

# WOAH Reference Laboratory Reports Activities 2024

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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:	Animal and Plant Quarantine Agency, Ministry of Agriculture, Forest and Rural Affairs, 177, Hyeoksin 8-ro, Gimcheon-si, Gyeongsangbuk-do, Republic of Korea
*Tel:	+82-54-912-0968
*E-mail address:	ensenble@korea.kr
Website:	https://www.qia.go.kr
*Name (including Title) of Head of Laboratory (Responsible Official):	Jung-hee Kim (Commissioner, APQA)
*Name (including Title and Position) of WOAH Reference Expert:	Dr. Eun-Kyoung Lee, Head of Avian Influenza Virus Research Laboratory, Avian Influenza Research and Diagnostic Division
*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	t performed last year
Indirect diagnostic tests		Nationally	Internationally
c-ELISA (Al type A)	Yes	0	0
HI (H5/H7)	Yes	2797	0
Direct diagnostic tests		Nationally	Internationally
Virus isolation	Yes	887	

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			0
RT-PCR	Yes	8066	46
H5/H7 pathotyping by Sanger sequencing	Yes	84	1
Next Generation Sequencing for AIV gene	Yes	151	142

## **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
Antigen (H5, H7, H9) Antiserum (H5, H7, H9)	HI test	Produced/ Provide	H5: 73,400 tests, H7: 73.400 tests, H9: 155,800 tests	0	1	Korea (Rep. of),
AIV rapid antigen kit	NP protein detection	provide	0	150 Test	2	CAMBODIA, MONGOLIA,

#### 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?

Yes

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.)
	patent application No. : KR-10-2700809(2024.8.27.) Publication:
Novel multiplex rRT-PCR of subtype H5, H7, H9 according to	Development and evaluation of a multiplex real-time RT-PCR assay
WOAH standards	for simultaneous detection of H5, H7, and H9 subtype avian
	influenza viruses. An et al. J Virol Methods. 2024. Jun:327:114942

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

Yes

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)
Clade 2.3.2.1d/2.3.4.4b multivalent H5 vaccines	The newly validated clade 2.3.2.1d/2.3.4.4b multivalent vaccine for emergency preparedness in Korea (patent application No.: KR-10-2023-0061365(2023.5.11))
H7N9 vaccine	The H7N9 vaccine as a candidate for the Korea avian influenza antigen bank (Journal publication: Vet Immunol Immunopathol. 2024. 278:110851. )

## **TOR4: DIAGNOSTIC TESTING FACILITIES**

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

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
MONGOLIA	2024-05-02	Real-time RT-PCR, NGS	0	12
MONGOLIA	2024-08-29	Real-time RT-PCR, NGS	0	18
MONGOLIA	2024-12-24	Real-time RT-PCR, NGS	0	16
LAOS	2024-06-20	NGS	0	14
LAOS	2024-09-30	NGS	0	11
CAMBODIA	2024-06-05	NGS	0	20
CAMBODIA	2024-12-19	NGS	0	16
VIETNAM	2024-11-14	NGS	0	35

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

#### Yes

Yes

Name of the WOAH Member Country receiving a technical consultancy	Purpose	How the advice was provided
VIETNAM	To share the experience and surveillance strategy on the broiler duck flocks at the slaughterhouse using viral genome detection method to find the AIV infected flocks during the period of high risk of HPAI infection.	During the training course for the governmental veterinary officials and researchers, held in APQA for two days in November, as a program of ODA project supported by Korean Government, this topic was asked and answered after a talk about Korean diagnosis and surveillance system for Avian influenza delivered by WOAH reference lab.

### **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

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Eun-Kyoung	Lee		KOREA_	(REP	OF)
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Title of the study	Duration	Purpose of the study	Partners (Institutions)	involved other than your country
The monitoring and characteristic studies for avian influenza and foot and mouth disease viruses in Vietnam	10 years (15-24)	Monitoring of high pathogenicity avian influenza in Vietnam	National Center for Veterinary Diagnosis	VIETNAM
Studies on genetic characterization of foot and mouth disease and avian influenza virus in Southeast Asian countries	5 years (23-27)	Monitoring of high pathogenicity avian influenza in Cambodia and LAO PDR	National Animal Health and Production Research Institute (Cambodia), National Animal Health Laboratory (Lao PDR)	CAMBODIA LAOS
The monitoring and characteristic studies for Avian Influenza viruses in migratory habitats of Mongolia	5 years (21-25)	Monitoring of high pathogenicity avian influenza in Mongolia	Mongolian University of Life Sciences(MULS)	MONGOLIA

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

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:

- (For HPAI outbreaks in Korea) For all the HPAI outbreaks of Korea in 2024, the epidemiological data are collected in APQA and all the laboratory works for characterization of viruses are performed for official announcement.

