WOAH Reference Laboratory Reports Activities 2022

Activities in 2022

This report has been submitted : 26 avril 2023 11:01

Laboratory Information

Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:	Highly and low pathogenic avian influenza
Address of laboratory:	WOAH Reference Laboratory for avian Influenza disease Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) Viale dell'Università 10 – 35020 Legnaro (PD) - Italy
Tel.:	+39-049 808 4381
E-mail address:	imonne@izsvenezie.it
Website:	www.izsvenezie.it
Name (including Title) of Head of Laboratory (Responsible Official):	Calogero Terregino, Head of the EU/National Reference Laboratory for AI/NDV. Director of the Research and Development Department/Acting Director of the Specialized Virology and Experimental Research Unit (IZSVe)
Name (including Title and Position) of WOAH Reference Expert:	Isabella Monne, DVM PhD, Head of the Viral genomics and transcriptomics Laboratory, Division of Research and Innovation
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
Haemoagglutination inhibition (HI)	yes	33223	0
Neuraminidase inhibition	yes	6	0
C-ELISA (AI-type A)	yes	11255	17
AGID	yes	0	

			0
Direct diagnostic tests		Nationally	Internationally
Virus Isolation	yes	74	33
RRT/RT-PCR	yes	40256	1454
Sequencing of HA gene	yes	104	185
IVPI - Intravenous Pathogenicity Index	yes	1	0
WGS - Whole Genome Sequencing	yes	279	416

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
Control positive antigens	HI serological test	13354/ 4425 ml	1205 ml	3220 ml	35	Africa America Asia and Pacific Europe MiddleEast
Control positive sera	HI/AGID serological test	2026/ 1701 ml	439 ml	1362 ml	40	Africa America Asia and Pacific Europe MiddleEast
Control negative serum	HI serological test	1262/ 667 ml	366 ml	30 ml	27	Africa Europe

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?

No

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

Yes

NAME OF THE NEW TEST OR DIAGNOSTIC METHOD DEVELOPED	DESCRIPTION AND REFERENCES (PUBLICATION, WEBSITE, ETC.)
Detection of H9 avian influenza virus by real-time RT-PCR (Panzarin et al., 2022) (SOP VIR 014)	https://doi.org/10.3390/v14061263https://www.izsvenezie.com/documents/reference-laboratories/avian-influenza/diagnostic-protocols/sop-vir-014.pdf

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?

No

TOR4: DIAGNOSTIC TESTING FACILITIES

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

Yes

NAME OF WOAH 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
ALBANIA	2022-03-08	ELISA Real Time PCR RT PCR Sequencing	0	19
AUSTRIA	2022-01-21	Real Time PCR RT PCR Sequencing	0	3
BULGARIA	2022-02-04	Isolation Real Time PCR RT PCR	0	12
BURKINA FASO	2022-01-02	Real Time PCR	0	6
CYPRUS	2022-12-02	Real Time PCR RT PCR Sequencing	0	13
CROATIA	2022-02-09	Real Time PCR RT PCR Sequencing	0	8
FINLAND	2022-04-14	Real Time PCR RT PCR Sequencing	0	3
GREECE	2022-04-19	Real Time PCR Sequencing	0	11
GUINEA	2022-06-01	Isolation Real Time PCR RT PCR Sequencing	0	98
IRELAND	2022-02-28	Real Time PCR RT PCR Sequencing	0	23
KOSOVO	2022-04-14	Real Time PCR RT PCR Sequencing	0	33
LITHUANIA	2022-08-22	Real Time PCR RT PCR Sequencing	0	8
MALI	2022-06-29	Isolation Real Time PCR RT PCR Sequencing	0	14
MALTA	2022-08-04	Elisa Real Time PCR	0	27
		Isolation Real Time PCR		

