and as more assistance is requested.

• Assign personnel to Incident Command System positions to manage the emergency response activities with the help of supporting agencies.

• Prompted by a positive laboratory result confirming HPAI, establish a Control Area around the Infected Premises, and institute movement controls (see Appendix 3: Mitigation, subsection ii. Quarantine and subsection iii. Permitting), as well as epidemiological tracing (see Appendix 2: Epidemiological Investigation and Surveillance).

• Through HSEMD, request supporting agency representatives to report to the SEOC with knowledge of available capabilities and resources.

• Continue disease surveillance to detect other Infected Premises or potential spread of HPAI.

• Communicate through HSEMD with local emergency managers and officials of the affected areas to determine local resource needs and availability.

• Request HSEMD starts to mobilize foamers staged throughout Iowa for potential operations.

• Based on a stamping-out strategy dependent on the size of the flock, implement a depopulation plan with greatest probability of depopulating the flock in a timely manner (see Appendix 3: Mitigation, subsection v. Mass Depopulation).

• Collaborate with Iowa’s Department of Natural Resources (DNR) to approve the animal owner’s disposal plan for carcasses and other associated materials (see Appendix 3: Mitigation, subsection vi. Carcass Disposal).
• Require biocontainment protocols to prevent spread of HPAI from Infected Premises (see Appendix 3: Mitigation, subsection iv. Biocontainment).

• If not already instituted, implement a system of permitted movement to approve and document movements into, within, and out of the Control Area (see Appendix 3: Mitigation, subsection iii. Permitting).

• Develop protocols for cleaning and disinfection to decontaminate buildings, areas and articles on the premises after infected animals have been removed. Protocols will be guided by FAD PReP Guidelines: Cleaning and Disinfection.

• Decide the method of releasing a Control Area and restrictions imposed on movements into, out of, and within the Control Area. The Control Area may be released as a whole or in parts to gradually reduce the size. Considerations include:
  
  o Premises due to be released do not appear to pose a risk for further spread of HPAI;
  
  o Results of epidemiological surveillance and confirmed/suspected cases in the vicinity;
  
  o Disease status of other neighboring premises;
  
  o Progress of the eradication effort and current response approach; and/or
  
  o Reasonable confidence that the non-infected premises due to be released will not be vulnerable to re-exposure (see Appendix 3: Mitigation, subsection iii. Permitting).

• Allow repopulation once infected/contagious poultry have been removed and the environment of a premises is no longer a risk to spread HPAI (through cleaning and disinfection or a fallow period - see Appendix 3: Mitigation, subsection vi. Cleaning and Disinfection). Conditions for repopulation may change if the response strategy transitions from stamping-out.

• Continue disease surveillance to detect new infections, and also to collect data to prove HPAI freedom if possible.

• Initiate regular briefings for the media and for information release to the general public through the JIC.
Appendix 1: Standstill Order

During an HPAI outbreak IDALS may implement some aspects of the IDALS’ General Standstill Protocol to reduce horizontal transmission between flocks. This may or may not include certain live bird movements and movements of some eggs or egg products. Exceptions may be made, depending on the epidemiology of the outbreak, for critical movements (i.e., slaughter, etc.) at the discretion of IDALS. Exceptions may also be made for systems and facilities that are recognized and validated by the USDA as a compartment.

Appendix 2: Epidemiological Investigation and Surveillance

During an HPAI outbreak the following premises definitions will be used:

- **Infected Premises (IP):** any premises with laboratory confirmed HPAI
- **Contact Premises (CP):** any premises with an established epidemiological link to a IP in the previous 30 days at a minimum

The following are IDALS’ initial goals of an HPAI epidemiological investigation conducted in Iowa:

- identify each potential IP through tracing activities, assign a premises classification and investigation priority;
- identify any CP (this includes all potential CP within a production system where sites may be separated by large geographic distances); and
- characterize the nature of the HPAI outbreak, identifying any potential horizontal transmission pathways and mitigation strategies.

Identifying potential CP within the same production system may include, but is not limited to, IDALS auditing the following aspects of movement onto and off a premises:

- live bird movement logs,
- egg and egg product movement logs,
- feed delivery logs,
- personnel logs,
- visitor logs (both domestic and international),
- list of equipment shared between premises,
- poultry disposal logs (i.e. rendering, etc.), and
- supply delivery logs (i.e. fuel delivery, etc.)

In addition to active investigations, the need for statewide HPAI surveillance may become necessary. This will take two forms: 1) passive surveillance and 2) active surveillance.
Passive surveillance will occur from veterinarian and producer reporting of suspicious clinical signs and mortalities noted in poultry. IDALS will widely communicate that anyone suspecting a possible HPAI introduction into Iowa reports it immediately to IDALS and/or the USDA. At which time either an IDALS or USDA FADD will be dispatched to the premises to conduct an investigation.

