

OIE Reference Laboratory Reports Activities

Activities in 2020

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Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Foot and mouth disease
Address of laboratory:	National Centre for Foreign Animal Disease Canadian Food Inspection Agency Canadian Science Centre for Human and Animal Health 1015 Arlington Street, Suite T2300 Winnipeg Manitoba R3E 3M4 CANADA
Tel.:	+1-204 789.20.23
Fax:	+1-204 789.20.38
E-mail address:	Charles.nfon@canada.ca
Website:	https://merlin.cfia-acia.inspection.gc.ca/eng
Name (including Title) of Head of Laboratory (Responsible Official):	Dr John Copps, Executive Director CFIA-National Centre for Foreign Animal Disease
Name (including Title and Position) of OIE Reference Expert:	Dr Charles Nfon, Research Scientist/Head Vesicular Diseases Unit
Which of the following defines your laboratory? Check all that apply:	Governmental

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
3ABC ELISA	Yes	38	444
SPCE	Yes	9	0
Direct diagnostic tests		Nationally	Internationally
Real-time RT-PCR	Yes	74	44
Virus isolation	Yes	26	28
Antigen ELISA	Yes	0	140
VP1 sequence	Yes	0	28
Full genome sequence	No	0	28
Lateral flow stip test	No	0	140

**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
Recombinant FMDV 3ABC antigen	FMD 3ABC ELISA	Produced and provided	0	5mL	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
HRP-conjugated anti-FMD 3B monoclonal antibody	FMD 3ABC ELISA	Produced and provided	0	8mL	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
Rabbit anti-FMDV polyclonal sera (serotypes A, O, SAT1 and SAT2)	Solid phase competitive ELISA (SPCE) and antigen detection ELISA (AgELISA)	Produced and provided	0	10mL each	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
Guinea pig anti-FMDV polyclonal sera (serotypes A, O, SAT1 and SAT2)	SPCE and AgELISA	Produced and provided	0	10mL each	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
BEI-inactivated FMDV serotype A antigen	SPCE	produced and provided	0	20mL	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
BEI-inactivated FMDV serotype O antigen	SPCE	produced and provided	0	30mL	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East

BEI-inactivated FMDV serotype SAT1 antigen	SPCE	produced and provided	0	40mL	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
BEI-inactivated FMDV serotype SAT2 antigen	SPCE	produced and provided	0	30mL	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
Positive control bovine sera for FMDV serotypes A,O, SAT1, SAT2 and 3ABC	SPCE and 3ABC ELISA	Produced and provided	0	28mL total	1	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
Negative bovine sera	Validation of FMD serological tests	Produced and provided	0	121x40mL	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
Negative porcine sera	Validation of FMD serological tests	Produced and provided	0	102x40mL	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
Hybridoma producing anti FMD 3B monoclonal antibody	3ABC ELISA	Produced and provided	0	2mL	1	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East

FMD 3ABC antigen-coated plates	3ABC ELISA	Produced and provided	69 plates	0	1	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
FMDV RRT-PCR panels	RRT-PCR	Produced and provided	26 panels	0	1	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> 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.)
Rapid lateral flow test strips for detection of foot-and-mouth disease virus SAT 1 and SAT 3	Journal of Virological Methods: 2020 Sep 5;113967. doi: 10.1016/j.jviromet.2020.113967.

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
NIGERIA	July	472 (444 sera and 28 tissues)	0
GHANA	March	16 sera	0

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
NIGERIA	FMD diagnosis	Protocols and training on FMD serology
BOTSWANA	Design room temperature-stable strip tests for FMD	Brainstorming meetings with scientists and industry

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
Comparative studies for Foot and Mouth Disease virus diagnostics and vaccines in Cattle	2.5 years (ongoing)	Validation of FMD serological assay; identification of efficacious FMD vaccine	Animal and Plant Quarantine Agency,	KOREA (REP. OF)
Development of rapid lateral flow strip tests for the detection of (1) foot-and-mouth disease virus (FMDV) serotype SAT 1, 2, 3, and (2) antibodies against FMDV non-structural proteins	5 years (ongoing)	Development of rapid field deployable assays for FMD detection	Botswana Institute for Technology Research and Innovation	BOTSWANA
Capacity building for National and Regional Foot-and-Mouth-Disease Control Strategy in Nigeria (2019 - 2022)	4 years (ongoing)	Sustainable diagnostic capacity building	National Veterinary Research Institute (NVRI), Vom	NIGERIA

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:

Clinical samples from various parts of Nigeria were analyzed and FMDV serotypes/subtypes circulating in the country identified by VP1 and full genome sequencing. In addition, serum samples were tested to estimate the seroprevalence of FMD. Since FMD is a transboundary animal disease, with a regional control strategy, this information from Nigeria will be relevant for the West African region

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:

Data from #11 above was shared with Nigeria, World Reference Laboratory for FMD in Pirbright, OIE and FAO. Specifically, phylogenetic trees of the FMD sequences were generated and shared. In addition, this data was presented to the OIE/FAO FMD Reference Laboratories Network in December 2020.

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: 3

Yeo S, Yang M, Nyachoti M, Rauh R, Callahan JD, Nfon C. Detection of Foot-and-Mouth Disease Virus in Swine Meat Juice. Pathogens. 2020 May 29;9(6):424. doi: 10.3390/pathogens9060424.

Yang M, Mudabuka B, Dueck C, Xu W, Masisi K, Fana EM, Mpofo C, Nfon C. Development of two rapid lateral flow test strips for detection of foot-and-mouth disease virus SAT 1 and SAT 3. J Virol Methods. 2020 Sep 5:113967.

Eschbaumer M, Vögtlin A, Paton DJ, Barnabei JL, Sanchez-Vazquez MJ, Pituco EM, Rivera AM, O'Brien D, Nfon C, Brocchi E, Bakkali Kassimi L, Lefebvre DJ, Navarro López R, Maradei E, Duffy SJ, Loitsch A, De Clercq K, King DP, Zientara S, Griot C, Beer M. Non-discriminatory Exclusion Testing as a Tool for the Early Detection of Foot-and-Mouth Disease Incursions. Front Vet Sci. 2020 Nov 19;7:552670. doi: 10.3389/fvets.2020.552670.

b) International conferences: 3

Nfon C: Global Foot-and-Mouth Disease Situation. 2020 North American Animal Health Committee Meeting.

Nfon C: Laboratory updates from National Centre for Foreign Animal Disease (NCFAD)

Canadian Food Inspection Agency, Winnipeg, Manitoba, Canada in collaboration with NVRI, Vom, Nigeria. 2020 OIE/FAO FMD Reference Laboratories Network meeting.

Nfon C: OIE Reference laboratory support: Which is the support provided by Reference Laboratories in relation to status reconfirmation and eventual need of recovery? 2020 Virtual Workshop on OIE Officially Recognized Animal Disease Status; focus on Foot and Mouth Disease status maintenance, reconfirmation, suspension and recovery.

c) National conferences: 0

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?

Yes

a) Technical visits: 0

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
Virtual training (via Zoom) on optimization and validation of in-house FMD serological assays	Nigeria	5

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	ASB_CTF_15579-CFIA-Certificate_v1_2017-07-24.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Vesicular Diseases: Virus Isolation by Inoculation of Tissue Culture	Standards Council of Canada
Vesicular Disease Viral Antigen Detection by the Double Antibody Sandwich Enzyme-Linked Immunosorbent Assay (ELISA) Test	Standards Council of Canada
Solid Phase Competitive ELISA for Detection of Antibodies to Foot and Mouth Disease Virus Structural Proteins	Standards Council of Canada
Virus Neutralization Test (VNT) for the Detection of Antibodies to Foot-and-Mouth Disease Virus	Standards Council of Canada
3ABC Competitive ELISA for Detection of Antibodies to Foot and Mouth Disease Virus Non-structural proteins	Standards Council of Canada
Real Time Reverse Transcription Polymerase Chain Reaction (PCR) for the Detection of Foot -and-Mouth Disease Virus (FMDV)	Standards Council of Canada
FMDV VP1 and full genome sequencing	Standards Council of Canada

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
Virtual Workshop on OIE Officially Recognized Animal Disease Status; focus on Foot and Mouth Disease status maintenance, reconfirmation, suspension and recovery.	12/2020	Virtual	Speaker	OIE Reference laboratory support: Which is the support provided by Reference Laboratories in relation to status reconfirmation and eventual need of recovery?

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.
FMD proficiency test scheme	Participant	4	Organizer: World Reference Laboratory for FMD
FMD and vesicular stomatitis proficiency test scheme	Participant	4	Organizer: PANAFTOSA, Brazil

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
Comparative studies for Foot and Mouth Disease virus diagnostics and vaccines in Cattle	FMD serological diagnostics and FDM vaccine matching/efficacy testing	Animal and Plant Quarantine Agency, South Korea

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
Harmonization of FMD, ASF and CSF diagnostics with USDA and SENASICA, Mexico	3	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> 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?

No

25. Additional comments regarding your report:

Many of our research and diagnostic activities have been affected by the ongoing COVID-19 pandemic. Shipping of reagents to external labs and receiving of samples from these labs has also been affected. Either the shipments are too expensive or they take too long to get to their destination and may be compromised in quality if stored improperly. The samples that were received from Nigeria and Ghana for FMD testing have not been fully analyzed because of the restrictions put in place to reduce the spread of COVID-19 in Canada. The first batch of samples from Nigeria were partially analyzed but no testing has been done on the second batch. Hands on training activities were planned for two visitors from NVRI, Nigeria to come to the NCFAD, Canada in March 2020. Unfortunately, restrictions in travel to Canada started in March. A visit to Nigeria by NCFAD scientists was also cancelled in July 2020. However, virtual training has been conducted using Zoom. Hands on training activities will be rescheduled once the pandemic resolves.

