

# WOAH Reference Laboratory Reports Activities 2024

This report has been submitted: 31 janvier 2025 18:50

### LABORATORY INFORMATION

*Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:	Avian influenza
*Address of laboratory:	1015 Arlington Street Winnipeg, Manitoba R3E 3M4
*Tel:	+1-204 789 20 89
*E-mail address:	yohannes.berhane@inspection.gc.ca
Website:	https://inspection.canada.ca/en/about-cfia/science-and-research-cfia/our- laboratories/ncfad-winnipeg
*Name (including Title) of Head of Laboratory (Responsible Official):	Dr Kathleen Hooper-McGrevy
*Name (including Title and Position) of WOAH Reference Expert:	Dr Yohannes Berhane
*Which of the following defines your laboratory? Check all that apply:	Governmental

### **TOR1: DIAGNOSTIC METHODS**

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training) Yes

Diagnostic Test	Indicated in WOAH Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
cELISA (Type A)	Yes	9547	0

WOAH Reference Laboratory Reports Activities 2024



AGID	Yes	239	0
Hemagglutination Inhibition (H3, H5, H7)	Yes	1811	0
Direct diagnostic tests		Nationally	Internationally
Virus Isolation	Yes	895	0
matrix real-time RT-PCR	Yes	13117	0
H5 & H7 real-time RT-PCR	Yes	13117	0
HA subtyping (HI:1-16)	Yes	359	0
NA subtyping	Yes	15	0
molecular pathotyping and whole genome sequencing	Yes	1652	0

### **TOR2: REFERENCE MATERIAL**

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by WOAH?

No

3. Did your laboratory supply standard reference reagents (nonWOAH-approved) and/or other diagnostic reagents to WOAH Members? Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient WOAH Member Countries	Country of recipients
Influenza A H5Nx clad 2.3.4.4b viruses	qPCR, HI, HA, VI	In-house produced	0	15 viruses of 1ml aliquots	1	UNITED KINGDOM,
Influenza A H5Nx clad 2.3.4.4b viruses	qPCR, HI, HA, VI	In-house produced	0	22 viruses of 1ml aliquots	1	ITALY,
Influenza A viruses from Canadian poultry and wildlife	qPCR, HI, HA, VI	In-house produced	0	29 viruses of 1ml aliquots	1	AUSTRALIA,
IVT-RNA qPCR controls	qPCR	In-house produced	0	40 aliquots of 0.1ml	1	GHANA,

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAH Members?

No

### **TOR3: NEW PROCEDURES**

6. Did your laboratory develop new diagnostic methods for the designated pathogen or disease?

WOAH Reference Laboratory Reports Activities 2024



No

7. Did your laboratory validate diagnostic methods according to WOAH Standards for the designated pathogen or disease?

No

8. Did your laboratory develop new vaccines for the designated pathogen or disease?

No

9. Did your laboratory validate vaccines according to WOAH Standards for the designated pathogen or disease?

Yes

Name of the new vaccine developed	Description and References (Publication, website, etc)
H5N2 Zoetis inactivated vaccine (in ducks)	not yet published
HVT-H5 vaccines in turkeys (BI and CEVA)	not yet published

### **TOR4: DIAGNOSTIC TESTING FACILITIES**

10. Did your laboratory carry out diagnostic testing for other WOAH Members?

No

11. Did your laboratory provide expert advice in technical consultancies on the request of an WOAH Member?

No

### **TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES**

12. Did your laboratory participate in international scientific studies in collaboration with WOAH Members other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	WOAH Member Countries involved other than your country
HPAI A(H5N5) virus incursions and pathogenicity in mammals	2023-2024	to understand the genetic and phenotypic evolution of clade 2.3.4.4b A(H5N5) viruses	Department of Infectious Diseases, St. Jude Children's Research Hospital	UNITED STATES OF AMERICA
HPAI A(H5N5) pathogenicity and transmission in aquatic wild birds	2023-2024	To understand the phenotypic evolution of clade 2.3.4.4b A(H5N5) viruses	Kappa-FLU multi- institutions at EU states	GERMANY

13. In exercising your activities, have you identified any regulatory research needs\* relevant for WOAH?

Yes

#### -Research need : 1-

**Please type the Research need:** Harmonization of the nomenclature of 2.3.4.4b clade H5Nx viruses circulating in the Americas. USDA has started this, but the existing genotyping tool does not capture all genotypes circulating in Canada **Relevance for WOAH** Disease Control, Facilitation of international collaboration,

Relevance for the Code or Manual



Field Epidemiology and Surveillance, Diagnostics,

Animal Category Terrestrial,

Disease:

Avian influenza

Kind of disease (Zoonosis, Transboundary diseases) Zoonosis, Transboundary diseases,

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture) *Answer*:

Notes:

Answer:

### TOR6: EPIZOOLOGICAL DATA

14. Did your Laboratory collect epidemiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:

We work with our North American and European partners to determine sources of the multiple incursions of 2.3.4.4b clade H5Nx viruses to North America.

15. Did your laboratory disseminate epidemiological data that had been processed and analysed?

Yes

If the answer is yes, please provide details of the data collected:

Surveillance is ongoing. Some has been published and ongoing results will be published at a future date. Sequencing data from the surveillance work was shared regularly through VCM (OFFLU). Some sequences have been shared through the GISAID portal

16. What method of dissemination of information is most often used by your laboratory? (Indicate in the appropriate box the number by category and list the details in the box)

a) Articles published in peer-reviewed journals:

10

1 Erdelyan CNG, Kandeil A, Signore AV, Jones MEB, Vogel P, Andreev K, Bøe CA, Gjerset B, Alkie TN, Yason C, Hisanaga T, Sullivan D, Lung O, Bourque L, Ayilara I, Pama L, Jeevan T, Franks J, Jones JC, Seiler JP, Miller L, Mubareka S, Webby RJ, Berhane Y. Multiple transatlantic incursions of highly pathogenic avian influenza clade 2.3.4.4b A(H5N5) virus into North America and spillover to mammals. Cell Rep. 2024 Jul 23;43(7):114479. doi: 10.1016/j.celrep.2024.114479. Epub 2024 Jul 13. PMID: 39003741; PMCID: PMC11305400.

2 Lair S, Quesnel L, Signore AV, Delnatte P, Embury-Hyatt C, Nadeau MS, Lung O, Ferrell ST, Michaud R, Berhane Y. Outbreak of Highly Pathogenic Avian Influenza A(H5N1) Virus in Seals, St. Lawrence Estuary, Quebec, Canada1. Emerg Infect Dis. 2024 Jun;30(6):1133-1143.



#### doi: 10.3201/eid3006.231033. PMID: 38781927; PMCID: PMC11138997.

3 Wight J, Rahman I, Wallace HL, Cunningham JT, Roul S, Robertson GJ, Russell RS, Xu W, Zhmendak D, Alkie TN, Berhane Y, Hargan KE, Lang AS. Avian influenza virus circulation and immunity in a wild urban duck population prior to and during a highly pathogenic H5N1 outbreak. Vet Res. 2024 Nov 22;55(1):154. doi: 10.1186/s13567-024-01397-5. PMID: 39578905; PMCID: PMC11585116.

4 Russell SL, Andrew CL, Yang KC, Coombe M, McGregor G, Redford T, Jassem AN, Zlosnik JEA, Giacinti J, Kuchinski KS, Palmer JL, Tyson JR, Fjell C, Willie M, Ross MV, Winchester M, Wilson L, Berhane Y, Thacker C, Harms NJ, Soos C, Burns T, Prystajecky N, Himsworth C. Descriptive epidemiology and phylogenetic analysis of highly pathogenic avian influenza H5N1 clade 2.3.4.4b in British Columbia (B.C.) and the Yukon, Canada, September 2022 to June 2023. Emerg Microbes Infect. 2024 Dec; 13(1):2392667. doi: 10.1080/22221751.2024.2392667. Epub 2024 Sep 22. PMID: 39143912; PMCID: PMC11421163.

