

OIE Reference Laboratory Reports Activities

Activities in 2021

This report has been submitted : 2022-01-17 09:19:34

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Avian influenza
Address of laboratory:	1. 678 Haping Road, Harbin, 150069,CHINA (PEOPLES REP. OF) 2. 427 Maduan Street, Harbin, 150001,CHINA (PEOPLES REP. OF)
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Name (including Title) of Head of Laboratory (Responsible Official):	Hualan Chen,Professor,Director
Name (including Title and Position) of OIE Reference Expert:	Hualan Chen,Professor,Director
Which of the following defines your laboratory? Check all that apply:	Academic

ToR 1: To use, promote and disseminate diagnostic methods validated according to OIE Standards

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 OIE Manual (Yes/No)	Total number of test performed last year	
		Nationally	Internationally
Indirect diagnostic tests		Nationally	Internationally
Hemagglutinin inhibition(H5)	yes	6427	0
Hemagglutinin inhibition(H7)	yes	6427	0
Hemagglutinin inhibition(H9)	yes	6427	0
Hemagglutinin inhibition(H1)	yes	1300	0
Hemagglutinin inhibition(H3)	yes	1300	0
Direct diagnostic tests		Nationally	Internationally
Chicken embros	yes	505370	0
RT-PCR	yes	4200	0

ToR 2: To develop reference material in accordance with OIE requirements, and implement and promote the application of OIE Standards. To store and distribute to national laboratories biological reference products and any other reagents used in the diagnosis and control of the designated pathogens or disease.

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

No

3. Did your laboratory supply standard reference reagents (non OIE-approved) and/or other diagnostic reagents to OIE Member Countries?

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient OIE Member Countries	Region of recipients
AI type antigens(H5)	HI serological test	produced	21,174 ml	390 ml	2	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
AI type antigens(H7)	HI serological test	produced	14,330 ml		1	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
AI type antigens(H9)	HI serological test	produced	3,368 ml	210 ml	2	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
AI type antiserum(H5)	HI serological test	produced	5,488 ml	90 ml	2	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
AI type antiserum(H7)	HI serological test	produced	3,646 ml		1	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
AI type antiserum(H9)	HI serological test	produced	552 ml	70 ml	2	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East

4. Did your laboratory produce vaccines?

Yes

5. Did your laboratory supply vaccines to OIE Member Countries?

Yes

Vaccine name	Amount supplied nationally (ml, mg) (including for own use)	Amount supplied to other countries (ml, mg)	Name of recipient OIE Member Countries
Avian influenza virus inactivated vaccine(H5+H7)	474,884,750 mL	0	CHINA (PEOPLE'S REP. OF)
Avian influenza virus inactivated vaccine(H5)	0	51,705,000 ml	EGYPT
Avian influenza virus inactivated vaccine(H5/H9)	0	11,705,000 ml	EGYPT
AI (H9N2, H5N1) -ND vaccine	0	16,705,000 ml	EGYPT
Avian influenza virus NDV vector live vaccine(H5)	476,200 ml	0	CHINA (PEOPLE'S REP. OF)

ToR 3: To develop, standardise and validate, according to OIE Standards, new procedures for diagnosis and control of the designated pathogens or diseases

6. Did your laboratory develop new diagnostic methods validated according to OIE Standards for the designated pathogen or disease?

Yes

7. Did your laboratory develop new vaccines according to OIE Standards for the designated pathogen or disease?

Yes

Name of the new test or diagnostic method or vaccine developed	Description and References (Publication, website, etc.)
Avian influenza virus trivalent inactivated vaccine(H5+H7)(H5N6 H5-Re13 strain+H5N8 H5-Re14 strain+H7N9 H7-Re4 strain)	http://www.moa.gov.cn/govpublic/xmsyj/202201/t20220111_6386642.htm
Avian influenza virus trivalent inactivated vaccine(H5+H7)(cell cultured, H5N6 H5-Re13 strain+H5N8 H5-Re14 strain+H7N9 H7-Re4 strain)	http://www.moa.gov.cn/govpublic/xmsyj/202201/t20220111_6386642.htm
Avian influenza virus bivalent inactivated vaccine(H5)(H5N6 H5-Re13 strain+H5N8 H5-Re14 strain)	http://www.moa.gov.cn/govpublic/xmsyj/202201/t20220111_6386642.htm
Avian influenza virus bivalent inactivated vaccine(H5)(cell cultured,H5N6 H5-Re13 strain+H5N8 H5-Re14 strain)	http://www.moa.gov.cn/govpublic/xmsyj/202201/t20220111_6386642.htm
Avian influenza antigen,antisera for HI test(H5N6 H5-Re13 strain);Avian influenza antigen,antisera for HI test(H5N8 H5-Re14 strain);Avian influenza antigen,antisera for HI test(H7N9 H7-Re4 strain);	http://www.moa.gov.cn/govpublic/xmsyj/202201/t20220111_6386642.htm

ToR 4: To provide diagnostic testing facilities, and, where appropriate, scientific and technical advice on disease control measures to OIE Member Countries

8. Did your laboratory carry out diagnostic testing for other OIE Member Countries?

No

9. Did your laboratory provide expert advice in technical consultancies on the request of an OIE Member Country?

Yes

Name of the OIE Member Country receiving a technical consultancy	Purpose	How the advice was provided
EGYPT	To provide important information on the update of avian influenza vaccine seed	by WeChat

ToR 5: To carry out and/or coordinate scientific and technical studies in collaboration with other laboratories, centres or organisations

10. Did your laboratory participate in international scientific studies in collaboration with OIE Member Countries other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	OIE Member Countries involved other than your country
Research on Emerging infectious diseases	2020-2025	The genetic basis of the host range and virulence of influenza viruses	Division of Virology, Department of Microbiology and Immunology; Institute of Medical Science, University ofTokyo, Japan	JAPAN
Animal influenza surveillance in China	2015-2021	Surveillance campaign of avian influenza from China	Emory University,Atlanta, Georgia 30322 USA	UNITED STATES OF AMERICA

ToR 6: To collect, process, analyse, publish and disseminate epizootiological data relevant to the designated pathogens or diseases

11. Did your Laboratory collect epizootiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:
<p>1.The distribution and biocharacters of clade 2.3.4.4 H5N6 virus: H5N6 viruses have been widely detected in wild birds and domestic poultry in many countries and as of December 16, 2021, 57 human cases of infection with H5N6 viruses including 27 deaths have been reported to the WHO. The clade 2.3.4.4 H5N6 avian influenza viruses display considerably different virulence in mice. 2.The spatiotemporal spread of H5N8 virus across the world since 2020: The H5N8 viruses have been widely detected in different avian species in many countries since the beginning of 2020. H5N8 viruses formed two branches (branch I and branch II) that probably separated in the middle of 2017. The viruses in branch I circulated in domestic poultry and wild birds in Hungary, Germany, Czech Republic, and Poland in the spring and summer of 2020, and were then detected in domestic poultry and wild birds in Japan and Korea in the winter of 2020. The branch II viruses were firstly detected in chickens in Iraq in May 2020, then caused multiple disease outbreaks in domestic poultry in July and August 2020 in Russia, and were responsible for the subsequently widespread disease outbreaks in wild birds and domestic poultry in Russia and many countries in Middle East, Europe, and Asia. Of note, H5N8 viruses bearing the branch II HA gene were also detected in humans in Russia and in seals and a fox in the United Kingdom.</p>

12. Did your laboratory disseminate epizootiological data that had been processed and analysed?

Yes

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

1. H5N8 virus in wild birds and poultry in China The migratory swans carried and introduced the H5N8 viruses bearing HA from two different branches to China in October 2020 and January 2021. In January 2021, a virus (WS/SD/SC195/2021) of branch I was detected in a whopper swan in Shandong province. The branch II viruses were subsequently spread to other wild birds and domestic waterfowl in China. The branch II virus began to be detected in swans and other wild birds in China from October 2020, and was also detected in ducks and geese in 2021. Thirty-nine viruses isolated in China are in three different forks of branch II. 2. The evolution of H7N9 virus in chickens in China We found that the H7N9 viruses recently isolated in chickens in China gradually lost their binding to human-type receptors and were antigenically different from the H7N9 vaccine strain that was used in China for H7N9 influenza control in poultry. 3. The evolution of H6 viruses from farm and wild birds in China Phylogenetic analysis showed that 19 different genotypes were formed among 20 representative H6 viruses isolated from farms in China between 2014 and 2018. And novel reassortant H6 viruses isolated from wild birds in China. 4. H5 low pathogenic viruses in wild birds in China In regular active surveillance of avian influenza virus from wild birds in China in 2020, we isolated six low pathogenic H5 avian influenza viruses, including one H5N2, two H5N3, and three H5N8.

