

WOAH Reference Laboratory Reports Activities 2025

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LABORATORY INFORMATION

*Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:	Avian Influenza
*Address of laboratory:	Virology, APHA, Woodham Lane, New Haw, Addlestone, KT15 3NB, United Kingdom
*Tel:	+442080269669
*E-mail address:	Ashley.Banyard@apha.gov.uk
Website:	www.gov.uk/apha
*Name (including Title) of Head of Laboratory (Responsible Official):	Prof. Ashley Banyard
*Name (including Title and Position) of WOAH Reference Expert:	Prof. Ashley Banyard
*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	
		Nationally	Internationally
Indirect diagnostic tests			
HI	Yes	14916	90
AGID	Yes	10433	0
ELISA	Yes	428	458
Direct diagnostic tests			
Real-time RT-PCR M gene	Yes	32783	837
Real-time RT-PCR H5	Yes	1422	26
Real-Time RT-PCR H5 Pathotyping	Yes	20652	535
H5 genetic analyses by Sanger sequencing	Yes	5	0
Real-time RT-PCR N5	Yes	142	7
Real-time RT-PCR N6	Yes	2	0
Real-time RT-PCR N7	Yes	2	0
Real-time RT-PCR N8	Yes	2	0
Real-time RT-PCR N9	Yes	14	0
Real-time RT-PCR N1	Yes	13069	535

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Real-time RT-PCR H7	Yes	356	0
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TOR2: REFERENCE MATERIAL

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

No

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

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient WOA?H Member Countries	Country of recipients
Antisera	HI	Produced & Provided	3.5ml	138.5ml	8	ETHIOPIA, FRANCE, HONG KONG, ITALY, KOREA (DEM. PEOPLE'S. REP. OF), NORWAY, PHILIPPINES, ROMANIA,
Antigen	HI	Produced & Provided	64ml	1212ml	9	ETHIOPIA, HONG KONG, ITALY, KOREA (DEM. PEOPLE'S. REP. OF), NORWAY, PHILIPPINES, ROMANIA, UNITED STATES OF AMERICA, VIETNAM,

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOA?H Members?

TOR3: NEW PROCEDURES

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

Yes

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

Yes

Name of the new test or diagnostic method developed	Description and References (Publication, website, etc.)
Avian Influenza pan-H9 rRT-PCR ISO17025 validation.	A real-time RT-PCR (RRT-PCR) for the specific detection of AIV subtype H9 has been locally validated based on the methodology of (Panzarin et al. 2022) and is available for use as front-line diagnostic tools for avian influenza disease response and for wild bird surveillance in conjunction with the M-gene influenza A screening. Panzarin, V., Marciano, S., Fortin, A., Brian, I., D'amico, V., Gobbo, F., Bonfante, F., Palumbo, E., Sakoda, Y., Le, K.T. and Chu, D.H., 2022. Redesign and validation of a real-time RT-PCR to improve surveillance for avian influenza viruses of the H9 subtype. Viruses, 14(6), p.1263.

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

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

TOR4: DIAGNOSTIC TESTING FACILITIES

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

Yes

Name of WOA?H Member Country seeking assistance	Date	Which diagnostic test used	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses

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BANGLADESH	2025-01-08	M-Gene PCR, H5 HA2 PCR, H5HP PCR, H9 PCR	0	350
OMAN	2025-07-08	M-Gene PCR, H9 PCR	0	38
BANGLADESH	2025-12-30	M-Gene PCR, H5 HA2 PCR, H5HP PCR, H9 PCR	0	350