5 Giacinti JA, Jarvis-Cross M, Lewis H, Provencher JF, Berhane Y, Kuchinski K, Jardine CM, Signore A, Mansour SC, Sadler DE, Stevens B, Prystajecky NA, Sarma SN, Ojkic D, Cortez GAP, Kalhor M, Kenmuir E, Sharp CM. Transmission dynamics of highly pathogenic avian influenza virus at the wildlife-poultry-environmental interface: A case study. One Health. 2024 Nov 12;19:100932. doi: 10.1016/j.onehlt.2024.100932. PMID: 39640906; PMCID: PMC11617448.

6 Rahman I, Erdelyan CNG, Signore AV, Ayilara I, Wight J, Jones MEB, Sullivan DS, Lung O, Hisanaga T, Wilhelm SI, Cunningham JT, Ward CRE, Bosch J, Robertson GJ, Gosse K, Baker M, Dawe B, Lair S, Provencher JF, Hargan KE, Berhane Y, Lang AS. Recurring incursions and dissemination of novel Eurasian-origin H5Nx avian influenza viruses in Atlantic Canada. Virus Evol. 2024 Dec 17;10(1):veae111. doi: 10.1093/ve/veae111. PMID: 39722685; PMCID: PMC11669315.

7 Calzas C, Alkie TN, Suderman M, Embury-Hyatt C, Khatri V, Le Goffic R, Berhane Y, Bourgault S, Archambault D, Chevalier C. M2e nanovaccines supplemented with recombinant hemagglutinin protect chickens against heterologous HPAI H5N1 challenge. NPJ Vaccines. 2024 Sep 5;9(1):161. doi: 10.1038/s41541-024-00944-7. PMID: 39237609; PMCID: PMC11377767.

8 Giacinti JA, Signore AV, Jones MEB, Bourque L, Lair S, Jardine C, Stevens B, Bollinger T, Goldsmith D; British Columbia Wildlife AIV Surveillance Program (BC WASP); Pybus M, Stasiak I, Davis R, Pople N, Nituch L, Brook RW, Ojkic D, Massé A, Dimitri-Masson G, Parsons GJ, Baker M, Yason C, Harms J, Jutha N, Neely J, Berhane Y, Lung O, French SK, Myers L, Provencher JF, Avery-Gomm S, Robertson GJ, Barychka T, Gurney KEB, Wight J, Rahman I, Hargan K, Lang AS, Montevecchi WA, Burt TV, Brown MGC, Pekarik C, Thompson T, McLaughlin A, Willie M, Wilson L, Flemming SA, Ross MV, Leafloor J, Baldwin F, Sharp C, Lewis H, Beaumont M, Hanson A, Ronconi RA, Reed E, Campbell M, Saunders M, Soos C. Avian influenza viruses in wild birds in Canada following incursions of highly pathogenic H5N1 virus from Eurasia in 2021-2022. mBio. 2024 Aug 14;15(8):e0320323. doi: 10.1128/mbio.03203-23. Epub 2024 Jul 16. PMID: 39012149; PMCID: PMC11323545.

9 Descriptive Epidemiology and Phylodynamics of the "First Wave" of an Outbreak of Highly Pathogenic Avian Influenza (H5N1 Clade 2.3.4.4b) in British Columbia and the Yukon, Canada, April to September 2022. Andrew, Cassandra, L., Russell, Shannon L., Coombe, Michelle, Zlosnik, James E.A., Kuchinski, KevinS., Caleta, Jessica, Fjell, Chris, Berhane, Yohannes, Bowes, Victoria, Redford, Tony, Thacker, Caeley, Wilson, Laurie, Henaff, Maud, Harms, N.Jane, Jassem, Agatha, Giacinti, Jolene, Soos, Catherine, Prystajecky, Natalie, Himsworth, Chelsea. Transboundary and Emerging Diseases, 2024, 2327939, 18 pages, 2024. https://doi.org/10.1155/2024/2327939