**13. What method of dissemination of information is most often used by your laboratory?
(Indicate in the appropriate box the number by category)**

a) Articles published in peer-reviewed journals: 16

(1) Cui, J.Q., Cui, P.F., Shi, J.Z., Fan, W.F., Xing, X., Gu, W.L., Zhang, Y.C., Zhang, Y.P., Zeng, X.Y., Jiang, Y.P., Chen, P.C., Yang, H.L., Chen, Y., Liu, J.X., Liu, L.L., Tian, G.B., Lu, Y.X., Chen, H.L., Li, C.J., Deng, G.H., 2021a. Continued evolution of H6 avian influenza viruses isolated from farms in China between 2014 and 2018. *Transbound Emerg Dis* doi. 10.1111/tbed.14212.

(2) Cui, P.F., Zeng, X.Y., Li, X.Y., Li, Y.B., Shi, J.Z., Zhao, C.H., Qu, Z.Y., Wang, Y.W., Guo, J., Gu, W.L., Ma, Q., Zhang, Y.C., Lin, W.P., Li, M.H., Tian, J.M., Wang, D.X., Xing, X., Liu, Y.J., Pan, S.X., Zhang, Y.P., Bao, H.M., Liu, L.L., Tian, G.B., Li, C.J., Deng, G.H., Chen, H.L., 2021b. Genetic and biological characteristics of the globally circulating H5N8 avian influenza viruses and the protective efficacy offered by the poultry vaccine currently used in China. *Sci China Life Sci*, doi. 10.1007/s11427-021-2025-y.

(3) Fan, M.L., Liang, B., Zhao, Y.Z., Zhang, Y.P., Liu, Q.Z., Tian, M., Zheng, Y.Q., Xia, H.Z., Suzuki, Y., Chen, H.L., Ping, J.H., 2021. Mutations of 127, 183 and 212 residues on the HA globular head affect the antigenicity, replication and pathogenicity of H9N2 avian influenza virus. *Transbound Emerg Dis*, doi. 10.1111/tbed.14363.

(4) Guo, J., Wang, Y.W., Zhao, C.H., Gao, X.X., Zhang, Y.P., Li, J.Q., Wang, M.J., Zhang, H., Liu, W.Q., Wang, C., Xia, Y.J., Xu, L., He, G.M., Shen, J.Y., Sun, X.H., Wang, W.T., Han, X.Y., Zhang, X.X., Hou, Z.Y., Jin, X.L., Peng, N., Li, Y.B., Deng, G.H., Cui, P.F., Zhang, Q.Y., Li, X.Y., Chen, H.L., 2021. Molecular characterization, receptor binding property, and replication in chickens and mice of H9N2 avian influenza viruses isolated from chickens, peafowls, and wild birds in eastern China. *Emerg Microbes Infec* 10, 2098-2112.

(5) Kong, X.T., Guan, L.Z., Shi, J.Z., Kong, H.H., Zhang, Y.P., Zeng, X.Y., Tian, G.B., Liu, L.L., Li, C.J., Kawaoka, Y., Deng, G.H., Chen, H.L., 2021. A single-amino-acid mutation at position 225 in hemagglutinin attenuates H5N6 influenza virus in mice. *Emerg Microbes Infec* 10, 2052-2061.

(6) Li, C.J., Chen, H.L., 2021. H7N9 Influenza Virus in China. *Csh Perspect Med* 11.

(7) Li, J.P., Liang, L.B., Jiang, L., Wang, Q., Wen, X., Zhao, Y.H., Cui, P.F., Zhang, Y.P., Wang, G.W., Li, Q.B., Deng, G.H., Shi, J.Z., Tian, G.B., Zeng, X.Y., Jiang, Y.P., Liu, L.L., Chen, H.L., Li, C.J., 2021a. Viral RNA-binding ability conferred by SUMOylation at PB1 K612 of influenza A virus is essential for viral pathogenesis and transmission. *Plos Pathog* 17, doi. 10.1371/journal.ppat.1009336.

(8) Li, Y.L., Li, M.H., Tian, J.M., Bai, X.L., Li, Y.B., 2021b. Genetic characteristics and pathogenicity of novel reassortant H6 viruses isolated from wild birds in China. *Vet Microbiol* 254, doi. 10.1016/j.vetmic.2021.108978.

(9) Qu, Z.Y., Meng, F., Shi, J.Z., Deng, G.H., Zeng, X.Y., Ge, J.Y., Li, Y.B., Liu, L.L., Chen, P.C., Jiang, Y.P., Li, C.J., Chen, H.L., 2021. A Novel Intronic Circular RNA Antagonizes Influenza Virus by Absorbing a microRNA That Degrades CREBBP and Accelerating IFN-beta Production. *Mbio* 12, doi. 10.1128/mBio.01017-21.

(10) Song, Y.M., Huang, H.X., Hu, Y.Z., Zhang, J.W., Li, F., Yin, X., Shi, J.Z., Li, Y.B., Li, C.J., Zhao, D.M., Chen, H.L., 2021. A genome-wide CRISPR/Cas9 gene knockout screen identifies immunoglobulin superfamily DCC subclass member 4 as a key host factor that promotes influenza virus endocytosis. *Plos Pathog* 17, doi. 10.1371/journal.ppat.1010141.

(11) Tian, J., Li, M., Bai, X., Li, Y., Wang, X., Wang, F., Shi, J., Zeng, X., Tian, G., Li, Y., 2021. H5 low pathogenic avian influenza viruses maintained in wild birds in China. *Vet Microbiol* 263, 109268.

(12) Wang, Z., Chen, Y., Chen, H.Y., Meng, F., Tao, S.Y., Ma, S.J., Qiao, C.L., Chen, H.L., Yang, H.L., 2021. A single amino acid at position 158 in haemagglutinin affects the antigenic property of Eurasian avian-like H1N1 swine influenza viruses. *Transbound Emerg Dis*, doi. 10.1111/tbed.14288.

- (13) Yin, X., Deng, G.H., Zeng, X.Y., Cui, P.F., Hou, Y.J., Liu, Y.J., Fang, J.Z., Pan, S.X., Wang, D.X., Chen, X.H., Zhang, Y.P., Wang, X.R., Tian, G.B., Li, Y.B., Chen, Y., Liu, L.L., Suzuki, Y., Guan, Y.T., Li, C.J., Shi, J.Z., Chen, H.L., 2021. Genetic and biological properties of H7N9 avian influenza viruses detected after application of the H7N9 poultry vaccine in China. *Plos Pathog* 17, doi. 10.1371/journal.ppat.1009561.
- (14) Zeng, Y., Xu, S., Wei, Y.L., Zhang, X.G., Wang, Q., Jia, Y.N., Wang, W.B., Han, L., Chen, Z.S., Wang, Z.X., Zhang, B., Chen, H.L., Lei, C.Q., Zhu, Q.Y., 2021. The PB1 protein of influenza A virus inhibits the innate immune response by targeting MAVS for NBR1-mediated selective autophagic degradation. *Plos Pathog* 17, doi. 10.1371/journal.ppat.1009300.
- (15) Wan X.P., Li J.Q., Wang Y.P., Yu X.F., He X.J., Shi J.Z., Deng G.H., Zeng X.Y., Tian G.B., Li Y.B., Jiang Y.P., Guan Y.T., Li C.J., Shao F., Chen H.L., 2021. H7N9 virus infection triggers lethal cytokine storm by activating gasdermin E-mediated pyroptosis of lung alveolar epithelial cells. *National Science Review*, doi.org/10.1093/nsr/nwab137.
- (16) Guo J, Chen J, Li Y, Li Y, Deng G, Shi J, Liu L, Chen H, Li X. 2021. SUMOylation of matrix protein M1 and filamentous morphology collectively contribute to the replication and virulence of highly pathogenic H5N1 avian influenza viruses in mammals. *J Virol*. Dec 15;JV10163021. doi: 10.1128/JVI.01630-21. PMID: 34908445.

b) International conferences: 6

- (1) Professor Hualan Chen gave a presentation with the title of 'The prevention and control of avian influenza in China' at the online meeting of the Regional Expert Network Meeting and Workshop for Avian Diseases(virtual) in Asia and the Pacific held on 29-30 September 2021.
- (2) Professor Hualan Chen gave a presentation with the title of 'H5 avian influenza situation in Asia and the control strategy in China' at the online meeting of a regional consultation on avian influenza surveillance in Asia held by FAO on November 30th, 2021.
- (3) Professor Hualan Chen gave a presentation with the title of 'Avian influenza control in China' at the online meeting of One Health Global Experts Symposium held by FAO and Nanjing Agricultural University held on December 8-9th, 2021.
- (4) Professor Hualan Chen gave a presentation with the title of 'Successful control of H7N9 influenza in China' at the online meeting of International Veterinary Vaccinology Network Virtual Symposium: Vaccines for Poultry held on February 25th, 2021.
- (5) Professor Chengjun Li gave a presentation with the title of '"SUMOylation at PB1 K612 of influenza A virus is essential for viral pathogenesis and transmission' at the Virtual Mini-symposium on Zoonotic Disease and 12th International Symposium of Integrative Zoology (ISIZ) held on April 26th, 2021.
- (6) Professor Yanbing Li gave a presentation with the title of 'H5N6 situation and vaccine update' at the online meeting of the AI situation update in poultry and wild birds held November 8th in 2021.

c) National conferences: 4

- (1) Professor Guobin Tian gave a presentation with the title of 'Application of H5 and H7 avian influenza vaccine in poultry' at the national training course on prevention and control of the key animal diseases held in Chongqing, China, on March 18th 2021.
- (2) Professor Guobin Tian gave a presentation with the title of 'Application of H5 and H7 avian influenza vaccine in poultry' at the training course on prevention and control of the key animal diseases in Guangdong held on April 27th, 2021, in Guangzhou, China.
- (3) Professor Guobin Tian gave a presentation with the title of 'Application of H5 and H7 avian influenza vaccine in poultry' at the online training course on prevention and control of the key animal diseases in Henan after floods held on August 28th, 2021.
- (4) Professor Guobin Tian gave a presentation with the title of 'Application of H5 and H7 avian influenza vaccine in poultry' at the training course on prevention and control of the key animal diseases in Guizhou held on September 3th, 2021, in Guizhou, China.

d) Other:

(Provide website address or link to appropriate information) 0
none

ToR 7: To provide scientific and technical training for personnel from OIE Member Countries

To recommend the prescribed and alternative tests or vaccines as OIE Standards

14. Did your laboratory provide scientific and technical training to laboratory personnel from other OIE Member Countries?

No

ToR 8: To maintain a system of quality assurance, biosafety and biosecurity relevant for the pathogen and the disease concerned

15. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)
CNAS L6928	CNAS-Certificate.jpg
CNAS BL0085	CNAS-certification in new place.jpg

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Haemagglutination inhibition test(HI)	ILAC
RT-PCR	ILAC
Isolation of influenza virus	ILAC
Neutralization assay	ILAC

17. Does your laboratory maintain a “biorisk management system” for the pathogen and the disease concerned?

Yes

(See *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, Chapter 1.1.4*)

ToR 9: To organise and participate in scientific meetings on behalf of the OIE

18. Did your laboratory organise scientific meetings on behalf of the OIE?

No

19. Did your laboratory participate in scientific meetings on behalf of the OIE?

Yes

Title of event	Date (mm/yy)	Location	Role (speaker, presenting poster, short communications)	Title of the work presented
Regional Expert Network Meeting and Workshop for Avian Diseases(virtual) in Asia and the Pacific	09/21	online	speaker	The prevention and control of avian influenza in China
Regional consultation on avian influenza surveillance in Asia	11/21	online	speaker	H5 avian influenza situation in Asia and the control strategy in China
One Health Global Experts Symposium held by FAO and Nanjing Agricultural University	12/21	Nanjing, China	speaker	Avian influenza control in China
International Veterinary Vaccinology Network Virtual Symposium: Vaccines for Poultry	02/21	online	speaker	Successful control of H7N9 influenza in China
Virtual Mini-symposium on Zoonotic Disease and 12th International Symposium of Integrative Zoology (ISIZ)	04/21	online	speaker	SUMOylation at PB1 K612 of influenza A virus is essential for viral pathogenesis and transmission
AI situation update in poultry and wild birds	11/21	online	speaker	H5N6 situation and vaccine update
National training course on prevention and control of the key animal diseases	03/21	Chongqing, China	speaker	Application of H5 and H7 avian influenza vaccine in poultry

ToR 10: To establish and maintain a network with other OIE Reference Laboratories designated for the same pathogen or disease and organise regular inter-laboratory proficiency testing to ensure comparability of results

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

Yes

21. Was your laboratory involved in maintaining a network with OIE Reference Laboratories designated for the

same pathogen or disease by organising or participating in proficiency tests?

No

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

No

ToR 11: To organise inter-laboratory proficiency testing with laboratories other than OIE Reference Laboratories for the same pathogens and diseases to ensure equivalence of results

23. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than OIE Reference Laboratories for the same disease?

No

Note: See Interlaboratory test comparisons in: Laboratory Proficiency Testing at: <http://www.oie.int/en/our-scientific-expertise/reference-laboratories/proficiency-testing> see point 1.3

ToR 12: To place expert consultants at the disposal of the OIE

24. Did your laboratory place expert consultants at the disposal of the OIE?

No

25. Additional comments regarding your report: