OIE Reference Laboratory Reports Activities

Activities in 2020

This report has been submitted : 2021-01-18 17:45:14

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Foot and mouth disease
Address of laboratory:	Ash Road, Pirbright Woking, Surrey, GU24 0NF UNITED KINGDOM
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Website:	www.wrlfmd.org and https://www.pirbright.ac.uk
Name (including Title) of Head of Laboratory (Responsible Official):	Dr Bryan Charleston
Name (including Title and Position) of OIE Reference Expert:	Dr Donald King, Head of Vesicular Disease Reference Laboratories
Which of the following defines your laboratory? Check all that apply:	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
Vaccine Matching	Yes	0	14
Virus Neutralisation Test	Yes	0	1329
ELISA - Structural protein Antibody	Yes	0	414
ELISA - Non-structural protein Antibody	Yes	0	407
Direct diagnostic tests		Nationally	Internationally
Virus Isolation	Yes	0	159
Antigen ELISA	Yes	0	100
real time RT-PCR	Yes	0	322
VP1 region sequencing	Yes	0	30
Phylogenetic Analyses (sequences recieved from other laboratories)	Yes	0	290
Complete genome sequencing	No	0	2

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?

Yes

NOTE: Currently, there are 22 laboratories that produce Standard Reference Reagents officially recognised by the OIE for 19 diseases/pathogens. Please click the following link to the list of OIE-approved International Standard Sera: http://www.oie.int/en/our-scientific-expertise/veterinary-products/reference-reagents/. If the reagent is not listed on this page, it is NOT considered OIE-approved. The next two questions allow you to indicate non-OIE-approved diagnostic reagents.

OIE-approved SRR producing laboratory – Select your lab from list:

Disease	Test	Available from
Foot and mouth disease	Enzyme-linked immunosorbent assay (antigen and antibody detection); Virus neutralisation	Dr Donald King Institute for Animal Health, Pirbright Laboratory, Ash Road, Pirbright, Woking, Surrey GU24 0NF, United Kingdom Tel: (44-1483) 23.24.41 Fax: (44-1483) 23.24.48 donald.king@pirbright.ac.uk

Type of reagent available	Related diagnostic test	Produced/ Supply imported	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	Name of recipient OIE Member Countries
Reagents	ELISA serology tests	Produced	○<10mL ◉10-100mL ○100-500mL ○>500mL	○<10mL ○10-100mL ○100-500mL ◉>500mL	ARGENTINA BOTSWANA CHINA (PEOPLE'S REP. OF) CHINESE TAIPEI ERITREA GERMANY KOREA (REP. OF) POLAND SAUDI ARABIA UNITED STATES OF AMERICA VIETNAM

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
Virus Isolates	FMD virus detection tests	Produced	97.2	208.8	7	☐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?

No

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

No

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?

Yes

Name of OIE Member Country seeking assistance	Date (month)	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
ERITREA	January	0	47
INDONESIA	July	0	2
PAKISTAN	June	0	50
SRI LANKA	January	0	23
VIETNAM	July	0	39

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

No

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
OIE Twinning Project	3 years	Vaccine QA/QC for Africa	AU-PANVAC	ETHIOPIA
Validation of PCR lysis buffer methods	1 year	Optimise biosafe methods for FMDV	FLI (Germany)	GERMANY
Development of FMD ELISA tests	on-going	On-going new ELISA tests for FMD diagnosis	IZSLER (Italy)	ITALY
Improved tools for the surveillance and diagnosis of FMD	5 years	Understanding the epidemiology of FMD in endemic settings	SUA (Tanzania) and TVLA (Tanzania)	TANZANIA
Serological assays for FMD	on-going	Post-vaccination testing and surveillance	KSRVI (Kazakhstan)	KAZAKHSTAN
Development of new vaccine matching tests for FMD	1 year	Generate validation data for field tests	INTA, Argentina	ARGENTINA
Validation of NSP tests	1 year	Inter-laboratory exercise for NSP assays	IZSLER (Italy), ANSES (France), Lelystad (The Netherlands)	FRANCE ITALY THE NETHERLANDS

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:
Sampling time, location and species

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:
Sampling time, location and species

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: 22

1 - Armson, B., A. Di Nardo, D.M. Nyaguthii, B. Sanz-Bernardo, P.M. Kitala, E. Chepkwony, V. Mioulet, D.P. King, and N.A. Lyons (2020). Utilizing milk from pooling facilities as a novel approach for Foot-and-Mouth Disease surveillance. Transboundary and Emerging Diseases, 67(4): 1532-1542. DOI: 10.1111/tbed.13487.

2 - Armson, B., S. Gubbins, V. Mioulet, I.A. Qasim, D.P. King, and N.A. Lyons (2020). Foot-and-Mouth Disease surveillance using pooled milk on a large-scale dairy farm in an endemic setting. Frontiers in Veterinary Science, 7: 11. DOI: 10.3389/fvets.2020.00264.

3 - Asfor, A.S., N. Howe, S. Grazioli, S. Berryman, K. Parekh, G. Wilsden, A. Ludi, D.P. King, S. Parida, E. Brocchi, and T.J. Tuthill (2020). Detection of bovine antibodies against a conserved capsid epitope as the basis of a novel universal serological test for Foot-and-Mouth Disease. Journal of Clinical Microbiology, 58(6): 9. DOI: 10.1128/jcm.01527-19.

4 - Belsham, G.J., T. Kristensen, and T. Jackson (2020). Foot-and-Mouth Disease virus: Prospects for using knowledge of virus biology to improve control of this continuing global threat. Virus Research, 281: 11. DOI: 10.1016/j.virusres.2020.197909.

5 - Browning, C.F.J., A. Di Nardo, L. Henry, T. Pollard, L. Hendry, A. Romey, A. Relmy, P. Eble, E. Brocchi, S. Grazioli, D.P. King, and A.B. Ludi (2020). Inter-laboratory comparison of 2 ELISA kits used for Foot-and-Mouth Disease virus nonstructural protein serology. Journal of Veterinary Diagnostic Investigation, 32(6): 933-937. DOI: 10.1177/1040638720962070.

6 - Colenutt, C., E. Brown, N. Nelson, D.J. Paton, P. Eble, A. Dekker, J.L. Gonzales, and S. Gubbins (2020). Detection of bovine antibodies against a conserved capsid epitope as the basis of a novel universal serological test for foot-and-Mouth Disease. Mbio, 11(4): 13. DOI: 10.1128/mBio.00381-20.

7 - Dekker, A., B. Sanz-Bernardo, N.B. Singanallur, A.B. Ludi, J. Horsington, P.L. Eble, D.P. King, and W. Vosloo (2020). Cross-protection induced by a A/MAY/97 emergency vaccine against intra-serotype heterologous challenge with a Foot-and-Mouth Disease virus from the A/ASIA/G-VII lineage. Vaccines, 8(1): 17. DOI: 10.3390/vaccines8010024.

8 - Eschbaumer, M., A. Vogtlin, D.J. Paton, J.L. Barnabei, M.J. Sanchez-Vazquez, E.M. Pituco, A.M. Rivera, D. O'Brien, C. Nfon, E. Brocchi, L.B. Kassimi, D.J. Lefebvre, R.N. Lopez, E. Maradei, S.J. Duffy, A. Loitsch, K. De Clercq, D.P. King, S. Zientara, C. Griot, and M. Beer (2020). Non-discriminatory exclusion testing as a tool for the early detection of Foot-and-Mouth Disease incursions. Frontiers in Veterinary Science, 7: 11. DOI: 10.3389/fvets.2020.552670.

9 - Ferretti, L., E. Perez-Martin, F.Q. Zhang, F. Maree, L.M. de Klerk-Lorist, L. van Schalkwykc, N.D. Juleff, B. Charleston, and P. Ribeca (2020). Pervasive within-host recombination and epistasis as major determinants of the molecular evolution of the Foot-and-Mouth Disease virus capsid. Plos Pathogens, 16(1): 23. DOI: 10.1371/journal.ppat.1008235.

10 - Gizaw, D., Y. Tesfaye, B.A. Wood, A. Di Nardo, D. Shegu, A. Muluneh, T. Bilata, R. Belayneh, A. Fentie, H. Asgdome, M. Sombo, T. Rufael, F.T. Woldemariyam, F. Khan, M. Yami, E. Gelaye, J. Wadsworth, N.J. Knowles, and D.P. King (2020). Molecular characterization of Foot-and-Mouth Disease viruses circulating in Ethiopia between 2008 and 2019. Transboundary and Emerging Diseases, 67(6): 2983-2992. DOI: 10.1111/tbed.13675.

11 - Gray, A.R., B.A. Wood, E. Henry, M. Azhar, D.P. King, and V. Mioulet (2020). Evaluation of cell lines for the

isolation of Foot-and-Mouth Disease virus and other viruses causing vesicular disease. Frontiers in Veterinary Science, 7: 11. DOI: 10.3389/fvets.2020.00426.

12 - Grazioli, S., N.P. Ferris, G. Dho, G. Pezzoni, A.S. Morris, V. Mioulet, and E. Brocchi (2020). Development and validation of a simplified serotyping ELISA based on monoclonal antibodies for the diagnosis of Foot-and-Mouth Disease virus serotypes O, A, C and Asia 1. Transboundary and Emerging Diseases, 67(6): 3005-3015. DOI: 10.1111/tbed.13677.

13 - Hicks, H.M., J. Wadsworth, M. Azhar, M. Afzal, S. Manzoor, M. Abubakar, E.U.H. Khan, D.P. King, and N.J. Knowles (2020). Genome sequences of Foot-and-Mouth Disease virus O/ME-SA/Ind-2001e strains isolated in Pakistan. Microbiology Resource Announcements, 9(18): 3. DOI: 10.1128/mra.00165-20.

14 - Howson, E.L.A., R.J. Orton, V. Mioulet, T. Lembo, D.P. King, and V.L. Fowler (2020). GoPrime: development of an in silico framework to predict the performance of real-time PCR primers and probes using Foot-and-Mouth Disease virus as a model. Pathogens, 9(4): 15. DOI: 10.3390/pathogens9040303.

15 - Lignereux, L., A.L. Chaber, C. Saegerman, L. Heath, N.J. Knowles, J. Wadsworth, V. Mioulet, and D.P. King (2020). Foot-and-Mouth Disease outbreaks in captive scimitar-horned oryx (Oryx dammah). Transboundary and Emerging Diseases, 67(4): 1716-1724. DOI: 10.1111/tbed.13502.

16 - Limon, G., G. Ulziibat, B. Sandag, S. Dorj, D. Purevtseren, B. Khishgee, G. Basan, T. Bandi, S. Ruuragch, M. Bruce, J. Rushton, P.M. Beard, and N.A. Lyons (2020). Socio-economic impact of Foot-and-Mouth Disease outbreaks and control measures: An analysis of Mongolian outbreaks in 2017. Transboundary and Emerging Diseases, 67(5): 2034-2049. DOI: 10.1111/tbed.13547.

17 - Orton, R.J., C.F. Wright, D.P. King, and D.T. Haydon (2020). Estimating viral bottleneck sizes for FMDV transmission within and between hosts and implications for the rate of viral evolution. Interface Focus, 10(1): 10. DOI: 10.1098/rsfs.2019.0066.

18 - Quattrocchi, V., J. Bidart, A.C. Mignaqui, V. Ruiz, A. Ferella, C. Langellotti, M. Gammella, S. Ferraris, J. Carrillo, A. Wigdorovitz, Y. Durocher, S.B. Cardillo, B. Charleston, and P.I. Zamorano (2020). Bovine dendritic cell activation, T cell proliferation and antibody responses to Foot-and-Mouth Disease, is similar with inactivated virus and virus like particles. Frontiers in Veterinary Science, 7: 7. DOI: 10.3389/fvets.2020.00594.

19 - Tesfaye, Y., F. Khan, M. Yami, J. Wadsworth, N.J. Knowles, D.P. King, and E. Gelaye (2020). A vaccine-matching assessment of different genetic variants of serotype O Foot-and-Mouth Disease virus isolated in Ethiopia between 2011 and 2014. Archives of Virology, 165(8): 1749-1757. DOI: 10.1007/s00705-020-04662-y.

20 - Ulziibat, G., O. Maygmarsuren, B. Khishgee, G. Basan, B. Sandag, S. Ruuragc, G. Limon, G. Wilsden, C. Browning, D.P. King, A.B. Ludi, and N.A. Lyons (2020). Immunogenicity of imported Foot-and-Mouth vaccines in different species in Mongolia. Vaccine, 38(7): 1708-1714. DOI: 10.1016/j.vaccine.2019.12.053.

21 - Willems, T., A. De Vleeschauwer, M. Perez-Filgueira, Y.M. Li, A. Ludi, D. Lefebvre, G. Wilsden, B. Statham, B. Haas, N. Mattion, B. Robiolo, C.B. Perez, E. Maradei, E. Smitsaart, J. La Torre, and K. De Clercq (2020). FMD vaccine matching: Inter laboratory study for improved understanding of r(1) values. Journal of Virological Methods, 276: 7. DOI: 10.1016/j.jviromet.2019.113786.

22 - Wood, B.A., V. Mioulet, E. Henry, A. Gray, M. Azhar, B. Thapa, S. Diederich, B. Hoffmann, M. Beer, D.P. King, and M. Eschbaumer (2020). Inactivation of Foot-and-Mouth Disease virus A/IRN/8/2015 with commercially available lysis buffers. Journal of Virological Methods, 278: 5. DOI: 10.1016/j.jviromet.2020.113835.

b) International conferences: 6

1 - King, D. "Global review". 15th OIE/FAO FMD Reference Laboratories Network Annual Meeting, 1-2 December 2020

2 - Di Nardo, A. "A harmonised system to collect and display laboratory and field data from the Network". 15th OIE/FAO FMD Reference Laboratories Network Annual Meeting, 1-2 December 2020

3 - Knowles, N. "FMDbase: a new “open access” database for FMDV sequences". 15th OIE/FAO FMD Reference Laboratories Network Annual Meeting, 1-2 December 2020

4 - Shaw, A. "Enhanced complete genome sequencing of foot-and-mouth disease virus using probe enrichment.

Open session of EuFMD. December 2020.

5 - Ludi, A. "A review of the WRLFMD's proficiency testing scheme. Open session of EuFMD. December 2020.

6 - Asfor, A. "Development of a peptide elisa for specific detection of foot-and-mouth disease virus-neutralising antibodies: can a test in this format replace VNT? Open session of EuFMD. December 2020.

c) National conferences: 0
None

d) Other:
(Provide website address or link to appropriate information) 3
Website: wwww.wrlfmd.org
Website: www.foot-and-mouth.org/
twitter account: https://twitter.com/WRLFMD

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: 2
b) Seminars: 1
c) Hands-on training courses: 0
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; e-learning training course (with webinars) covering FMD diagnostics - delivered with EuFMD	>80 countries	>100 delegates
a	Botswana	1
a	Belize	1

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 17025:2005	Pirbright UKAS testing Schedule 2020.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Identification of Foot-and-Mouth Disease Virus (FMDV) and related vesicular viruses	United Kingdom Accreditation Service
Detection of Antibodies to structural and non-structural proteins of Foot-and-Mouth Disease (FMDV)	United Kingdom Accreditation Service
Detection of antibodies to Vesicular and related viruses	United Kingdom Accreditation Service
Detection of antibodies to Structural proteins of Foot-and-Mouth Disease (FMDV)	United Kingdom Accreditation Service
Detection of antibodies toNon-structural protein of Foot and Mouth Disease Virus (FMDV)	United Kingdom Accreditation Service
Detection and identification of Foot and Mouth Disease Virus (FMDV) & Swine Vesicular Disease Virus (SVDV)	United Kingdom Accreditation Service
Detection of specific nucleic acid from species susceptible to non-vesicular viruses	United Kingdom Accreditation Service
Efficacy Testing against Swine Vesicular Disease Virus, Foot and Mouth Disease Virus	United Kingdom Accreditation Service

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?

Yes

National/ International	Title of event	Co-organiser	Date (mm/yy)	Location	No. Participants
International	15th Annual Meeting of the OIE/FAO FMD Reference Laboratory Network	-	12/20	Online	>50

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
SEACFMD National Coordinators meeting	06/20 and 07/20	virtual	speaker	Regional update
OIE/FAO SADC Roadmap meeting for FMD (in southern Africa)	11/20	virtual	speaker	Regional risks
OIE sub-commission for southeast Asia (SEACFMD)	12/20	virtual	speaker	Global FMD situation

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?

Yes

Purpose of the proficiency tests: [1]	Role of your Reference Laboratory (organiser/ participant)	No. participants	Participating OIE Ref. Labs/ organising OIE Ref. Lab.
Panel 1 - Virology (Outbreak scenarios)	Organiser	13	Argentina, Belgium, Botswana, Brazil, Canada, France, Italy, Russia, South Africa, Republic of Korea, Thailand, UK (organiser) and USA
Panel 2 - Serology (post-surveillance serology)	Organiser	13	Argentina, Belgium, Botswana, Brazil, Canada, France, Italy, Russia, South Africa, Republic of Korea, Thailand, UK (organiser) and USA

[1] *validation of a diagnostic protocol: specify the test; quality control of vaccines: specify the vaccine type, etc.*

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
Development of FMD ELISA tests	Apply new technologies for FMD serology and antigen detection	IZSLER (Italy)
Validation of NSP assays	Inter-laboratory exercise for commercial NSP ELISA kits	ANSES (France) and IZSLER(Italy)
Post-vaccination serology	Harmonization and calibration of VNT methods	ANSES (France), Sciensano (Belgium) and IZSLER(Italy)

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
Panel 1 - Virology (Outbreak scenarios)	40	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East
Panel 2 - Serology (post-surveillance serology)	51	☒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)
OIE SCAD in February 2020	Paris - attended via video conference	FMD Global update
OIE Biological Standards Commission Meeting in September 2020	Attended via video conference	Work of the OIE/FAO Reference Laboratory Network
OIE ad-hoc group in June/July 2020	Attended via video conference	Review the OIE code rules on the safe trade in meat
OIE ad-hoc group during the Autumn 2020	Attended via video conference	Review of country-level dossiers and Member status

25. Additional comments regarding your report: