Food and Agriculture Organization of the United Nations

European Commission for the Control of Foot-and-Mouth disease

WOAH/FAO Foot-and-Mouth Disease Reference Laboratories Network

FMD 2025 JUL AUG SEP Quarterly Report

2025 Foot-and-mouth disease quarterly report
July-August-September

European Commission for the Control of Foot-and-Mouth Disease

2023-2027 Strategy
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Jammu and Kashmir: *Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.*

Sudan and South Sudan: *Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.*

Abyei: *Final status of the Abyei area is not yet determined.*

Falkland Islands (Malvinas): *A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).*

Contents

Abbreviations and acronyms

ANSES	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail
EuFMD	European Commission for the Control of Foot-and-Mouth Disease
EURL for FMD	European Union Reference laboratory for Foot-and-mouth disease
FAST reports	foot-and-mouth and similar transboundary animal diseases reports
FLI	Friedrich Loeffler Institute
FMD	foot-and-mouth disease
FMDV	foot-and-mouth disease virus
FMDV GD	foot-and-mouth disease virus genome detected
FMDV NGD	foot-and-mouth disease virus genome not detected
GF-TAD	Global Framework for the Progressive Control of Transboundary Animal Diseases
NT	not tested
NVD	no virus detected
NRL	National reference Laboratory
rRT-PCR	real-time reverse transcription polymerase chain reaction
SAT	Southern African Territories
SVD	swine vesicular disease
VI	virus isolation
WAHIS	World Animal Health Information System (of the WOAH)
WOAH	World Organisation for Animal Health
WRLFMD	World Reference Laboratory for Foot-and-Mouth Disease

1. Highlights and headlines

Welcome to this third FMD status report for 2025 which summarises the current FMD global risks by bringing together data from the WRLFMD with other disease intelligence information. During the past three months, the WRLFMD has reported test results for samples received from Nepal, Nigeria and Thailand. In addition, new sequences have been submitted for analyses associated with FMD cases in Namibia (from BVI, Botswana), Mozambique (from BVI Botswana) as well as unofficial sequences via GenBank for SAT1 outbreaks in Egypt. Apologies for the slow release of this report, which in part is due to the conflicting prioritises arising from the recent FMD meetings in Istanbul for GFRA (https://insights.crdfglobal.org/gfra2025) and the Annual meeting of the WOAH/FAO FMD Laboratory Network (www.foot-and-mouth.org). These meetings were a great opportunity to discuss recent dynamic patterns of FMD spread with colleagues across the world. No further FMD cases have been detected in Europe since the last case in Hungary on 17th April 2025. Hungary and Slovakia have successfully regained their official WOAH free (without vaccination) status due to tremendous efforts to get ahead of the spread of FMDV and cut transmission links between the infected farms. Elsewhere in Europe, early estimations from colleagues in Germany suggest that the costs associated with the single FMD outbreak earlier in the year may be close to 1 billion euros, mainly due to lost access to international trade markets.

These are challenging times, where it is as important as ever to maintain networks that collate and share information about the changing patterns of risk. FMD outbreaks in Western Asia continue to be dominated by the spread of serotype SAT1 (topotype I) viruses where cases due to this exotic lineage have been reported in Bahrain (in a quarantine station), Iraq, Kuwait and Türkiye (and Egypt – topotype has not been officially confirmed). [**STOP PRESS:** In October, Azerbaijan reported an FMD outbreak close to the border with Georgia that represents the further geographical expansion of SAT1 in Western Asia, although sequence data is required to confirm this initial report]. During 2025, there has been an upsurge in FMD outbreaks reported in Türkiye, the greatest proportion of the >800 outbreaks is due to serotype SAT 1, but there are also outbreaks due to the new serotype O lineage (O/ME-SA/SA-2018;) that has been recently imported from the Indian sub-continent (https://pubmed.ncbi.nlm.nih.gov/40419097/) as well as serotype SAT 2 outbreaks, due to topotype XIV which emerged during 2022/3. Data to support the presence of the emerging O/ME-SA/SA-2018 lineage in Pakistan were presented at the GFRA meeting. In view of the lack of pre-existing immunity in livestock (from infection or vaccination) for the SAT1 serotype, further spread of this exotic serotype should be anticipated. The WRLFMD is supporting countries by performing heterologous testing of candidate FMD vaccines from different suppliers, where a recent collaborative paper with AU-PANVAC provides a new approach to undertake this testing using regional reference antigens (https://pubmed.ncbi.nlm.nih.gov/40419503/).