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

Yes

Name of the WOAHA Member	Country receiving a technical consultancy	Purpose	How the advice was provided
	AUSTRALIA	Research	Email
	ARGENTINA	PT Scheme Participant	Email, Reagents
	BANGLADESH	Diagnostic Testing/Research/PT Scheme	Email
	BANGLADESH	PT Scheme Participant	Email, Reagents
	BELARUS	PT Scheme Participant	Email
	BOTSWANA	PT Scheme Participant	Email, Reagents
	BRAZIL	PT Scheme Participant	Email, Reagents
	CAMBODIA	PT Scheme Participant	Email, Reagents
	CANADA	Material transfer	Email
	CHILE	PT Scheme Participant	Email, Reagents
	COLOMBIA	PT Scheme Participant	Email, Reagents
	COSTA RICA	PT Scheme Participant	Email, Reagents
	CROATIA	PT Scheme Participant	Email, Reagents
	CUBA	PT Scheme Participant	Email, Reagents
	DOMINICAN (REP)	PT Scheme Participant	Email, Reagents
	ECUADOR	PT Scheme Participant	Email, Reagents
	EGYPT	Research	Email, Reagents
	FRANCE	Diagnostic Testing/Research	Email, Reagents
	GEORGIA	PT Scheme Participant	Email, Reagents
	GHANA	PT Scheme Participant	Email, Reagents
	GUATEMALA	PT Scheme Participant	Email, Reagents
	INDONESIA	Offer of linkage/material exchange	Email, Online meeting
	IRELAND	PT Scheme Participant	Email, Reagents
	ITALY	PT Scheme Participant	Email, Reagents
	JAPAN	Material Transfer request	Email
	MALI	PT Scheme Participant	Email, Reagents
	NEPAL	Virus Characterisation	Email
	NIGERIA	PT Scheme Participant	Email, Reagents
	IRELAND	PT Scheme Participant	Email, Reagents
	OMAN	Diagnostic Testing/Research	Email, Online meeting
	OMAN	Sharing Protocols	Email, In person visit
	OMAN	WOAH Twinning project	In person visits
	PANAMA	PT Scheme Participant	Email, Reagents
	PARAGUAY	PT Scheme Participant	Email, Reagents
	PERU	PT Scheme Participant	Email, Reagents
	SAUDI ARABIA	PT Panel request	Email
	SEYCHELLES	Diagnostic Testing/Research	Email
	SIERRA LEONE	Exchange of material	Email, Online meeting
	SOUTH AFRICA	PT Scheme Participant	Email, Reagents
	SPAIN	PT Scheme Participant	Email, Reagents
	TAJIKISTAN	Twinning project	Email
	THAILAND	PT Scheme Participant	Email, Reagents
	TRINIDAD AND TOBAGO	PT Scheme Participant	Email, Reagents
	TURKEY	PT Scheme Participant	Email, Reagents

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UGANDA	Offer of linkage	Email
UKRAINE	PT Scheme Participant	Email, Reagents
URUGUAY	PT Scheme Participant	Email, Reagents
UNITED STATES OF AMERICA	Diagnostic Testing/Research	Email
VIETNAM	Request for Material Transfer	Email
ZAMBIA	PT Scheme Participant	Email, Reagents

TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

12. Did your laboratory participate in international scientific studies in collaboration with WOA 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
One Health Poultry Hub	2019-2025	Hub researchers have characterised the networks through which chickens are produced and chickens and chicken products are distributed to identify points of high disease risk as well as where and how interventions to mitigate disease risk are best made. Hub researchers are assessing how pathogens and viral genes can transmit between chickens and from chickens to people and back again - focusing in particular on how this is influenced by how chickens are kept and traded. This is vital information to inform potential interventions. https://www.onehealthpoultry.org	Our Hub is led by the Royal Veterinary College (RVC) London, and comprises partners in Asia, Europe and the UK. 27 partners in total. Key focus for programme Vietnam, India, Sri Lanka and Bangladesh. This project has enabled a significant increase in the amount of genomic data generated for H9 and H5 subtype avian influenza viruses	BANGLADESH INDIA SRI LANKA VIETNAM
OFFLU VCM	Ongoing – biannually	APHA has carried out testing and contributed reagents, data and expertise to the biannual WHO VCM activities.	OFFLU network/WHO	AUSTRALIA ITALY UNITED STATES OF AMERICA
Avian influenza matching (AIM donor funded through FAO/WOAH)	2022-2025	Antigenic characterisation of emerging HP- and LPAIV H5Nx viruses to inform vaccine matching.	Alongside FAO through OFFLU interactions this consortium includes; IZSVE, Italy Francis Crick Institute, UK CSIRO, Australia USDA, USA	AUSTRALIA ITALY UNITED STATES OF AMERICA
Flu-Switch: Identification of factors driving the emergence and spread of avian influenza viruses with zoonotic potential	2023-2026	International coordination of research on infectious animal diseases (ICRAD) This project aims to identify the factors that contribute to the evolution of AIV pathogenicity in poultry, and subsequent increased zoonotic potential that shapes its host range with the goal of defining risk factors to crossing species barriers	Roslin institute, Edinburgh, UK Friedrich-Loeffler-Institut, Insel, Riems; Animal and Plant Health Agency, Weybridge Linnaeus University; Istituto Zooprofilattico Sperimentale delle Venezie All led by: Ecole nationale vétérinaire de Toulouse	FRANCE GERMANY ITALY SWEDEN
WOAH Twinning Oman	2023-2026	WOAH twinning project: Capacity building for diagnostic and surveillance of Avian Influenza and Newcastle Disease in Oman	Central Laboratory for Animal Health, MAFWR	OMAN
Kappa-Flu: Ecology and biology of HPAIV H5	2023-2026	HORIZON-FARM2FORK Aims at understanding the connectivity and dynamics of H5 HPAI in wild birds, poultry and the environment, including the impact of climate change.	Friedrich-Loeffler-Institut, Insel, Riems; Erasmus Universitair Medisch Centrum, Rotterdam; Animal and Plant Health Agency, Weybridge; Linnaeus University; Istituto Zooprofilattico Sperimentale delle Venezie; Royal	GERMANY ITALY SWEDEN SWITZERLAND THE NETHERLANDS

