



AVIAN INFLUENZA

Public Health Considerations in the Application of Measures to Contain and Control Highly Pathogenic Avian Influenza (HPAI) Outbreaks in Poultry

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Introduction

A sustained, widespread highly pathogenic avian influenza (HPAI) epidemic, especially due to H5N1 infection in poultry, is a significant public health hazard as it increases the risk of a human influenza pandemic. Spread of the infection and human risk are especially great and hard to manage where poultry are raised in village/backyard farms, and where there is significant live poultry movement through farms and markets. The best method to prevent or limit the impact of HPAI outbreaks on public health is to promptly contain and control these outbreaks in poultry, conduct efficient surveillance and reporting of potentially infected poultry flocks, and implement biosecurity measures that reduce human exposure to potentially infective birds, bird debris such as litter, feather dust and husbandry equipment. These considerations are intended to direct careful attention to safeguarding public health in relation to the application of containment and control measures for HPAI outbreaks in poultry.

Key Points

1. HPAI viruses, especially H5N1, can cause severe disease and death in poultry and humans. Death in poultry can occur within 1-2 days of infection.
2. Humans get avian influenza virus infection through direct contact with bird faeces and respiratory secretions, droplets, and by mechanical transfer through contact with contaminated fomites (surfaces such as clothing, footwear, farm and transportation equipment, cages, tools, other materials and vehicles). Fomites are an important mechanism of HPAI virus transmission.
3. Depending on environmental conditions, AI viruses may remain infectious in manure, water, soil and on contaminated equipment for at least 35 days (Ausvetplan 2002) and perhaps as long as 3 months in colder climates.
4. Wild birds, especially waterfowl, can acquire HPAI infection without signs of clinical disease. They can initiate HPAI outbreaks in domestic poultry through contamination of their food and drinking water supplies (e.g. lakes).
5. AI viruses can infect and replicate in mammals. Widespread HPAI infections and prolonged circulation in the animal population may result in mutations and recombination that may increase the disease potential of the virus in humans.
6. AI viruses can contaminate eggs and poultry meat. Even dressed (frozen and/or commercially packaged) poultry can present a risk for infection to humans because HPAI viruses can survive in frozen carcasses and blood for as long as 3 weeks.
7. The prevention and control of HPAI epidemics in poultry, and thus potentially the reduction in human exposure risk to the virus, can be achieved through implementation of systematic surveillance for disease in poultry flocks (clinical and if possible laboratory diagnosis and reporting to appropriate animal health authorities), followed by rapid stamping out and application of comprehensive biosecurity measures.
8. AI viruses are orthomyxoviruses, influenza type A, that possess the following physical and chemical characteristics:

Temperature:	Inactivated by 56 °C in 3 hours; 60 °C in 30 minutes
PH:	Inactivated by acid pH
Chemicals:	Inactivated by oxidizing agents, sodium dodecyl sulphate, lipid solvents, b-propiolactone
Disinfectants:	Inactivated by detergents, halogenated compounds (chlorine and iodine), quaternary ammonium salts, synthetic phenols, alkalis, formaldehyde and glutaraldehyde, and other products.
Survival:	Remains viable for long periods in tissues, faeces and water, but highly susceptible to disinfection

(Ref: Highly pathogenic avian influenza. <http://www.oie.int> Office International Epizooties 22 April 2002 ; and

HPAI outbreak detection and containment practices for affected poultry establishments and areas

A. General Principle

Avian influenza disease control and elimination is highly dependent on rapid and effective response activities. Speed is of the essence: the earlier the official intervention, the fewer the number of birds that will need to be killed. Any approach adopted must ensure complete elimination of the virus. Because of the professional training and competence required, veterinary authorities must be involved.

B. Identification of HPAI Disease in Poultry

In countries experiencing or likely to be experiencing an outbreak of HPAI in poultry, the empiric detection of an HPAI outbreak should be considered if there are reliable reports of any poultry establishment experiencing an unusually high mortality rate (e.g. >1% daily mortality for 2 days in commercial settings and >5% for village poultry farms) and where the mortality is associated with one or more of the following signs: depression and respiratory disease, swollen heads, cyanosis of the combs or wattles, and possibly neurologic signs and diarrhea. Animal health authority confirmation of these reports should be grounds for initiating AI containment measures in the affected poultry population.

In apparently HPAI-free zones and countries, appropriate laboratory diagnosis (e.g. through RT-PCR, hemagglutination inhibition assays, neutralization assays and agar gel precipitation tests, and/or viral isolations) may be necessary to unequivocally determine H5N1 avian influenza infection in suspect poultry flocks before initiation of AI stamping out measures.

In all circumstances, the concerned countries must decide rapidly (preferably within 24 hours), using sound scientific and epidemiologic evidence, whether to implement HPAI containment measures.

C. Containment of HPAI Outbreaks in Poultry Through Quarantine, Isolation and Stamping Out

The declaration and implementation of quarantine, isolation and stamping out measures should be undertaken in accordance to recommendations made by the Food and Agriculture Organization of the United Nations (FAO) and the Office International des Épizooties (OIE) in areas where HPAI outbreaks in poultry are confirmed.

1. Application of containment measures in protection zones where HPAI infected or potentially infected poultry are identified

A protection zone contains one or more infected and closely adjacent uninfected farms. The rationale for its declaration is to immediately contain the geographic spread of HPAI. Thus, it entails stamping out of all infected and potentially infected poultry flocks and restricting entry onto and exit from these farms and locations by people, materials, equipment, vehicles (cars, trucks, bicycles, etc.), and animals (livestock, pets, and vermin).

Specific protection zone measures may include the following:

- diligent securing or policing of HPAI contaminated farms (demarcation of farms) and the boundary of the protection zone (e.g. designating checkpoints);
- application of comprehensive decontamination measures on all poultry premises, farm equipment and vehicles within the protection zone;
- issuance and distribution of public advisories for protection zone and surrounding area residents, travellers or visitors with information on methods for HPAI infection prevention (refer to WHO advice for people living in an area affected by highly pathogenic avian influenza (HPAI) virus, 10 February 2004);
- assurance and verification by responsible authorities of compliance with stamping out and quarantine orders, including active monitoring for the absence of poultry (until repopulation is authorized), sanitary disposal of poultry carcasses and debris, and decontamination of farms or other locations where poultry were kept; and
- intensified monitoring and control near protection zone boundaries.

2. Quarantine measures applied in surveillance zones

Areas immediately surrounding protection zones are declared as surveillance zones. These zones are subject to quarantine measures even though there are no reports of HPAI infection in poultry within these zones. Strict biosecurity measures are implemented within and between establishments to make sure that poultry and birds are

kept isolated from other birds and animals, and strict movement restrictions (e.g. farms to markets) are in place.

Specific surveillance zone measures may include the following:

- implementation of heightened surveillance for poultry cases suspected of meeting the H5N1 case definition above;
- immediate implementation of protection zone containment measures if HPAI infection or potential infection is identified in the surveillance zone;
- enhanced biosecurity measures such as keeping poultry inside sheds or enclosures to prevent contact with wild birds and their excreta and keeping poultry and pigs separated and not housed in the same sheds or areas (pigs can serve as a vehicle for spreading re-assorted influenza viruses to people); and
- strict discouragement or control and monitoring of the movement of poultry (live or processed), eggs, farm materials, equipment, and vehicles within the surveillance zone. Movement of these items from the surveillance zone is strongly discouraged.

D. Culling of Poultry

Culling inside the protection zones must be diligently performed, considering the risk of infection to poultry in adjacent apparently HPAI free areas and the potential for H5N1 transmission to people. Culling must be done as close as possible to the centre of infection, for example, within the affected farm. When practicable, it is best to cull birds inside the poultry house or in containers just outside the poultry house. Moist disinfection of the house or container surfaces, poultry litter and debris can help reduce the spread of virus during and after the culling process. Under all circumstances, the culling procedure should be as humane as possible, without compromising human safety. The access of wild birds, vermin and other animals to the area where poultry are being culled and disposed of should be prevented as much as possible.

Carbon dioxide saturation is the method of choice for destroying poultry species when large numbers are involved. For a thorough description of culling methods, refer to the Manual on Procedures for Disease Eradication by Stamping Out (FAO, 2001) and the Report of the First Meeting of the OIE Ad Hoc Group on the Humane Killing of Animals for Disease Control Purposes, Paris, 14-16 October 2003.

Responsible authorities should ensure that all materials needed for culling are available in advance of the procedure, especially personal protective equipment (PPE) for the cullers. The supply of these materials should be adequate for the anticipated scale of the culling operation. The proper use of PPE is described in "WHO interim recommendations for the protection of persons involved in the mass slaughter of animals potentially infected with highly pathogenic avian influenza viruses".