Published information on these samples can be retrieved from the following website (http://www.wrlfmd.org/). We also maintain a web-based dashboard (OpenFMD: http://www.openfmd.org) to allow users to retrieve and interrogate FMDV sequences, perform custom analyses for vaccine selection using PRAGMATIST and review FMD surveillance data.

Don King, Pirbright, October 2025

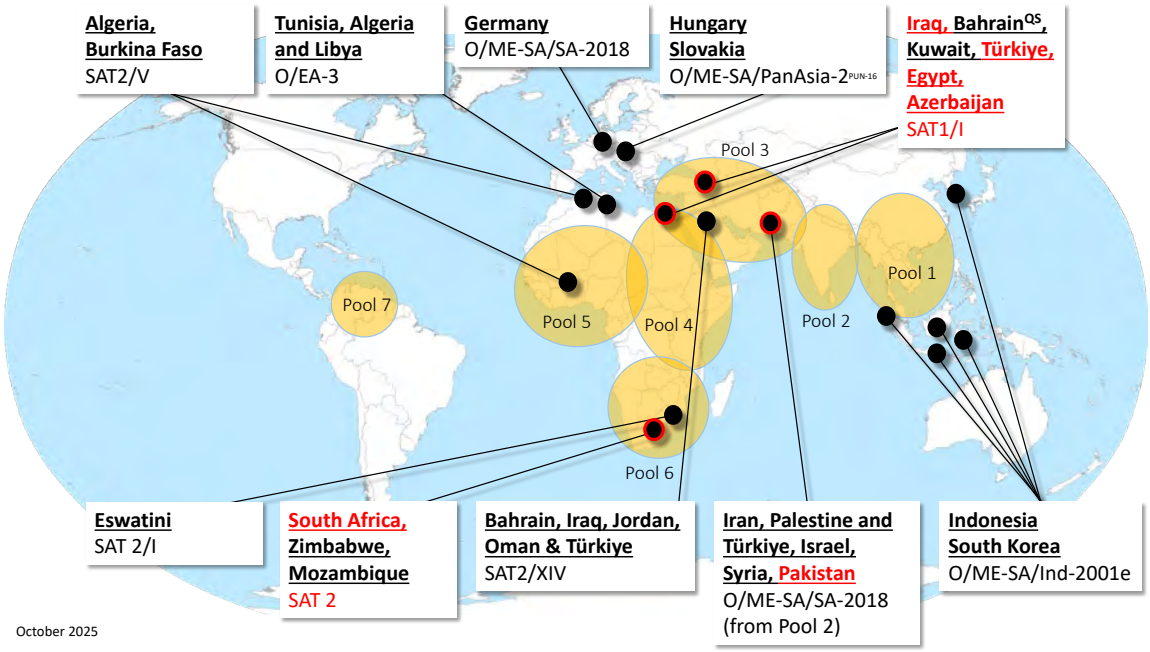


Figure 1: Recent FMD outbreaks with global epidemiological significance.

Note: New headline events reported July to September 2025 are highlighted in red with FMD endemic pools highlighted in orange. Source: WRLFMD. Map conforms to the United Nations World Map, June 2020.

2. General overview

Endemic Pools comprise separate ecosystems that maintain independently circulating and evolving foot-and-mouth disease virus (FMDV) genotypes. In the absence of specific reports, it should be assumed that the serotypes indicated below are continuously circulating in parts of these pools and would be detected if sufficient surveillance was in place.

POOL	REGION/COUNTRIES	SEROTYPES PRESENT
1	**SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA** Cambodia, China, China (Hong Kong SAR), Taiwan Province of China, Indonesia, Democratic People's Republic of Korea, Republic of Korea, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Russian Federation, Thailand, Viet Nam	A, Asia1 and O
2	**SOUTH ASIA** Bangladesh, Bhutan, India, (Mauritius[1]), Nepal, Sri Lanka	A, Asia1 and O
3	**WEST EURASIA & NEAR EAST** Afghanistan, Armenia, Azerbaijan, Bahrain, Georgia, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, Tajikistan, Türkiye, Turkmenistan, United Arab Emirates, Uzbekistan	A, Asia1 and O (SAT2)
4	**EASTERN AFRICA** Burundi, Comoros, Djibouti, Egypt[3], Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Uganda, United Republic of Tanzania, Yemen	O, A, SAT1, SAT2 and SAT3
	NORTH AFRICA[2] Algeria, Libya, Morocco, Tunisia	A and O
5	**WEST/CENTRAL AFRICA** Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo	O, A, SAT1 and SAT2
6	**SOUTHERN AFRICA** Angola, Botswana, Malawi, Mozambique, (Mauritius[1]), Namibia, South Africa, Zambia, Zimbabwe	SAT1, SAT2 and SAT3 (O[4], A)
7	**SOUTH AMERICA** Venezuela (Bolivarian Republic of)	O and A

[1]FMD outbreaks in 2016/21 due to O/ME-SA/Ind-2001 demonstrate close epidemiological links between Pool 2 and Mauritius, while cases due to serotype SAT 3 (reported in 2024) highlight the connectivity to Pool 6.

[2]Long-term maintenance of FMDV lineages has not been documented in the Maghreb countries of North Africa and therefore this region does not constitute an Endemic Pool, but data is segregated here since FMD circulation in this region poses a specific risk to FMD-free countries in Southern Europe.

[3]Egypt represents a crossroads between East African Pool 4 and the Near East (Pool 3). NB: Serotypes SAT1 and SAT3 have not been detected in this country.

[4]Detection of O/EA-2 in southern/western Zambia (2018–2021), Namibia (2021), Malawi (2022) and Mozambique (2022) represent a new incursion into Pool 6.

3. Summary of FMD outbreaks and intelligence

3.1. Overview of reports

The location of information provided in this report can be seen on the map below. More detailed maps and sample data, on a country-by-country basis, can be found in the following sections of this report.