Active surveillance will occur through screening diagnostic samples that are collected on a regular basis. This would include any samples from poultry submitted to the Iowa Veterinary Diagnostic Laboratory, for any purpose, as well as samples retained at the Laboratory from the previous 60 days. Samples may be screened with the following diagnostic tests:

<table>
<thead>
<tr>
<th>Test</th>
<th>Sample Types</th>
</tr>
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<tbody>
<tr>
<td>AGID (Agar Gel Immunodiffusion)</td>
<td>Serum (2mL Red Top Tube)</td>
</tr>
<tr>
<td>HI/NI (Hemagglutinin-Neuraminidase)**</td>
<td>Serum (1mL Red Top Tube)</td>
</tr>
<tr>
<td>IVPI (Intravenous Pathogenicity Index)**</td>
<td>Virus</td>
</tr>
<tr>
<td>rRT-PCR (real-time Reverse Transcriptase Polymerase Chain Reaction)*+</td>
<td>Swab</td>
</tr>
<tr>
<td>VI (Virus Isolation)*</td>
<td>Tissue, Swab (dry swabs are not a valid sample)</td>
</tr>
</tbody>
</table>

*Run simultaneously when HPAI is suspected but not confirmed and when a case is suspected outside of the control area when a case has been confirmed

**Run after rRT-PCR and VI confirm HPAI

+Run for any suspect cases within the control area during a HPAI outbreak

++Attempted after positive rRT-PCR to determine subtype/pathotype

At the onset of the surveillance program any sample that screens positive would be sent to the National Veterinary Service Laboratory (NVSL) in Ames, Iowa for confirmatory testing. This would continue until testing became decentralized and more widely available at other laboratories.

Any sample that tests and is then confirmed positive, regardless of the sample type, would prompt an epidemiologic investigation to determine where the infected animal originated and where it could have potentially exposed other avian species.
Appendix 3: Mitigation

i. Quarantine

Any premises with confirmed HPAI or that is epidemiologically linked to a confirmed HPAI case will likely be placed under a quarantine as established in the *IDALS’s General Quarantine Protocol*. If a positive or linked premises is part of a large system that recently moved live birds, eggs, or egg products to other locations within the system, those locations, may or may not be temporarily placed under a quarantine while the epidemiologic investigation of that system is ongoing or the locations prove negative status through a series of tests.

ii. Control Area

During an HPAI outbreak a Control Area will be established to contain the infection, target stamping-out activities, and control animal movements. The function and minimum size of the Control Area is explained in the *IDALS General Control and Monitoring Zones Protocol*.

iii. Permitting

Premises inside the Control Area may be allowed permitted movements based on protocols established in the *IDALS General Animal Permitting Protocol*. This will include egg and egg products moving on and off a premises. Special considerations may be made for systems and facilities within a Control Area that are recognized and validated by the USDA as a compartment.

iv. Mass Depopulation

To maximize biocontainment procedures and reduce the overall viral burden of an infected premises the goal is to have all infected and exposed premises depopulated as soon as possible, preferably within 24 hours, after the confirmed diagnosis [8]. If a producer wishes to seek indemnity for depopulated poultry, USDA APHIS must preapprove the method. Poultry that dies prior to depopulation will not qualify for indemnity.

The following is a list of some depopulation methods in alphabetical order IDALS may chose during an HPAI outbreak:

- Carbon dioxide and other gasses,
- Injectable euthanasia,
- Ventilation shutdown, and
- Water based foam.

Potential depopulation methods:
- *Carbon Dioxide and Other Gasses*: Carbon dioxide (CO\(_2\)) has been used commercially in harvesting poultry and swine to stun the animal prior to exsanguination. Asphyxiates such as carbon dioxide, nitrogen, argon, and carbon monoxide exclude oxygen. An animal exposed to an atmosphere which is completely devoid of oxygen will lose consciousness very rapidly. The AVMA
has categorized the use of CO\textsubscript{2} as a “preferred method” for the depopulation of poultry (for both large flocks, small backyard flocks, and individual birds) [9].

Personnel involved in the procedure must be trained. Safety procedures along with appropriate safety equipment must be utilized according to guidelines reviewed or established by the Safety Officer.

Refer to FAD PReP/NAHEMS Guidelines: Mass Depopulation and Euthanasia for additional information on the use of CO\textsubscript{2} gas in poultry.

- **Injectable euthanasia:** The use of chemical methods to euthanize large poultry flocks during an animal health crisis is not practical due to the logistics of carrying out the protocol and because of the residue potential if carcasses must be rendered, composted, or buried. However, this may be the preferred method for small backyard flocks or individual birds.

  The AVMA has categorized the use of injectable euthanasia as a “preferred method” for depopulation of individual birds [9].

- **Ventilation Shutdown (VSD):** While AVMA preferred methods will first be considered in an HPAI response, VSD may be considered if these methods will not achieve depopulation of infected herds (based on the presumptive positive result) within a timely manner or be accomplished in a way that assures human safety. VSD is an adjunct method that may be considered by IDALS for depopulation of infected poultry based on the defined policy and considered on a premises-by-premises basis. However, VSD should be used only after a full consideration of the epidemiologic threat posed concludes that no other method can be completed in a timely manner to minimize the chance of the virus spreading. Timely implementation would significantly reduce virus amplification and the risk of ongoing transmission while also protecting nearby and epidemiologically linked production facilities [10]. However, depending on weather conditions and facility design, VSD may require supplement heating for buildings during colder seasons and/or an added source of CO\textsubscript{2} gas. The AVMA has categorized the use of VSD with the addition of CO\textsubscript{2} gas as “permitted in constrained circumstances” for depopulation of for floor-reared and cage-housed poultry [9].

- **Water Based Foam:** Water-based foam, as well as other foam types, have been used for mass depopulation of poultry during avian influenza outbreaks. Poultry die from physical asphyxiation versus chemical asphyxiation as seen with CO\textsubscript{2} euthanasia. Studies have shown that asphyxiation by foam occurs more quickly than CO\textsubscript{2} tenting [11]. Other advantages include greatly increased speed of depopulation when compared to other methods; decreased labor because fewer personnel are needed for preparation and to execute this approach; and little or no bird handling. In addition, foam decreases dust and therefore airborne pathogens [8]. The AVMA has categorized the use of water based foam as a “preferred” method for depopulation of
for floor-reared poultry and “not recommended” for cage-housed poultry [9].

Refer to Water Based-Foam Depopulation: For Poultry during Animal Health Emergencies for additional information on the use of water based foam in poultry.

v. Carcass Disposal
In most cases during an HPAI outbreak IDALS will require on-site disposal of animal carcasses and other associated materials. On-site disposal eliminates the need to move carcasses great distances and eliminates potentially moving live virus off the premises. During an HPAI outbreak in most cases IDALS will require the animal owner to utilize one of the following on-site disposal methods:

- above ground burial,
- composting, or
- in-barn composting.

Explanations on disposing of carcasses using burial, burning, composting, and incineration can be found in the NAHEMS Guidelines: Disposal and Iowa DNR Mass Animal Mortality Plan.

vi. Cleaning and Disinfection
Cleaning and Disinfection (C&D) protocols for HPAI should follow the basic principles outlined in the IDALS’s General Cleaning and Disinfection Protocol. Influenza viruses in general are easily killed in the environment by most disinfectants. The following are a select few disinfectants currently approved for avian influenza in farm settings [12]:

- Acetic acid
- Aseptrol S10-TAB
- Citric acid
- Lonza
- Lysol brand disinfectant direct multi-purpose cleaner
- Maquat
- Oxonia
- Sodium hypochlorite
- Virkon S

vii. Vaccination

While vaccines against HPAI exist, USDA APHIS has not approved of their use in the U.S. as of the drafting of this document. Since 2015 USDA APHIS has maintained some avian influenza vaccines in the National Veterinary Stockpile (NVS). However, before APHIS deployed emergency vaccinations the following would be considered:

- extent and rate of spread of the outbreak,
- type of poultry operations affected,
- potential impact on domestic and international supplies/markets,
- potential impact on U.S. producers’ ability to export poultry products overseas,
- and
- effectiveness and availability of vaccine [4] [5].

The two currently proposed purposes of emergency vaccination are vaccination-to-kill and vaccination-to-live [8] [13].

However, vaccination use could also affect international trade relationships, with some trading partners suspending imports from areas of the U.S. where vaccination was utilized, or even the entire U.S. Furthermore, once poultry were vaccinated against HPAI, APHIS would have to track all vaccinates until death to ensure that they are removed from the U.S. flock before declaring the country HPAI free. Potentially further delaying resumption of normal trade [4] [5].

For these reasons IDALS would not consider deploying an emergency HPAI vaccination strategy without the recommendation of APHIS. If APHIS ever recommends an emergency vaccination strategy it would likely be limited to injectable-type vaccines administered to hatching eggs or day old chicks. Turkeys would likely need at least one additional dose and layer chickens one or two additional doses. Due to the short lifespan for broiler chickens (40 days) they would likely not receive vaccinations. Once vaccinated, it would take approximately 21 days for immunity to develop [4].
Bibliography