FAZD CENTER

National Center for Foreign Animal and Zoonotic Disease Defense

A Component of the Department of Homeland Security at Texas A&M University in partnership with the University of California, Davis, the University of Southern California and the University of Texas Medical Branch

Avian Influenza

Avian influenza (AI) is a disease caused by one of several subtypes of the influenza A virus. Wild, primarily aquatic birds serve as the natural host for this virus – hence, the name avian influenza (Alexander, 2000). The viruses that cause AI are highly contagious among birds and can be deadly, particularly among domesticated birds like turkeys and chickens (CDC, 2005a). Although 15 subtypes have been identified to date, influenza A viruses affecting poultry can be grouped broadly into two divisions: the viruses causing Highly Pathogenic Avian Influenza (HPAI) and those causing Low Pathogenicity Avian Influenza (LPAI). The viruses of two subtypes, H5 and H7, are associated with HPAI and may result in domestic flock mortality as high as 100 percent. Viruses of all other subtypes cause a much milder disease and are associated with LPAI.

Since avian influenza A was first isolated from South African terns in 1961, several major outbreaks have been studied worldwide (reviewed in Capua and Alexander, 2004). More AI viruses have been isolated from ducks than any other species, although most free-flying birds may also be infected including shorebirds, gulls and other seabirds. Waterfowl (ducks, geese, etc.) are more resistant to AI than are domestic poultry (chickens, turkeys, etc.) Viruses that cause no obvious disease in waterfowl can be highly pathogenic (rapidly fatal) in domestic poultry.

What are the signs of AI in poultry?

Signs of AI are extremely variable. In some birds the only evidence of the infection is seroconversion i.e., the birds develop a detectable antibody titer to AI. AI can also be manifest as respiratory, enteric, reproductive or nervous system disease. Decreased food consumption and drops in egg production are among some of the earliest and most predictable signs of disease.

Common signs including coughing, sneezing, ruffled feathers, swollen heads, nervous signs like depression, and diarrhea may occur together or individually. In some cases, birds die rapidly without clinical signs of disease.

What can I do to protect the health of my domestic bird flocks?

Waterfowl act as a reservoir of AI virus by carrying the virus in their intestinal tract and shedding it in their feces. AI viruses are spread to susceptible birds through inhalation of influenza particles in nasal and respiratory secretions and from contact with the feces of infected birds. As such, migrating waterfowl are a significant source of AI viruses especially in the major flyways. Turkeys on open ranges in Minnesota, a state in the major flyway for migrating ducks, frequently experience AI problems. But the prevalence of AI in turkeys has been high in some years and minimal in others. The reason why influenza viruses come and go is not known. The risk to susceptible birds from contact with waterfowl must be considered very high although it may vary from year to year for unknown reasons.

Prevention and Control Measures

Wild birds and their fecal/oral excretions should be considered a major source of AI virus. Preventing direct contact with free-flying birds and protecting domestic poultry from contact with the feces of wild birds is an important way to prevent AI. Live bird markets have been an important source of AI, especially on the East coast of the U.S. It is important to avoid live markets, educate employees about the dangers posed by these markets, and prevent the spread of disease from these markets to your flock by preventing any contact.

Infected birds shed virus in saliva, nasal secretions and feces in the first two weeks of infection. Four weeks after infection, virus can no longer be detected. Hence, prevention is best accomplished by preventing contact between newly infected and susceptible birds. AI can be spread from infected birds through the transfer of feces especially on contaminated equipment and clothing. Controlling the traffic between infected and uninfected birds is essential.

Influenza viruses are very sensitive to most detergents and disinfectants, and they are readily inactivated by heating and drying. However, flu viruses are well-protected from inactivation by organic material, and infectious virus can be recovered from manure for up to 105 days. Complete removal of all organic material is part of any effective disinfection procedure.

Contaminated houses are heated for several days to inactivate virus. Organic material is removed followed by complete cleaning and disinfection of all surfaces. Contaminated litter and manure is problematic and should be composted or buried to ensure that it does not spread infectious virus.

Vaccines effectively prevent clinical signs of influenza infections in many species including poultry. However, the vaccines are not cross-protective for the 15 virus subtypes that can infect poultry. Since there is no way to predict which type will infect a flock, vaccines are generally not practical to prevent infections.

What should I do if I suspect AI in my domestic poultry?

You should contact your state or USDA veterinarian if you observe any of the signs of AI, especially if they are accompanied by a drop in feed consumption and/or a significant drop in egg production. Because the signs of AI are so variable, it is important to get the help of an expert for diagnosis.

What risk does AI pose to human health?

The danger to human health posed by outbreaks of AI in wild bird populations and domestic poultry operations is not clearly understood. In 1997, the first case of direct bird-to-human transmission of AI (H5N1) virus was documented in Hong Kong. As of late June 2005, health officials throughout Asia have reported a total of 108 confirmed human cases of AI (H5N1), with 54 of these infections resulting in mortality (WHO, 2005). The Centers for Disease Control and Prevention in Atlanta suggest that avian influenza A (H5N1) among birds has become endemic to Southeast Asia and that human infections will likely continue to occur.

While evidence of human-to-human transmission is limited (one case of probable human-to-human transmission was reported in Thailand and two possible cases have been reported in Vietnam), humans coinfected with avian influenza A and another influenza strain could theoretically serve as a host for genetic reassortment events

of the two strains. The result would be a combined strain of flu to which no human is immune and no vaccine is currently available. Given the high fatality rates (over 70 percent) of humans infected with avian influenza A (H5N1) and the ease with which modern strains of influenza A viruses that typically affect humans are transmitted, emergence of a combined or mutated strain of H5N1 could rapidly give rise to a modern influenza pandemic.

The world has not experienced an influenza A pandemic since 1968, but all flu pandemics have been characterized by enormous numbers of illnesses and fatalities. The most severe flu pandemic (1918-1919) resulted in the death of more than 20 million people worldwide. More than 550,000 people died in the United States and 28 percent of the population was sickened by the illness. While healthcare and our understanding of disease processes has improved dramatically since the early twentieth century, the CDC projects that a modern pandemic would likely result in 2 to 7.4 million deaths worldwide and affect as many as over 300 million people. The human health and economic consequences of such a pandemic, which many experts feel is imminent, would place an enormous strain on the U.S. healthcare system and would the impact is likely to be greatest on low income countries due to strained healthcare resources (WHO, 2004).

What are FAZD Center AI experts doing in response to outbreaks in Asia?

- Continuing implementation of an $18M initiative to continue the study of several diseases important to both human and animal health, including AI
- Mounting a program to incorporate biosecurity strategies in live bird markets to help prevent human infection and transmission to healthy birds
- Implementing programs to improve surveillance for AI in live bird markets in the United States
- Building high-throughput laboratory and field diagnostic techniques to allow faster diagnosis and disease identification
- Developing and investigating the efficacy of immunostimulatory reagents for domestic poultry for use in conjunction with current vaccination strategies
- Working collaboratively with the states of Texas and California as part of a pilot effort to develop consequence management planning for a potential AI pandemic in the United States
- Teaching in undergraduate, graduate, extension, and veterinary continuing education roles to enhance awareness and understanding of AI

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This document was primarly adapted from Dr. Carol J. Cardona's *Avian Influenza Fact Sheet (2004)* available at: http://www.vetmed.ucdavis.edu/vetext/INF-PO_AvianInfluenzaFS.html

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More Information:

For more information about biosecurity and control of the spread of AI in birds, visit: http://www.vetmed.ucdavis.edu/vetext/INF-PO_Biosecurity.html by Dr Joan Jeffrey, University of California, Davis Extension Poultry Veterinarian) and the Texas Animal Health Commission: http://www.tahc.state.tx.us.

For more technical information about infection in birds, visit the Office Interationale des Epizooties (now World Organization for Animal Health) website at: http://www.oie.int/end/maladies/fiches/a_A150.htm.

For additional information about infections in humans visit the World Health Organization website at: http://www.who.int.

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