

OIE Reference Laboratory Reports Activities

Activities in 2020

This report has been submitted : 2021-01-19 02:49:59

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Highly and low pathogenic avian influenza
Address of laboratory:	Harbin Veterinary Research Institute, CAAS 1. 427 Maduan Street, Harbin, 150001,CHINA (PEOPLES REP. OF) 2. 678 Haping Road, Harbin, 150069,CHINA (PEOPLES REP. OF)
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E-mail address:	hlchen1@yahoo.com
Website:	www.hvri.ac.cn
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	8873	0
Hemagglutinin inhibition(H7)	yes	8873	0
Hemagglutinin inhibition(H9)	yes	8873	0
Hemagglutinin inhibition(H1)	yes	2220	0
Hemagglutinin inhibition(H3)	yes	2220	0
Direct diagnostic tests		Nationally	Internationally
Chicken embros	yes	42991	0
RT-PCR	yes	4000	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	20,756	180	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	12,152	0	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	3,966	90	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	5,278	60	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	2,360	0	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	686	30	1	<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 trivalent inactivated vaccine(H5+H7)	455,977,250	0	CHINA (PEOPLE'S REP. OF)
Avian influenza virus bivalent inactivated vaccine(H5+H7)	3,870,000	0	CHINA (PEOPLE'S REP. OF)
Avian influenza virus inactivated vaccine(H5)	0	15,000,000	EGYPT
Avian influenza virus inactivated vaccine(H5+H9)	0	13,000,000	EGYPT
Avian influenza virus inactivated vaccine(H5)	0	20,000,000	IRAN

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?

No

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)(Re-11 strain+Re-12 strain+H7-Re2 strain)	http://www.moa.gov.cn/govpublic/xmsyj/202007/t20200721_6348991.htm
Avian influenza virus trivalent inactivated vaccine(cell cultured,H5+H7)(Re-11 strain+Re-12 strain+H7-Re2 strain)	http://www.moa.gov.cn/govpublic/xmsyj/202007/t20200721_6348991.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
INDONESIA	Provide important information on the application procedure of the avian influenza inactivated vaccine in poultry	Online meeting

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	2015-2020	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 of Tokyo, 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:

1.H5N6 virus isolated in swans: In January 2020, the subclade 2.3.4.4h of highly pathogenic avian influenza (H5N6) virus infected migratory whooper swans and mute swans in Xinjiang, western China. The virus is lethal to chickens and ducks but has low pathogenicity in mice. Antigenically, this subclade is similar to the H5N1 vaccine seed virus Re-11. 2. Evolution and extensive reassortment of H5 influenza viruses isolated from wild birds in China over the past decade: To investigate the genetic evolution and pathogenicity of H5 viruses in wild birds, we performed a detailed genetic and biologic analysis of 27 viruses, including H5N1, H5N2, H5N6, and H5N8 subtypes, that were responsible for avian influenza outbreaks in wild birds in China over the past decade. We found that these 27 viruses, bearing different clades/subclades of HA, were complicated reassortants and formed 12 different genotypes. Ten of the viruses tested were highly pathogenic in chickens, but showed distinct pathotypes in ducks and mice. Five of these 10 viruses, which were all from clade2.3.4.4, could bind human-type receptors. Our findings reveal the diversity of the genetic and biologic properties of H5 viruses circulating in wild birds and highlight the need to carefully monitor and evaluate the risks these viruses pose to animal and public health. 3. The first H16N3 subtype influenza A viruses isolated in western China.