10 Spatiotemporal patterns of low and highly pathogenic avian influenza virus prevalence in murres in Canada from 2007 to 2022—a case study for wildlife viral monitoring. Angela McLaughlin, Jolene Giacinti, Ishraq Rahman, Jordan Wight, Kathryn Hargan, Andrew S. Lang, Mark L. Mallory, Gregory J. Robertson, Kyle Elliot, Davor Ojkic, Stéphane Lair, Megan Jones, Yohannes Berhane, Grant Gilchrist, Laurie Wilson, Sabina I. Wilhelm, Michael G.C. Brown, Jennifer F. Provencher, FACETS, Volume 9, 2024, Pages 1-13, https://doi.org/10.1139/facets-2023-0185

b) International conferences:



#### 3

Erdelyan, C. Genomic analyses of clade 2.3.4.4b H5N5 viruses reveal multiple transatlantic incursions into North America and spillover into mammals. BSL4ZNet International Conference. Virtual. September 2024. Signore, A.V. Phylodynamics of the H5N1 avian influenza outbreak in North America reveals the emergence of reassortants with increased fitness. PROCINORTE Animal Health Task Force Annual Conference (virtual). Mexico City, Mexico. June, 2024. Signore, A.V. Phylodynamics of the H5N1 avian influenza outbreak in North America reveals the emergence of reassortants with increased fitness. BSL4ZNet International Conference. Virtual. September 2024.

c) National conferences:

#### 5

Signore, A.V. Surveillance and phylodynamics of H5N1 avian influenza in Canadian domestic and wild animals: a One Health approach to an emerging infections threat. Canadian Respiratory Research Network Annual Meeting. Ottawa, ON. October 2024. Erdelyan, C. Genomic analyses of clade 2.3.4.4b H5N5 viruses reveal multiple transatlantic incursions into North America and spillover into mammals. Canadian Animal Health Laboratorians Network Annual Meeting. Ottawa, ON. June 2024. Signore, A.V. Phylodynamics of the H5N1 avian influenza outbreak in North America reveals the emergence of reassortants with increased fitness. Canadian Animal Health Laboratorians Network Annual Meeting. Ottawa, ON. June 2024. Signore, A.V. Phylodynamics of H5N1 avian influenza outbreak in North America reveals the emergence of reassortants with increased fitness. Canadian Animal Health Laboratorians Network Annual Meeting. Ottawa, ON. June 2024. Signore, A.V. Phylodynamics of H5N1 avian influenza viruses in North American wildlife reveal the emergence of reassortants with increased fitness. Canadian Chapter of the Wildlife Society Annual Meeting. Jasper, Canada. March, 2024. Alkie, T.N. Highly Pathogenic Avian Influenza: Vaccine Study. HPAI Steeringe - SB research on HPAI presentation (Virtual), Canada, March, 2024.

d) Other (Provide website address or link to appropriate information):

### **TOR7: SCIENTIFIC AND TECHNICAL TRAINING**

17. Did your laboratory provide scientific and technical training to laboratory personnel from other WOAH Members?

#### Yes

- a) Technical visit : 0
- b) Seminars : 13
- c) Hands-on training courses: 0

d) Internships (>1 month) 0

Type of technical training provided (a, b, c or	Country of origin of the expert(s) provided	No. participants from the corresponding
d)	with training	country
В	GHANA	2

### **TOR8: QUALITY ASSURANCE**

18. Does your laboratory have a Quality Management System?



#### Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO 17025	see attached	SCC Accreditation Certificate.pdf
ISO 17025	see attached	SCC Notice-Reaccreditation-Letter.pdf

#### 19. Is your quality management system accredited?

#### Yes

Test for which your laboratory is accredited	Accreditation body
ELISA	Standard Council of Canada
Hemagglutination Assay	Standard Council of Canada
Hemagglutination Inhibition Assay	Standard Council of Canada
Real-time RT-PCR	Standard Council of Canada
PCR	Standard Council of Canada
IVPI	Standard Council of Canada
AGID	Standard Council of Canada
Virus Isolation	Standard Council of Canada
Molecular pathotyping/Sequencing	Standard Council of Canada

