POSITION STATEMENT

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Statement on Avian Influenza

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Introduction

Avian Influenza (AI), sometimes called bird flu, is a clinically variable disease caused by bird-adapted type A influenza viruses of the family Orthomyxoviridae. The natural hosts and reservoirs of these viruses, hereafter referred to as AI viruses, are wild aquatic birds (ducks, geese and shorebirds) where the infections are typically asymptomatic and caused by viruses that almost always exhibit low pathogenicity (LP) for poultry. However, the occasional spread of AI viruses from aquatic birds to domestic birds can result in disease, particularly in chickens and turkeys where the effects are unpredictable but can be devastating.

Description of the disease

Infection of chickens and turkeys by AI viruses typically produces syndromes ranging from asymptomatic infections to respiratory disease and decreased egg production to extremely severe disease with near 100% mortality. In the absence of concurrent infections with other pathogens, severity of the disease is largely determined by the pathogenicity characteristics of the infecting virus, but it is also influenced by factors such as host species, host age, acquired immunity, environmental conditions, and concurrent infections with other pathogens.

Clinical signs of LP avian influenza (LPAI) in chickens and turkeys are the result of localized virus infection in the respiratory, digestive, and reproductive tracts. The most frequently observed signs are those of a transient mild-to-severe respiratory disease accompanied by coughing, sneezing, nasal discharges, and excessive lacrimation. Transient drops in egg production also may occur. High morbidity and low mortality rates are typical for LPAI, although high mortality rates may be observed if other pathogens are involved.

Clinical signs of high pathogenicity avian influenza (HPAI) in chickens and turkeys are the result of systemic spread of the virus with replication in many tissues. The outcome of these infections vary from sudden death with few or no overt clinical signs to a more characteristic disease including severe depression, marked reduction in feed and water intake, cyanosis of the skin, swelling of the head and upper neck, nervous signs, diarrhea, and precipitous drops in egg production. The morbidity and mortality rates for HPAI in chickens and turkeys are typically very high, sometimes approaching 100%.

The clinical features and severity of LPAI and HPAI virus infections in domestic and confined birds other than chickens and turkeys are highly variable depending on the host species and age and the strain of virus involved. However, when non-gallinaceous birds are affected, morbidity and mortality rates generally do not approach those seen in chickens and turkeys.

Characteristics of the virus

Individual AI virus strains are identified according to subtype based on the detailed structural characteristics of their 2 major surface proteins, the hemagglutinin (H) and neuraminidase (N). Sixteen H subtypes (H1 – H16) and nine N subtypes (N1 – N9) are currently recognized. These two proteins may be found in any of their possible combinations, which means there are 144 (9x16) possible AI virus subtypes, e.g., H1N1, H5N1, and H9N2. Most of the diverse AI virus subtype combinations have been isolated from waterfowl or other avian species. Sporadic and typically self-limiting infections with some avian subtypes have also been reported in mammals (pigs, humans, cats and marine mammals).

Avian influenza viruses are further classified based on their ability to produce disease in chickens. Pathogenicity testing is conducted according to guidelines published by the World Organization for Animal Health. Procedures involve assessment of mortality following bird inoculation and detailed genetic analysis of the virus isolate. Isolates that are lethal for $\geq$ 75% of the inoculated chickens, or have a pathogenicity index of > 1.2 are classified as HPAI viruses. Also, subtype H5 and H7 avian influenza viruses that do not meet the above lethality criteria, but can be shown to possess the well-defined genetic markers of high pathogenicity (HP) are classified as HPAI viruses. Isolates that do not meet the either of these criteria are classified as LPAI virus.

For unknown reasons, HP has never been associated with AI viruses belonging to subtypes other than H5 and H7. However, even among the H5 and H7 viruses HP is rarely observed, which means that the vast majority of H5 and H7 viruses are like those of the other 14 H subtypes, i.e., LPAI viruses. Nevertheless, when LP H5 and H7 viruses are allowed to circulate in poultry they may undergo unpredictable genetic changes that transform them into HP viruses. Such pathogenicity shifts have been observed in several outbreaks in poultry, for example, Pennsylvania in 1983 (H5N2), Italy in 2000 (H7N1), Chile in 2002 (H7N3), and British Colombia in 2004 (H7N3).

Avian Influenza Control

Because of their potentially catastrophic effects, H5 and H7 LPAI and HPAI outbreaks in U.S. poultry are officially classified as notifiable diseases, i.e., they must be reported to animal health authorities. The policy of the U.S. Department of Agriculture (USDA), the poultry industry and state authorities is to control and eliminate notifiable AI (NAI) as quickly as possible after detection. When outbreaks occur, emergency control programs are activated and managed through the cooperative efforts of USDA, state authorities and the poultry industry. Control programs for LPAI outbreaks caused by viruses of the other 14 H subtypes are managed by the poultry industry working in conjunction with state authorities. Elimination is usually the goal and the outcome of LPAI control programs, but the measures applied are typically less stringent than those used for NAI outbreaks and largely based on risk assessment and cost-benefit evaluation. Specific approaches used to control both forms of the disease are briefly described below.