MOLDOVA	2022-01-21	RT PCR Sequencing	0	2
NIGER	2022-02-16	Real Time PCR RT PCR Sequencing	0	30
NIGERIA	2022-04-12	Isolation Real Time PCR	0	70
NORWAY	2022-04-07	Isolation Real Time PCR RT PCR Sequencing	0	4
POLAND	2022-03-23	Real Time PCR RT PCR Sequencing	0	8
PORTUGAL	2022-04-07	Real Time PCR RT PCR Sequencing	0	19
ROMANIA	2022-03-25	Real Time PCR RT PCR Sequencing	0	8
SENEGAL	2022-03-18	Real Time PCR RT PCR Sequencing	0	7
SLOVENIA	2022-02-07	Isolation Real Time PCR RT PCR	0	9
SPAIN	2022-03-11	Real Time PCR	0	40
THE NETHERLANDS	2022-02-09	Real Time PCR RT PCR Sequencing	0	1
UNITED KINGDOM	2022-02-01	Real Time PCR	0	52
AUSTRIA	2022-11-18	Real Time PCR RT PCR Sequencing	0	2
IRELAND	2022-03-08	Real Time PCR RT PCR Sequencing	0	2
IRELAND	2022-12-23	Real Time PCR RT PCR Sequencing	0	12
MALTA	2022-11-11	Elisa Real Time PCR	0	54
NORWAY	2022-05-26	Isolation Real Time PCR RT PCR Sequencing	0	2
ROMANIA	2022-05-10	Real Time PCR RT PCR Sequencing	0	8
SPAIN	2022-10-13	Real Time PCR	0	36
SPAIN	2022-08-24	Real Time PCR	0	23
SPAIN	2022-12-28	Real Time PCR	0	22
SPAIN	2022-11-11	Real Time PCR	0	11
UNITED KINGDOM	2022-01-24	Real Time PCR RT PCR Sequencing	0	30
UNITED KINGDOM	2022-02-18	Real Time PCR RT PCR Sequencing	0	2
UNITED KINGDOM	2022-11-04	Real Time PCR RT PCR Sequencing	0	20

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

Yes

NAME OF THE WOAH MEMBER COUNTRY RECEIVING A TECHNICAL CONSULTANCY	PURPOSE	HOW THE ADVICE WAS PROVIDED
	Online meeting: provided updates	

IRAQ	on biomolecular methods recommended for the identification of avian influenza viruses, as well as on new types of primers and probes 01/09/2022	Remote assistance (video call)
ICELAND	Support for the diagnosis/confirmation of suspected cases and the complete characterization of the HP H5N1 and ND viruses including phylogenetic analyses 10/05/2022	Remote assistance (email)
NORWAY	Clarifications on molecular methodology for H9 viruses and use of LNA probes (PDP VIR 014 Detection of avian influenza virus subtype H9 by Real Time reverse transcriptase PCR) 30/03/2022	Remote assistance (email)
ROMANIA	Clarifications on definition of “outbreak” and “cluster” in the case of evolution of avian influenza outbreak in domestic birds from backyard and farms 15/02/2022	Remote assistance (email)
BELGIUM	Information was provided on the in vitro protocols for the evaluation of the zoonotic potential of influenza viruses 06/02/2022	Remote assistance (email)
LUXEMBOURG	Replying to questions concerning SOP VIR 1000 "Sample preparation and nucleic acids isolation for the detection and typing of Avian influenza virus and Avian Orthoavulavirus type 1 by molecular methods" 12/10/2022	Remote assistance (email)
FRANCE	Replying to questions concerning SOP VIR 1005 “Molecular pathotyping and phylotyping of Eurasian H5 avian influenza virus by real-time RT-PCR” From 14/10/2022 onwards	Remote assistance (email)
IRELAND	Replying to questions related to the internal controls by using SOP VIR 1003 "Detection of type A influenza virus by real-time RT-PCR (Nagy et al., 2021)" 14/10/2022	Remote assistance (email)
SLOVAKIA	Clarification regarding EU legislation which allows us to use ELISA test in serological monitoring of Avian Influenza 29/11/2022	Remote assistance (email)
NORWAY	Technical support with particular reference to detection of new variants of HP H5NX on two	Remote assistance (email)

		samples of sea eagles 11/04/2022		

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
HORIZON 2020: DELTA-FLU Dynamics of avian influenza in a changing world	2017-2022	Study of the key viral, host-related, and environmental factors that determine the dynamics of avian influenza (AI) in poultry and other host species, with the goal of improving prevention and control strategies against this disease https://delta-flu.fli.de/de/home	1)Friedrich- Loeffler-Institut (FLI) (Germany,2) Erasmus Universitair Medisch Centrum Rotterdam (The Netherlands),3) The Secretary of State for Environment, Food and rural Affairs (UK), 4) IZSVE (Italy), Universiteit Gent (Belgium), 5) The University of Edinburgh (UK), 6) Linneuniversitetet (Sweden), 7) The University of Hong Kong (People's Rep. of China), 8) Southeast Poultry Research Laboratory (SEPRL), U.S. National Poultry Research Center, Agricultural Research Service, U.S. Department of Agriculture (USA), 9) Canadian Food Inspection Agency (CFIA) - Canada (associated partner)	CANADA CHINA (PEOPLE'S REP. OF) GERMANY ITALY THE NETHERLANDS UNITED KINGDOM UNITED STATES OF AMERICA
			European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden; Wageningen Bioveterinary Research, Netherlands.	

