

The logo graphic for ARC LNR features a stylized eye shape composed of several curved, overlapping bands in shades of green and maroon. Below this graphic, the text 'ARC • LNR' is written in a large, bold, maroon serif font.

ARC • LNR

Excellence in Research and Development



Training Workshop on FMD epidemiology,
diagnostics and surveillance for strengthening
FMD control in Eastern Africa
21 to 23rd October 2025, Mombasa, Kenya

TRANSBOUNDARY ANIMAL DISEASE LABORATORY:

**WOAH FMD Reference
Laboratory**

**Paidamwoyo Berry Mutowembwa
Research Veterinarian
ARC-Onderstepoort Veterinary Institute
Transboundary Animal Diseases**



ARC-OVI-TAD LABORATORY



TAD Diagnostics Laboratory

Vaccines and Diagnostics Development (Research)

Vaccine Production (FMD Vaccine Production)

BSL 3 Animal Facility (Clinical Animal studies)

ARC-OVI TADs DIAGNOSTIC LABORATORY

- BSL3



- WOAH/FAO Reference laboratory for FMD



- WOAH/FAO Reference Laboratory for African swine fever

- National Reference Laboratory for PPR

- ISO 17025 accredited



ARC–ONDERSTEPSPOORT VETERINARY INSTITUTE

Mission

To provide scientific support for Veterinary Services in effective risk management for quality of life for all in South Africa

- OVI promotes animal health and welfare by providing effective veterinary diagnostic and research services
- WOAHA Reference Laboratories / FAO Collaborating Centers
 - ✓ Research and Development
 - ✓ Global Collaboration
 - ✓ Expertise and Standardization
 - ✓ Capacity Building

ARC-OVI-TADs WOAAH REFERENCE LAB

- **Standardization and Harmonization:**
WOAH FMD Reference Laboratory play a crucial role in harmonizing and standardizing diagnostic assays for FMD. This ensures consistent and reliable testing across different laboratories in the region and beyond.
- **Expertise and Training:**
Offer expert advice and training to WOAAH member countries, particularly in low- and middle-income countries, to enhance their capacity in disease diagnosis, surveillance, and control.
- **Data Management:**
Contribute to global databanks by providing genomic data and other relevant information related to FMD.
- **Support for National Laboratories:**
Support national reference laboratories by providing technical assistance, diagnostic services, and guidance on disease management.
- **Preparedness and Response:**
WOAH FMD Reference Laboratories are involved in early preparedness and response strategies for FMD.
- **Research and Development:**
Conduct research and development to improve diagnostic tools, vaccines, and other control measures for FMD.
- **Collaboration:**
Collaborate with other WOAAH Reference Laboratories, national laboratories, and international organizations to achieve the objectives.
- **Laboratory Twinning Program**
To improve the capacity and scientific expertise of laboratories in developing or in-transition countries

CHALLENGES FACING FMD DIAGNOSTICS

- Lack of diagnostic testing facilities and capacity at regional and national level.
- Lack of harmonization of diagnostic methods and quality assurance, biosafety and biosecurity systems.
- Lack of reference material and Diagnostic reagents.
- Lack of epidemiological information pertaining to outbreaks.

FMD DIAGNOSTIC CAPACITY

Clinical Diagnosis

Clinical signs
Lesions
Sampling and shipment

Virus Isolation

Cytopathic Effect
Vaccine Matching

Molecular Testing

Polymerase Chain Reaction (RT-PCR)
Real-time PCR (RT-qPCR)
Sequencing
Phylogenetic analysis

Biobanks

Reference material
Virus Repository
Serum Bank

Antibody Detection

Competitive ELISA
Non-structural Protein ELISA
Virus Neutralization

ISO 17025 Accredited



CHANGES IN VOLUME AND TYPE OF WORK

FMD Laboratory Diagnostic Tests

	LPBE	SPCE	T-E	NSP	VNT	PCR	VI	SEQ FMD & ASF
2016	48 553	39	65	2 097	47	163	71	
2017	43 113	0	60	4 117	166	213	92	3
2018	38 578	0	63	3 248	46	165	69	4
2019	17 826	52 287	3	4 990	8	113	9	4
2020	0	72 781	3	1 298	358	263	52	3
2021	0	94 715	0	6 652	0	599	39	5
2022	0	171 322	0	8 066	92	867	5	56
2023	0	102 752	0	12 029	0	480	0	17
2024	0	133 598	60	13 711	14	610	16	21
2025 (until June)	0	98 327	0	15 885	0	402	0	45

Key:

- LPBE: Liquid phase blocking ELISA
- SPCE: Solid phase competition ELISA
- TE: Typing ELISA
- NSP: ELISA detecting antibodies to non-structural proteins of FMD virus
- VNT: Virus neutralisation test
- VI: Virus isolation on pig kidney culture
- PCR: Polymerase chain reaction
- SEQ: Sequencing

DIAGNOSTIC SUPPORT

- The reference laboratory provides diagnostic testing to member countries where national and regional capacity does not exist.
- Primary or Confirmatory testing is done at no cost to the member state.
- The laboratory can assist with passive and active surveillance, but the sender will be charged for the tests conducted.
- Shipment of samples are often difficult, but the reference laboratory can assist with the logistics and authorization.
- Plans to launch a FMD proficiency testing scheme.
 - ARC-OVI (TADs) partakes in the annual FMD PT by the WRL, Pirbright.

CAPACITY BUILDING AND TRAINING

➤ Regional support and training

Namibia (FMD and ASF)

Botswana (FMD)

Uganda (FMD)

Mozambique (FMD and ASF)

Mauritius (FMD and ASF)

Malawi (FMD, ASF, PPR)

Nigeria (FMD, ASF, PPR)

Zimbabwe (FMD and ASF)

- SADC training courses (Diagnostics and disease surveillance).
- Assessment of laboratories and provide guidance and advise on ways forward for competency.



WOAH Twinning program

OUTBREAK INVESTIGATIONS

- The reference laboratory can assist with outbreak investigations
- Our outbreak response team is available to assist with the clinical diagnosis of FMD, collection of samples and advise on appropriate control measures
- The laboratory can provide buffers, Probang cups and Liquid N2 supply for sample collection and shipment.
- Online training for sample collection is under development.
- Primary or Confirmatory testing is done at no cost to the sender.
- Member states will receive a detailed report including information on the FMD status of animal/herds
 - ▶ Serotyping
 - ▶ Genetic relationship
 - ▶ Vaccine matching

FMD DIAGNOSTIC SERVICES R & D

➤ Validation of Diagnostic Assays

Objective	Expected Outcome
Validation of FMD serological assays in goats	FMD serological assays appropriate for use in goats
Validation of FMD serological assays in wildlife	FMD serological assays appropriate for use in wildlife

FMD Diagnostic Services R & D

➤ FMDV Serological assay development

Objective	Expected Outcome
Development of alternative vaccine matching assays	ELISA-based assays for determination of R values
Identification of FMDV B-cell epitopes using phage display	Identification of cross-reacting epitopes and development of alternative serological assays

FMD Diagnostic Services R & D

➤ FMDV Molecular assay development

Objective	Expected Outcome
Genetic characterisation of FMDV during experimental infections and natural outbreaks	Protocol for Full genome sequencing of FMDV. Identifying the source of FMD outbreaks and tracking its spread.
Implementation of point-of-care molecular assays for FMDV surveillance and Diagnosis.	Access to validated molecular assays for in-field application

WOAH REFERENCE LABORATORIES

- Cross-border FMD spread emphasize the need for national/international cooperation to fight this disease.
- Rapid and accurate diagnosis remain a critical component of FMD control programmes.
- Collaboration between reference laboratories and veterinary services laboratories are encouraged.



FMD DIAGNOSTIC TEAM

TADs Diagnostic Lab Contact Person

Dr Paidamwoyo Mutowembwa

Tel: +27 12 529 9593

Email: MutowembwaP@arc.agric.za

Dr Livio Heath (Vaccine Production Research Team Manager)

Ms Keneiloe Montsu

Ms Refiloe Malesa

Ms Hanlie Jones

Mr Henry Harris

Ms Thabisile Tshabalala

Mr Cassius Mkhantshwa

Mr Isaac Matabane

Ms Boledi Matabane



ARC • LNR

Excellence in Research and Development

THANK YOU

