

# WOAH Reference Laboratory Reports Activities 2025

This report has been submitted: 13 mars 2026 10:07

## LABORATORY INFORMATION

<b>*Name of disease (or topic) for which you are a designated WOAHO Reference Laboratory:</b>	Foot and mouth disease
<b>*Address of laboratory:</b>	Plot 6385/90 Lejara Road, Broadhurst Industrial, Gaborone Botswana
<b>*Tel:</b>	+2673912711
<b>*E-mail address:</b>	jhyera@bvi.co.bw
<b>Website:</b>	www.bvi.co.bw
<b>*Name (including Title) of Head of Laboratory (Responsible Official):</b>	Mr. Andrew Madeswi, Chief Executive Officer, Botswana Vaccine Institute
<b>*Name (including Title and Position) of WOAHO Reference Expert:</b>	Dr Joseph Hyera, Laboratory Manager (WOAH Reference Expert)
<b>*Which of the following defines your laboratory? Check all that apply:</b>	Parastatal organization under the Ministry of Agricultural Development and Food Security, Botswana Government

## 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 WOAHO Manual (Yes/No)	Total number of test performed last year	
		Nationally	Internationally
<b>Indirect diagnostic tests</b>			
NSP ELISA	Yes	4	222
VNT	Yes	158	11
<b>Direct diagnostic tests</b>			
Virus Isolation in Cell Culture & typing by Antigen ELISA	Yes	3	34
Genome Detection (RT-PCR and Sequencing)	Yes	3	34

## TOR2: REFERENCE MATERIAL

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by WOAHO?

No

3. Did your laboratory supply standard reference reagents (nonWOAH-approved) and/or other diagnostic reagents to WOAHO Members?

No

4. Did your laboratory produce vaccines?

Yes

5. Did your laboratory supply vaccines to WOAHO Members?

Yes

Vaccine name	Amount supplied nationally (ml, mg)	Amount supplied nationally (ml, mg)	Name of recipient WOAHO Members
FMD Trivalent (SAT 1, SAT 2, SAT 3)	None	3 920 400 monodoses (February 2025)	NAMIBIA

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FMD QUADRIVALENT (SAT 1, SAT 2, A, O)	None	13 860 monodoses (February 2025)	TANZANIA
FMD BIVALENT (SAT 2, O)	None	60 000 monodoses (March 2025)	MALAWI
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	180 000 monodoses (March 2025)	MALAWI
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	459 000 monodoses (March 2025)	None	BOTSWANA
FMD BIVALENT (SAT 2, O)	None	430 200 monodoses (March 2025)	ZAMBIA
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	60 000 monodoses (April 2025)	ZIMBABWE
FMD BIVALENT (SAT 2, O)	None	945900 monodoses (May 2025)	ZAMBIA
FMD MONOVALENT ( O )	None	600 000 monodoses (May 2025)	ZAMBIA
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	1 500 000 monodoses (June 2025)	SOUTH AFRICA
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	300 000 monodoses (June 2025)	ESWATINI
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	30 000 monodoses (June 2025)	ZIMBABWE
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	987 300 monodoses (August 2025)	ZIMBABWE
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	1 203 600 monodoses (August 2025)	SOUTH AFRICA
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	188 000 monodoses (September 2025)	ESWATINI
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	1 950 000 monodoses (October 2025)	SOUTH AFRICA
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	30 000 monodoses (November 2025)	ZIMBABWE
FMD TRIVALENT (SAT 1, SAT 2, SAT 3)	None	231 900 monodoses (November 2025)	SOUTH AFRICA
FMD QUADRIVALENT (SAT 1, SAT 2, A, O)	None	20 064 monodoses (November 2025)	CONGO (DEM. REP. OF THE)

## 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 WOAHA Standards for the designated pathogen or disease?

Yes

Name of the new test or diagnostic method developed	Description and References (Publication, website, etc.)
Immortalization of primary lamb kidney cells towards a continuous cell line For propagation of FMD virus	Work was conducted at this laboratory by MSc Student from 2024 and completed in September 2025. Work submitted as a Dissertation to the Botswana International University of Science & Technology (BIUST) in partial fulfilment for the requirements of the award of the degree of Master of Science (MSc) in Biological Sciences
Development and evaluation of a serotyping real time RT-PCR for Southern African Territories (SAT) serotypes of foot-and-mouth disease virus (FMDV)	Work conducted by MSc Student at this laboratory from 2024 and completed in September 2025. Work submitted as a Dissertation to the Botswana International University of Science & Technology (BIUST) in partial fulfilment for the requirements of the award of the degree of Master of Science (MSc) in Biological Sciences

8. Did your laboratory develop new vaccines for the designated pathogen or disease?

Yes

9. Did your laboratory validate vaccines according to WOAHA Standards for the designated pathogen or disease?

Yes

Name of the new vaccine developed	Description and References (Publication, website, etc)
Engineering epitope-based Vaccine for FMD SAT viruses	Work conducted at this laboratory by PhD Student from 2021 and completed in 2025. Dissertation was accepted by the University of Botswana, Gaborone in partial fulfilments of the requirements for the award of the degree of Doctor of Philosophy (PhD) of the University (Biological Sciences). Arrangements are on-going to get the vaccine clinically tested in target host animals (cattle).

## TOR4: DIAGNOSTIC TESTING FACILITIES

10. Did your laboratory carry out diagnostic testing for other WOAHA Members?

Yes

Name of WOAHA Member Country seeking assistance	Date	Which diagnostic test used	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
BOTSWANA	2025-03-04	NSP ELISA, VI, RT-PCR	4	3
BOTSWANA	2025-04-22	VNT	49	0

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BOTSWANA	2025-05-20	VNT	26	0
NAMIBIA	2025-05-28	NSP ELISA, VNT, VI, RT-PCR	6	9
BOTSWANA	2025-06-03	VNT	10	0
BOTSWANA	2025-06-11	VNT	39	0
BOTSWANA	2025-06-03	LPBE,PVM	285	0
ESWATINI	2025-06-20	NSP ELISA, VI, Antigen typing, RT-PCR and Sequencing	3	5
ZIMBABWE	2025-07-25	VI, Antigen typing, RT-PCR and Sequencing	0	7
BOTSWANA	2025-07-25	VNT	30	0
LESOTHO	2025-12-08	NSP ELISA, VNT	200	0
ESWATINI	2025-12-03	NSP ELISA, VNT, VI, Antigen typing, RT-PCR and Sequencing	3	3
ESWATINI	2025-12-04	NSP ELISA, VNT, VI, Antigen typing, RT-PCR and Sequencing	10	10
ESWATINI	2025-12-04	LPBE,PVM	30	0

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

Yes

Name of the WOA Member Country receiving a technical consultancy	Purpose	How the advice was provided
KENYA	FMD on Epidemiology, Surveillance and Diagnostics to strengthen Control Efforts in Eastern Africa	Workshop presentations (n=2) (i) Clinical and Laboratory diagnosis of FMD (ii) Role of BVI Ref Lab for FMD in the control of the diseases in southern and Eastern Africa. Workshop organized by WOA Eastern Africa, 21-23 October 2025, Mombasa, Kenya.
ESWATINI	Technical Visit to the Laboratory Personnel (5 -10 October 2015)	Establishing a robust protocol for the standardized collection, secure packaging, and rapid transportation of samples to ensure the preservation of sample quality during transit to the reference lab.

## TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

12. Did your laboratory participate in international scientific studies in collaboration with WOA Members other than the own?

No

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

Yes

### Research need : 1

**Please type the Research need:** Validation of in-vivo method (Virus challenge) for assessing protective values of FMD vaccines (vaccine challenge); this test cannot be done at present due to high biorisks. Efforts are on-going to rehabilitate the animal stables to BSL3 containment. This is an important WOA regulatory requirement for FMD vaccine manufacturing.

**Relevance for WOA** Disease Control,

**Relevance for the Code or Manual** Manual,

**Field** Vaccines,

**Animal Category** Terrestrial,

**Disease:**

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

**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:

Notes:

Answer: None.

## 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:

Bovine epithelial tissue samples collected and received from Eswatini and Zimbabwe were investigated for presence of FMDV by virus isolation in cell culture and by RT-PCR. The circulating FMDV serotypes in these countries were identified as SAT1 and SAT2 respectively from Eswatini and from Zimbabwe. Bovine tissue and probang samples collected from Botswana and Namibia were investigated similarly for presence of FMDV; all samples yielded negative results. Serum samples for FMD surveillance from Lesotho were tested for evidence of antibodies to NSPs of FMDV and were all found to be negative for such antibodies indicating lack of exposure to field FMDV. Lesotho is recognized as a FMD free without vaccination by WOAHO and the country still maintains this status to date.

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:

The data collected from disease investigations (including laboratory testing) were analyzed and test results were disseminated in the form of test reports. Data collected from research activities were analyzed and disseminated in the form of scientific publications (peer review journals & University dissertations); presentations at Conferences.

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:

5

GABOIPHIWE, K. et al. (2025). A review of the utility of established cell lines for isolation and propagation of the Southern African Territories (SAT) serotypes of FMD Virus. *Viruses*, 17: 39. <https://doi.org/10.3390/v17-10039>.

FANA, E.M. (2025). Engineering a Foot-and-mouth disease Vaccine appropriate for southern Africa. PhD Dissertation submitted to the Department of Biological Sciences, University of Botswana, Gaborone, Botswana.

GABOIPHIWE, K (2025). Immortalization of primary lamb kidney cells towards a continuous cell line for propagation of FMD Virus. MSc Dissertation submitted to the School of Life Sciences, Botswana International University of Science and Technology (BIUST), Palapye, Botswana.

MSHOLOMBE, P. et al. (2025). Development and evaluation of a serotyping real time RT-PCR assay for Southern African Territories (SAT) serotypes of Foot-and-mouth disease (FMD) Virus. MSc Dissertation submitted to the School of Life Sciences, Botswana International University of Science and Technology (BIUST), Palapye, Botswana.

MSHOLOME, P. et al. (2025). Development and evaluation of a serotyping real time RT-PCR assay for Southern African Territories (SAT) serotypes of Foot-and-mouth disease (FMD) Virus. *Journal of Veterinary Diagnostic Investigation* (In Press).

b) International conferences:

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FANA, E.M. and HYERA, JM. (2025). Foot-and-mouth disease virus circulation I the regional pools: Pools 4 & 6. 20th WOAHO/FAO FMD Reference Laboratories Network Annual Meeting, 21st – 23rd October 2025, Istanbul, Turkey.

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GABOIPHIWE, K. et al. (2025). Development and evaluation of a serotyping real time RT-PCR assay for Southern African Territories (SAT) serotypes of Foot-and-mouth disease (FMD) Virus. Poster Presentation, Veterinary Epidemiology Conference, 21st – 23rd October 2025, Istanbul, Turkey.

MSHOLOMBE, P. et al. (2025). Development and evaluation of a serotyping real time RT-PCR assay for Southern African Territories (SAT) serotypes of Foot-and-mouth disease (FMD) Virus. Presentation at Veterinary Epidemiology Conference, 21st – 23rd October 2025, Istanbul, Turkey.

HYERA, J.M. (2025). The role of the Foot-and-Mouth Disease (FMD) Reference Laboratory at Botswana Vaccine Institute in the control of the disease in southern and eastern Africa. WOAHP Workshop on FMD Epidemiology, Surveillance and Diagnostics to strengthen control efforts in Eastern Africa. 21st – 23rd October 2025, Mombasa, Kenya.

c) National conferences:

0

None

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

0

None

## TOR7: SCIENTIFIC AND TECHNICAL TRAINING

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

Yes

a) Technical visit : 2

b) Seminars : 0

c) Hands-on training courses: 2

d) Internships (>1 month) 4

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	KENYA	30
C	ESWATINI	6
D	BOTSWANA	4

## 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 Attached	SADCAS Certificate of Accreditation.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
FMD virus isolation in primary lamb kidney cell culture	SANAS & SADCAS
FMD virus serotype identification by antigen ELISA	SANAS & SADCAS
FMD virus genome detection and sequencing	SANAS & SADCAS

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

Yes

We have several Standard operating procedures (SOPs) which guide on the biorisk management. The documents are: (i) SHEB 0001 Virus Leak/spill Containment and

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clean-up: It clearly outlines the steps to be taken should the FMD virus leak or spill, posing a potential breach of containment. (ii) SHEB 0013 Autoclaving SOP: The document spells out the removal of utensils and autoclavable equipment out of a Biosafety level 3 laboratory, where the virus pathogen is inactivated through heat. (iii) SHEB0014Wastedisposal SOP: All laboratory waste undergoes decontamination before being removed from the BSL 3 facility to prevent any potential environmental risks. Once removed from the contaminated area, the waste is further incinerated within the compound. (iv) SHEB 0015 Procedure for entry and exit of visitors at BVI: Entry and exit of personnel into the BSL3 laboratory are controlled to minimize the risk of spreading the virus to the environment personnel interact with. (v) SHEB 0028 Organization of Movement: A movement grid has been implemented to further minimize contamination of virus-free areas by personnel and equipment exiting the BSL3 laboratories. (vi) SHEB 0029 Decontamination Procedure: Utilizing the Safety Airlock System, the procedure further decontaminates materials that cannot be autoclaved.

## TOR9: SCIENTIFIC MEETINGS

21. Did your laboratory organise scientific meetings related to the pathogen in question on behalf of WOA?H?

No

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOA?H?

Yes

Title of event	Date	location	Role (speaker, presenting poster, short communications)	Title of the work presented
20th WOA/H/FAO FMD Reference Laboratories Network Annual Meeting	2025-10-20	Istanbul, Turkey	FANA, E.M. and HYERRA, JM; Presentation	Foot-and-mouth disease virus circulation in the regional pools: Pools 4 & 6
Veterinary Epidemiology Conference	2025-10-20	Istanbul, Turkey	GABOIPHIWE, K, Msc student; Poster Presentation	Development and evaluation of a serotyping real time RT-PCR assay for Southern African Territories (SAT) serotypes of Foot-and-mouth disease (FMD) Virus
Veterinary Epidemiology Conference	2025-10-20	Istanbul, Turkey	MSHOLOMBE, P, Msc student; Presentation	Development and evaluation of a serotyping real time RT-PCR assay for Southern African Territories (SAT) serotypes of Foot-and-mouth disease (FMD) Virus
WOAH Workshop on FMD Epidemiology, Surveillance and Diagnostics to strengthen control efforts in Eastern Africa	2025-10-20	, Mombasa, Kenya	HYERA, JM, WOA/H FMD Reference expert; Presentation	The role of the Foot-and-Mouth Disease (FMD) Reference Laboratory at Botswana Vaccine Institute in the control of the disease in southern and eastern Africa

## TOR10: NETWORK WITH WOA/H REFERENCE LABORATORIES

23. Did your laboratory exchange information with other WOA/H Reference Laboratories designated for the same pathogen or disease?

Yes

24. Are you a member of a network of WOA/H Reference Laboratories designated for the same pathogen?

Yes

NETWORK/DISEASE	ROLE OF YOUR LABORATORY (PARTICIPANT, ORGANISER, ETC)	NO. PARTICIPANTS	PARTICIPATING WOA/H REF. LABS
Foot and mouth disease	Participant	52	All WOA/H labs designated for Foot and Mouth Disease

25. Did you organise or participate in inter-laboratory proficiency tests with WOA/H Reference Laboratories designated for the same pathogen during the past 2 years?

Yes

Purpose of the proficiency test:	Role of your Reference Laboratory (organiser/ participant)	No. participating Laboratories	Participating WOA/H Ref. Labs/ organising WOA/H Ref Lab
Assurance of Test results	Organiser	1	Pirbright Institute

26. Did your laboratory collaborate with other WOA Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

No

## TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

27. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than WOA Reference Laboratories for the same pathogen during the past 2 years?

Yes

Purpose for inter-laboratory test comparisons <sup>1</sup>	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries
Assurance of Test results	Organiser	2	NSP-ELISA	BOTSWANA,

## TOR12: EXPERT CONSULTANTS

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

Yes

Kind of consultancy	Location	Subject (facultative)
WOAH Workshop on FMD Epidemiology, Surveillance and Diagnostics to strengthen control efforts in Eastern Africa	MOMBASA, KENYA	The role of the Foot-and-Mouth Disease (FMD) Reference Laboratory at Botswana Vaccine Institute in the control of the disease in southern and eastern Africa

29. Additional comments regarding your report:

No