Wild Bird News

National Avian Influenza Wild Bird Surveillance Newsletter - June 2019

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Contribution to national laboratory diagnostic capacity and capability

In response to the emergence of HPAI H5N1 in Asia, national surveillance for avian influenza (AI) in wild birds was further strengthened in Australia in 2006 and included the establishment of the National Avian Influenza Wild Bird (NAIWB) Steering Group. The group ensures national coordination and collaboration of wild bird surveillance activities.

NAIWB surveillance activities are conducted Australia-wide, with funding provided by the Australian Government Department of Agriculture, Water and the Environment, in addition to in-kind support provided by the jurisdictional agencies, researchers and representative's institutions.

Activities comprise two sampling components:

- Targeted surveillance (samples are collected from known wild bird reservoirs - e.g. waterfowl - at key locations, and tested for specific pathogen(s) such as AIV), and
- General surveillance (investigation of significant, unexplained morbidity and mortality events in any species of wild bird, with a focus on exclusion testing for AIV).

Find out more in [Wild Bird News - December 2018](#).

Analysis of AIVs from wild birds provides valuable ecological, epidemiological and genomic information that contribute to strategic risk assessment, management and communication.

Avian Influenza Virus

To date, 16 haemagglutinin (HA; H1-H16) and 9 neuraminidase (NA; N1-N9) subtypes are recognised in birds. **Waterfowl and shorebirds are the main natural reservoirs and rarely show signs of disease.** Avian Influenza Virus (AIV) can cause significant infectious disease in domestic poultry and can also infect and/or cause disease in a range of other species including wild birds and humans[1,2].

Of global concern is the capacity of AIV subtypes H5 and H7 to mutate from Low Pathogenicity (LPAI) into **High Pathogenicity (HPAI) forms which can cause significant losses in both poultry and wildlife.**

AIV in Australia

Whilst **HPAI H5 viruses have not been detected in Australia**, there have been seven outbreaks due to HPAI H7 viruses in commercial poultry operations since 1976 in Victoria, Queensland and the last in 2013 in New South Wales[3,4,5,6,7,8].

Mortality due to AIVs have not been reported in feral or native free-ranging birds[9]. However, **LPAI viruses have been detected in wild birds in Australia.**

Given Australia's geographic and ecological isolation, **it is important that assumptions about AIV epidemiology in Australia are not based entirely on studies from Asia, Europe or North America[10,11].**

More info: [WHA FACT SHEET](#)

This Wild Bird News issue explores how the NAIWB targeted surveillance activities contribute to national laboratory diagnostic capacity and capability.

Monitoring AIVs in wild birds maintains ongoing capacity to rapidly and reliably test for AIVs of any subtype in Australian poultry and wild birds.

All viruses, including AIVs, undergo constant evolution, which leads to changes in their genetic sequences and sometimes the emergence of new strains of the virus. Molecular diagnostic tests for AIV are predominantly based on real-time reverse transcription PCR (RT-PCR) assays targeting a specific section of the virus's genetic sequence - i.e. the 'PCR primer and probe target sequences'. Given the propensity of influenza viruses for genetic variation, changes to the 'PCR primer and/or probe target sequence' may impact the performance of the diagnostic test.

The main diagnostic test used to detect AIV targets a highly conserved region of the virus (the matrix protein gene). Whereas, subsequent diagnostic tests, used to further determine the subtype of AIV, target more variable genes: the haemagglutinin (HA) gene (H1-H16) and the neuraminidase (NA) gene (N1-N9). Within a virus population, HA and NA gene sequences change due to constant selection pressure by the host immune system. Sequence variation in the 'PCR primer and/or probe target sequence' within these genes may lead to poor performance and possibly failure of the diagnostic tests.

Detections of AIV in poultry are relatively rare in Australia. Targeted wild bird AI surveillance in Australia provides a contemporary source of AIV sequences necessary to monitor the ongoing evolution of Australian-specific AIVs.

Through regular evaluation of HA and NA gene 'PCR and/or probe target sequence' variability, diagnostic tests can be modified as required. These checks and balances ensure diagnostic tests used in Australia will continue to detect current circulating strains of AIVs. They also reduce the possibility of detection failure, which could result from tests based mainly on historical or non-Australian AIV strains. Hence, ongoing surveillance and subsequent sequencing of AIVs circulating in wild birds is crucial to ensure changes to the virus genetic population continue to be monitored. The program also assists in maintaining laboratory capacity for high-throughput molecular diagnostic testing in Australia.

Australian wild bird AIV sequence data is essential for monitoring Australian-specific lineages in order to reduce the possibility of detection failure, but can also:

- Allow comparison with subtypes circulating regionally and in the other parts of the world (by phylogenetic analysis), and;
- In case of outbreaks e.g. in poultry, allows a quick assessment of whether introduction is likely to have been from local wild birds or from another (possibly exotic) source.

No HPAI H5 or H7 viruses have been detected via targeted wild bird surveillance in Australia.

Based on phylogenetic analysis at the Australian Centre for Disease Preparedness (ACDP, previously Australian Animal Health Laboratory), **H5 viruses detected in Australian wild birds were all Australian lineage LPAI viruses, and NOT Asian [goose/Guangdong/96(H5N1)] lineage viruses that have devastating impacts to commercial poultry in many other parts of the world since 2003.**

i.e. Australian LPAI viruses are not related to HPAI H5Nx clade 2.3.4.4 viruses that are currently circulating overseas that have shown unprecedented ability for intercontinental spread via wild birds with numerous outbreaks in poultry and wild birds in Asia, Africa, North America and Europe.

Research study: Serologic Evidence of Exposure to Highly Pathogenic Avian Influenza H5 Viruses in Migratory Shorebirds, Australia

The research project conducted at **World Health Organization Collaborating Centre for Reference and Research on Influenza (WHOCCRI)**, in collaboration with **Deakin University**, **CSIRO Australian Centre for Disease Preparedness (ACDP, previously Australian Animal Health Laboratory)**, and the **Australian Government Department of Agriculture, Water and the Environment** aimed to understand if shorebirds that migrate using the East-Asian Australasian Flyway from Siberia and northern Eurasia, where they breed each year, to Australia are exposed to HPAI H5 viruses during their migrations.

Image Courtesy of Mark Smith

Using blood samples collected from birds in Australia, the research demonstrated that the migratory shorebird red-necked stint had antibodies against one group of HPAI H5 viruses, clade 2.3.4.4, which has been responsible for outbreaks in poultry and wild birds in other countries since 2013. Antibodies tell us about previous exposure in birds, but do not tell us about active infection. NAIWB surveillance projects across Australia, including research done by WHOCCRI and Deakin University, have demonstrated that there is no evidence that migratory birds still carry these HPAI H5 viruses when they arrive in Australia. As ducks are important carriers of all AI viruses, including HPAI H5 overseas, researchers also tested Australian pacific black ducks to find out if these resident birds have been exposed to HPAI H5 in Australia. The majority of ducks and stints were sampled in the same states. They found that in contrast, resident pacific black ducks did not have antibodies against HPAI H5, indicating that seropositive (or antibody positive) red-necked stints are being exposed to HPAI H5 viruses during their migratory route outside Australia and that these viruses are not within Australia. This work was was recently published in the Journal of Emerging Infectious Diseases:

Wille M et al. 2019. **Serologic Evidence of Exposure to Highly Pathogenic Avian Influenza H5 Viruses in Migratory Shorebirds, Australia**. *Emerging Infectious Diseases*. 25 (10): 1903-1910.

See also: **How our 'Avian Athletes' Could Spread Influenza**

Targeted surveillance - Jan to Jun 2019

Between January and June 2019, AIV-specific, risk-based surveillance occurred at sites in New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia with cloacal, oropharyngeal or faecal environmental swabs collected from 2008 waterbirds. Samples were tested using RT-PCR for AIV M (Matrix) gene detection. Influenza A reactors (positives) to the influenza A matrix gene PCR were tested using specific RT- PCRs for influenza A H5 and H7. Samples for which H5/H7 subtypes were detected by RT-PCR were dispatched to ACDP (previously Australian Animal Health Laboratory) for confirmatory and further testing, and other AIV subtypes were identified by virus gene sequencing.

