WOAH Reference Laboratory Reports Activities 2023

Activities in 2023

This report has been submitted : 11 juin 2024 09:32

Laboratory Information

Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:	Infection with Infecitous haematopoietic necrosis virus
Address of laboratory:	1011 of Fuqiang Road, Futianqu, Shenzhen, Guangdong Province, 518045, P. R. China
Tel.:	+86-755 25 58 84 10
E-mail address:	709274714@qq.com
Website:	
Name (including Title) of Head of Laboratory (Responsible Official):	Tikang Lu/Director
Name (including Title and Position) of WOAH Reference Expert:	Hong Liu/professor
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
Cell culture (EPC, GCO, FHM)		59	0
Direct diagnostic tests		Nationally	Internationally
Conventional RT-PCR		59	0
Real-time RT-PCR		78	0

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
cell line	virus isolation	EPC	35 mL	0	1	CHINA (PEOPLE'S REP. OF),
virus suspension	virus isolation	IHNV	110 mg	0	1	CHINA (PEOPLE'S REP. OF),

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.)
Recombinase aided amplification (RAA)	ZHU Song-qi, WU Jiang, LIAO Li-shan, ZHU Yu-min, WANG Jin-jin, ZHU Peng, WEN Zhi-qing, JIA Peng, YANG Li-yuan, LIU Hong, 2023. Establishment and analytical validation of recombinase-aid amplification for detection of infectious hematopoietic necrosis virus. Chinese Veterinary Science, 1-8[2023-05-23]. https://doi.org/10. 16656/ j.issn.1673-4696.2023.0137.
real-time recombinase-aid amplification combined with lateral flow dipstick (RT-RAA-LFD)	LIAO Li-shan, XU Bin, CHEN Bing, WU Jiang, WANG Jin-jin, ZHU Yu-min, LIU Hong, WANG Wan-jun, SUN Jie, 2023. Development and application of an RT-RAA-LFD assay for rapid etection of infectious haematopoietic necrosis virus. Chinese Veterinary Science, 2023, 53(08):991- 996
high-throughput liquid chip assay	in review
eDNA concentration and validation in the imported aquatic animals	draft
validation on microfluidic test on IHNV	draft

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?

No

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

No

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
Study on the genome of IHNV isolated in the world	2023~	Study on the molecular biology of IHNV	The western fishery institute, USA	UNITED STATES OF AMERICA

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

Yes

Research need : 1

Please type the Research need: eDNA test on IHNV in practical cases, such as the biosecurity system of free compartment or free zone, or imported broodstock or eyed-eggs, or early warning system

Relevance for WOAH Disease Control, Capacity Building, Standard Setting, Facilitation of international collaboration,

Relevance for the Codes or Manual Manual,

Field Epidemiology and Surveillance, Diagnostics, inspection and quarantine, biosecurity system maintenance,

Animal Category Aquatic,

Disease:

Infection with infectious haematopoietic necrosis virus

Kind of disease (Zoonosis, Transboundary diseases) Transboundary diseases,

Additional keywords if needed: One keyword per entry

eDNA

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture)

Answer: Aquatic Manual, Chapter 2.3.5

Notes:

Answer:

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:

The status of the infection of IHNV is as follows (WOAH WAHIS):
1) Canada: present in wild aquatic animals in limited zones in 2023 and suspect in domestic aquatic animals in limited zones in 2023
2) Denmark: present in domestic aquatic animals in 2023
3) France: present in domestic aquatic animals in limited zones in 2023
4) Georgia: present in domestic aquatic animals in limited zones in 2023
5) Germany: present in domestic aquatic animals in 2023
6) Italy: present in domestic aquatic animals in limited zones in 2023
7) Japan: present in domestic aquatic animals in 2023
8) North Macedonia: present in domestic aquatic animals in limited zones in 2023
9) United States of America: present in domestic and wild aquatic animals in limited zones in 2023

Metagenomic and metabolomic analyses exposed how rainbow trout gut microbiota and metabolites respond to IHNV at different temperatures, and screens beneficial bacteria with potential resistance to IHN, providing new insights and scientific basis for the prevention and treatment of IHN (Hai Q, Wang J, Kang W, Cheng S, Li J, Lyu N, Li Y, Luo Z, Liu Z. Metagenomic and metabolomic analysis of changes in intestinal contents of rainbow trout (Oncorhynchus mykiss) infected with infectious hematopoietic necrosis virus at different culture water temperatures. Front Microbiol. 2023 Oct 16;14:1275649. doi: 10.3389/fmicb.2023.1275649. PMID: 37908544; PMCID: PMC10614001).

Rainbow trout immunized with VHSV genotype Ia G gene- or IVa G gene-expressing DNA vaccine were significantly protected against VHSV genotype Ia, but were not protected against IHNV. In contrast to the DNA vaccine, the single-cycle VHSV IVa vaccine induced significant protection against not only VHSV Ia but also IHNV (Kim SY, Lee KM, Kim KH. Differences between DNA vaccine and single-cycle viral vaccine in the ability of cross-protection against viral hemorrhagic septicemia virus (VHSV) and infectious hematopoietic necrosis virus (IHNV). Vaccine. 2023 Aug 31;41(38):5580-5586. doi: 10.1016/j.vaccine.2023.07.058. Epub 2023 Jul 29. PMID: 37517909.).

In May 2015, a high mortality event in farmed rainbow trout occurred in Jeollabuk-do province in Korea and phylogenetic analysis demonstrated the strain belong to JRt Nagano group (Kim HJ, Olesen NJ, Dale OB, Kim YC, Jung TS, Vendramin N, Kwon SR. Pathogenicity of two lineages of infectious hematopoietic necrosis virus (IHNV) to farmed rainbow trout (Oncorhynchus mykiss) in South Korea. Virus Res. 2023 Jul 15;332:199133. doi: 10.1016/j.virusres.2023.199133. Epub 2023 May 18. PMID: 37178795; PMCID: PMC10345748.).

IHNV was used to estimate IHNV transmission dynamics in a unique geographic region, the Snake River Basin (SRB), and to quantitatively estimate the effect of model coproduction on inference because previous assessments of coproduction have been qualitative. The result found great potential for coproduction and modeling spatial contact networks to advance understanding about infectious disease transmission in complex production systems and surrounding free-ranging animal populations (Mattheiss JP, Breyta R, Kurath G, LaDeau SL, Páez DJ, Ferguson PFB. Coproduction and modeling spatial contact networks prevent bias about infectious hematopoietic necrosis virus transmission for Snake River Basin salmonids. J Environ Manage. 2023 May 15;334:117415. doi: 10.1016/j.jenvman.2023.117415. Epub 2023 Feb 11. PMID: 36780814.).

the transcriptome profiles in U genogroup and J genogroup of IHNV revealed 17,064 new genes, of which 7,390 genes were functionally annotated and 345 new genes were discovered. The DEGs related to immune responses, cellular signal transduction (Zhao JZ, Xu LM, Ren GM, Shao YZ, Liu Q, Teng CB, Lu TY. Comparative transcriptome analysis of rainbow trout gonadal cells (RTG-2) infected with U and J genogroup infectious hematopoietic necrosis virus. Front Microbiol. 2023 Jan 17;13:1109606. doi: 10.3389/fmicb.2022.1109606. PMID: 36733771; PMCID: PMC9887044).

A bivalent recombinant adenovirus vaccine with IHNV Glycoprotein (G) and IPNV VP2 genes was developed and the results demonstrated that replication-defective adenovirus can be developed as a qualified vector for fish vaccines and IHNV G and IPNV VP2 were two suitable antigenic genes that could induce effective immune protection against these two pathogens (Li S, Li X, Yuan R, Chen X, Chen S, Qiu Y, Yang Q, Wang M, Shi J, Zhang S. Development of a recombinant adenovirus-vectored

vaccine against both infectious hematopoietic necrosis virus and infectious pancreatic necrosis virus in rainbow trout (Oncorhynchus mykiss). Fish Shellfish Immunol. 2023 Jan;132:108457. doi: 10.1016/j.fsi.2022.108457. Epub 2022 Nov 29. PMID: 36455780.).