 - (For international HPAI outbreaks) The information on the isolated viruses of avian influenza, e.g. origin, subtype, pathotype or nucleotide sequences, for the molecular epidemiological studies on the outbreaks of HPAI in Vietnam, Cambodia and LAO PDR.
- (International active surveillance on migratory birds) The information of the avian influenza viruses detected from the migratory birds during collaborative active surveillance in Mongolia e.g. origin, subtype, pathotype or nucleotide sequences. The molecular epidemiological results of this study were published for data sharing in 2024.

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:

We disseminated those data concerning molecular epidemiological characterization of avian influenza viruses isolated from wild birds or poultry in South Korea and other countries through research paper publication and presentations in the workshops for veterinary officers or reseasches of other Asian countries hosted by WOAH or APQA.



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:

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1. Baek, Yoon-Gi, et al. "Research Note: Comparative evaluation of pathogenicity in SPF chicken between different subgroups of H5N6 high pathogenicity avian influenza viruses." Poultry Science 103.2 (2024): 103289.

2. An, Se-Hee, et al. "Development and evaluation of a multiplex real-time RT-PCR assay for simultaneous detection of H5, H7, and H9 subtype avian influenza viruses." Journal of Virological Methods 327 (2024): 114942.

3. Heo, Gyeong-Beom, et al. "Concurrent Infection with Clade 2.3. 4.4 b Highly Pathogenic Avian Influenza H5N6 and H5N1 Viruses, South Korea, 2023." Emerging Infectious Diseases 30.6 (2024): 1223.

4. Kang, Yong-Myung, et al. "Surveillance and Genetic Analysis of Low-Pathogenicity Avian Influenza Viruses Isolated from Feces of Wild Birds in Mongolia, 2021 to 2023." Animals 14.7 (2024): 1105.

5. Kang, Yong-Myung, et al. "Highly Pathogenic Avian Influenza A (H5N1) Virus Infection in Cats, South Korea, 2023." Emerging Infectious Diseases 30.12 (2024): 2510.

6. Jang, Yunyueng, et al. "Research Note: Establishment of vector system harboring duck RNA polymerase I promoter for avian influenza virus." Poultry Science 104.1 (2025): 104570.

7. Do, Hyerim, et al. "Efficacy of the H7N9 vaccine as a candidate for the Korean avian influenza antigen bank." Veterinary Immunology and Immunopathology 278 (2024): 110851.

b) International conferences:

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1. Phylogenetic analysis of H5N1 high pathogenicity avian influenza virus isolated in Laos, 2021-2023 (The Korean Society of Veterinary Science, 2024.4.25. Korea)

2. Genetic characterization of H5N1 high pathogenicity avian influenza virus in Vietnam (The Korean Society of Veterinary Science, 2024.4.25. Korea)

3. Detection of Avian Influenza Virus in Mandarin Duck Since 2020 in South Korea (Asian-Pacific Wildlife Health Workshop, 2024.8.6.-8, Hawaii, US)

4. Update on HPAI in Korea (Regional Workshop on Avian Disease Prevention and Control in Asia and the Pacific 2024, 2024.8.27.-29., Korea)

5. Current situation of Highly Pathogenic Avian Influenza in Korea. (2024 The Korean Society of Veterinary Science, 2024.10.17.-19., Korea) 6. Avian influenza outbreaks and control strategies in Korea over the past 20 years (2024 FAVA, 2024.10.25.-27. Korea)

7. Pathogenicity of clade 2.3.4.4b of H5N1 high pathogenicity avian influenza virus in chickens and ducks isolated from South Korea in 2022-2023 (2024 FAVA, 2024.10.25.-27. Korea)

8. Construction of Candidates for H7N9 Recombinant Avian Influenza Viruses and Their Antigenic Analysis (2024 FAVA, 2024.10.25.-27. Korea)

9. Genetic characterization of low pathogenic avian influenza viruses isolated from wild birds in Mongolia during 2021 to 2023 (2024 FAVA, 2024.10.25.-27. Korea)

c) National conferences:

#### 3

1. Concurrent introduction of H5N6 and H5N1 High pathogenicity avian influenza viruses of clade 2.3.4.4b, South Korea, 2023 (The Korean society for zoonoses., 2024.5.17.)



 Development and evaluation of a multiplex real-time RT-PCR assay for simultaneous detection of H5, H7 and H9 subtype avian influenza viruses (The Korean society of preventive veterinary medicine, 2024.5.30.)
Characterization of a H6N1 avian influenza virus isolated from a broiler duck farm in Korea, 2023-2024 (The Korean society for zoonoses., 2024.11.14.~15.)

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 : 22

c) Hands-on training courses: 12

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
В	VIETNAM	10
В	KAZAKHSTAN	2
В	MALAYSIA	2
В	MONGOLIA	2
В	PHILIPPINES	2
В	SINGAPORE	2
В	SRI LANKA	1
В	THAILAND	1
C	KAZAKHSTAN	2
C	MALAYSIA	2
С	MONGOLIA	2
C	PHILIPPINES	2
С	SINGAPORE	2
С	SRI LANKA	1
C	THAILAND	1

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# **TOR8: QUALITY ASSURANCE**

18. Does your laboratory have a Quality Management System?

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO/IEC 17025:2017	Certificate (PDF)	20231214_KT372_Animal_and_Plant_Quarantine_Agency_PM_Eng.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Identification of the agent (Molecular diagnostic method)	KOLAS-Korea Laboratory Accreditation Scheme
Serological test (HI test)	KOLAS-Korea Laboratory Accreditation Scheme

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

Yes

A national biorisk management is designated to prevent disease among personnel and to protect the community from harm by preventing the release of infectious pathogen. In order to maintain the biorisk capacity of containment facilities in Korea, the national approval and management system for these facilities, such as Biosafety Level 3(BL3) facilities (Accreditation No: KCDC-16-3-04). We have operated "Guideline for biosafety of infectious disease diagnosis and research (APQA-PR-BR-ABL3)".

## **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?

Yes

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Title of event	Date	location	Role (speaker, presenting poster, short communications)	Title of the work presented
3rd Online meeting for the WOAH avian disease network in East Asia	2024-04-02	Online	Speaker	Update on HPAI in Korea
Review of the WOAH chapter on avian influenza	2024-04-23	Online	Participants	Revision discussion
Avian Influenza Matching (AIM) for Poultry Vaccines	2024-07-10	Online	Participants	OFFLU AIM project
4th Regional Meeting for WOAH Reference Centers in Asian and the Pacific	2024-07-19	Online	Participants	Networking among Reference Laboratory and sharing the information to strengthen activities
Regional Workshop on				



Avian Disease Prevention and Control in Asian and the Pacific 2024	2024-08-28	Korea (Seoul)	Speaker	Avian Influenza update in South Korea
IABS-WOAH HPAI vaccine workshop	2024-10-22	France (Paris)	Participants	HPAI vaccine strategy
OFFLU avian influenza teleconference	2024-12-12	Online	Short communication	The current global avian influenza situation updates

## **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
Regional network for Avian Influenza in Asia and the Pacific	Participant	5	Reference laboratories of Korea, Japan, China, Australia, India

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
To improve accurate global detection and characterization of influenza in birds	Participant	information available from organizer, CSIRO/ACDP(Australia)	CSIRO/ACDP has conducted proficiency testing on behalf of OFFLU

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?

No

# 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 comparisons1Role of your reference laboratory (organizer/participant)No. participating laboratoriesName of the testWOAH Member Countries	Yes				
	Purpose for inter-laboratory test comparisons1	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries

Annual national proficiency test

for the diagnosis of avian



for the diagnosis of avail				
influenza virus in viral genome	Organiser	40		
detection method using real-	Organiser	40	IKI-FCKTII test	KORLA (ILF. OF),
time RT-PCR to provincial				
laboratories				

# **TOR12: EXPERT CONSULTANTS**

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

Yes					
Kind of consultancy OFFLU avian influenza zoonotic report for WHO VCM (Feb 2024 meeting) and situation updates (2024.2.5)		Location	Subject (facultative)		
		Online	Avian influenza zoonotic report for WHO VCM update, recent AI situation from regional experts		
3rd Online me disease netw Review of the influ	3rd Online meeting for the WOAH avian disease network in East Asia (2024.4.2)	Online	Disease surveillance updates, Sharing the research activites		
	Review of the WOAH chapter on avian influenza (2024.4.23)	Online	Discussion about details of the table for intended purpose of AIV test		
OFFLU avian influenza teleconference (2024.12.12)		Online	The current global avian influenza situation focus on surveillance, genetic data, vaccination		

#### 29. Additional comments regarding your report:

No