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.H5N6 virus isolated in swans: In January 2020, the subclade 2.3.4.4h of highly pathogenic avian influenza (H5N6) virus infected migratory whooper swans and mute swans in Xinjiang, western China. The virus is lethal to chickens and ducks but has low pathogenicity in mice. Antigenically, this subclade is similar to the H5N1 vaccine seed virus Re-11. 2. Evolution and extensive reassortment of H5 influenza viruses isolated from wild birds in China over the past decade: To investigate the genetic evolution and pathogenicity of H5 viruses in wild birds, we performed a detailed genetic and biologic analysis of 27 viruses, including H5N1, H5N2, H5N6, and H5N8 subtypes, that were responsible for avian influenza outbreaks in wild birds in China over the past decade. We found that these 27 viruses, bearing different clades/subclades of HA, were complicated reassortants and formed 12 different genotypes. Ten of the viruses tested were highly pathogenic in chickens, but showed distinct pathotypes in ducks and mice. Five of these 10 viruses, which were all from clade2.3.4.4, could bind human-type receptors. Our findings reveal the diversity of the genetic and biologic properties of H5 viruses circulating in wild birds and highlight the need to carefully monitor and evaluate the risks these viruses pose to animal and public health. 3. The first H16N3 subtype influenza A viruses isolated in western China.

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: 11

(1) Shi, J.Z., Wen, Z.Y., Zhong, G.X., Yang, H.L., Wang, C., Huang, B.Y., Liu, R.Q., He, X.J., Shuai, L., Sun, Z.R., Zhao, Y.B., Liu, P.P., Liang, L.B., Cui, P.F., Wang, J.L., Zhang, X.F., Guan, Y.T., Tan, W.J., Wu, G.Z., Chen, H.L., Bu, Z.G., 2020. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2. *Science* 368, 1016-1020.

(2) Sun, N., Jiang, L., Ye, M.M., Wang, Y.H., Wang, G.W., Wan, X.P., Zhao, Y.H., Wen, X., Liang, L.B., Ma, S.J., Liu, L.L., Bu, Z.G., Chen, H.L., Li, C.J., 2020. TRIM35 mediates protection against influenza infection by activating TRAF3 and degrading viral PB2. *Protein & Cell*, doi:10.1007/s13238-020-00734-6.

(3) Kong, H.H., Ma, S.J., Wang, J.F., Gu, C.Y., Wang, Z., Shi, J.Z., Deng, G.H., Guan, Y.T., Chen, H.L., 2020. Identification of Key Amino Acids in the PB2 and M1 Proteins of H7N9 Influenza Virus That Affect Its Transmission in Guinea Pigs. *Journal of virology* 94, doi: ARTN e01180-19, 10.1128/JVI.01180-19.

(4) Ma, S., Zhang, B., Shi, J., Yin, X., Wang, G., Cui, P., Liu, L., Deng, G., Jiang, Y., Li, C., Chen, H., 2020. Amino Acid Mutations A286V and T437M in the Nucleoprotein Attenuate H7N9 Viruses in Mice. *Journal of virology* 94, doi:10.1128/JVI.01530-19.

(5) Wang, G.W., Jiang, L., Wang, J.L., Zhang, J., Kong, F.D., Li, Q.B., Yan, Y., Huang, S.Y., Zhao, Y.H., Liang, L.B., Li,

