Avian influenza—ensuring preparedness for a rapidly emerging zoonosis

Mike Nunn outlines preparedness for avian influenza

Abstract

The recent emergence of avian influenza (AI) as a disease capable of infecting humans requires a multidisciplinary approach at local, national and international levels to ensure adequate preparedness for either animal or human outbreaks. It also requires regional co-operation and targeted development assistance, supported by applied research to provide optimal preventive and response options. Australia has experience with AI in poultry and has a strong capacity in research on both animal and human influenza. Sharing this experience and capacity with Asian countries helps them control the disease. It reduces the likelihood of further outbreaks in poultry and the possibility of the emergence of new influenza viruses capable of person-to-person transmission.

Introduction

Over the past few years, AI has emerged as the cause of an increasing number of outbreaks of disease in poultry, significant disruptions to trade, and a number of human cases of disease. Public health authorities are also concerned that AI might lead to a new virus capable of person-to-person spread, potentially causing a worldwide epidemic (pandemic) of influenza in humans.

Previous outbreaks

The AI viruses responsible for the disease originally called 'fowl plague' (and now called 'highly pathogenic AI', HPAI) were identified only in 1955, although fowl plague was first described in 1901. Since 2000, there have been more outbreaks of HPAI than in the preceding 45 years, and these have involved much larger areas and greater numbers of birds.

AI viruses are classified into subtypes on the basis of their molecular structure. For example, the 'classical' fowl plague virus is identified as H7N7 and the subtype that caused the 2003–04 epidemic of HPAI in poultry in several Asian countries is H5N1. Five outbreaks of HPAI have occurred in poultry in Australia. The first (1976: H7N7) involved three adjacent poultry farms in a Melbourne suburb. The second (1985: H7N7) and third (1992: H7N3) outbreaks both occurred near Bendigo. The fourth (1995: H7N3) occurred near Lowood, in south-eastern Queensland, and the fifth (1997: H7N4) near Tamworth in New South Wales. Each outbreak was eradicated by adopting a 'stamping-out' policy based on slaughter, disinfection and movement controls.

The current epidemic in Asia

The 2003–04 epidemic of H5N1 HPAI in poultry in Asia involved a larger geographical area and a faster rate of spread than any previous outbreaks of this disease and resulted in the death or slaughter of more than 100 million poultry. Its rapid spread across national boundaries demonstrates that H5N1 HPAI must be managed as a 'transboundary animal disease' through the co-operation of countries in the region. Outbreaks of H5N1 reported in China, Indonesia, Thailand and Vietnam in July and August are a reminder to Australia to maintain its vigilance for the disease.

Host range and clinical signs

All domesticated poultry and many species of wild bird are susceptible to infection with AI. Many species of wild birds and waterfowl carry the virus but generally show no signs of disease, which occurs most frequently in chickens and turkeys. The clinical signs include sudden death, a drop in egg production, loss of appetite, and diarrhoea. The signs vary depending on factors such as the strain of the virus and the age and species of the birds infected.

AI viruses can be brought into Australia by nomadic or migratory wild birds and then cycle through Australian wild waterfowl. Direct or indirect contact (through contamination of drinking water) with wild waterfowl is the most likely initial source of infection of poultry in Australia. Spread can also occur through movement of infected birds (e.g. at markets), contact of domestic poultry with contaminated eggs or equipment (crates, feed trucks etc.), or via humans (through contaminated footwear or clothing).

H5N1 AI virus can infect humans who come in close contact with affected birds. The World Health Organization (WHO) has confirmed 27 human deaths due to H5N1 in 2003–04. Although there is no

evidence of sustained transmission of this virus between people, public health authorities have expressed concerns that H5N1 AI might acquire the ability to spread from person to person, potentially causing a pandemic of influenza in humans.

Australia's response to H5N1 in Asia

Australian human and animal health authorities continue to monitor developments in the region and remain in regular contact with relevant agencies overseas. Australian Government Departments—including Agriculture, Fisheries and Forestry (DAFF), Environment and Heritage (DEH), Health and Ageing (DHA), and Foreign Affairs and Trade (DFAT)—are collaborating closely on a range of preparedness and response issues.

State and Territory agencies and industry groups were alerted to upgrade monitoring of any unusual signs in susceptible species so they can be immediately investigated. Regular information updates are provided to State and Territory agencies, poultry industry associations, veterinarians, wildlife carers and other special interest groups to keep them informed about the disease.

