

# WOAH Reference Laboratory Reports Activities 2025

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## LABORATORY INFORMATION

*Name of disease (or topic) for which you are a designated WOA 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:	<a href="https://www.qia.go.kr">https://www.qia.go.kr</a>
*Name (including Title) of Head of Laboratory (Responsible Official):	Jung-rok Choi (Commissioner, APQA)
*Name (including Title and Position) of WOA 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 WOA Manual (Yes/No)	Total number of test performed last year	
		Nationally	Internationally
<b>Indirect diagnostic tests</b>			
c-ELISA (AI type A)	Yes	0	0
HI (H5/H7)	Yes	3912	0
<b>Direct diagnostic tests</b>			
Virus isolation	Yes	854	0
RT-PCR	Yes	10371	40
H5/H7 pathotyping by Sanger sequencing	Yes	195	10
Next Generation Sequencing for AIV gene	Yes	112	55

## TOR2: REFERENCE MATERIAL

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

No

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

No

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAHP 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 WOAHP Standards for the designated pathogen or disease?

Yes

Name of the new test or diagnostic method developed	Description and References (Publication, website, etc.)
multiplex and universal RT-PCR assay for HA and NA subtyping of AIV	- Patent application No. : KR-10-2024-0188553(2024.12.17) - Publication (2025.8.26.) : An, S.-H., et al. (2025) "Development of a multiplex and universal RT-PCR assay for hemagglutinin and neuraminidase subtyping of avian influenza virus." Journal of veterinary science, 26(5): e59.

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

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

### TOR4: DIAGNOSTIC TESTING FACILITIES

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

Yes

Name of WOAHP 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
LAOS	2025-07-08	NGS	0	15
MONGOLIA	2025-08-04	Real-time RT-PCR, NGS	0	10
MONGOLIA	2025-10-02	Real-time RT-PCR, NGS	0	20
BANGLADESH	2025-12-02	Real-time RT-PCR, NGS	0	10

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

No

### TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

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

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	WOAHP Member Countries involved other than your country
Studies on genetic characterization of foot and mouth disease viruses and avian influenza virus in FMD and AI endemic countries (Cambodia and LAO PDR)	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
Joint Korea-Japan surveillance of HPAI in Wild birds and Advancement of Diagnostic Technologies	3 years (25-27)	the information sharing about HPAI outbreaks, and validation of diagnostic methods of each labs	Hokkaido university (WOAHP reference lab)	JAPAN

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

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 2025, 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 Cambodia and LAO PDR.
- (International active surveillance) 1. The characterization of the avian influenza viruses detected from the migratory birds during collaborative active surveillance in Mongolia. The molecular epidemiological results and virus information, e.g. origin, subtype, pathotype or nucleotide sequences were collected for data sharing.  
2. Korea-Japan Joint research on surveillance of HPAI in wild birds and advanced diagnostic technologies.

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 researchers of other Asian countries hosted by WOA 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:

4

1. Cha, Ra Mi, et al. "Genetic characteristics and pathogenesis of clade 2.3. 4.4 b H5N1 high pathogenicity avian influenza virus isolated from poultry in South Korea, 2022–2023." *Virus Research* 353 (2025): 199541.
2. An, Se-Hee, et al. "Development of a multiplex and universal RT-PCR assay for hemagglutinin and neuraminidase subtyping of avian influenza virus." *Journal of Veterinary Science* 26.5 (2025): e59.
3. Kim, Hye-Ryoung, et al. "Comparison of Gross Lesions in Poultry Naturally Infected With High Pathogenicity Avian Influenza H5N6 and H5N1 Viruses in South Korea, 2023–2025." *Transboundary and Emerging Diseases* 2025.1 (2025): 1736453.
4. Kim, Min-Beom, et al. "Comprehensive analysis of surveillance for avian influenza viruses in migratory wild birds in South Korea, 2019 to 2025" *Journal of Veterinary Science* (2025)

b) International conferences:

7

1. Establishment of Vector System Harboring Duck RNA Polymerase I Promoter for Avian influenza virus (ISAI, 2025.6.23.-26., Canada)
2. Genetic characteristics and pathogenesis of clade 2.3.4.4b H5N1 high pathogenicity avian influenza virus in South Korea during 2022-2023 (ISAI, 2025.6.23.-26., Canada)
3. Validation of Pre-Barcoded Primer Sets for High-Throughput Nanopore Sequencing of Avian Influenza Viruses (ISAI, 2025.6.23.-26., Canada)
4. Current HPAI situation in Korea (1st joint symposium of the Korea-Japan network for the control of avian influenza, 2025.8.29-30., Japan)
5. Multiplex rRT-PCR assay for simultaneous detection of H5, H7, and H9 subtype AIV (1st joint symposium of the Korea-Japan network for the control of avian influenza, 2025.8.29-30., Japan)
6. The current situation of high pathogenicity avian influenza in South Korea (The 1st East Asian National Veterinary Research Institute Roundtable Meeting, 2025.9.25.-26., Japan)
7. development and evaluation of a consensus-based recombinant H7N9 avian influenza vaccine against heterologous challenge in poultry (Japanese Vaccine Conference, 2025.9.7., Japan)

c) National conferences:

16

1. Status of Avian influenza outbreaks in Korea and Worldwide (Symposium on Mammalian influenza, 2025.4.24)
2. Molecular Characterization and Phylogenetic Analysis of H5N1 High Pathogenicity Avian Influenza Viruses in Cambodia, 2022-2023 (The Korean society for zoonoses, 2025.5.16.)
3. Avian Influenza Surveillance and HPAI outbreaks in Korea. AI symposium at APQA, Korea (2025.7.15)
4. Establishment and Application of an Enzyme-Linked Lectin Assay (ELLA) for Detection of Neuraminidase-Inhibiting Antibodies Against Korean Avian Influenza Viruses (The Korean society of preventive veterinary medicine, 2025.9.10.)
5. Identification of a Chicken Complement Fragment Interface Involved in Humoral Immunity Enhancement (The Korean society of preventive veterinary medicine, 2025.9.10.)
6. Development of a multiplex and universal RT-PCR assay for HA and NA subtyping of avian influenza virus (The Korean Society of Vet, Sci., 2025.10.21.)
7. Molecular epidemiology of a H5N3 avian influenza virus isolated from a broiler duck farm in Korea, 2023 (The Korean Society of Vet, Sci., 2025.10.21.)
8. Genetic Characterization of H5N1 and H5N3 High Pathogenicity Avian Influenza Virus Isolated in South Korea during 2024 – 2025 (The Korean Society of Vet, Sci., 2025.10.21.)
9. Genetic characterization of H5 and H7 low pathogenicity avian influenza virus from wild birds during 2023-2025 in Korea (The Korean Society of Vet, Sci., 2025.10.21.)
10. Epidemiological investigation of Y280-lineage H9N2 avian influenza viruses in Korea (The Korean society for zoonoses, 2025.11.10.)
11. Long-read-optimized Nanopore sequencing enables efficient subtyping and genotyping of avian influenza viruses (The Korean society for zoonoses, 2025.11.10.)
12. Molecular Characterization and Phylogenetic Analysis of H5N1 High Pathogenicity Avian Influenza Viruses in Laos, 2023-2024 (The Korean society for zoonoses, 2025.11.10.)
13. Avian influenza surveillance and highly pathogenic avian influenza outbreaks in poultry in Korea, 2020-2025 (The Korean society for zoonoses, 2025.11.10.)
14. Pathogenicity of clade 2.3.4.4b H5N6 high pathogenicity avian influenza virus isolated from South Korea in 2023–2024 (The Korean society for zoonoses, 2025.11.10.)
15. Standardization of an Enzyme-Linked Lectin Assay (ELLA) for Measuring IN antibodies against Avian Influenza Virus (The Korean society for zoonoses, 2025.11.10.)
16. Mapping CR2-Interacting Domains of Chicken Complement Fragments for Humoral Immunity Enhancement (The Korean society for zoonoses, 2025.11.10.)

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 WOA Members?

Yes

a) Technical visit : 0

b) Seminars : 19

c) Hands-on training courses: 19

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
B	MONGOLIA	2
B	NEPAL	2
B	LAOS	2
B	MALAYSIA	2
B	MYANMAR	2
B	BANGLADESH	2
B	SINGAPORE	2
B	SRI LANKA	2
B	THAILAND	2
B	PHILIPPINES	1
C	MONGOLIA	2

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C	NEPAL	2
C	NEPAL	2
C	LAOS	2
C	MALAYSIA	2
C	MYANMAR	2
C	BANGLADESH	2
C	SINGAPORE	2
C	THAILAND	2
C	PHILIPPINES	1

## TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO/IEC 17025:2017	Certificate (PDF)	KT372_Animal_and_Plant_Quarantine_Agency_PM_Eng_20241121.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 WOAHP?

No

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

Yes

Title of event	Date	location	Role (speaker, presenting poster, short communications)	Title of the work presented
OFFLU pre VCM teleconference	2025-02-05	Online	Participants	The current global avian influenza situation updates
15th meeting of the WOAHP East Asia wildlife health network	2025-03-05	Online	Participants	Occurrence of Low Pathogenicity Avian Influenza
4th Online meeting for the WOAHP avian disease network in East Asia	2025-05-18	Online	Speaker	Update on HPAI situation and one health approach in Korea
WOAHP Regional Workshop for Avian Disease Prevention and Control in Asia and the Pacific 2025	2025-08-26	Hokkaido (Japan)	Speaker	Laboratory activity and Research updates [APQA, South Korea]

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OFFLU pre VCM teleconference	2025-09-14	Online	Participants	The current global avian influenza situation updates
WOAH Webinar: update on the global situation of high pathogenicity avian influenza	2025-12-17	Online	Participants	The current global avian influenza situation updates

## TOR10: NETWORK WITH WOAHP REFERENCE LABORATORIES

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

Yes

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

Yes

NETWORK/DISEASE	ROLE OF YOUR LABORATORY (PARTICIPANT, ORGANISER, ETC)	NO. PARTICIPANTS	PARTICIPATING WOAHP REF. LABS
Regional network for Avian Influenza in Asia and Pacific	Participant	5	Reference laboratories of Korea, Japan, China, Australia, India
Avian Influenza	Principal investigator for collaborative project	2	Hokkaido University

25. Did you organise or participate in inter-laboratory proficiency tests with WOAHP 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 WOAHP Ref. Labs/ organising WOAHP 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 WOAHP 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 WOAHP Reference Laboratories
Joint Korea-Japan surveillance of HPAI in Wild birds and Advancement of Diagnostic Technologies	Sharing the information about HPAI outbreaks, and validation of diagnostic methods of each labs	Hokkaido university

## TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

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

Yes

Purpose for inter-laboratory test comparisons <sup>1</sup>	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAHP Member Countries
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Annual national proficiency test for the diagnosis of avian influenza virus in viral genome detection method using real-time RT-PCR to provincial laboratories

Organiser

40

rRT-PCR HI test

KOREA (REP. OF),

## TOR12: EXPERT CONSULTANTS

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

Yes

Kind of consultancy	Location	Subject (facultative)
OFFLU avian influenza teleconference (2025.2.6)	Online	Avian influenza zoonotic report for February 2025 WHO VCM meeting data submission, recent AI situation from regional experts

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4th Online meeting for the WOAHA avian disease network in East Asia (2025.5.19)	Online	Disease surveillance updates, sharing the research activities
OFFLU avian influenza teleconference (2025.9.15)	Online	Avian influenza zoonotic report for September 2025 WHO VCM meeting data submission, recent AI situation from regional experts

29. Additional comments regarding your report:

No