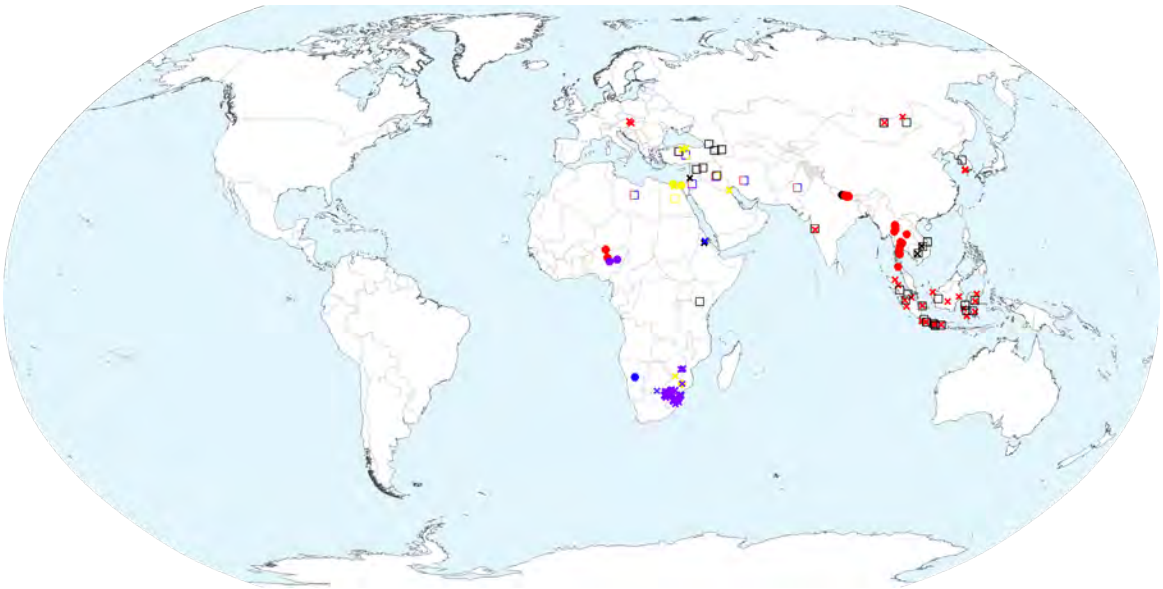


Figure 1: Samples tested by WRLFMD or reported in this quarter. ● indicates samples analysed; × indicates outbreaks reported/updated to the WOAH this quarter; □ indicates reports of FMD from other sources. Shape colours define the serotype detected ●O; ●A; ●C; ●Asia1, ●SAT1, ●SAT2, ●SAT3, ● serotype undetermined/not given in the report, ○ FMD not detected.

Source: WRLFMD. Map conforms to the United Nations World map, June 2020.

Note: in the sections below, there are references to ProMED posts, where only the title of the post is indicated. ProMED is now a subscription service, so access to these posts may be restricted.

3.2. Pool 1 (Southeast Asia/Central Asia/East Asia)

The Kingdom of Cambodia

In July via WAHIS, 2 outbreaks of **untyped FMD** were reported due to outbreaks from March and April in cattle (52 cases, 7 deaths) located in Rôtânôkiri and Kâmpóng Cham. These data were provided as an update to the outbreak that was first reported in January 2025.

WAHIS event ID: 6221

Foot and mouth disease - Cambodia (03): cattle, WOAH — ProMED post: 8725988

The Republic of Indonesia

An event update was released via WAHIS in August. A total of 3823 outbreaks of **FMD type O** were recorded occurring from March to August from locations across the entire country. There were 754 cases in buffalo, 268844 in cattle, 40 in goats and 77 in sheep. Of the 269715 identified cases, there were only 454 deaths (all in cattle).

WAHIS event ID: 6310

In July and August 19 outbreaks FMD in domestic mammals (5474 cases) were reported by the national authorities on the FAO's Empres-i+ system.

Empres-i+ event IDs: 415279 to 415288 & 415308 to 415316

Foot and mouth disease - Indonesia (12): disease-free zones without vaccination, seeking WOAH recognition

ProMED post: 8726890

The Republic of Korea

Foot and mouth disease - South Korea (08): cattle, pig, serotype O, WOAH

ProMED post: 8726550

Mongolia

Two outbreaks of **FMD type O** were reported in sheep in July (from the Ulaanbaatar) and August (from Dornod province). In both instances the single affected sheep was killed and disposed of.

WAHIS event IDs: 6646 and 6761

- Foot & mouth disease - Mongolia: (Ulaanbaatar) livestock, quarantine
- Foot & mouth disease - Mongolia (02): (Ulaanbaatar) sheep, serotype O, WOAH
- Foot & mouth disease - mongolia (03): (Ulaanbaatar) sheep, serotype O, WOAH
- Foot & mouth disease - Mongolia (04): (Dornod) sheep, serotype O, WOAH

ProMED posts: 8725735 8725904, 8726335, 8727069

The Kingdom of Thailand

A batch of 15 samples was received on 19th June 2025. All samples were identified as **FMD type O**. The lineage O/ME-SA/Ind-2001e was determined for 14 of the samples, and the lineage O/SEA/Tai-87 for one sample (see below). *NOTE: the possibility that O/SEA-Tai-87 is a circulating field lineage in Thailand has been subsequently eliminated after formal investigation of the sample testing process by RRL-SEA and the WRLFMD (a updated Genotyping Report has been circulated by WRLFMD)*

The Socialist Republic of Viet Nam

Foot and mouth disease - Viet Nam (02): (Quang Ngai) cattle, control

ProMED post: 8725929

3.3. Pool 2 (South Asia)

The Republic of India

A single outbreak of **FMD type O** was reported in August. Three Chital (*Axis axis*) died from FMD during July. The deer were housed at the Rajiv Gandhi Zoological Park & Wildlife Research Centre, Pune, Maharashtra. Various control measuires, including vaccination, were applied in response to the outbreak.

WAHIS event ID: 6703

Undiagnosed deaths, Spotted Deer - India (02): (Maharashtra) foot-and-mouth disease confirmed

ProMED post: 8726039

Nepal

A batch of 30 samples was received on 3rd July 2025. All samples were identified as **FMD type O** and the lineage determined to be O/ME-SA/Ind-2001e (see below).

3.4. Pool 3 (West Eurasia and Near East)

Armenia

Passive and active surveillance for FMD is used in Armenia, as well as awareness-raising activities for farmers and the veterinary services. This quarter over 550,000 large and small ruminants were vaccinated with a pentavalent vaccine (containing serotypes O,A, Asia-1 and SAT 2), and a SAT 1 vaccine was used in identified risk zones. A post vaccination serosurvey is planned for after this vaccination campaign.

EuFMD FAST Report

The Republic of Azerbaijan

During July to September, over 165,000 large and small ruminants were vaccinated. Active and passive surveillance is in place to monitor for outbreaks of FMD.

EuFMD FAST Report

Georgia

200,000 large and small ruminants have been vaccinated against FMD this quarter. For NSP sero-monitoring, 3400 samples have been collected from large and small ruminants and are being tested.

EuFMD FAST Report

The Islamic Republic of Iran

68 outbreaks of FMD have been reported this quarter (serotypes O and A). With clinical (passive and risk-based), virological and serological surveillance in place to identify further outbreaks.

Vaccination (using O, A and Asia-1 serotypes) occurs twice a year – achieving more than 80% coverage in large and small ruminants. A SAT 1 vaccine has been purchased but has not yet been deployed

EuFMD FAST Report

The Republic of Iraq

In July and August, 24 outbreaks were reported from Ninawa, Al-Basrah, Babil, Diyala, Al-Najaf and Baghdad Governorates. Data on FMD occurrence is being collected from 15 veterinary hospitals across the country.

EuFMD FAST Report

Foot and mouth disease - Iraq (12): livestock, spread, restriction measures ProMED post: 8726156

The State of Israel

An outbreak of **FMD type O** causing 20 cases in cattle from Gazit, Hatzafon during August 2025 were reported via WAHIS. The lineage of FMD responsible has been identified as O/ME-SA/SA-2018 which has been circulating recently in the region.

WAHIS event ID: 6729

The Hashemite Kingdom of Jordan

Passive surveillance for FMD is established and a pilot initiative for syndromic surveillance for the early detection of FAST diseases is ongoing. Over 580,000 animals have been vaccinated this quarter using a vaccine containing serotypes O, A and SAT 2.

EuFMD FAST Report

The State of Kuwait

An updated WAHIS report in August reported 64 outbreaks of **FMD type SAT 1**. These outbreaks added a further 1624 cases of FMD in dairy cattle from farms in Al Jahrah Governorate to the event that started in April 2025.

WAHIS event ID: 6445.

The Islamic Republic of Pakistan

Outbreaks of FMD (O, A and Asia-1 serotypes) have been recorded in across the entire country this quarter. There are two national vaccination campaings each year as well as ring vaccination around each identified outbreak.

EuFMD FAST Report

The Syrian Arab Republic

Outbreaks of FMD are suspected in several governates. Passive surveillance is being conducted nationwide, and active surveillance is being conducted in Hama, Damascus and Aleppo governorates and at quarantine stations for animals intended for importation. Almost 60 000 cattle and sheep have been vaccinated this quarter. Vaccination and diagnostic capability in the country is insufficient for the current needs.

EuFMD FAST Report

Foot and mouth disease - Syria (02): (Deir-ez-Zor) livestock, spread, request for information

ProMED post: 8725842

Türkiye

On 1st July, 6 outbreaks of **FMD Type SAT 1** in 106 cattle from Yolustu, Merzifon, Amasya and Eskialibey and Kurucay in Bayat, Çorum were reported via WAHIS

WAHIS event ID: 6589.

