Technical Issue Update - Global High Pathogenicity Avian Influenza Events

Developed by the National Avian Influenza Wild Bird Steering Group

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Summary

This document aims to summarise the current global HPAI events and the risks to Australia, with a focus on the H5Nx HPAI clade 2.3.4.4b. Recognising the increased risk to Australia and the need for heightened vigilance, this document will also summarise activities to reduce this risk.

High pathogenicity avian influenza (HPAI) virus caused by H5 subtypes of the A/goose/Guangdong/1/96 lineage have been endemic in various parts of Asia for the past two decades. This lineage has persisted and constantly evolved through mutation and reassortment, causing HPAI outbreaks in both wild birds and poultry overseas, mostly in Asia and Europe. Since 2021, a new strain from this lineage, H5Nx[1] clade 2.3.4.4b has caused unprecedented outbreaks of HPAI in wild birds and poultry in all continents apart from Oceania (including Australia and New Zealand) and Antarctica. The emergence of this strain is associated with a significant increase in the frequency and geographic range of HPAI outbreaks in both wild birds and poultry overseas. Mortalities in wild birds have been observed in a wide range of species, seen as individual bird deaths and mass mortalities.

The risk of introduction of HPAI virus to Australia was previously assessed as low (East et al. 2008; East et al. 2008; Curran 2012; Wille et al 2019)[2], however recent assessment indicates that with the emergence of the new strain of HPAI virus, the likelihood of introduction to Australia via migratory birds has increased compared to previous years[3]. Between August and November is the period of particular concern as this is when migratory birds return to Australia from the northern hemisphere.

To report unusual or mass sickness and deaths in domestic and wild birds:

You can call the Emergency Animal Disease Hotline on 1800 675 888 wherever you are in Australia. This will put you in touch with your department of agriculture or primary industries. See: https://www.outbreak.gov.au/report-outbreak

Unusual signs of disease or deaths in wildlife can also be reported to State/Territory WHA Coordinator

[1] HPAI H5 clade 2.3.4.4b viruses have a diversity of neuraminidase subtypes, and therefore the convention H5Nx will be used for the purposes of this document. In the vast majority of cases the outbreaks are caused by H5N1 and to a lesser extent H5N8. Other H5Nx subtypes have been detected, but these are secondary, having caused a substantially smaller impact compared to H5N1 and H5N8.

[2] Note: East et al. 2008; East et al. 2008; Curran 2012 assessed the risk of introduction of H5 clade 2.2.1 C viruses to Australia. Wille et al 2019 explored exposure of the long-distance migratory red-necked stint to H5 including clade 2.3.4.4 viruses.

[3] A formal risk assessment of the H5Nx HPAI clade 2.3.4.4b was undertaken in 2023 but has not yet been published.

What is Avian Influenza?

- Low pathogenicity forms of avian influenza (LPAI) virus naturally occur in wild birds, notably waterfowl (ducks, geese and swans) and shorebirds, with little ill effect. Wild birds harbour a considerable diversity of LPAI virus subtypes: 16 HA (haemagglutinin) and 9 NA (neuraminidase) subtypes.
- Some specific LPAI virus subtypes (subtypes H5 and H7) can evolve to HPAI virus following spillover and circulation in poultry.
- Infection with HPAI viruses typically cause severe disease in poultry and may also impact other species including wild birds, humans, and other mammals. The *spillback* of HPAI virus from poultry into wild birds contributes to the geographic spread of HPAI virus (**NOTE:** The epidemiology of currently circulating strains of HPAI virus does not fit this typical pattern. See Current Global Situation below).
- Although avian influenza viruses (AIVs) do not normally infect humans, some subtypes have been associated with disease in humans ranging from mild illness to severe disease.
- Multiple lineages and strains of AIVs have been classified based on sequence analysis and distributions of the viruses in hosts, geographic locations and time. AIVs constantly evolve by error-prone replication (mutation) and reassortment resulting in ongoing emergence of new lineages and reassortants.
- Of profound concern are HPAI H5Nx viruses belonging to the A/goose/Guangdong/1/96 lineage. This lineage was first detected in 1996, and since its emergence it has continued to evolve, resulting in a large diversity of clades and genotypes that have caused significant outbreaks of disease in poultry, particularly in Europe and Asia. These viruses are endemic in multiple countries in Asia.
- Around 2013, a new clade of A/goose/Guangdong/1/96 lineage emerged, 2.3.4.4. Clade 2.3.4.4 H5Nx viruses have the propensity to have a diversity of NA subtypes. Between 2014-2020, H5N6 and H5N8 were the dominant HA-NA subtype combinations detected. Clade 2.3.4.4 viruses demonstrated increased capability to infect and be dispersed via migratory wild birds.
- The current strain circulating overseas belongs to A/goose/Guangdong/1/96 HPAI H5Nx virus clade 2.3.4.4b with the H5N1 subtype combination being the dominant subtype combination. These strains significantly differ from previous HPAI H5 viruses in their increased pathogenicity, replication and viral shedding in wild birds, increased avian and mammalian host range, increased persistence of virus in the environment and ability to spread via a wide range of avian species including both poultry and wild birds.

Avian Influenza in Australia

- HPAI H5Nx viruses belonging to the A/goose/Guangdong/1/96 lineage, including viruses in the clade 2.3.4.4b, have not been detected in Australia (NAIWB Surveillance Program; Wille & Klaassen 2023).
- LPAI viruses have been detected in wild birds in Australia and are part of the natural virus community of Australian wild birds. HPAI virus has not been detected in Australian wild birds,

other than detection of HPAI H7 virus in one feral Eurasian starling trapped inside an affected poultry shed during a 1985 HPAI H7 outbreak.

- Since 1976, there have been eight outbreaks due to HPAI H7 viruses in Australian poultry, with the most recent being in 2020 in Victoria, all of which were successfully eradicated. All had evidence of contact with wild waterfowl or inadequately treated drinking water that had potentially been contaminated by wild waterfowl. These outbreaks were most likely caused by introduction of local wild bird LPAI viruses and subsequent mutation from LPAI virus to HPAI virus after circulation in poultry: a well-documented occurrence.
- The National Avian Influenza Wild Bird Surveillance (NAIWB) program collects and screens samples from Australian wild birds for avian influenza viruses and the data generated are used to monitor and understand avian influenza in wild birds in Australia. Sequence analysis of avian influenza viruses detected in wild birds through the NAIWB program contributes to tracking Australian virus evolution and dynamics, maintaining currency of diagnostic tests, and maintaining a virus sequence library allowing comparison of Australian and overseas strains.
- Based on sequence analysis to date it can be concluded that incursions of overseas avian influenza viruses into Australia are infrequent (Bhatta et al. 2020; Hoque et al 2015; Hoye et al. 2021; Hurt et al 2006; Kishida et al. 2008, Vijaykrishna et al. 2013, , Wille et al. 2022), with LPAI virus sequences forming distinct Australian lineages (Bulach et al. 2010; Hansbro et al. 2010; Wille et al. 2022).

Current Global High Pathogenicity Avian Influenza Situation

- The current strain circulating overseas, which emerged in 2021, belongs to A/goose/Guangdong/1/96 HPAI H5Nx virus clade 2.3.4.4b.
- Between October 2021 and June 2023, there were 9080 notifications of HPAI outbreaks in wild birds and 8203 in poultry to the World Organisation for Animal Health (WOAH)[4]. These have occurred on all continents apart from Oceania (including Australia and New Zealand) and Antarctica, and have caused significant mortalities in wild birds and poultry. These outbreaks represent a significant increase in the intensity, frequency and geographic range of HPAI outbreaks compared to previous years.
- Clade 2.3.4.4b viruses have infected a much larger range of wild bird species than previous strains, which has likely contributed to the rapid spread of this strain around the world, and incursion into countries not previously affected by HPAI.
- While clade 2.3.4.4b has been detected in apparently healthy wild birds, it has also contributed to a number of substantial wild bird mortality events. This includes the mortality of 8000 Eurasian cranes in Israel in December 2021 and January 2022, ~20% of the Svalbard breeding population of barnacle geese in the United Kingdom in January 2022, and over 60,000 wild birds in Peru in 2022-2023[5].
- Clade 2.3.4.4b has also resulted in unprecedented morbidity and mortality events in terrestrial and aquatic mammals, with at least 26 species known to have been affected[6]. Examples of

[4] https://wahis.woah.org/#/home
[5] https://www.cms.int/sites/default/files/uploads/avian_influenza_0.pdf
[6] https://www.who.int/news/item/12-07-2023-ongoing-avian-influenza-outbreaks-in-animals-pose-risk-to-humans

such events include a mass mortality in marine mammals and birds in Peru in 2023 (Leguia et al., 2023), mortalities in marine birds and mammals in Chile in 2022-2023 (Azat et al., 2023), and an outbreak at a mink farm in Spain in 2022 (Aguero et al., 2023).

- Human infections with the clade 2.3.4.4b are uncommon and have typically only occurred in people who have had close contact with infected domestic or wild birds. Human infection may be asymptomatic or result in severe illness (see Australian Department of Health and Aged Care).

The risk of avian influenza to Australian wild birds and commercial poultry

- LPAI viruses known to circulate in Australian wild birds remain a constant biosecurity threat to Australian poultry through direct or indirect (e.g. contaminated drinking water, fomites) contact.
- HPAI outbreaks in poultry in Australia were due to endemic strains of AIVs closely related to LPAI viruses already circulating in Australian wild bird species, and not a recently arrived overseas AIV strain.
- Previous research (prior to the emergence of the 2.3.4.4 clade) assessed the overall risk of introduction of HPAI virus to Australia via migratory birds to be low (East et al. 2008; East et al. 2008; Curran 2012). This is because the usual species responsible for long-distance transmission of HPAI virus overseas are waterfowl (*Anseriformes*), whereas in Australia waterfowl are not migratory (but are nomadic within the Australo-Papuan region).
- Shorebirds (order *Charadriiformes*) regularly migrate between Australia and Asia. Recent research has demonstrated that Australian migratory shorebirds are being exposed to HPAI H5Nx clade 2.3.4.4 viruses along their migratory route between Asia and Australia. However, there is currently no evidence that these migratory birds are carrying infectious HPAI H5Nx clade 2.3.4.4 viruses when they arrive in Australia (Wille et al 2019). Recent sampling of inbound migratory seabirds and shorebirds for HPAI H5N1 virus between September and December 2022 found no evidence of viral incursion in Australia (Wille et al. 2022).
- A formal risk assessment of the risk to Australia of the H5Nx HPAI clade 2.3.4.4b was undertaken in 2023 but has not yet been published. This risk assessment found that the risk of HPAI virus incursions into Australia via wild birds has increased due to changes in the epidemiology and ecology of viruses within the current HPAI H5N1 clade 2.3.4.4b. Poultry industries, wild bird and mammal populations, and potentially humans, will be impacted should disease enter and become established within Australia.
- Migratory birds return to Australia from the northern hemisphere between August and November, making this the key risk period.

What should Australia do to reduce the risk?

- Maintain best biosecurity practices (Biosecurity Guidelines for Poultry Producers and Wildlife Professionals)
- Deter wild birds, particularly waterfowl, from poultry farms and minimizing indirect contact by treating drinking water for poultry.

- Continue to report and investigate unusual and mass sickness and deaths in domestic and wild birds. For more information on reporting wildlife incidents, refer to WHA HPAI advice for veterinarians and wildlife health professionals.

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  Unusual signs of disease or deaths in wildlife can also be reported to State/Territory WHA Coordinator
- Despite the relatively low zoonotic potential of the current circulating viruses as noted above, health and safety measures should be employed for those handling birds and materials. Further Safety advice - Protecting yourself and the animal can be found on the WHA website.
- Continue to strengthen surveillance and monitor AIV strains circulating in apparently healthy Australian wild birds for overseas strains through the NAIWB program.
- Continue to work with our near-neighbouring countries to monitor for AIV events.

What is currently being done to address the potential AIV threat?

- Australia's **national avian influenza wild bird surveillance program** includes:
  - **Targeted surveillance:** faecal environmental swabs and cloacal and/or oropharyngeal samples collected from 'apparently' healthy, live and hunter-shot wild birds.
  - **General surveillance:** investigation of significant, unexplained morbidity / mortality events in wild birds (with a focus on H5 and H7 virus exclusion testing).
- Sequence analysis of AIVs detected in wild birds through the national program contributes to tracking Australian virus evolution and dynamics, maintaining fit-for-purpose diagnostic tests, maintaining a virus sequence library allowing comparison of Australian and overseas strains. Read more in Wild Bird News.
- In commercial poultry, surveillance is based around passive and syndromic surveillance activities, with intermittent active surveillance associated with outbreak response, research or industry/jurisdictional initiatives. These activities are run at the jurisdictional level (Commonwealth of Australia, 2010).
- A number of recent publications have assessed the risk to Australia from endemic and overseas AIV strains. See the WHA website for a list of recent papers.
- Current analysis and research continues on:
  - patterns of wild bird virus infections in Australia.
  - wild bird AIV sequence data to better understand transmission patterns (including reassortant events) and connections across space, time and host species.
  - development of Nextstrain software to track Australian AIV evolution in real-time.

Further information

Please note: all Australian Jurisdictions require that all avian influenza virus infection is reported to the relevant Chief Veterinary Officer (CVO). The national notifiable diseases list does not specify strains of AI but includes avian influenza. For further information see: https://www.agriculture.gov.au/pests-diseases-weeds/animal/notifiable

Wildlife Health Australia

- Fact sheet: Avian influenza in wild birds in Australia
- High Pathogenicity Avian Influenza Information
- National Avian Influenza Wild Bird Surveillance

Australian Biosecurity Manuals

- National Wildlife Biosecurity Manual
- National Farm Biosecurity Manuals – Poultry (e.g. chickens)
- National Zoo Biosecurity Manual
- Australian Veterinary Association (2017) Guidelines for Veterinary Personal Biosecurity

Australian Department of Agriculture, Fisheries and Forestry

- Information on Avian Influenza or Bird Flu and Information for bird owners
- Outbreak.gov.au provides details on how to prepare for and respond to animal pests and diseases.
- Descriptive characteristics of the seven HPAI outbreaks in Australia from 1976 to 2013 and of the confirmed LPAI reports in poultry in Australia from 1976 to 2018 are described in Scott et al. 2020.

Human Health

- Australian Department of Health and Aged Care information on Avian influenza in humans
- The Communicable Diseases Network Australia (CDNA) National Guidelines for Public Health Units on Avian Influenza.
- Australian Health Management Plan for Pandemic Influenza

AUSVETPLAN

- The Avian Influenza AUSVETPLAN sets out the nationally agreed response approach to Avian Influenza outbreaks in Australia. This includes agreed policy in Australia with respect to LPAI or HPAI virus detection in wild birds.
- The **AUSVETPLAN Disease Strategy for Avian Influenza** can be downloaded from Animal Health Australia website under Disease-specific documents**.**

Global Situation

- World Organisation for Animal Health (WOAH) updates on avian influenza in animals (types H5 and H7).
- Joint OIE-FAO Scientific Network on Animal Influenza (OFFLU) situation updates and statements on avian influenza.

- Food and Agriculture Organisation of the United Nations (FAO) Global AIV with Zoonotic Potential situation update.
- Avian influenza in Europe update.
- Convention on the Conservation of Migratory Species of Wild Animals Scientific Task Force on Avian Influenza and Wild Birds.
- World Organisation for Animal Health & IUCN Wildlife Health Specialist Group Avian Influenza and Wildlife: Risk management for people working with wild birds
- Centres for Disease Control and Prevention Information on Bird Flu
- Regional or country-specific data
    - European Union Reference Laboratories (EURL) Avian Flu Data Portal
    - Canadian Food Inspection Agency National Emergency Operations Center GIS services High Pathogenicity Avian Influenza in Wildlife dashboard
    - United States Department of Agriculture HPAI in wild birds map