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:

13 positive cases of IHNV belong to J genotype were detected in 117 samples in the domestic active surveillance program in P. R. China in 2022 (published in the 2023 analysis of major aquatic animal diseases in China, Agricultural publish company) and 1 newly isolated strain were studied in rainbow trout in northwest China (Wu D, Wang J, Zhang Y, Wang Q, Liu Q, Shao S. Characterization and pathogenicity analysis of a newly isolated strain of infectious hematopoietic necrosis virus. Microb Pathog. 2023 Dec;185:106443. doi: 10.1016/j.micpath.2023.106443. Epub 2023 Nov 8. PMID: 37949305.)

1. The status of the infection of IHNV is as follows (WOAH WAHIS):

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5) Germany: present in domestic aquatic animals in 2023

6) Italy: present in domestic aquatic animals in limited zones in 2023

7) Japan: present in domestic aquatic animals in 2023

8) North Macedonia: present in domestic aquatic animals in limited zones in 2023

9) United States of America: present in domestic and wild aquatic animals in limited zones in 2023

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

ZHU Song-qi, WU Jiang, LIAO Li-shan, ZHU Yu-min, WANG Jin-jin, ZHU Peng, WEN Zhi-qing, JIA Peng, YANG Li-yuan, LIU Hong, 2023. Establishment and analytical validation of recombinase-aid amplification for detection of infectious hematopoietic necrosis virus. Chinese Veterinary Science, 1-8[2023-05-23]. https://doi.org/10. 16656/j.issn.1673-4696.2023.0137.

LIAO Li-shan, XU Bin, CHEN Bing, WU Jiang, WANG Jin-jin, ZHU Yu-min, LIU Hong, WANG Wan-jun, SUN Jie, 2023. Development and application of an RT-RAA-LFD assay for rapid etection of infectious haematopoietic necrosis virus. Chinese Veterinary Science, 2023, 53(08) :991- 996

The status report of important aquatic animal diseases in P. R. China, published by China Agriculture Press, 2023

The epidemiological analysis report of important aquatic animal disease in P. R. China, published by China Agriculture Press, 2023

b) International conferences:

0

c) National conferences:

3

1. Annual meeting on domestic aquatic animal health prevention and control, Huzhou, Dec. 11-13th 2023

2. Meeting on the surveillance of animal and aquatic animal disease of imported and exported trade, Shenzhen, Nov. 24-28th, 2023.

3. Training on improve the detection ability on important aquatic animal diseases, Oct. 25th, 2023

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

0

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

17. Did your laboratory provide scientific and technical training to laboratory personnel from other WOAH Members?

No

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO 17025	PDF	centificate-ISO 17025.pdf
GB 19489-2008	PDF	centificate-Biosafety.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Virus isolation	China National Accreditation Service for Conformity Assessment (CNAS)
Conventional RT-PCR	China National Accreditation Service for Conformity Assessment (CNAS)
real-time RT-PCR	China National Accreditation Service for Conformity Assessment (CNAS)

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

Yes

Have a series of protocols or procedures to maintain the biorisk management system; Apply for the accreditation of Bio-safety 2 and have a annual audit; Have all the necessary facilities or instruments to meet the requirement of Bio-safety 2 accreditation;

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. 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
Infeciton with Infectious haematopoietic necrosis virus	Participant	3	2

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

No

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
Study on the molecular biology of IHNV based on the virus genome sequenced	Molecular epidemiology	the Centre for Environment, Fisheries and Aquaculture Science (CEFAS), UK The western fishery Institute, USA

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	Name of the Test	WOAH Member Countries
To confirm the ability of the laboratory who will join the active surveillence program at different leves or test on the fry of aquatic animals	organizer	36	virus isolation and identification with conventional RT-PCR or real-time RT-PCR	CHINA (PEOPLE'S REP. OF),

TOR12: EXPERT CONSULTANTS

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

Yes

KIND OF CONSULTANCY	Location	SUBJECT (FACULTATIVE)
WOAH Commission meeting in Feb. 2023	Paris, France	review of WOAH Standards
WOAH Commission meeting in Sep. 2023	Paris, France	review of WOAH Standards
WOAH ad hoc group meeting	virtual meeting	assessment of susceptible species of fish diseases (ISKNV)
WOAH ad hoc group meeting	virtual meeting	assessment of susceptible species of fish diseases (EUS)

29. Additional comments regarding your report:

Yes

We are waiting for the authority to distribute the ring test samples to WOAH members.