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			Veterinary College, University of London; Swiss Ornithological Institute (SOI);	
UK Ministry of Defence (MOD) Biothreat reduction programme (BTRP)	2022-2026	Establishing a West African network for laboratory capability in avian influenza and Newcastle disease virus: Developing capability and capacity to define disease burden.	APHA, various laboratories across West Africa	GAMBIA GHANA LIBERIA MALI NIGERIA SIERRA LEONE

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

No

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:

Collection and characterisation has been conducted on a range of AIV samples including metadata within the UK and internationally to provide an epidemiological picture of global disease spread. Clinical samples continue to be received from British Overseas Territories and research partners in the Antarctic and South Atlantic (primarily from South Georgia and the South Sandwich Islands, the Falkland Islands, the Antarctic peninsula, and Tristan da Cunha). We report that H5 HPAIV continues to circulate in these regions with high mortality rates reported from both avian and marine mammal populations. Characterisation of AIV samples collected in Bangladesh continues from samples collected from studies conducted by the One Health Poultry Hub. Clinical samples have been shared as part of the AIV/NDV WOA?H Twinning between APHA and CLAH, Oman. From these samples H9 AIV has been detected and characterised.

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:

An analysis of the epidemiological data collected nationally and internationally was disseminated through governmental outputs and in peer-reviewed publications, detailing the evolution of AIV and the epidemiological picture with reference to the global situation. Sequence data with associated metadata are publicly available on GISAID (<https://gisaid.org/>).

- Van Borm S, Ahrens AK, Bachofen C, Banyard AC, Boe CA, Briand FX, Dirbakova Z, Engelsma M, Fusaro A, Germeraad E, Gjerset B, Grasland B, Harders F, Hostyn P, Kauppinen A, Lambrecht B, Mollett BC, Monne I, Nagy A, Pohlmann A, Polzer D, Reid SM, Revilla-Fernandez S, Steensels M, Statter M, Swieton E, Tammiranta N, Wyler M, Zecchin B, Zohari S and Dellicour S (2025). "Genesis and Spread of Novel Highly Pathogenic Avian Influenza A(H5N1) Clade 2.3.4.4b Virus Genotype EA-2023-DG Reassortant, Western Europe." *Emerg Infect Dis* <https://doi.org/10.3201/eid3106.241870>
- Banyard AC, Coombes H, Terrey J, McGinn N, Seekings J, Clifton B, Mollett BC, Genova CD, Sainz-Dominguez P, Worsley L, Jorquera R, Billington E, Fullick E, Schlachter AL, Jorge D, Nunez A, Falchieri M, James J and Reid SM (2025). "Detection of clade 2.3.4.4b H5N1 high pathogenicity avian influenza virus in a sheep in Great Britain, 2025." *Emerg Microbes Infect* <https://doi.org/10.1080/22221751.2025.2547730>
- (PRE-PRINT) Banyard A, Mollett B, Lynton-Jenkins J, Richardson S, Quantrill J, Byrne A, Harvey R, Adams L, Proust A, Brown M, Yang J, Reid S, Coombes H, Clifton

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:

20

14 publications in peer-reviewed journals; 5 publications as pre-prints which are currently undergoing peer-review.

1. Billington E, Di Genova C, Warren CJ, Thomas SS, Johnson S, Riccio S, De Silva D, Peers-Dent J, Temperton N, da Costa K, Byrne AMP, Airey M, Schlachter AL, Yang J, Nunez A, Iqbal M, Slomka MJ, Brown IH, Banyard AC and James J (2025). "Investigating factors driving shifts in subtype dominance within H5Nx clade 2.3.4.4b high pathogenicity avian influenza viruses." *J Gen Virol* <https://doi.org/10.1099/jgv.0.002150>
2. Di Genova C, Warren CJ, Johnson S, Riccio S, Roper K, Thomas SS, Schlachter AL, Jorge D, Ralh K, Hassan J, Billington E, Nunez A, Brown IH, Slomka MJ, Banyard AC and James J (2025). "Pigeons exhibit low susceptibility and poor transmission capacity for H5N1 clade 2.3.4.4b high pathogenicity avian influenza virus." *J Gen Virol* <https://doi.org/10.1099/jgv.0.002156>

3. Seekings AH, Billington E, Mahmood S, Thomas SS, Puranik A, Johnson S, Nunez A, Watson S, Banks J, Brookes SM, Brown IH and Slomka MJ (2025). "Infection of point-of-lay hens to assess the sequential events during H7N7 high-pathogenicity avian influenza emergence at a layer premises." *Virology* <https://doi.org/10.1016/j.virol.2025.110733>
4. Mahmood S, Thomas SS, Ross CS, Fothergill L, Hansen RDE, Jinks R, Brown IH, Falchieri M, James J, Banyard AC and Reid SM (2025). "Understanding limitations to successful avian influenza virus isolation from wild birds." *J Virol Methods* <https://doi.org/10.1016/j.jviromet.2025.115291>
5. Dhakal J, Bhat S, James J, Otwey RY, Chapagain S and Singh P (2025). "Highly Pathogenic Avian Influenza (HPAI) H5N1 in Raw Pet Foods and Milk: A Growing Threat to both Companion Animals and Human Health, and Potential Raw Pet Food Industry Liability." *J Food Prot* <https://doi.org/10.1016/j.jfp.2025.100628>
6. Schlachter AD, Bruno-McClung E, Diaz-Delgado J, Odom M, Banyard AC and Nunez A (2025). "Feline high pathogenicity avian influenza H5N1 infection: past and present." *J Feline Med Surg* <https://doi.org/10.1177/1098612X251370695>
7. Kuiken T, Vanstreels RET, Banyard A, Begeman L, Breed A, Dewar M, Fijn R, Serafini PP, Uhart M and Wille M (2025). "Emergence, spread, and impact of high-pathogenicity avian influenza H5 in wild birds and mammals of South America and Antarctica." *Conserv Biol* <https://doi.org/10.1111/cobi.70052>
8. Hosseini P, Syndicus I, Houghton E, Alarcon P, Fournie G, Guitian J, Paterson A, Banyard AC, Brown IH, Hepple R and Wood JLN (2025). "Qualitative studies on farm managers perception of risk from HPAIV and implementation of biosecurity measures on UK poultry farms." *Prev Vet Med* <https://doi.org/10.1016/j.prevetmed.2025.106445>
9. Van Borm S, Ahrens AK, Bachofen C, Banyard AC, Boe CA, Briand FX, Dirbakova Z, Engelsma M, Fusaro A, Germeeraad E, Gjerset B, Grasland B, Harders F, Hostyn P, Kauppinen A, Lambrecht B, Mollett BC, Monne I, Nagy A, Pohlmann A, Polzer D, Reid SM, Revilla-Fernandez S, Steensels M, Statter M, Swieton E, Tammiranta N, Wyler M, Zecchin B, Zohari S and Dellicour S (2025). "Genesis and Spread of Novel Highly Pathogenic Avian Influenza A(H5N1) Clade 2.3.4.4b Virus Genotype EA-2023-DG Reassortant, Western Europe." *Emerg Infect Dis* <https://doi.org/10.3201/eid3106.241870>
10. Schafers J, Warren CJ, Yang J, Zhang J, Cole SJ, Cooper J, Drewek K, Kolli BR, McGinn N, Qureshi M, Reid SM, Peacock TP, Brown I, James J, Banyard AC, Iqbal M, Digard P and Hutchinson E (2025). "Pasteurisation temperatures effectively inactivate influenza A viruses in milk." *Nat Commun* <https://doi.org/10.1038/s41467-025-56406-8>
11. Greco F, Ravenswater HM, Ruiz-Raya F, D'Avino C, Newell MA, Hewitt J, Taylor E, Benninghaus E, Daunt F, Goodman G, Steel D, Park J, Philip E, Thomas SS, Slomka MJ, Falchieri M, Reid SM, James J, Banyard AC, Burthe SJ and Cunningham EJA (2025). "Asymptomatic infection and antibody prevalence to co-occurring avian influenza viruses vary substantially between sympatric seabird species following H5N1 outbreaks." *Sci Rep* <https://doi.org/10.1038/s41598-025-85152-6>
12. Banyard AC, Coombes H, Terrey J, McGinn N, Seekings J, Clifton B, Mollett BC, Genova CD, Sainz-Dominguez P, Worsley L, Jorquera R, Billington E, Fullick E, Schlachter AL, Jorge D, Nunez A, Falchieri M, James J and Reid SM (2025). "Detection of clade 2.3.4.4b H5N1 high pathogenicity avian influenza virus in a sheep in Great Britain, 2025." *Emerg Microbes Infect* <https://doi.org/10.1080/22221751.2025.2547730>
13. Schlachter AD, Furman N, Byrne AMP, Reid SM, Smith SJ, Maskell D, Mollett BC, Peers-Dent J, Falchieri M, Schock A, Banyard AC, Brown IH and Nunez A (2025). "High pathogenicity avian influenza H5N1 clade 2.3.4.4b natural infection in captive Humboldt penguins (*Spheniscus humboldti*)." *Avian Pathol* <https://doi.org/10.1080/03079457.2025.2513338>
14. Atkinson PW, Balmer DE, Banyard AC, Duggan J, Falchieri M, Frost TM, Humphreys EM, Jones R, Langlois Lopez S, Miles WTS, Murphy M, Owens R, Pearce-Higgins JW, Reid SM, Smith C and Tremlett CJ (2025). "Evaluating the use of carcass and testing data to assess the high pathogenicity avian influenza (HPAI) related mortality in wild birds in the United Kingdom and Crown Dependencies between 2021–2023." *Bird Study* <https://doi.org/10.1080/00063657.2025.2492902>
15. (PRE-PRINT) Banyard A, Mollett B, Lynton-Jenkins J, Richardson S, Quantrill J, Byrne A, Harvey R, Adams L, Proust A, Brown M, Yang J, Reid S, Coombes H, Clifton B, Bennison A, Clessin A, Gamble A, Fitzcharles E, Fowler Z, Masonou T, Case K, Aejan J, Woodall M, Smith C, Iqbal M, Brown I, Lewis N, Barclay W, Peacock T and James J (2025). "Disease ecology and zoonotic risk of clade 2.3.4.4b H5N1 high pathogenicity avian influenza in the sub-Antarctic region." <https://doi.org/10.21203/rs.3.rs-8029950/v1>
16. (PRE-PRINT) Falchieri M, Bentley E, Coombes HA, Mollett BC, Terrey J, Holland S, Stubbings E, McGinn N, Cooper J, Ahmad S, Lewis J, Clifton B, Collinson N, Aegerter J, Venkatesh D, Russell DJF, James J, Reid SM and Banyard AC (2025). "Co-circulation of distinct high pathogenicity avian influenza virus (HPAIV) subtypes in a mass mortality event in wild seabirds and co-location with dead seals." *bioRxiv* <https://doi.org/10.1101/2025.07.11.664278>
17. (PRE-PRINT) Harvey WT, Pinto RM, Brown MD, Lu L, Quantrill JL, Yang J, Pankaew N, Nel M, Baxter J, Byrne AMP, Kapczynski DR, Iqbal M, James J, Banyard AC, Brown I, Barclay W, Peacock TP, Digard P and Lycett SJ (2025). "Genetic reassortment and diversification of host specificity have driven evolutionary trajectories of lineages of panzootic H5N1 influenza." *bioRxiv* <https://doi.org/10.1101/2025.08.20.670882>
18. (PRE-PRINT) Steinfurth A, Lynton-Jenkins JG, Cleeland J, Mollett BC, Coombes HA, Moores A, Neal R, Clifton B, Falchieri M, Jones CW, Risi MM, Gold S, James J, Ryan PG, González-Solís J and Banyard AC (2025). "Investigating high pathogenicity avian influenza virus incursions to remote islands: Detection of H5N1 on Gough Island in the South Atlantic Ocean." *bioRxiv* <https://doi.org/10.1101/2025.09.06.674618>
19. (PRE-PRINT) Stolle L, Bolton JS, Steventon R, Gregory R, Klim H, Di Genova C, Haddock L, Bhatta A, Camell G, Brady C, Da Costa K, Edmans M, Calliss K, Simmonds P, Hill EM, Temperton N, Hill SC, Jarvis L, McNally C, James J, Banyard AC, Carroll M, Obolski U, Lambe T, Spencer A, Milicic A, Robb NC and Thompson CP (2025). "Divergent antibody-mediated population immunity to H5, H7 and H9 subtype potential pandemic influenza viruses." *medRxiv* <https://doi.org/10.1101/2025.09.08.25335309>
20. (PRE-PRINT) Lam TT, Davis CT, World Health Organization/World Organisation for Animal Health/Food and Agriculture Organization (WHO/WOAH/FAO) H5 Evolution Working Group. "Nomenclature updates to the hemagglutinin gene clade designations resulting from the continued evolution of high pathogenicity avian influenza A(H5) virus clades 2.3.2.1c and 2.3.4.4." *bioRxiv* <https://doi.org/10.1101/2025.11.23.690055>

b) International conferences:

4

1. Prof Ashley Banyard: "OFFLU AIM for Poultry Vaccines", 11th International Symposium on Avian Influenza, Canada, June 2025.
2. Dr Elizabeth Billington: "Comparison of dominant clade 2.3.4.4b high pathogenicity avian influenza virus (HPAIV) H5N1 genotypes in avian species following spill over into terrestrial carnivores", 11th International Symposium on Avian Influenza (ISAI), St. John's, Newfoundland, Canada, 24–26 June 2025 (Poster).
3. Dr Cecilia Di Genova: "Serological approaches to investigate incursions of non-notifiable low pathogenicity avian influenza virus into UK poultry over a 10-year period", 11th International Symposium on Avian Influenza (ISAI), St. John's, Newfoundland, Canada, 24–26 June 2025 (Poster).
4. Dr Dilhani De Silva: "Investigation of the emergence pathways of EA-2021-AB and EA-2022-BB A (H5N1) avian influenza genotypes", 11th International Symposium on Avian Influenza (ISAI), St. John's, Newfoundland, Canada, 24–26 June 2025 (Poster)

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5. Ashley Banyard: "Avian Influenza in the UK". ECOFLU Annual meeting, Edinburgh, Scotland. 24th Apr 2025
6. Ashley Banyard: "UK avian influenza outbreaks: Diagnostics and stakeholder impact". Dushanbe, Tajikistan. 10th Jun 2025

c) National conferences:

32

1. Marek Slomka & Elizabeth Billington. Attended FLU-TRAIL-MAP and FLU-TRAIL-MAP-OneHealth Joint Meeting. The Crick Institute, London, UK, 14 January 2025.
2. Joe James. Situation update on H5N1 HPAIV in the UK. FLU-TRAIL-MAP and FLU-TRAIL-MAP-OneHealth Joint Meeting, The Crick Institute, London, UK, 14 January 2025.
3. Ashley Banyard: Face to face – FluTrailMap – Work package 5 overview. Crick Institute, London. 14th Jan 2025
4. Ashley Banyard: Virtual – Overview of high pathogenicity avian influenza (HPAIV): Mammalian risk? SaVSNet Annual meeting. 15th Jan 2025
5. Ashley Banyard: Virtual – EU poultry audit: Diagnostics for Avian Influenza and Newcastle disease. Weybridge. 16th Jan 2025
6. Ashley Banyard: Virtual – An update on AIV in the UK. Northern Ireland Avian Influenza Forum. 27th Feb 2025
7. Ashley Banyard: Virtual – AIM programme for emerging HPAI H5Nx viruses. OFFLU Steering Committee. 13th Feb 2025
8. Joe James. Understanding the diverse animal influenza virus threats to the UK. DEFRA and Policy Science Day, Virtual, 12 March 2025.
9. Ashley Banyard: Virtual – FluTrailMap finders meeting WP5 update. 20th Mar 2025
10. Ashley Banyard: Virtual – Avian and swine influenza: Zoonotic risk. University of Sussex. 20th Mar 2025
11. Kelly Roper. Investigating molecular mechanisms behind the virulence change from low to high pathogenicity in H7 avian influenza viruses. Microbiology Society Annual Conference, Liverpool, UK, 31 March–3 April 2025 (Poster).
12. Sofia Riccio. Characterisation and comparison of two H5N1 highly high-pathogenicity avian influenza viruses (HPAIVs) from the UK epizootic. Microbiology Society Annual Conference, Liverpool, UK, 31 March–3 April 2025 (Poster).
13. Joe James. A UK perspective on the ever-changing world of high pathogenicity avian influenza. East of England Zoonoses – One Health Seminar, 10 April 2025.
14. Ashley Banyard: Face to face – Zambian delegation: International Reference Laboratory activities. APHA Weybridge. 23rd May 2025
15. Marek Slomka. Attended 9th Pseudotype Virus Meeting (co-author on two talks). University of Sussex, Falmer, Brighton, UK, 17 June 2025.
16. Cecilia Di Genova. Role of pseudotype viruses to investigate prior immunity in the emergence of H5Nx clade 2.3.4.4b HPAIV. 9th Pseudotype Virus Meeting, University of Sussex, Falmer, Brighton, UK, 17 June 2025 (Talk).
17. Kaja Rath. Serological detection of non-notifiable avian influenza subtypes in UK commercial poultry by pseudotype virus neutralisation. 9th Pseudotype Virus Meeting, University of Sussex, Falmer, Brighton, UK, 17 June 2025 (Talk).
18. Ashley Banyard: Virtual – Defra Wild Birds Working Group: UK Avian Influenza update. 15th Jul 2025
19. Ashley Banyard: Virtual – Avian Expert Group: UK Avian Influenza update. 16th Jul 2025
20. Ashley Banyard: Virtual – Avian influenza in the UK. NHS Infection meeting. 30th Jul 2025
21. Ashley Banyard: Face to face – Avian influenza and pigs. Pig Veterinary Society, Nottingham. 5th Oct 2025
22. Ashley Banyard: Face to face – International Reference Laboratory: Avian, Swine Influenza, Newcastle Disease. iPREPARE collaborators meeting. 13th Oct 2025
23. Joe James. United Kingdom Health Security Agency – Winter Influenza Season 2025/26 seminar: an update on the H5 HPAIV situation in the UK. 16 October 2025.
24. Ashley Banyard: Face to face – High Pathogenicity Avian Influenza: Global threat. Avian Science Day. Peterborough. 5th Nov 2025
25. Ashley Banyard: Face to face- Overview of diagnostic pipeline and Notifiable Avian Disease. iPREPARE Annual meeting, University of Leeds, Leeds, 12th November
26. Joe James. iPREPARE: Influenza Preparedness and Planning for Animal Risks of Emerging Threats update meeting – Genotype to Phenotype: Understanding Clade

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2.3.4.4b H5 HPAIV Diversity. 11–12 November 2025.

27. Ashley Banyard: Face to face- ECO HEALTH Poultry experts meeting, Royal Veterinary College, Hawkshead, London. 4th Dec 2025

28. Ashley Banyard: Virtual – Northern Ireland Avian Influenza Forum. Update on HPAI in GB. 4th Dec 2025

29. Elizabeth Billington. Assessing viral pathogenesis and the role of antibodies on infection outcome during high pathogenicity avian influenza subtype emergence. Influenza Update Meeting, University of Warwick, Coventry, UK, 15–16 December 2025 (Talk).

30. Cecilia Di Genova. Pigeons exhibit low susceptibility and poor transmission capacity for H5N1 clade 2.3.4.4b high pathogenicity avian influenza virus. Influenza Update Meeting, University of Warwick, Coventry, UK, 15–16 December 2025 (Poster).

31. Simon Johnson. The mammalian-adaptive PB2-627K mutation in clade 2.3.4.4b H5N1 HPAI virus maintains fitness in avian hosts. Influenza Update Meeting, University of Warwick, Coventry, UK, 15–16 December 2025 (Poster).

32. Sofia Riccio. Comparative fitness and reassortment dynamics of two dominant clade 2.3.4.4b H5N1 HPAIV genotypes (AB and BB) in ducks and chickens. Influenza Update Meeting, University of Warwick, Coventry, UK, 15–16 December 2025 (Poster).

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

0

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

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

Yes

a) Technical visit : 1

b) Seminars : 0

c) Hands-on training courses: 4

d) Internships (>1 month) 0

Type of technical training provided (a, b, c or d)	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
A	OMAN	10
C	BRAZIL	1
C	URUGUAY	1
C	ARGENTINA	1
C	PARAGUAY	1

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO17025	pdf	UKAS Certificate dec 25 (1).pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Haemagglutination inhibition test	UKAS
AGIDT	UKAS
Matrix (M)-gene PCR	UKAS
H5 real-time PCR (HA2)	UKAS

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H5 real-time PCR (Pathotyping)	UKAS
H7 real-time PCR (cleavage site)	UKAS
Real-time RT-PCR N1	UKAS
Real-time RT-PCR N5 to N9	UKAS
Next Generation Sequencing	UKAS
H7 real-time PCR (HA2)	UKAS
Avian influenza virus Sanger nucleotide sequencing	UKAS
Neuraminidase inhibition	UKAS

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

Yes

APHA maintains a complete and functioning laboratory biological risk management system which ensures that the laboratory is in compliance with applicable local, national (UK Health and Safety Executive), regional and international standards and requirements for biosafety and laboratory biosecurity.

TOR9: SCIENTIFIC MEETINGS

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

Yes

National/ International	Title of event	Co-organiser	Date	location	No. Participants
International	International Symposium of Avian Influenza	A Banyard (Scientific committee)	2025-06-09	Newfoundland, Canada	300

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOA?H?

Yes

Title of event	Date	location	Role (speaker, presenting poster, short communications)	Title of the work presented
Reference Laboratories Network	2025-05-20	Paris, France	Prof A Banyard a speaker and panel member alongside Dr Timm Harder from FLI, Germany.	An overview of avian influenza and Newcastle disease network challenges

TOR10: NETWORK WITH WOA?H REFERENCE LABORATORIES

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

Yes

24. Are you a member of a network of WOA?H Reference Laboratories designated for the same pathogen?

Yes

NETWORK/DISEASE	ROLE OF YOUR LABORATORY (PARTICIPANT, ORGANISER, ETC)	NO. PARTICIPANTS	PARTICIPATING WOA?H REF. LABS
AIV	OFFLU	12	Instituto Zooprofilattico Sperimentale delle Venezie, Italy Auditora Fiscal Federal Agropecuária Laboratório de Diagnóstico Animal, Laboratório Federal de Defesa Agropecuária – LFDA/SP – CGAL, Brazil Animal and Plant Quarantine Agency, Ministry of Agriculture, Korea National Reference Laboratory for Avian Influenza and Newcastle Disease Federal State-Financed Institution "Federal Centre for Animal Health" (FGBI "ARRIAH"), Russia National Avian Influenza Reference Laboratory, Animal Influenza Laboratory of the Ministry of Agriculture, China Reference Laboratory for Veterinary Quality Control on Poultry Production, Animal Health Research Institute, Egypt Hokkaido University, Research Center for

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			Zoonosis Control, Japan Indian Council of Agricultural Research (ICAR), National Institute of High Security Animal Diseases (NIHSAD), India Friedrich Loeffler Institute, Federal Research Institute for Animal Health, Germany Canadian Food Inspection Agency National Centre for Foreign Animal Disease, Canada CSIRO Australian Centre for Disease Preparedness SEPRL National Veterinary Services Laboratories, USDA, USA
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25. Did you organise or participate in inter-laboratory proficiency tests with WOA 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 WOA Ref. Labs/ organising WOA Ref Lab
Proficiency Test Exercise: Conventional and Molecular AIV/NDV Panels	Organiser	34	Laboratório Federal de Defesa Agropecuária em Sao Paulo – LFDA-SP, Brazil Istituto Zooprofilattico Sperimentale delle Venezie, Italy
EURL Proficiency test	Participant	95	Istituto Zooprofilattico Sperimentale delle Venezie, Italy
OFFLU Proficiency test programme	Participant	9	CSIRO Australian Centre for Disease Preparedness, Australia

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

Yes

Title of the project or contract	Scope	Name(s) of relevant WOA Reference Laboratories
OFFLU WHO Vaccine Composition Meeting (VCM)	APHA has carried out testing and contributed reagents, data and expertise to the biannual WHO VCM activities	Istituto Zooprofilattico Sperimentale delle Venezie, Italy National Veterinary Services Laboratories, USDA, USA
OFFLU Avian Influenza Matching (AIM)	APHA has carried out testing and contributed reagents, data and expertise to the OFFLU AIM project focused on antigenic assessment of H5 poultry vaccines.	Istituto Zooprofilattico Sperimentale delle Venezie, Italy CSIRO Australian Centre for Disease Preparedness, Australia
Flu-Switch: Identification of factors driving the emergence and spread of avian influenza viruses with zoonotic potential	International coordination of research on infectious animal diseases (ICRAD) This project aims to identify the factors that contribute to the evolution of AIV pathogenicity in poultry, and subsequent increased zoonotic potential that shapes its host range with the goal of defining risk factors to crossing species barriers.	Friedrich Loeffler Institute, Germany Istituto Zooprofilattico Sperimentale delle Venezie, Italy
Kappa-Flu: Ecology and biology of HPAIV H5	HORIZON-FARM2FORK Aims at understanding the connectivity and dynamics of H5 HPAI in wild birds, poultry and the environment, including the impact of climate change.	Friedrich Loeffler Institute, Germany Istituto Zooprofilattico Sperimentale delle Venezie, Italy

TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

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

Yes

Purpose for inter-laboratory test comparisons ¹	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries
Proficiency Test Exercise: Conventional and	Organiser	34	PT-DCP	BANGLADESH, BOTSWANA, BRAZIL, CAMBODIA, CHILE, COLOMBIA, COSTA RICA, CROATIA, CUBA, ECUADOR, GEORGIA, GHANA, IRELAND, ISRAEL, MALI, NIGERIA,

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Conventional and
Molecular AIV/NDV Panels

Organiser

ST

INFORM

PANAMA, PERU, SOUTH AFRICA, THAILAND, TRINIDAD
AND TOBAGO, TURKEY, UKRAINE, UNITED KINGDOM,
URUGUAY,

TOR12: EXPERT CONSULTANTS

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

Yes

Kind of consultancy	Location	Subject (facultative)
WOAH Commission meetings	Paris, France	HPAIV
WOAH terrestrial chapter updates	Email and online	HPAIV

29. Additional comments regarding your report:

N/A