EFSA - Working Group on Avian Influenza	(for the time needed)	Avian influenza surveillance	Erasmus MC, Rotterdam, the Netherlands Anses (French Agency for Food, Environmental and Occupational Health & Safety) Ploufragan, France Friedrich-Loeffler-Institut, Germany.	FRANCE GERMANY ITALY SWEDEN THE NETHERLANDS
Memorandum of Understanding:Studies on general avian virology and genetics	2019-2024	Exchange of scientists and Technicians through short to medium term missions; sharing of knowledge and expertise	Avian Virology and Immunology service of Sciensano (Belgium) Genetic Engineering and Society Center, North Carolina State University, Raleigh, NC 27695, USA. Anses (French Agency for Food, Environmental and Occupational Health & Safety), Ploufragan-Plouzané-Niort Laboratory, Avian and Rabbit Virology Immunology and Parasitology Unit, Institute of Epidemiology, Friedrich-Loeffler-Institut, 17493 Greifswald-Insel Riems, Germany. EFSA - European Food Safety Authority, European ; ECDC - Centre for Disease Prevention and Control ; EURL - European Union Reference Laboratory for Avian Influenza	BELGIUM FRANCE GERMANY ITALY UNITED STATES OF AMERICA
Memorandum of Understanding: Collaboration in diagnostic and scientific research on host range, interspecies transmission and	2017-2022	Training of research personnel; sharing of viruses, reagents, facilities and expertise	IZSVE (Italy);Philipps Universität Marburg (Germany)	GERMANY

pathogenicity of influenza viruses				
Memorandum of Understanding:Research studies relating to zoonotic viral agents including animal influenza viruses	2015-2020 2-year extension 2020-2022	Encouraging and promoting cooperation in the following areas: diagnostic and vaccine developments for influenza viruses; training of research personnel; sharing viruses, reagents, facilities and expertise.	IZSVe - National Centre for Foreign Animal Disease -"NCFAD" (Canada)	CANADA ITALY
Memorandum of Understanding: Research studies relating to zoonotic viral agents including animal influenza viruses	2019-2024	Research collaborations for diagnostic and scientific purposes with reference to animal and human viral agents, including influenza viruses	The Institute of Veterinary Science (IVS), University of Liverpool, UK	ITALY UNITED KINGDOM
OFFLU Vaccination Composition Meeting	(for the time needed)	The aim of the network is to identify animal influenza viruses with zoonotic potential, and to speed up production of human vaccines against zoonotic influenza, or pandemic viruses that have emerged from animals and that could have negatively impact on humans	Global network of expertise on animal influenza	
Novel test approaches to determine efficacy and potency of irradiated vaccines against avian influenza viruses	(for the time needed	The action is part of a broader research project D32037 "Novel test Approaches to Determine Efficacy and Potency of Irradiated and Other Vaccines".	IAEA - Austria; IZSVe (Italy)	AUSTRIA DJIBOUTI
Working group on HPAI vaccination "WG/U/ALPHA/2018/04 - EFSA SWG avian influenza"	(for the time needed)	https://www.efsa.europa.eu/en/news/avian-influenza-cases-poultry-and-water-birds-rise	FLI Friedrich-Loeffler- Institut (Germany) ; Erasmus University Medical Center (Rotterdam) ; Estonian University of Life Sciences (Estonia); INRAE Institut national de la recherche agronomique (France); ANSES: French Agency for Food, Environmental and Occupational Health & Safety (France); EMA European Medicines Agency (The Netherlands) WOAH	ESTONIA FRANCE GERMANY THE NETHERLANDS
Memorandum of Understanding	2022-2027	Collaborative studies and implementation of projects on animal health, zoonotic diseases and food safety.	The National Research Center for Tropical and Transboundary	ITALY LIBYA

			Diseases - LIBYA	
H2020 PROJECT European Virus Archive - EVAg. https://www.european-virus-archive.com/	2020 - 2023	A non-profit global network sharing expertise in virology and aimed to preserve, produce and distribute viruses and derived products.	CSIRO (Australia); ANSES, CIRAD and the Institute Pasteur (France); the Friedrich-Loeffler-Institute (Germany); Erasmus MC (The Netherlands).	AUSTRALIA FRANCE GERMANY THE NETHERLANDS

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:

1) National surveillance programmes for avian influenza: i) National/regional surveillance programmes following the European Commission's technical advice with reference to circulation of avian influenza viruses in the domestic species; ii) the RL supported a specific regional surveillance programme targeting areas of high sampling intensity and at a high risk of infection; iii) Active surveillance programmes for avian influenza virus infection in wild birds and analysis of avian fecal samples from the environment, in collaboration with the Italian National Institute for Environmental Protection and Research (ISPRA); iv) Regional passive surveillance programmes in wild birds.

2) International surveillance for avian influenza in poultry and wild birds: i) through the Mattermost IZSVe-EURL platform (see box n° 15) communication, sharing and publishing data and news to keep the scientific community updated about the activities carried out by the EURL for AI/ND. Provision of epidemiological support to design and analyse results from surveillance programmes implemented in EU member states
https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/

3) Sample diagnostic and epidemiologic metadata accompanied by virus genetic data from Western African countries.

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:

1) National Information Systems: regular reporting of epidemiological data to the Italian Ministry of Health and EU Commission.
2) EU Commission, EFSA, ECDC: providing technical and scientific expertise on the phenotypic and genotypic characterization of influenza viruses; contributing to the official epidemiological reports on avian influenza in Europe.
3) OFFLU VCM network: identification of animal influenza viruses with zoonotic potential; speeding up production of human vaccines against zoonotic influenza, or pandemic viruses that have emerged from animals and that could negatively impact on humans. The RL generated and provided HA sequences from 59 AI viruses of the H5 and H9 subtypes.
4) Reporting results of molecular, epidemiological and diagnostic analyses to the EU NRLs by email and/or through Mattermost, an open source messaging platform that enables safe team collaboration and enhances cooperation between veterinary/public health laboratories and scientists from the European Union (EU).
5) In November 2022 the IZSVe launched the EURL Avian Flu Data Portal, an informative web application where all the main official data about epidemic of High Pathogenicity Avian Influenza (HPAI) in Europe are collected. Accessible data are retrieved from ADIS – Animal

Disease Information System, the European Union official system used by Member States to send immediate notifications and follow-ups about infectious animal diseases.
www.izsvenezie.com/eurl-avian-flu-data-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:

14

1. Blaurock, C., Pfaff, F., Scheibner, D., Hoffmann, B., Fusaro, A., Monne, I., Mettenleiter, T.C., Breithaupt, A., & Abdelwhab, E.M. (2022). Evidence for Different Virulence Determinants and Host Response after Infection of Turkeys and Chickens with Highly Pathogenic H7N1 Avian Influenza Virus. 96, e0099422-22. Epub 2022 Aug 22. Journal of virology, Sep 14 doi:10.1128/jvi.00994-22 [doi]
2. Bortolami, A., Mazzetto, E., Kangethe, R.T., Wijewardana, V., Barbato, M., Porfiri, L., Maniero, S., Mazzacan, E., Budai, J., Marciano, S., Panzarin, V., Terregino, C., Bonfante, F., & Cattoli, G. (2022). Protective Efficacy of H9N2 Avian Influenza Vaccines Inactivated by Ionizing Radiation Methods Administered by the Parenteral or Mucosal Routes. Frontiers in veterinary science, 9, 916108.
3. Decaro, N., & Terregino, C. (2022). Don't look up: dobbiamo avere paura del cielo? La settimana veterinaria, 1220, 38-40.
4. El Mellouli, F., Mouahid, M., Fusaro, A., Zecchin, B., Zekhnini, H., El Khantour, A., Giussani, E., Palumbo, E., Rguibi Idrissi, H., Monne, I., & Benhoussa, A. (2022). Spatiotemporal dynamics, evolutionary history and zoonotic potential of moroccan H9N2 avian influenza viruses from 2016 to 2021. 10.3390/v14030509
5. European Centre for Disease Prevention and Control. Adlhoch,C., Bandinelli, F., Terregino, C., Chincio, E., Fusaro, A., Mirinaviciute, G., Schneider, E., & Vukovikj , M. (2022). Testing and detection of zoonotic influenza virus infections in humans in the EU/EEA, and occupational safety and health measures for those exposed at work. Stockholm. ECDC, European Centre for Disease Prevention and Control. October 2022 doi:10.2900/852604
6. European Food Safety Authority, European Centre for Disease Prevention and Control, European Union Reference Laboratory for Avian Influenza, Adlhoch, C., Fusaro, A., Gonzales, J.L., Kuiken, T., Marangon, S., Niqueux, E., Staubach, C., Terregino, C., Aznar, I., Munoz Guajardo, I., & Baldinelli, F. (2022). Avian influenza overview December 2021 - March 2022. EFSA journal.European Food Safety Authority, 20, e07289.
7. European Food, S.A., European Centre for Disease Prevention,and Control, European Union Reference Laboratory for,Avian Influenza, Adlhoch, C., Fusaro, A., Gonzales, J.L., Kuiken, T., Marangon, S., Niqueux, É., Staubach, C., Terregino, C., Aznar, I., Guajardo, I.M., & Baldinelli, F. (2022). Avian influenza overview March – June 2022. 20 EFSA Journal, John Wiley & Sons, Ltd2022/08 doi: https://doi.org/10.2903/j.efsa.2022.7415
8. European Food Safety Authority, European Centre for Disease Prevention and Control, European Union Reference Laboratory for Avian Influenza, Adlhoch, C., Fusaro, A., Gonzales, J.L., Kuiken, T., Marangon, S., Niqueux, É., & Staubach, C. (2022). Avian influenza overview June–September 2022. 20 EFSA Journal 2022, Wiley-VCH Verlag GmbH & Co. KgaA on behalf of the European Food Safety Authority. doi:https://doi.org/10.2903/j.efsa.2022.7597
9. Gobbo F, Zanardello C, Bottinelli M, et al. Silent Infection of Highly Pathogenic Avian Influenza Virus (H5N1) Clade 2.3.4.4b in a Commercial Chicken Broiler Flock in Italy. Viruses. 2022;14(8):1600. Published 2022 Jul 22. doi:10.3390/v14081600
10. Lo, F.T., Zecchin, B., Diallo, A.A., Racky, O., Tassoni, L., Diop, A., Diouf, M., Diouf, M., Samb, Y.N., Pastori, A., Gobbo, F., Ellero, F., Diop, M., Lo, M.M., Diouf, M.N., Fall, M., Ndiaye, A.A., Gaye, A.M., Badiane, M., Lo, M., Youm, B.N., Ndao, I., Niaga, M., Terregino, C., Diop, B., Ndiaye, Y., Angot, A., Seck, I., Niang, M., Soumare, B., Fusaro, A., & Monne, I. (2022). Intercontinental Spread of Eurasian Highly Pathogenic Avian Influenza A(H5N1) to Senegal. Emerging infectious diseases, 28, 234-237.
11. Ouoba, L.B., Habibata-Zerbo, L., Zecchin, B., Barbierato, G., Hamidou-Ouandaogo, S., Palumbo, E., Giussani, E., Bortolami, A., Niang, M., & Traore-Kam, A. (2022). Emergence of a Reassortant 2.3. 4.4 b Highly Pathogenic H5N1 Avian Influenza Virus Containing H9N2 PA Gene in Burkina Faso, West Africa, in 2021. 14, 1901. Viruses, MDPI doi: 10.3390/v14091901.
12. Panzarin V, Marciano S, Fortin A, Brian I, D'Amico V, Gobbo F, Bonfante F, Palumbo E, Sakoda Y, Le KT, Chu DH, Shittu I, Meseko C, Haido AM, Odoom T, Diouf MN, Djegui F, Steensels M, Terregino C, Monne I. Redesign and Validation of a Real-Time RT-PCR to Improve Surveillance for Avian Influenza Viruses of the H9 Subtype. Viruses. 2022 Jun 10;14(6):1263. doi: 10.3390/v14061263. PMID: 35746734; PMCID: PMC9227555.
13. Pinto, R.M., Bakshi, S., Lytras, S., Zakaria, M.K., Swingler, S., Worrell, J.C., Herder, V., Varjak, M., Cameron-Ruiz, N., Rodriguez, M.C.,

Varela, M., Wickenhagen, A., Loney, C., Pei, Y., Hughes, J., Valette, E., Turnbull, M.L., Furnon, W., Hargrave, K.E., Gu, Q., Orr, L., Taggart, A., Boutell, C., Grey, F., Hutchinson, E., Digard, P., Monne, I., Wootton, S.K., MacLeod, M.K.L., Wilson, S.J., & Palmarini, M. (2022). Zoonotic avian influenza viruses evade human BTN3A3 restriction. bioRxiv, Cold Spring Harbor Laboratory doi:10.1101/2022.06.14.496196
14. Pohlmann, A., King, J., Fusaro, A., Zecchin, B., Banyard, A.C., Brown, I.H., Byrne, A.M., Beerens, N., Liang, Y., & Heutink, R. (2022). Has Epizootic Become Enzootic? Evidence for a Fundamental Change in the Infection Dynamics of Highly Pathogenic Avian Influenza in Europe, 2021. 13, e00609-22. Mbio, Am Soc Microbiol doi:https://doi.org/10.1128/mbio.00609-22

b) International conferences:

8
1. Francesco Bonfante, Alessio Bortolami, Eva Mazzetto, Matteo Pagliari, Cecilia Laterza, Marta Vascellari, Alessandra Napolitan, Valentina Panzarin, Andrea Fortin, Alice Fusaro, Jane Budai, Isabella Monne, Nicola Elvassore, Calogero Terregino (2022). Fitness and neurotropism of H5NX 2.3.4.4B in ferrets, human respiratory cells and human brain organoids (O185). ESVV 2022, Ghent, Belgium, ESVV 2022 87. 20-23 September 2022 2. Gobbo F., Zanardello C., Bottinelli M., Budai J., Bruno F., De Nardi R., Patregnani T., Catania S., Terregino C. (2022). Epidemia italiana di HPAI H5N1 Clade 2.3.4.4B (2021-2022): infezione silente in un allevamento industriale di broiler. VII Simposio Scientifico SIPA Forlì, Italy 28 October 2022 3. Bitrus Inuwa, Chinyere Chinoyerem, Ismaila Shittu, Bianca Zecchin, Francesco Bonfante, Giacomo Barbierato, Alice Fusaro, Maimuna Habib, Maryam Muhammad, Isabella Monne and Clement Meseko. (2022). Emergence of a Highly Pathogenic H5N1/H9N2 Reassortant Influenza Virus in Poultry in Hotspot Nigeria. Options XI for the control of Influenza, Belfast 26-29 September 2022 4. Monne, I. (2022). Avian influenza - an expanding global threat. 6th National Congress of the Italian Society for Virology – One virology, One Health (presentazione orale) 3-5 July 2022 Napoli (Italy) 5. Ismaila Shittu, Eva Mazzetto, Chika Nwosuh, Alessandra Napolitan, Andrea Fortin, Maria Varotto, Alice Fusaro, Judith Bakam, Maryam Muhammad, Francesco Bonfante, Isabella Monne, Alessio Bortolami (2022). Detection of Genotype XIV.2 Newcastle Disease Viruses in Nigeria, Antigenic Characterization and Optimization of Vaccination Strategies (O161). ESVV 2022, Ghent, Belgium, ESVV 2022 87. 20-23 September 2022 6. Lalidia Bruno Ouoba1, Habibata Lamouni Zerbo-Ouermi, Bianca Zecchin, Giacomo Barbierato2, Sandaogo Hamidou-Ouandaogo, Elisa Palumbo, Edoardo Giussani, Alessio Bortolami, Calogero Terregino, Mariétou Guitti-Kindo1, Dominique Guigma1, Nicolas Barro, Alice Fusaro, Isabella Monne (2022). Highly pathogenic avian influenza H5N1/H9N2 reassortant virus in West Africa: a potential threat for humans? Options XI for the control of Influenza, Belfast 26-29 September 2022 7. G Zamperin, A Bianco, J Smith, A Bortolami, L Vervelde, A Schivo, A Fortin, S Marciano, V M Panzarin, E Mazzetto, A Milani, Y Berhane, P Digard, F Bonfante, I Monne (2022). The interplay between avian influenza viruses and their hosts: insights from transcriptomic sequencing of galliformes infected with low pathogenic viruses of the H7 subtype. Options XI for the control of Influenza, Belfast 26-29 September 2022 8. Bianca Zecchin, Alice Fusaro, Giacomo Barbierato, Edoardo Giussani, Diletta Fornasiero, Francesca Scolamacchia, Paolo Mulatti, Annalisa Salviato, Alessia Schivo, Elisa Palumbo, Maria Varotto, Federica Gobbo, Isabella Monne, Calogero Terregino (2022). Genetic investigation of the HPAI H5N1 viruses responsible of HPAI epidemic in Italy in 2021-2022 (88). ESVV 2022, Ghent, Belgium, ESVV 2022 87. 20-23 September 2022

c) National conferences:

1
Updates on avian influenza addressed to the diagnostic laboratories of the national surveillance network (16/12/2022) organised by IZSVe

https://www.izsvenezie.it/documenti/formazione/corsi-convegni/2022/2022-12-16-aggiornamenti-CRN-influenza-aviaria/programma.pdf

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

24
EURL team at IZSVe (n° 8 presentations)
Presentations from the 28th Annual Meeting of the National Reference Laboratories for Avian Influenza and Newcastle Disease of European Union Member States (September 2022)
https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/workshops/

Updates on avian Influenza and Newcastle Disease from the National Reference Centre (n° 6 presentations) (December 2022)
https://www.izsvenezie.it/documenti/formazione/corsi-convegni/2022/2022-12-16-aggiornamenti-CRN-influenza-aviaria/programma.pdf

Guidelines produced by the RL (n°2):
Guidance for genomic monitoring of Avian Influenza Virus (AIV)
https://www.izsvenezie.com/documents/reference-laboratories/avian-influenza/useful-resources/guidance-representative-genomic-avian-influenza-virus.pdf

Weekly pool sampling ("bucket sampling") in poultry species that often do not manifest clinical signs when infected with HPAI
https://www.izsvenezie.com/documents/reference-laboratories/avian-influenza/diagnostic-protocols/weekly-pool-sampling-bucket-sampling.pdf

Reports produced by OFFLU in collaboration with the RL experts (n°3):
OFFLU Annual Report 2021 (april 2022)
https://www.offlu.org/wp-content/uploads/2022/04/OFFLU_Annual_Report_2021_FINAL.pdf

OFFLU avian influenza VCM report September 2021 to February 2022 (march 2022)
https://www.offlu.org/wp-content/uploads/2022/04/Feb22-Avian-OFFLU-Final3.pdf

OFFLU update of wild bird AI events in Canada, UK, Israel and other Europe countries (January 2022)
https://www.offlu.org/wp-content/uploads/2022/02/OFFLU-wild-bird_jan2022summary_final.pdf

Links from IZSVe's website (n°6):
Diagnostic protocols
https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/diagnostic-protocols/

New interactive dashboard for the weekly AI updates in Europe
https://eurlaidata.izsvenezie.it/

WOAH & FAO activities
https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/woah-fao-activities/

Avian influenza in Europe update
https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/europe-update/
https://food.ec.europa.eu/animals/animal-diseases/diseases-and-control-measures/avian-influenza_it#emergency_and_control_mea

European Union Reference Laboratory (EURL) for Avian Influenza and Newcastle Disease
http://www.izsvenezie.com/reference-laboratories/avian-influenza-and-newcastle-disease/

EVA-GLOBAL Biobank
https://www.izsvenezie.com/izsve-veterinary-biobank-and-the-oie-collaborating-centre-for-veterinary-biological-biobank/
https://www.european-virus-archive.com/

Links to other websites (n°5):
DELTA-FLU Dynamics of avian influenza in a changing world
https://delta-flu.fli.de/de/public-outreach/library/research-papers

EFSA - Avian influenza

https://www.efsa.europa.eu/en/topics/topic/avian-influenza#published-on-this-topic

WHO - Global Influenza Surveillance and Response System (GISRS)
https://www.who.int/initiatives/global-influenza-surveillance-and-response-system

WOAH –FAO OFFLU - Network of expertise on animal influenza
https://www.woah.org/en/transparency-on-avian-influenza-virus-strains-the-oie-fao-offlu-network/

Global Collaboration on H5N8 and Related Influenza Viruses
https://www.gisaid.org/collaborations/global-collaboration-on-h5n8/

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 : 3

b) Seminars : 105

c) Hands-on training courses: 2

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	Malaysia	3
b	Luxembourg	1
b	Cyprus	1
b	Romania	1
b	Sweden	1
b	Austria	1
b	26 EU countries and 14 non EU countries (detailed information available at IZSVe)	100
c	Albania	1
c	Poland	1

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
UNI CEI EN ISO/IEC 17025:2018	ACCREDIA certificate as Testing Laboraotory	1_ACCREDIA Certificato di accreditamento Laboratori di prova.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Avian Influenza Viruses Antibodies agar gel immunodiffusion test	ACCREDIA – Italian Accreditation System
Avian Influenza Viruses Antibodies hemagglutination assay	ACCREDIA – Italian Accreditation System
Avian Influenza Virus Antibodies serological enzyme-linked immunosorbent assay (ELISA)	ACCREDIA – Italian Accreditation System
Avian Influenza Viruses isolation and differential diagnosis	ACCREDIA – Italian Accreditation System
Detection of type A avian influenza virus by Real-Time Reverse Transcriptase PCR	ACCREDIA – Italian Accreditation System
Avian Influenza Virus subtype H5 RT-PCR	ACCREDIA – Italian Accreditation System
Avian Influenza Virus H5 sequence analysis	ACCREDIA – Italian Accreditation System
Avian Influenza Virus subtype H7 RT-PCR	ACCREDIA – Italian Accreditation System
Avian Influenza Virus H7 sequence analysis	ACCREDIA – Italian Accreditation System
Avian Influenza virus subtype H5 rRT-PCR	ACCREDIA – Italian Accreditation System
Avian Influenza Virus subtype H7 rRT-PCR	ACCREDIA – Italian Accreditation System
Proficiency testing provider	ACCREDIA – Italian Accreditation System

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

Yes

The RL implements biorisk management actions to prevent diseases among personnel and to protect the community from harm caused by potentially infectious pathogens. Particular attention is also paid to the safe transport management of infectious substances according to IATA guidelines and UN classification system. Agents (pathogenic or infectious organisms) posing moderate hazards to personnel and the environment are handled under BSL-2 conditions. The use of PPE, including lab coats, gloves, eye protection, and — in some cases — face shields is mandatory. On the contrary, highly pathogenic avian influenza (HPAI) viruses are handled and cultured under BSL-3 conditions. At IZSVe, since 2013, there exists a Biosafety Committee responsible for the following tasks: - Evaluation of the safety risks for workers and for the environment connected to the activities to be performed under BSL3 conditions that involves the use of microorganisms, animals and Genetically Modified Microorganisms MOGM; - Evaluation of the emergency procedures - Evaluation of all the management and operative procedures to be applied inside the BSL-3 laboratory and animal facilities including potential biosecurity issues. All Standard Operative Procedures (SOPs) and handling of pathogens are written and performed accordingly to the WHO Laboratory Biosafety Manual (5th Ed.). The BSL-3 laboratory and animal facilities are maintained regularly to ensure biocontainment during an annual suspension of activities for plant and equipment maintenance following decontamination of the premises. All the BSL-3 facilities are equipped with self-closing set of locking doors with access away from general building corridors and access is restricted and controlled at all times as part of the internal biosecurity measures.

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. Are you a member of a network of WOAH Reference Laboratories designated for the same pathogen?

Yes

PURPOSE OF THE PROFICIENCY TESTS: 1	ROLE OF YOUR REFERENCE LABORATORY (ORGANISER/ PARTICIPANT)	NO. PARTICIPANTS	PARTICIPATING WOAH REF. LABS/ ORGANISING WOAH REF. LAB.
OFFLU - joint WOAH-FAO scientific network on animal influenza https://www.offlu.org/	Participant		https://www.offlu.org/index.php/participating-laboratories/
OFFLU VCM The aim of the network is to identify animal influenza viruses with zoonotic potential, and to speed up production of human vaccines against zoonotic influenza, or pandemic viruses that have emerged from animals and that could have negatively impact on humans. https://bulletin.woah.org/?panorama=03-3-2020-2_offlu	Participant		Information on participants available from the organiser 1) EU Reference Laboratory, the Animal and Plant Health Agency (APHA) Surrey, UK; 2) National Avian Influenza Reference Laboratory Animal Influenza Laboratory of the Ministry of Agriculture, Harbin People's Rep. of China; 3) Hokkaido University Research Center for Zoonosis Control, Sapporo, Japan; 4) Indian Council of Agricultural Research (ICAR) National Institute of High Security Animal Diseases (NIHSAD), Bhopal, India.

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

Yes

PURPOSE OF THE PROFICIENCY TESTS: 1	ROLE OF YOUR REFERENCE LABORATORY (ORGANISER/ PARTICIPANT)	NO. PARTICIPANTS	PARTICIPATING WOAH REF. LABS/ ORGANISING WOAH REF. LAB.
European Proficiency Test on Avian influenza and Newcastle disease	Organiser	Thirty-eight (38) laboratories – twenty-six (26) EU National reference Laboratories (NRLs) and twelve (12) Non-EU NRLs (including three (3) from EFTA countries) –	• Friedrich Loeffler Institute, Federal Research Institute for Animal Health Institute of Diagnostic Virology (Germany); • Animal and Plant Health Agency Weybridge (UK) (detailed Information and Final coded report available at the IZSVe)

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

TITLE OF THE PROJECT OR CONTRACT	SCOPE	NAME(S) OF RELEVANT WOAH REFERENCE LABORATORIES
OFFLU VCM Consultation on the Composition of Influenza	Antigenic and genetic characteristics of zoonotic influenza viruses and	1) EU Reference Laboratory, the Animal and Plant Health Agency (APHA) Surrey, UK; 2) National Avian Influenza Reference Laboratory Animal Influenza Laboratory of the Ministry of Agriculture, Harbin People's Rep. of China; 3) Hokkaido University Research Center for Zoonosis Control,

Virus Vaccines for the Northern Hemisphere	candidate vaccine viruses developed for potential use in human vaccines	Sapporo, Japan; 4) Indian Council of Agricultural Research (ICAR) National Institute of High Security Animal Diseases (NIHSAD), Bhopal, India.
European Food Safety Authority (EFSA)	EFSA Panel on Animal Health and Welfare (AHAW) - WG on Avian influenza	Friedrich- Loeffler- Institut (FLI) (Germany) See also https://www.efsa.europa.eu/en/topics/topic/avian-influenza
HORIZON 2020: DELTAFLU Dynamics of avian influenza in a changing world	Study of the key viral, host-related, and environmental factors that determine the dynamics of avian influenza (AI) in poultry and other host species, with the goal of improving prevention and control strategies against this disease	Friedrich- Loeffler- Institut (FLI) (Germany)

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?

Yes

Purpose for inter-laboratory test comparisons1	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Region(s) of participating WOAH Member Countries
National Proficiency Test for Avian Influenza and Newcastle Disease	Organiser	20	Europe
Proficiency test Test for Avian Influenza and Newcastle Disease (in the frame of LoA FAO PO No. 3496598)	Organiser	25	Africa
Proficiency Test on Avian influenza: serological test Organised by CEVA Animal Health (France) in collaboration with Royal GD (The Netherlands)	Participant (Information on participants available from the organiser)		

TOR12: EXPERT CONSULTANTS

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

29. Additional comments regarding your report:

No