- J.P., Sun, N., Hu, Y.Z., Shi, W.J., Deng, G.H., Chen, P.C., Liu, L.L., Zeng, X.Y., Tian, G.B., Bu, Z.G., Chen, H.L., Li, C.J., 2020. The G Protein-Coupled Receptor FFAR2 Promotes Internalization during Influenza A Virus Entry. *Journal of virology* 94, doi: ARTN e01707-19, 10.1128/JVI.01707-19.
- (6) Xu, C.Z., Xu, B.F., Wu, Y.P., Yang, S.M., Jia, Y.H., Liang, W.H., Yang, D.W., He, L.K., Zhu, W.F., Chen, Y., Yang, H.L., Yu, B.L., Wang, D.Y., Qiao, C.L., 2020. A Single Amino Acid at Position 431 of the PB2 Protein Determines the Virulence of H1N1 Swine Influenza Viruses in Mice. *Journal of virology* 94, ARTN e01930-19, 10.1128/JVI.01930-19.
- (7) Cui Y.F., Li Y.L., Li M.H., Zhao L., Wang D.L., Tian J.M., Bai X.L., Ci Y.P., Wu S.S., Wang F., Chen X.M., Ma S.J., Qu Z.Y., Yang C., Liu L.L., Shi J.Z., Guan Y.T., Zeng X.Y., Tian G.B., Cui P.F., Deng G.H., Jiang Y.P., Chen P.C., Liu J.X., Wang X.R., Bao H.M., Jiang L., Suzuki Yasuo, Li C.J., Li Y.B. & Chen H.L., 2020. Evolution and extensive reassortment of H5 influenza viruses isolated from wild birds in China over the past decade, *Emerging Microbes & Infections*, DOI: 10.1080/22221751.2020.1797542
- (8) Li, Y.L., Li, M.H., Tian, J.M., Zhang, Y.P., Bai, X.L., Wang, X.L., Shi, J.Z., Wang, Y.M., Ma, L., Yang, C., Li, Y.B., 2020. Characteristics of the first H16N3 subtype influenza A viruses isolated in western China. *Transboundary and emerging diseases* 67, 1677-1687.
- (9) Zeng, X.Y., Chen, X.H., Ma S.J., Wu J.J., Bao H.M., Pan S.X., Liu Y.J., Deng G.H., Shi J.Z., Chen P.C., Jiang Y.P., Li Y.B., Hu J.L., Lu T., Mao S.G., Guo X.F., Liu J.L., Tian G.B., Chen H.L., 2020. Protective efficacy of an H5/H7 trivalent inactivated vaccine produced from Re-11, Re-12, and H7-Re2 strains against challenge with different H5 and H7 viruses in chickens. *Journal of Integrative Agriculture*, Doi:10.1016/S2095-3119(20)63301-9.
- (10) Li, Y., Li, M., Li, Y., Tian, J., Bai, X., Yang, C....Chen, H. 2020. Outbreaks of Highly Pathogenic Avian Influenza (H5N6) Virus Subclade 2.3.4.4h in Swans, Xinjiang, Western China, 2020. *Emerging Infectious Diseases*, 26(12), 2956-2960. <https://dx.doi.org/10.3201/eid2612.201201>.
- (11) Shuai L., Zhong G., Yuan Q., Wen Z., Wang C., He X., Liu R., Wang J., Zhao Q., Liu Y., Huo N., Deng J., Bai J., Wu H., Guan Y., Shi J., Tian K., Xia N., Chen H.*, Bu Z.*, 2020. Replication, pathogenicity, and transmission of SARS-CoV-2 in minks, *National Science Review*, nwaa291, <https://doi.org/10.1093/nsr/nwaa291>.

b) International conferences: 7

- (1) Professor Hualan Chen gave a presentation with the title of 'Susceptibility of different animals to SARS-coronavirus 2' at the online meeting of Cell Press-Beijing Conference Online: COVID-19, Understand, Manage, Control on November 19th,2020.
- (2) Professor Hualan Chen gave a presentation with the title of 'Surveillance and control of avian influenza in China' at the online meeting of Regional Expert Group Meeting on Avian Influenza Virus(REG AI) Virtual Zoom Meeting on October 16th,2020.
- (3) Professor Chenjun Li gave a presentation with the title of 'Successful control of H7N9 influenza virus in China' at the online meeting of Global Meeting on Influenza on December 10th,2020.
- (4) Professor Chenjun Li gave a presentation with the title of 'National Presentations: China' at the online meeting of Regional Conference on early and Rapid Detection of important Animal Diseases and Zoonoses by Nuclear Technology of the International Atomic Energy Agency on December 10th,2020.
- (5) Professor Hualan Chen gave a presentation with the title of 'Susceptibility of different animals to SARS-coronavirus 2' at the online meeting of COVID-19: the Current State of the Science hosted by Alibaba Health and Cell Press on July 25th,2020, in Beijing, China.
- (6) Professor Hualan Chen gave a presentation with the title of 'Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2' at the online meeting of UNESCO For Women in Science Alumnae Network: Sharing Knowledge and Actions on COVID-19 held on June 2th, 2020.
- (7) Professor Hualan Chen gave a presentation with the title of 'Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2' at the online meeting of ADVC Webinar on Coronaviruses held on April 29th, 2020.

c) National conferences: 5

- (1) Professor Chengjun Li gave a presentation with the title of 'Host determination Mechanism of Influenza virus variation and Pathogenicity' at the conference on the fourth academic Forum of "Young Top talents" of Chinese association of Animal science and Veterinary medicine held from January 8th to 10th, 2020, in Guangzhou, China.
- (2) Professor Yanbing Li gave a presentation with the title of 'Evolution of the highly pathogenic avian influenza viruses in poultry in China' the online meeting of the laboratory testing technology and quality management training of veterinary system in Shandong Province held from June 28th to 29th, China.
- (3) Professor Guobin Tian gave a presentation with the title of 'Evolution of the highly pathogenic avian influenza viruses and vaccine application in poultry in China' at the meeting of the 29th Guangdong Animal Husbandry and Veterinary Science and Technology held on July 4th, 2020, in Guangzhou, China.
- (4) Professor Guobin Tian gave a presentation with the title of 'Evolution of the highly pathogenic avian influenza viruses and vaccine application in poultry in China' at the online meeting of the Science and Technology Lecture of Chinese association of Animal science and Veterinary medicine held on March 26th, 2020.
- (5) Professor Guobin Tian gave a presentation with the title of 'Prevention and Control of avian influenza in China' at the meeting of the 2020 Broiler Industry Development Summit Forum of Guangxi held on January 5th, 2020, in

Nanning, China.

d) Other:

(Provide website address or link to appropriate information) 0

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
Susceptibility of different Cell Press-Beijing Conference Online: COVID-19, Understand, Manage, Control	11/2020	Beijing	Speaker	Susceptibility of different animals to SARS-coronavirus 2
Surveillance and control Regional Expert Group Meeting on Avian Influenza Virus(REG AI) Virtual Zoom Meeting	10/2020	online	Speaker	Surveillance and control of avian influenza in China
2020 WORLD INFLUENZA CONFERENCE	11/2020	online	Speaker	Successful control of H7N9 influenza virus in China
Using Nuclear Derived Techniques in the Early and Rapid Detection of Priority Animal and Zoonotic Diseases with Focus on Avian Influenza of the International Atomic Energy Agency	08/2020	online	Speaker	National Presentations: China
COVID-19: the Current State of the Science	07/2020	online	Speaker	Susceptibility of different animals to SARS-coronavirus 2
UNESCO For Women in Science Alumnae Network: Sharing Knowledge and Actions on COVID-19	06/2020	online	Speaker	Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2
ADVC Webinar on Coronaviruses	04/2020	online	Speaker	Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2
The fourth academic Forum of "Young Top talents" of Chinese association of Animal science and Veterinary medicine	01/2020	Guangzhou, China	Speaker	Host determination Mechanism of Influenza virus variation and Pathogenicity
The laboratory testing technology and quality management training of veterinary system in Shandong Province	06/2020	online	speaker	Evolution of the highly pathogenic avian influenza viruses in poultry in China

The 29th Guangdong Animal Husbandry and Veterinary Science and Technology	07/2020	Guangzhou, China	speaker	Evolution of the highly pathogenic avian influenza viruses and vaccine application in poultry in China
The Science and Technology Lecture of Chinese association of Animal science and Veterinary medicine	03/2020	online	speaker	Evolution of the highly pathogenic avian influenza viruses and vaccine application in poultry in China
2020 Broiler Industry Development Summit Forum of Guangxi	01/2020	Nanning, China	speaker	Prevention and Control of avian influenza in China

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: