OIE Reference Laboratory Reports Activities

Activities in 2021

This report has been submitted : 2022-01-18 02:51:29

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Foot and mouth disease
Address of laboratory:	Xujiaping No.1, Yanchangpu Lanzhou, Gansu province 730046 CHINA (PEOPLES REP. OF)
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Website:	http://www.chvst.com/English/
Name (including Title) of Head of Laboratory (Responsible Official):	Dr.Haixue Zheng, Director General of Lanzhou Veterinary Research Institute,CAAS
Name (including Title and Position) of OIE Reference Expert:	Dr.Xiangtao Liu,deputy director of Lanzhou Veterinary Research Institute;head of OIE&China National Foot-and-Mouth Disease Reference Laboratory
Which of the following defines your laboratory? Check all that apply:	Governmental Research 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	
Indirect diagnostic tests		Nationally	Internationally
LPB-ELISA (type O)	yes	2865	0
LPB-ELISA (type Asia 1)	yes	1437	0
LPB-ELISA (type A)	yes	2865	0
NSP-3ABC ELISA	yes	2865	0
Direct diagnostic tests		Nationally	Internationally
Virus isolation	yes	16	0
Antigen typing ELISA	yes	14	0
Real Time-RT-PCR	yes	2551	0
VP1 sequencing	yes	34	0
Whole genome sequencing	yes	5	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
Guinea pig antisera (against FMDV type O and A)	ELISA	produced	6 ml	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMDV immune sera (type O)	ELISA	produced	200 ml	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMDV infected sera	ELISA	produced	23 ml	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMDV cell culture (inactivated)	RT-PCR	produced	150 ml	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMD LBP-ELISA kit (type O, A, Asia1)	ELISA for FMDV Antibody detection	produced	20624kits	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMDV-NSP 3ABC ELISA kit	ELISA for FMDV NSP antibody detection	produced	1618 kits	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East

SPCE (type O)	ELISA for FMDV antibody detection	produced	583 kits	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Conventional MultiRT-PCR	RT-PCR for FMDV RNA detection	produced	42 kits	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMDV real time RT-PCR kit	qRT-PCR for FMDV moleculr detection	produced	705 kits	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Typing real-time RT-PCR	qRT-PCR for FMDV RNA detection, type O, A, and Asia1	produced	261 kits	0	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East

4. Did your laboratory produce vaccines?

No

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

No

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?

No

Name of the new test or diagnostic method or vaccine developed	Description and References (Publication, website, etc.)
Development of an Indirect Chemiluminescence Immunoassay Using a Multiepitope Recombinant Protein To Specifically Detect Antibodies against Foot-and-Mouth Disease Virus Serotype O in Swine	Liu W, Shao J, Zhang G, Chang Y, Ge S, Sun Y, Gao Z, Chang H. Development of an Indirect Chemiluminescence Immunoassay Using a Multiepitope Recombinant Protein To Specifically Detect Antibodies against Foot-and-Mouth Disease Virus Serotype O in Swine. J Clin Microbiol. 2021 Feb 18;59(3):e02464-20. doi: 10.1128/JCM.02464-20. PMID: 33328177; PMCID: PMC8106706.
Bovine Foot–and–Mouth Disease Type O Virus–like Particle Vaccine	No. 471, Offical Announcement, MARA, China □2021□ New vet drug No.57 http://www.moa.gov.cn/govpublic/xmsyj/202109/t20210910_6376134.htm
Swine Foot–and–Mouth Disease Type O Virus–like Particle Vaccine	No.471, Offical Announcement, MARA, China □2021□ New vet drug No.58 http://www.moa.gov.cn/govpublic/xmsyj/202109/t20210910_6376134.htm
Blocking ELISA Kit for Detection of Antibody to Non–structural Protein 3ABC of Foot–and–Mouth Disease Virus	No. 449, Offical Announcement, MARA, China □2021□ New vet drug No.46 http://www.moa.gov.cn/govpublic/xmsyj/202107/t20210727_6372899.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
CHINA (PEOPLE'S REP. OF)	FMD vaccination and PVM in 2021 in China	meeting, draft plan
CHINA (PEOPLE'S REP. OF)	FMD active surveillance in 2021 in China	training courses, meetings, draft plan
CHINA (PEOPLE'S REP. OF)	Revision of the technical specifications for the prevention and control of foot and mouth disease	meeting, draft
CHINA (PEOPLE'S REP. OF)	draft the technical specifications for the prevention and control of exotic foot and mouth disease	draft

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 and development of an attenuated edible FMD vaccine using salmonella as the vector	3 y	Research and development of an attenuated edible FMD vaccine using salmonella as the vector	Korea Atomic Energy Research Institute/Prof. Seo HoSeong	KOREA (REP. OF)
Cooperative creation and application studies of new products for prevention and control of major transboundary animal diseases	3 y	Cooperative creation and application studies of new products for prevention and control of major transboundary animal diseases	Kazakh National Agrarian University, Kazakhstan/Prof. Gulnaz Ilgekbayeva	KAZAKHSTAN
Immunological modification and mechanism of DC-recruiting foot and mouth disease virus like particles	3 y	Research and development of FMD viral like particle (VLP) fused with the specific DC targeting domain	Korea Atomic Energy Research Institute/Prof. Seo HoSeong	KOREA (REP. OF)
Exchange of vaccine technology for the delivery of oral vaccines to mucosal surface	3 y	To explore the potential of plants and OMVs for production of antigens for oral vaccination	University of East Anglia	UNITED KINGDOM
prevention and control of TADs in China-Japan-Korea	5 y	prevention and control of TADs, such as FMD, PPR, ASF, HPAI	offical organizations	KOREA (REP. OF)
prevention and control of TADs in China-Monglia-Russia	5 y	prevention and control of TADs, such as FMD, PPR, HPAI	offical organizations	MONGOLIA RUSSIA

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:
The genenal situation of FMD in China is stable with sporadic outbreaks in 2021. A total of 3 outbreaks, all of which belonged to serotype O, were reported to OIE. In detail, following sequencing,3 epidemic strains were found, namely Mya-98(n=3),O/Ind-2001(n=18) and O/CATHAY(n=12).Notably, serotypes A and Asia 1 were not detected.

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:
Report FMD outbreaks to MARA, China and OIE. Perform phylogenetic analysis to trace the origin and evolution of strains.Share case informations with WRLFMD, SEACFMD member countries.

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: 4
He Y, Li K, Wang L, Sun Z, Cao Y, Li P, Sun P, Bao H, Zhou S, Wang S, Bai X, Liu X, Zhao L, Fan X, Liu Z, Lu Z, Yang C, Lou Z. Structures of Foot-and-Mouth Disease Virus with Bovine Neutralizing Antibodies Reveal the Determinant of Intraserotype Cross-Neutralization. J Virol. 2021 Nov 23;95(24):e0130821. doi: 10.1128/JVI.01308-21. Epub 2021 Sep 29. PMID: 34586859; PMCID: PMC8610593.
He Y, Li K, Cao Y, Sun Z, Li P, Bao H, Wang S, Zhu G, Bai X, Sun P, Liu X, Yang C, Liu Z, Lu Z, Rao Z, Lou Z. Structures of Foot-and-mouth Disease Virus with neutralizing antibodies derived from recovered natural host reveal a mechanism for cross-serotype neutralization. PLoS Pathog. 2021 Apr 28;17(4):e1009507. doi: 10.1371/journal.ppat.1009507. PMID: 33909694; PMCID: PMC8081260.
Li K, He Y, Wang L, Li P, Wang S, Sun P, Bao H, Cao Y, Liu X, Zhu G, Song Y, Bai X, Ma X, Fu Y, Yuan H, Zhang J, Wang J, Chen Y, Li D, Lou Z, Liu Z, Lu Z. Two Cross-Protective Antigen Sites on Foot-and-Mouth Disease Virus Serotype O Structurally Revealed by Broadly Neutralizing Antibodies from Cattle. J Virol. 2021 Oct 13;95(21):e0088121. doi: 10.1128/JVI.00881-21. Epub 2021 Aug 18. PMID: 34406868; PMCID: PMC8513477.
Dong H, Lu Y, Zhang Y, Mu S, Wang N, Du P, Zhi X, Wen X, Wang X, Sun S, Zhang Y, Guo H. A Heat-Induced Mutation on VP1 of Foot-and-Mouth Disease Virus Serotype O Enhanced Capsid Stability and Immunogenicity. J Virol. 2021 Jul 26;95(16):e0017721. doi: 10.1128/JVI.00177-21. Epub 2021 Jul 26. PMID: 34011545; PMCID: PMC8312871.

b) International conferences: 6
Experts or participants from OIE/China national foot and mouth diseas reference laboratory,LVRI, reported the current situation of FMD in China, exchange the information with other laboratories at the international meetings including SEACFMD Joint LabNet and EpiNet Virtual Meeting 2021, The 3rd OIE Regional Meeting of OIE Reference Centres in Asia and the Pacific,24th SEACFMD National Coordinators Meeting, The 16th OIE/FAO FMD Reference Laboratories Network Annual Meeting, GFRA 2021 Scientific meeting and SEACFMD Roadmap(2021-2025) meeting.

c) National conferences: 17
The national coferences on FMD control and prevention, vaccine and vaccination, diagnosis technique and the training coureses at national level (n=3) and provincial level(n=14), respectively.

d) Other:
(Provide website address or link to appropriate information) 10
http://www.moa.gov.cn/gk/sygb/
2021 Official Veterinary Bulletin

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?

Yes

a) Technical visits: 6
b) Seminars: 20
c) Hands-on training courses: 3
d) Internships (>1 month): 3

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
a	China	6
b	China	20
c	China	3
d	China	3

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)
ISO/IEC 17025:2017	17025-EN-web.jpg
CMA	CMA Qualification Certificate.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
LPB ELISA for FMDV antibody detection	CNAS
ELISA for FMDV NSP antibody detection	CNAS
FMDV Antigen detection ELISA	CNAS
RT-PCR for FMDV	CNAS
Real-time RT-PCR for FMDV	CNAS
FMDV 1D Gene sequencing	CNAS
SPC ELISA for FMDV antibody detection	CNAS
virus islation(VI)	CNAS
virus neutralization test (VNT)	CNAS
FMDV Vaccine safety and efficacy testing	CNAS

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
OIE SEACFMD Joint LabNet and EpiNet Virtual Meeting	02/21	Virtual meeting	short communications	/
The 3rd OIE Regional Meeting of OIE Reference Centres in Asia and the Pacific	02/21	Virtual meeting	short communications	/
24th SEACFMD National Coordinators Meeting	07/21	Virtual meeting	speaker	FMD vaccine and QC
2021-GFRA meeting	11/21	Virtual meeting	speaker	Study on Immunosuppression of foot and mouth disease
16th OIE/FAO FMD Reference Laboratories Network Annual Meeting	11/21	Virtual meeting	speaker	Report on National/OIE foot and mouth disease reference laboratory LVRI,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?

Yes

Title of the project or contract	Scope	Name(s) of relevant OIE Reference Laboratories
Monitoring and analysis of the genetic and antigenic evolution of the FMDV from China (OIE/FAO FMD Reference lab network MOU)	Evaluation of the efficacy of the current vaccine; selection of the new vaccine strains; Effective control of Foot-and-Mouth Disease.	The World reference laboratory for FMD, The Pirbright Institute, UK
Testing and validation of the molecular diagnostic methods for recommending application in SEA region	To evaluation the the specificity and sensitivity of FMDV serotyping qRT-PCR, lineage specific qRT-PCR and primers and probes for sequencing methods.	The OIE reference laboratories for FMD in Korea; The OIE regional reference laboratories for FMD in Thailand; The World reference laboratory for FMD, UK

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?

Yes

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

Purpose for inter-laboratory test comparisons[1]	No. participating laboratories	Region(s) of participating OIE Member Countries
Monitoring the provincial laboratory capacity in China for FMDV antibody detetion	36	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Confirm detection and analysis on FMDV field samples	15	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
FMDV 3ABC antibodydetection	2	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East

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?

Yes

Kind of consultancy	Location	Subject (facultative)
SEACFMD roadmap(2021-2025) implementation plan	virtual meeting	Comments and suggestions on SEACFMD roadmap(2021-2025) plan
Review of OIE code and Manual	China	Review of OIE code and manual revision 2021
SEACFMD labnet and Epinet	virtual meeting	SEACFMD LabNet and EpiNet online surveys and sharing active surveillance in China
How to enchance the role of RCs	virtual meeting	Supporting function of OIE reference centres and reference laboratories in Asia and the Pacific
Production and quality control of foot-and-mouth disease vaccine	virtual meeting	NCPs of SEACFMD

25. Additional comments regarding your report:

None