

Chapter 3: Avian Influenza

Avian influenza (AI) is an infectious and contagious viral infection affecting most species of wild and domestic birds. Infrequently, the virus has been found to cross into and cause disease in unrelated species including pigs, cats, dogs, ferrets, martens and humans. Transmission of the virus from one bird to another occurs primarily through direct contact – typically through contact with respiratory secretions or feces. Airborne transmission may occur if birds are in close proximity and with appropriate air movement. Infection with the virus may result in asymptomatic birds, as is found in many waterfowl and shorebird species, or a diversity of disease manifestations, as seen in domestic poultry, varying from sub-clinical disease, mild respiratory disease and loss of egg production to an acute and highly fatal disease. Most AI viruses found in birds do not appear to pose any significant health risk to humans.

Since 1955, virtually all highly pathogenic outbreaks in domestic poultry have been attributed to viruses of the H5 and H7 subtypes. These subtypes have repeatedly demonstrated the tendency to mutate from low pathogenicity strains to highly pathogenic forms while circulating within poultry populations.

Since 2003, trade in domestic poultry and the movement of migratory birds has resulted in the spread of the H5N1 Eurasian strains to numerous countries in Asia, Africa, the Middle East and Europe. Although the number of human infections remains low, the mortality rate in those infected is high. To date, there has been no sustained, efficient human-to-human transmission of the H5N1 Eurasian strains, so direct contact with infected birds (mainly poultry) remains the greatest risk of human infection. Of particular concern is the possibility of re-assortment of genetic material between human and avian influenza viruses when they simultaneously infect the same swine or human host. This re-assortment could result in the formation of a new influenza virus subtype with pandemic potential.

The World Organization for Animal Health (OIE) sets international standards for the prevention, control

and eradication of animal diseases of significance. It manages the “world animal health information system” based on the commitment of member countries to notify the OIE of listed “notifiable” diseases. Canada, Mexico and the United States are OIE member countries. Consistent with OIE guidelines under the *Terrestrial Animal Health Code*, each country has a legal framework that requires the suspicion of a notifiable avian influenza (NAI) virus to be reported immediately to the competent veterinary authority. Veterinary infrastructure should be sufficient so that the competent veterinary authority can isolate and characterize the avian influenza virus, immediately investigate the suspicion of disease and respond to, control or eradicate the disease. The basis of response to any detection of NAI in poultry is contained within the OIE’s *Terrestrial Animal Health Code*.

Notifiable Avian Influenza

The conditions under which avian influenza viruses are subject to OIE notification are set out in Chapter 2.7.12 of the OIE *Terrestrial Animal Health Code*.

The competent veterinary authority of a country may choose to include more AI virus subtypes within its domestic notification protocols, but is encouraged to follow the OIE notification conditions in its dealings with its North American trading partners.

The competent veterinary authority of each country should notify its counterparts of any new NAI infections using pre-established contacts in the respective governments.

Zoning And Compartmentalization

In the event of an incursion of NAI virus into North American poultry, the three countries, as WTO Members, must comply with Article 6 of the *Agreement on the Application of Sanitary and Phytosanitary Measures (WTO SPS Agreement)*, including Article 6.2 which requires that WTO Members “shall, in particular, recognize the concepts of pest- or disease-free areas and areas of low pest or disease prevalence.” This could

entail the implementation of “zoning” or “compartmentalization,”¹ per OIE guidelines.

When establishing a zone or compartment, the competent veterinary authority of the affected country should clearly define and document the basis for its claim that the subpopulation is a distinct zone or compartment. It should provide for sufficient human and financial resources for the maintenance of such a zone or compartment and see that the veterinary and industry infrastructures have the required technical capacity. The birds belonging to a zone or compartment should be clearly recognizable as such and measures taken for the identification of the subpopulation should be documented in detail. Confirmation of the disease-free status of a zone or compartment should be maintained through effective monitoring as well as active and passive surveillance.