Target Surveillance - Influenza A virus detections (Jan - Jun 2019)

State / Territory	# Individual Swabs Collected	# Positives*	H5 LPAI	H5 HPAI	H7 LPAI	H7 HPAI	Other LPAI HA Subtypes**
NSW	4	0					
NT	293	1	0	0	0	0	H1
Qld	288	8	0	0	0	0	H3
SA	100	2	0	0	1	0	
TAS	471	0					
VIC	553	27	1	0	6	0	H1, H2, H3, H4, H9, H10, H11
WA	299	12	3	0	1	0	H8
Total	**2008**	**50**	**4**	**0**	**8**	**0**	

* A number of swabs were tested as a pooled sample (up to 3 swabs in one pool). A positive pool represents one AIV positive. A sample is considered AIV positive if either: a) Positive at original lab; b) Indeterminate at original lab and subsequently tested positive; c) Indeterminate at original lab and subtyped at any lab.

** When positive AIV samples (not identified as H5 or H7) are submitted for subtyping and successful.

Between January and June 2019, no HPAI viruses were identified, but targeted surveillance continues[11,12] to find evidence of a wide range of low pathogenicity virus subtypes, including LPAI H5 and H7.

Molecular analysis of AIVs detected through the targeted surveillance activities contribute to understanding of AIVs dynamics in Australia, help maintain currency of diagnostic tests, and serve as a point of comparison when novel avian influenza virus strains of importance emerge overseas.

From January to June 2019, targeted species for sampling were from the order Anseriformes.

Other bird orders may have been present during collection. The great majority of samples collected during this period were faecal environmental swabs. A small proportion of cloacal and oropharyngeal samples from hunter-shot birds were also collected.

General surveillance - Jan to Jun 2019

Wild bird morbidity and mortality investigation are reported into the Australia's wildlife health information system (eWHIS) via a network of state / territory WHA coordinators (appointed by their respective Chief Veterinary Officer), veterinarians at zoo based wildlife hospitals and sentinel wildlife clinics, university clinics and pathology departments, as well as other wildlife health professionals. General surveillance summary tables (below) are drawn from data entered into eWHIS.

WHA received 50 reports of wild bird mortality or morbidity investigations from around Australia from January to June 2019, which were tested using RT-PCR for AIV M (Matrix) gene detection. Investigations may involve a single animal or multiple animals (e.g. a mass mortality event). Reports and samples from sick and dead birds are received from members of the public, private practitioners, universities, zoo wildlife clinics and wildlife sanctuaries.

General Surveillance - mortality and morbidity events in which birds were tested for Influenza A viruses (Jan - Jun 2019)

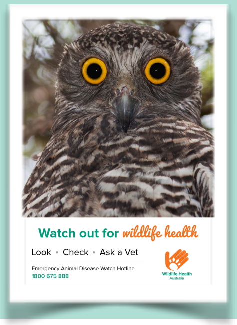
Bird Order	Common Names for Bird Order[13]	Number of Events AIV Tested via PCR*	Number of Events AIV Positive
Anseriformes	Magpie goose, ducks, geese, swans	7	0
Caprimulgiformes	Frogmouth, nightjars, owlet-nightjars, swifts	1	0
Charadriiformes	Shorebirds	5	0
Columbiformes	Doves and pigeons	2	0
Coraciiformes	Bee-eaters and kingfishers	1	0
Gruiformes	Rails, gallinules, coots and cranes	1	0
Passeriformes	Passerines or perching birds	13	0
Pelecaniformes	Ibis, herons and pelicans	5	0
Psittaciformes	Parrots and cockatoos	11	0
Sphenisciformes	Penguins	5	0
Suliformes	Gannets, boobies and cormorants	1	0

* Disease investigations may involve a single or multiple bird orders (e.g. a mass mortality event). The number of events where AIV was tested via PCR against each bird order do not equal the total number of investigations due to multi-species events. During the semester, two wild bird events involved multiple bird orders tested for AIV. One event involved the orders Gruiformes and Pelecaniformes, and the second event involved Coraciiformes and Passeriformes.

Avian influenza was not the cause of any wild bird morbidity or mortality event between January and June 2019 reported to eWHIS.

AVIAN INFLUENZA IS A NATIONAL NOTIFIABLE DISEASE AND REQUIRES REPORTING TO THE CHIEF VETERINARY OFFICER (CVO) AT THE APPROPRIATE AUSTRALIAN STATE OR TERRITORY

If you would like information about Avian Influenza testing and sample collection, please seek advice from your local WHA Coordinator or call the Emergency Animal Disease Watch Hotline (**1800 675 888**).



Disclaimer

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