Biosecurity: While the term biosecurity has broad meaning, it is used here to describe the protection provided by poultry management practices that limit the likelihood of introduction and spread of AI virus. Biosecurity practices are specifically aimed at either preventing virus exposure of non-infected flocks or preventing release and spread of virus from infected flocks. Most of the measures used involve some level of control on the movement of everything and everyone entering or leaving a farm. Another important aspect of biosecurity is education of poultry workers regarding potential sources of AI virus infection and how the virus can be spread.

Surveillance: Early detection of AI virus infections in poultry allows rapid and appropriate action to be taken before the infection becomes widespread. For this reason, surveillance programs are in place in the U.S. to monitor the AI virus infection status of most commercial poultry flocks. Sampling methods, test procedures, and reporting requirements are described in the provisions of the National Poultry Improvement Plan (NPIP), which is a USDA program managed in cooperation with state authorities and the poultry industry (Title 9 CFR, Parts 145, 146, and 147). Additional testing is done in state laboratories when cases that may involve AI virus infection are presented. Extremely large numbers of birds are tested in these programs. For example, in 2009 the state of Georgia tested approximately 312,000 birds and North Carolina tested approximately 232,000 birds.

Elimination of infected birds: Slaughter of infected flocks followed by thorough cleaning and disinfection of contaminated equipment and facilities are considered essential for control of NAI outbreaks. Disposal of carcasses, manure and other contaminated material is accomplished by composting, incineration, rendering or landfill burial. For LPAI, controlled marketing of recovered flocks is sometimes considered a viable option if appropriate biosecurity measures are applied.

Vaccination: Vaccination can provide significant protection against LPAI and HPAI, but several factors preclude its widespread use for AI control in U.S. poultry. For example, broad scale preventative vaccination is not feasible because vaccine-induced protection is virus subtype specific, therefore outbreaks must occur before the proper vaccine virus can be identified. Also, the overall economic impact of vaccination for control of any given outbreak can be positive or negative depending on which sector or sectors of the poultry industry are involved. Prior approval of state animal health authorities is required before vaccination can be used for control of LPAI caused by virus subtypes other than H5 or H7. Under emergency federal regulations, vaccination is also an option for control of H5 and H7 LPAI and HPAI, but federal and state approvals are required. Historically, in the U.S., such emergency vaccination has been used only for a limited number of cases for H5 and H7 LPAI, but has not been used for HPAI control.

Frequently asked questions

Can I get bird flu? The risk of people becoming infected with AI virus is very low. Influenza viruses tend to be highly host specific, which means that they are much more capable of infecting individuals of the same or closely related species than unrelated species such as humans. However, rare cases of human infection with AI virus have been reported and they are usually attributed to close contact with infected birds that are sick or have died.

What is the current situation with Asian bird flu? The H5N1 HPAI virus that first circulated in Southeast Asia and has subsequently spread to the Middle East, Europe and Africa has now become endemic in some areas of Egypt, Bangladesh, Indonesia, China and Vietnam. Most outbreaks have occurred in village poultry but some commercial flocks have also been affected. The fact that this particular virus has infected and caused severe disease in a significant number of people is unprecedented. Human infections have been reported in 15 countries since 2003, when the second wave of the outbreak started. By the end of 2009, affected countries had reported a total of 467 human cases with 282 deaths. Although a few instances of limited human to human transmission have been suspected, most cases have been attributed to close contact with infected birds. Despite extensive surveillance, the Asian H5N1 virus has not been found in poultry, wild birds, or people in North America.

Can the pandemic 2009 H1N1 influenza virus infect poultry? The 2009 H1N1 virus has spread around the world affecting predominately humans, but with some cases in swine. This virus has infected a few flocks of turkey breeder hens in Canada, Chile, France and the US with declines in egg production and no respiratory disease. In these cases, the source of infection appears to be from infected humans working with the flocks. However, there have been no reports of this virus spreading from turkeys to humans.

Can I get influenza from eating poultry products? Influenza viruses are rapidly destroyed by temperatures used for cooking. Also, USDA poultry inspection regulations prohibit birds suspected of infection with influenza virus from being processed for food. For these reasons, there is no danger of becoming infected from eating properly cooked poultry products.

For more detailed information, readers are referred to the following:

Swayne, D. E., D. L. Suarez and L. D. Sims. Influenza. In: Diseases of Poultry, 13th ed. Swayne, D.E., J.R. Glisson, L.R. McDougald, L.K. Nolan, D. L. Suarez and V. Nair. John Wiley & Sons, Inc. Ames, IA. pp.181-218. 2013.