Border staff of DAFF's Australian Quarantine and Inspection Service (AQIS) screen all flights from high risk countries, paying particular attention to eggs, egg products, poultry meat, feathers and similar items. All international mail is also screened. Maximum use is being made of X-ray machines, detector dog inspections, and the physical opening and checking of luggage and mail items. AQIS continues to work closely with DHA on border controls and awareness, including appropriate extension materials in English and other languages. It also operates the Northern Australia Quarantine Strategy (DAFF 2004), which conducts targeted surveillance in northern Australia, the Indonesian province of Papua, Papua New Guinea, and Timor Leste.

To ensure Australia's preparedness, three government-industry working groups continue to progress work on occupational health and safety issues, risk assessment of potential spread in Australia, and a range of scientific issues. The development of biosecurity plans (AHA 2004a) is an important component of cost-sharing arrangements (AHA 2004b) that underpin any response. Public awareness activities aim to ensure poultry growers and bird-keepers are alert to any unusual signs of disease and report them immediately to local vets, agricultural agencies, or the animal disease hotline (on 1800 675 888).

If an outbreak were to occur in Australia, the response would follow AUSVETPLAN (AHA 2004c), Australia's well-rehearsed veterinary emergency plan. Australia's strategy (AHA 2004d) for HPAI is to eradicate the disease by immediate stamping-out and disposal of infected and in-contact birds to remove the major source of infection. This strategy would be supported by:

- strict quarantine and movement controls to prevent the spread of infection;
- decontamination to remove and reduce the virus;
- tracing and surveillance to locate the source of infection, locate other infected premises, and determine the extent of the infection; and
- zoning to define infected and disease-free areas.

Vaccination might also be an option in some circumstances. Such measures must be implemented in combination and supported by surveillance to ensure early detection and rapid response. Public education and awareness campaigns are important to help in controlling the disease and to safeguard public health.

Australia's Chief Veterinary Officer and its Chief Medical Officer, and their respective staff, are in regular contact about zoonotic diseases, including AI. If AI were to pose a significant threat (direct or indirect) to Australia's human population, the Australian Government would activate Australia's Action Plan for Pandemic Influenza (CDA 2004) Additional public health information about AI is available on the DHA website (DHA 2004)

International activities

At a meeting in Bangkok in late July, the Food and Agriculture Organization (FAO), in collaboration with the Office International des Epizooties (which is the world organisation for animal health), launched a new regional diagnostic and surveillance network for AI in South-East Asia. The approach adopted is similar to the successful co-ordination approach used in the OIE South-East Asian Foot-and-Mouth Disease Control and Eradication Campaign. The initiative was welcomed by WHO as it will strengthen surveillance in animals and should provide more rapid detection and diagnosis of the disease.

The Australian Government provided $1 million, through AusAID, to assist affected Asian countries. Of this, $350 000 was provided to DAFF to co-ordinate and manage targeted technical assistance in animal health. Assistance included diagnostic laboratory and veterinary epidemiological support (including a regional training course on surveillance and control of HPAI conducted in Singapore in conjunction with that country's Agri-Food and Veterinary Authority, and expert assistance on epidemiological surveillance in Indonesia). The AusAID-funded project supported the role of CSIRO's Australian Animal Health Laboratory (AAHL) as an OIE Regional Reference Laboratory

for AI, including provision of additional diagnostic reagents to other countries. It also supported a training course for regional veterinarians at AAHL on laboratory diagnosis of HPAI, and a total of four-weeks input on HPAI testing and associated quality control procedures by an experienced veterinary virologist at four diagnostic laboratories in Indonesia.

DAFF, the Australian Centre for International Agricultural Research (ACIAR), AusAID, AAHL and other agencies including the Australian Biosecurity Cooperative Research Centre (AB CRC) are collaborating on possible future technical assistance and scientific research on AI. There are opportunities for targeted assistance, particularly in enhancing human resource capacity in emergency animal disease preparedness, diagnostic laboratory capability, and epidemiological surveillance (including information systems and reporting). There are also opportunities for collaborative research to help to elucidate the epidemiology and ecology of AI viruses circulating in the region and to develop improved preventive strategies.

Through such collaborative international work, Australia can maintain its high level of preparedness against AI and help to ensure that Asian countries control the disease and reduce the potential for further epidemics in poultry and the possibility of the emergence of viruses capable of person-to-person transmission.

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