20. Does your laboratory maintain a "biorisk management system" for the pathogen and the disease concerned? Yes

Canada's Canadian Biosafety Standard (CBS) requires that a biosecurity plan be in place for facilities that handle infectious agents. This plan details the aspects the facility has in place for the prevention of theft, misuse or intentional release of pathogens. The National Centre for Foreign Animal Disease (NCFAD) Biosecurity Plan addresses the requirements that are outlined in Section 4.1.8 of the CBS 3rd Edition, and security requirements detailed in Public Health Agency Canada (PHAC)'s Physical Security Standard for the NCFAD at the Canadian Science Centre for Human and Animal Health (CSCHAH) • The NCFAD Biosecurity Plan deals with all biological pathogens, including Risk Group 2, but its focus is on those in Risk Groups 3 and 4, which pose the greatest biosecurity risk. This plan includes details on the risk assessment of biological agents, physical protection of the facility, personnel suitability/reliability, information management, pathogen accountability and inventory, and incident and emergency response measures. • Work areas covered include diagnostic and research laboratory spaces in Containment Level 3 (CL3), a large animal CL3-Ag zone including post mortem suite, and higher containment laboratories, namely restricted zoonotic CL3 and CL4 labs. CL4 space includes a CL4 large animal zone. The NCFAD Biosecurity Plan will be reviewed biennially by the Director and/or Laboratory Executive Director (LED). Ad hoc review will take place in response to incident review outcomes and related document updates such as the Biosecurity Risk Assessment or Threat Risk Assessment.

### **TOR9: SCIENTIFIC MEETINGS**

21. Did your laboratory organise scientific meetings related to the pathogen in question on behalf of WOAH?

No

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOAH? No



### **TOR10: NETWORK WITH WOAH REFERENCE LABORATORIES**

23. Did your laboratory exchange information with other WOAH Reference Laboratories designated for the same pathogen or disease? Yes

24. Do you network (collaborate or share information) with other WOAH Reference Laboratories designated for the same pathogen? Yes

NETWORK/DISEASE	ROLE OF YOUR LABORATORY (PARTICIPANT, ORGANISER, ETC)	NO. PARTICIPANTS	PARTICIPATING WOAH REF. LABS
OFFLU/WOAH	participant	1	WOAH reference labs

25. Did you organise or participate in inter-laboratory proficiency tests with WOAH Reference Laboratories designated for the same pathogen during the past 2 years?

Yes

Purpose of the proficiency test:	Role of your Reference Laboratory (organiser/ participant)	No. participating Laboratories	Participating WOAH Ref. Labs/ organising WOAH Ref Lab
OFFLU 2024 - Avian Disease PCR	participant	12	12

26. Did your laboratory collaborate with other WOAH Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

Yes

Voc

Title of the project or contract	Scope	Name(s) of relevant WOAH Reference Laboratories
Kappa-Flu	Understanding the connectivity and dynamics of avian influenza in wild birds, poultry and environment	Friedrich-Loeffler-Institut, Insel Riems, Istituto Zooprofilattico Sperimentale delle Venezie, St. Jude Childrens Research Hospital, Animal and Plant Health Agency, Weybridge
Investigating the transatlantic incursion of 2.3.4.4b clade H5N5 virus	Multiple transatlantic incursions of highly pathogenic avian influenza clade 2.3.4.4b A(H5N5) virus into North America and spillover to mammals	St Jude Research Center, Memphis, TN, USA

### **TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING**

27. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than WOAH Reference Laboratories for the same pathogen during the past 2 years?

Purpose for inter- laboratory test comparisons1	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries
			Real-time RT-PCR, ELISA,	

MOAU Twinning

WOAH Reference Laboratory Reports Activities 2024



project

organizer

nemaggiumation and Hemagglutination Inhi

GHANA, Hemagglutination Inhibition

assays

## TOR12: EXPERT CONSULTANTS

1

28. Did your laboratory place expert consultants at the disposal of WOAH?

No

29. Additional comments regarding your report:

No