Where zoning or compartmentalization has been established for the purposes of maintaining international trade, the competent veterinary authority of the exporting country should provide the importing country with the necessary documentation to confirm that the zone or compartment is epidemiologically closed and that an appropriate surveillance and monitoring system is in place to verify its disease-free status. The competent veterinary authority of the importing country may then conduct a science-based risk assessment based on the information provided by the exporting country and provide, within a reasonable period of time, written notification to the exporting country of its recognition of the zone/compartment, a request for further information or its rejection of the zone/compartment.

The following commercial poultry compartments have been identified in Canada and the United States. The commercial poultry compartments for Mexico are pending signature of the Chief Veterinary Officers’ Memorandum of Understanding Regarding Compartmentalization:

1 As stated in the current Chapter 1.3.5 of the OIE Terrestrial Animal Health Code – 2006, ‘Compartment’ means one or more establishments under a common biosecurity management system containing an animal sub-population with a distinct health status with respect to a specific disease or specific diseases for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade. ‘Zone/region’ means a clearly defined part of a country containing an animal sub-population with a distinct health status with respect to a specific disease for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade. (http://www.oie.int/eng/normes/mcode/en_chapitre_1.1.1.htm#terme_compartment)

- Broiler, turkey or layer breeder production flocks;
- Duck breeder and upland game breeder flocks;
- Commercial (grow out) broiler and turkey flocks (meat-type birds);
- Commercial duck and goose meat-type production flocks;
- Pullet production flocks;
- Commercial layer (table egg) flocks; and
- Commercial poultry flocks used for the production of other commercial products such as feathers (down) and foie gras.

Surveillance/Epidemiology

Surveillance for NAI should be aimed at demonstrating the absence of NAI virus in the poultry sectors while also acting as an early detection system for incursions of NAI in poultry and highly pathogenic NAI (HPNAI) incursions in wild waterfowl. The competent veterinary authority of a country may choose to expand its surveillance program to include the identification of more AI virus subtypes than required by the OIE. The data collected should support the risk assessment process and substantiate the rationale for all biosecurity measures in place. The surveillance system should be under the direction of the competent veterinary authority in each country.

The competent veterinary authority of each country should promote the establishment of a formal and ongoing system for detecting and investigating suspected NAI infection. Procedures should be established so that all suspected cases of NAI are sampled rapidly, that the samples collected are appropriate for the species under investigation, that there is a mechanism in place to rapidly transport the samples to an approved NAI diagnostic laboratory and that the integrity of the samples is maintained at all times. The competent veterinary authority should promote the establishment of an effective system in place for the recording, managing and analyzing of diagnostic and surveillance data. Access to real-time data is of particular importance in an outbreak situation, since it will drive the control and prevention strategies. Methodologies used should be based on the best available information that is in accordance with cur-

rent scientific thinking and should be fully documented, referenced to the scientific literature and supported by expert opinion. All processes should be transparent for the purpose of fairness, the rationality and consistency of decision making, and to facilitate ease of understanding. The surveillance systems used should be subject to periodic auditing so that all of the systems' components are functioning according to the design criteria.

Surveillance programs should include imported poultry and birds for the pet trade, as well as birds for research and zoological display purposes.

Poultry Surveillance

The surveillance program for poultry should include both active and passive data collection for all levels of the production, marketing and processing chain, and all compartments within the poultry population. Ideally, it should include all susceptible poultry species but may be targeted to poultry populations at specific risk due to types of production, contact with wild birds, trade patterns or other significant factors. Active surveillance should occur at a frequency of at least six months, or according to recognized and established national surveillance program requirements, e.g., USDA's National Poultry Improvement Plan. Surveillance methods should include both random and targeted approaches using virological, serological and clinical methods with known and validated sensitivity and specificity.

In countries, zones or compartments where vaccination has been used to prevent the spread of HPNAI, surveillance programs should utilize virological and serological testing regimens that verify the absence of AI virus circulation as set out in Article 3.8.9.7 of the *OIE Terrestrial Animal Health Code*.

Wild Bird Surveillance

Effective wild bird surveillance provides an early warning system for potential or real threats that may exist in the wild bird population. Surveillance would allow an appreciation of changes in the types of AI viruses circulating in wild birds and detect any H5/H7 subtypes present that could result in the emergence of a highly pathogenic strain in domestic poultry. Advance warning would enable the poultry sector to adopt enhanced biosecurity measures and allow poultry surveillance programs to

be targeted to those populations or compartments at increased risk.

The competent veterinary authority should collaborate with wildlife agencies, universities and others to increase surveillance of wild birds, with an emphasis on waterfowl and shorebirds migrating from other mainland continents. Wild bird surveillance should be conducted at least annually during the periods when the movement or entry of migratory wild birds may pose an increased risk to domestic poultry. Wild bird surveillance programs should include active and passive methodologies and should include live and dead bird sampling.

Border Control Measures Associated With Notifiable Avian Influenza

Each country should apply proper and proportional import health measures when NAI is confirmed and reported. These measures are intended to maintain the animal health status of the importing country while minimizing the impact on the trade of poultry, poultry products and other products from avian species among Canada, Mexico and the United States. Import measures applicable to NAI should be based on the *OIE Terrestrial Animal Health Code*, including chapters on NAI and Zoning and Compartmentalization, and consistent with the WTO Agreements, particularly the WTO SPS Agreement and the NAFTA, particularly Chapter Seven, Part B (Sanitary and Phytosanitary Measures).

To enable a common approach that is both consistent and uniform among the countries, Canada, Mexico and the United States recognize that conditions for regional trade should be established to minimize unnecessary trade disruptions among the three countries. This is reflected in the understanding entitled *Agreement Between the Chief Veterinary Officers (CVO) of the United States and Canada For Reporting and Applying Measures When Notifiable Avian Influenza Is Confirmed in Each Respective Country (2006)*, contained in Annex 3. Mexico and the United States are developing a similar understanding based on OIE guidelines. Mexico's measures are pending trilateral discussion on the CVO's Memorandum of Understanding.

The competent veterinary authorities in each country should establish links with their respective border control

agencies to develop procedures to control legal imports and to detect illicit imports.

When a highly pathogenic variety of avian influenza exists outside North America, each of the three countries should enhance inspection methods to detect illicit trade in animals and commodities from the affected countries. Regulatory enforcement information related to the detection of illegal trade should be shared among Canada, Mexico and the United States.

Laboratory Practices

The laboratories conducting testing for the avian influenza virus should be authorized or certified by the country's Reference Laboratory to perform these test methods, and should follow the tests and procedures recommended in the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*. These include serological tests, virus identification/isolation and virus characterization. Reporting to OIE should be based on the "recognized standard," which includes virus isolation, complete subtyping of any H5/H7, the genetic sequencing of the hemagglutinin (HA) cleavage site and Intravenous Pathogenicity Index (IVPI) testing in chickens. All viral isolations and characterizations should be confirmed at a Reference Laboratory.

Procedures should be developed so that adequate supplies of diagnostic materials/reagents are available in the event of an NAI outbreak. These procedures should include provisions for the import/export of diagnostic materials/reagents among Canada, Mexico and the United States, as well as contingencies for the rapid cross-border movement of diagnostic specimens and isolates.

Contacts should be established among animal health, avian-influenza-virus testing laboratories in the three countries to recognize the methodologies, proficiency and equivalence of methods used for the diagnosis of avian influenza. Linkages should be established/strengthened between the animal health and the public health laboratory systems in each country to improve the exchange of information and to enhance public health surveillance. Information technologies should be examined to identify opportunities that would enhance rapid data transfer.

Avian Influenza Vaccines

Vaccination is recognized as a valuable tool and as part of an overall comprehensive management strategy to control and eradicate avian influenza in the affected and at-risk avian populations. Although vaccination has been shown to increase resistance to infection and reduce virus shedding, it is understood that the virus is still able to infect and replicate in clinically healthy vaccinated birds. Countries employing vaccination should be able to differentiate infected from vaccinated animals, or determine the absence of NAI virus through comprehensive surveillance programs that include environmental sampling, in accordance with the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*.

Each country should develop and implement a vaccination strategy that is effective within the scope of its disease control methodologies. This strategy should include a reliable system of monitoring and surveillance to identify rapidly any serious problems arising from the use of vaccines.

The competent veterinary authorities of the three countries intend to develop protocols to harmonize the circumstances under which vaccines would be employed. International arrangements or agreements should be developed to provide for an adequate supply of avian influenza vaccine in the event of a North American outbreak, including a mechanism for the rapid cross-border movement of vaccines.

Personnel

The three countries should regularly assess the capacity of their operational and laboratory systems to provide for sufficient capacity for the performance of routine surveillance as well as of expanded surveillance during an NAI isolation in domestic poultry or wild birds. The competent veterinary authority should have emergency disease response contingency plans in place and the capacity to deploy properly trained staff to manage and direct disease eradication and control measures when required.

The three countries may seek the assistance of staff with skills and experience from international sources to respond to an avian influenza outbreak. Contingency plans to expand the available resource base should be in

place in the event that current resources are exceeded, and should be shared among Canadian, Mexican and U.S. veterinary authorities. Procedures that would allow rapid entry and deployment of emergency responders across international, provincial and state jurisdictional boundaries should be considered within the contingency plans of each country. The competent veterinary authorities should identify and address barriers to the movement of animal health/veterinary personnel across international, provincial and state jurisdictional boundaries. Countries should have well-developed health and safety protocols for personnel that may be exposed to the virus, including the use of influenza vaccines and antiviral medications where necessary. Contingencies should include the possibility of exposure to NAI strains, which have the potential to result in human-to-human transmission.

Avian Health Information Sharing and Notification

The three countries should strive for open communication and sharing of information regarding the occurrence of NAI virus in domestic poultry so that proper, responsible and proportional import health measures can be applied by each country when NAI virus is confirmed and reported. When requested, Canada, Mexico and the United States intend to share with one another information on their isolates of NAI virus in poultry and highly pathogenic avian influenza (HPAI) virus in wild birds, and in birds other than poultry. Confirmation of NAI should include virus isolation, H5/H7 complete subtyping and genetic sequencing of the HA cleavage site of the HA protein. Notifications of any NAI should follow OIE guidelines as well as chief-veterinary-officer-to-chief-veterinary-officer agreements, and should occur between the corresponding import/export staff of each country. These notifications should minimize the impact such measures would have on the trade of poultry, poultry products and other products from avian species among the countries.

Avian and Human Health Interface

The emergence of the highly pathogenic H5N1 viruses has demonstrated the potential zoonotic impacts of certain strains of HPAI viruses given a coincident combination of epidemiologic factors – susceptible host, agent and environment – according to the principles of the epidemiological triad. Two of the most effective methods of protecting human populations from exposure to NAIs are by prevention and control of any exposure to domestic poultry of NAIs and by rapid containment and eradication of NAI-infected birds should an introduction occur. Prevention of domestic poultry exposure can be best achieved through the implementation of comprehensive surveillance programs, biosecurity protocols and adoption of effective import controls. Prevention of human exposure can be best achieved by adopting procedures to protect the health of individuals working in environments where HPAI virus may be found and by organizing public education programs on the importance of good hygiene and sanitation practices. Human health authorities should develop contingency plans that identify the risk to human health of low pathogenicity and highly pathogenic avian influenza viruses in wild and domestic birds, and should adopt appropriate response measures to manage the potential risks for the human population at risk.²

Human health authorities in Canada, Mexico and the United States should share best practices in occupational health, infection control and personal protective measures to reduce potential risk to human populations.

The competent veterinary authorities in the three countries should establish the appropriate contacts within their respective public health sectors for the purpose of consistency in the approach to public communications. Regular meetings should be held to review the communications framework, to identify emerging issues and to share communication products, where appropriate.

2 The Public Health Agency of Canada has developed guidelines entitled “Human Health Issues Related to Avian Influenza in Canada,” available at http://www.phac-aspc.gc.ca/publicat/daio-enia/pdf/nat-ai-guide-2006_e.pdf