

ANIMAL AND HUMAN HEALTH PREVENTION OPPORTUNITIES

Avian Influenza

Avian influenza (AI) is a viral disease of domestic poultry and other bird species caused by influenza A virus. AI viruses typically do not infect humans, but sporadic individuals or small clusters of limited human cases have occurred. Although human cases are rare, health experts are concerned that AI viruses could adapt to infect humans and spread through person-to-person contact. During the highly pathogenic avian influenza (HPAI) H5N2 outbreak that occurred in 2014–2015, Montana detected two cases: a captive falcon and a backyard flock. Neither case was associated with human infection. More recently, in January 2019, the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) detected the presence of the same strain (H5N2) in a wild mallard duck. The sample was obtained through routine surveillance and no illness or mortalities in domestic poultry were reported.

Animal Health

AI is a highly contagious viral disease that can affect bird species throughout the world. AI viruses are type A orthomyxoviruses characterized by antigenically homologous nucleoprotein and matrix internal proteins. Influenza A viruses are classified into subtypes based on two surface proteins, the Hemagglutinin (HA) and neuraminidase (NA). In addition, AI viruses are classified as HPAI or low pathogenic avian influenza (LPAI). This determination is based on the molecular makeup and virulence for chickens using an intravenous pathogenicity test. Clinical signs of disease can vary from mild to severe, depending on the strain of the virus. The most severe strain, HPAI, is caused by viruses with H5 or H7 surface proteins. HPAI viruses can produce significant disease with high morbidity and mortality in chickens, turkeys, and other related gallinaceous birds.

Wild migratory waterfowl and shorebirds are considered the natural reservoir for AI. Generally, the viruses are LPAI virus strains, and infected birds can circulate the virus without displaying obvious signs of illness. Wild birds infected with the virus, may expose domestic poultry populations through their feces and/or secretions from their nose, mouth, and eyes, or through direct bird-to-bird contact. Individuals coming into contact with wild migratory waterfowl such as game bird hunters, should practice biosecurity to prevent any potential exposure to other people or domestic poultry.

The incubation period of AI is highly variable and ranges from a few days to two weeks. In most wild birds, AI infections are subclinical, except for H5 HPAI viruses of Eurasian lineage. LPAI viruses produce clinical signs consisting of respiratory symptoms:

sneezing, coughing, ocular and nasal discharge, swollen infraorbital sinuses/sinusitis, congestion, and tracheal and lung inflammation. Other clinical signs include decreased egg production and infertility. Typically, bird mortality from LPAI is low unless a secondary infection is present. HPAI results in more significant disease with high mortality (90% - 100% in a few days). HPAI can cause widespread organ failure and sudden death, lack of energy, lack of appetite, ruffled feathers, decreased egg production, soft shelled or misshaped eggs, swelling, purple discoloration, respiratory symptoms, lack of coordination, and diarrhea. LPAI and HPAI viruses can be isolated from oropharyngeal, tracheal, and/or cloacal swabs from live birds.

Currently, no treatment exists for AI, although antimicrobials may be necessary to treat secondary bacterial infections. Due to the stability of the virus in the environment and its highly contagious nature, strict biosecurity measures and good hygiene are essential in protecting against disease outbreaks. AI viruses are sensitive to most disinfectants/detergents and inactivated by heat and drying. Increasing poultry housing temperatures may also reduce morbidity and mortality. While AI vaccines may reduce viral replication and shedding and help prevent clinical signs and death, the use of vaccination must be approved by the state veterinarian and may potentially impact American poultry exports overseas.

Avian influenza has the potential to spread rapidly in flocks and an outbreak can significantly impact individual producers, international trade and the economy. Veterinarians should report all suspected AI infections to the Department of Livestock (DOL) immediately. After a suspect case is reported, a veterinarian from the DOL or a Veterinary Medical Officer (VMO) with USDA will travel to the suspect flock for evaluation and sample collection.

Human Health

While the Centers for Disease Control and Prevention (CDC) considers the risk to the general public from H5 HPAI viruses to be low in the US, there have been rare human HPAI cases linked to birds. HPAI can spread easily through aerosolization, such as in enclosed areas like poultry barns and exposure to contaminated respiratory droplets, dust, or objects may result in transmission of the virus. Contrarily, there have been reports of cases that have no direct contact with infected birds or contaminated surfaces. The primary risk factor for human infection appears to be exposure (direct or indirect) to infected live or dead poultry or contaminated environments, such as live bird markets. There is no evidence of people becoming infected through the consumption of properly prepared poultry meat or eggs. For individuals that may be exposed to infected poultry, personal protective equipment is recommended, including properly fitted safety goggles, disposable gloves, boots, NIOSH-certified respirator (N95 or higher), and disposable fluid-resistant coveralls.

A feature of Influenza viruses that makes them generally more concerning to public health officials is the instability of their molecular anatomy. RNA viruses such

as AI can modify their genetic makeup slowly over time as the virus replicates, which is known as antigenic shift. The virus can also change its genetic makeup much more quickly, which is referred to as antigenic drift. An antigenic drift may occur when an influenza virus found within the animal population, makes its way into the human population. Intermediate hosts, such as pigs, have been associated with antigenic drifts. Pigs are susceptible to infection with both mammalian and AI strains. Three previous human pandemics of influenza have been attributed to strains with genes from both mammalian and avian influenza.

HPAI infection in humans may cause disease ranging in severity from mild upper respiratory infection, to severe pneumonia with multi-organ failure and death. LPAI infections can range in severity from conjunctivitis to an influenza-like illness and pneumonia.

Laboratory testing is required to diagnose an AI infection and respiratory specimens should be collected as early as possible. Based on the current evidence, the CDC recommends antivirals to treat illness caused by AI viruses and reduce the duration of viral replication and shedding.

Avian Influenza Key Points

Animal Health

- Animal health authorities should encourage producers, exhibitors, and animal caretakers to practice biosecurity measures to prevent the introduction of AI into their flocks.
- Hunters should dress game birds in the field whenever possible and practice biosecurity to prevent any potential exposure to humans or domestic poultry.
- Poultry owners should contact their veterinarian if they observe birds exhibiting signs of respiratory illness.
- Persons handling sick or dead animals should wear proper personal protective equipment.
- Veterinarians should immediately report any suspected AI to the DOL at 406-444-2043.

Human Health

- Human infections are rare, but health care providers should consider a possible AI infection in people with influenza-like illness and acute respiratory infection who have had contact (less than 10 days prior) with sick or dead birds. This includes contact with domestic poultry, wild aquatic birds, or captive birds of prey that have had contact with wild aquatic birds.
- If a health care provider suspects AI, they should contact their local health department regarding appropriate testing and reporting requirements.
- People should avoid contact with sick or dead poultry or wildlife. If contact occurs, wash your hands with soap and water and change clothing before having contact with healthy domestic poultry or birds.
- Health care providers should be connected with One Health resources to stay up-to-date with disease incidents involving domestic poultry or wild fowl that may have a zoonotic link.

References available on web version. Visit <http://www.dphhs.mt.gov/publichealth/publications.shtml>.

2,836 copies of this public document were published at an estimated cost of \$0.59 per copy, for a total cost of \$1660.54, which includes \$711.04 for printing and \$949.50 for distribution.

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