The minimum number of people necessary to accomplish the culling should be involved. Designated cullers should be trained in safe and appropriate culling procedures and should work directly under the supervision of responsible persons/authorities. Designating trained sets of cullers, for example for each district, may allow for easier supervision. Untrained persons should not participate directly in the culling process. Every effort should be made to prevent inadvertent virus exposure by persons not protected during culling operations.

Cullers must be closely supported and supervised throughout the culling operation to facilitate their changing of goggles, taking rests/breaks, and proper degowning and decontamination. Individuals with knowledge of infection control and biosecurity should take responsibility for helping cullers safely remove/replace goggles, masks, and PPE when these become inoperative/soiled, and for scheduled rests/breaks. These individuals should also wear PPE but must not be involved in handling the animals. Additionally, they must oversee that all the safety precautions (stipulated in the WHO guidelines) are in place—making sure that complete and correct PPE is provided and properly used, transported from storage to culling site and back, disposed of or decontaminated, and stored for subsequent use.

Making portable showers and toilets accessible will further promote personal protection. Health and animal authorities will need to cooperate in coordinating the close monitoring of the health of cullers for a certain period following the operation (refer to WHO guidelines for the health monitoring of cullers).

E. Disposal of culled poultry, accumulated litter and other contaminated materials

The prompt and effective disposal of culled birds and contaminated materials that cannot be effectively disinfected (e.g. feeds, litter and eggs) is essential. Depending on local circumstances, burial may be the preferred method of disposal. Covering the buried carcasses with lime is a requirement since it protects the carcasses from being uncovered by animals and earthworms. Lime should not be placed directly on carcasses because in wet conditions it slows decomposition.

Although it is best to bury poultry and contaminated materials at the affected area or farm, this may not always be possible because of the local well-water table level or other environmental conditions. Therefore, a burial place away from the infected farm may be the best option, especially in situations where a number of farms are infected in a given area. In this case, a common and centrally located burial site may be most practical.

Under all circumstances, however, the transportation of culled birds and other contaminated materials must be done in covered leak-proof container-vehicles that can be disinfected after use. These containers and vehicles should never leave the contaminated area without first being thoroughly disinfected.

The disposal of litter can pose special problems as virus may be spread in dust. Therefore, it is necessary to moisten the surface of the litter with detergent or disinfectant solution before disturbing the pile prior to disposal.

Composting (thermal deactivation of the virus) of litter and other contaminated organic wastes is a recommended option that can best be undertaken in closed and vermin proof sheds on the affected farm. If sheds are not available, after spraying the material to be composted with detergent or disinfectant solution, push it into mounds away from any potential source of surface water and cover securely with black or dark plastic tarps. Composting should be done in a secure area not accessible by other animals such as rodents, cats, dogs or birds. To ensure inactivation of virus, the mounds should not be disturbed for at least 3 months (United States Department of Agriculture).

In general, open-air burning of carcasses and contaminated materials is not recommended. Open-air burning should not be practised because of the extended time it takes to achieve complete combustion of the carcasses and waste, and the inability to easily verify that all infective pathogens are destroyed in the resulting incomplete combustion process. If burning must be attempted as the only practical method of disposing of dead birds and contaminated materials, closed incineration should be practised. Incinerators should be well maintained by knowledgeable operators.

Refer to FAO's *Manual on Procedures for Disease Eradication by Stamping Out* for thorough description of disposal procedures. Before disposal work starts, personnel should be fully briefed. The nature of the disease and hygiene requirements associated with zoonotic diseases should be explained on site. It is crucial to select a site that is well protected from people and scavenging animals. On some occasions it may be necessary to mount a guard at the site for the first few days.

F. Decontamination and Disinfection

Strict adherence to decontamination and disinfection procedures is essential to the control of HPAI infection in affected areas. Refer to FAO's *Manual on Procedures for Disease Eradication by Stamping Out* for thorough description of decontamination and disinfection procedures.

Decontamination involves thorough cleaning and disinfection of the infected site to remove all contaminated material and sources of virus. Individuals should be trained to conduct the procedures.

Initial cleaning of organic matter from sheds, equipment, and vehicles by brushing and washing with detergent and water is an essential step before chemical disinfection. It is very important to recognize that influenza virus can be spread on clothing, footwear, poultry crates, feed sacks and egg fillers and these items must be disinfected, or destroyed, after each use. Paper or wood items cannot be effectively decontaminated, so they should be destroyed and buried.

All farm materials (e.g. feed containers, water buckets), tools, equipment, vehicles and the structures that are physically or functionally connected to the areas where infected poultry are located should be properly cleaned and disinfected.

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