During this quarter there were 508 outbreaks of FMD, caused by serotypes O, A, SAT 1 and SAT 2. The SAT 1 outbreaks, starting in May, were initially limited to Hakkâri and Van provinces due to the control measures implemented, but have spread to the entire Anatolian region during this quarter.

There is passive and active surveillance for FMD in the country and the spring vaccination campaign has been completed as well as ring vaccination around each outbreak. Additionally all susceptible animals in Hakkâri and Van provinces have been vaccinated with a vaccine containing SAT 1. A PVM study to assess vaccination in these two provinces found an antibody level of 80% against SAT 1.

EuFMD FAST Report

Foot and mouth disease - Türkiye (02): livestock, spread, livestock market closure
Foot and mouth disease - Türkiye (03): livestock, SAT1 serotype, vaccination
ProMED posts: 8725416, 8725564

3.5. Pool 4 (North and Eastern Africa)

The State of Eritrea

Three outbreaks of **Untyped FMD** were released via WAHIS on 17th September. These consisted of 9 cattle from Berikh, Anseba occurring in February and June and 8 cattle from Areza, Maekel occurring in April.

WAHIS event IDs: 6776, 6777 and 6778

The Arab Republic of Egypt

Three **FMD type SAT 1** sequences were retrieved from GenBank, on 25th August 2025. These unofficial sequences suggest that recent outbreaks in Egypt are due to the SAT 1/I (NWZ) topotype closely related to the other SAT 1 cases in Western Asia (see below).

FMD type SAT 1 was reported in 2 outbreaks on 20th August. Both outbreaks were located in Alam EL Markab, Al Buhayrah and consisted of 277 buffalo (of which 28 died) and 78 cattle. As per the national contingency plan, active clinical surveillance around the village was executed (finding no further clinical cases) and emergency public awareness campaign activated.

WAHIS event ID: 6738

The State of Libya

There is passive surveillance for FMD in the country, which has reported no outbreaks this quarter. The Libyan FMD vaccination strategy is to vaccinate large ruminants twice a year.

EuFMD FAST Report

3.6. Pool 5 (West/Central Africa)

The Federal Republic of Nigeria

A batch of 21 samples was received on 2nd June 2025. **FMD type O** (O/EA-3 topotype) was identified in 8 of the samples. A further 2 samples were identified as **FMD type SAT 2** (SAT 2/VII topotype) (see below).

The Republic of Kenya

Foot and mouth disease - Kenya: (Kisumu) outbreak, livestock, quarantine

ProMED post: 8725584

3.7. Pool 6 (Southern Africa)

The Kingdom of Eswatini

57 outbreaks of FMD in cattle were reported during this quarter due to **FMD type SAT 2**. The Shiselweni region (where FMD was reported last quarter) reported a further 787 cases. In the Lubombo region, starting in July, 406 cases of FMD were reported.

WAHIS event ID: 6487

The Republic of Mozambique

One **FMD type SAT 1** sequence for phylogenetic analysis was received from BVI, Botswana, on 10th July 2025. Genotyping showed that this belonged to the SAT 1/II (SEZ) topotype (see below)

For the ongoing outbreak of **FMD type SAT 2** in cattle in Gaza province that started in June, a further 88 cases from a second location were reported via WAHIS in July.

WAHIS event ID: 6554

The Republic of Namibia

One **FMD type A** sequence for phylogenetic analysis was received from BVI, Botswana, on 10th July 2025. Genotyping showed that it belonged to the A/AFRICA/G-I lineage (see below)

The Republic of South Africa

In this quarter, 141 **FMD type SAT 2** outbreaks in cattle were reported in Free State (n=22), Gauteng (n=49), Kwazulu-Natal (n=30), Mpumalanga (n=14) and North West (n=26) Provinces via WAHIS. A total of 1543 cases, with no deaths, were recorded.

WAHIS event ID: 3738

The Republic of Zimbabwe

Three **FMD type SAT 2** outbreaks were reported via WAHIS from locations in Manicaland (5 cattle) and Masvingo (10 cattle) provinces. These outbreaks occurred in villages adjacent to a conservancy with resident buffaloes. Affected cattle from different age groups shared the same grazing and watering area.

On 1st July an outbreak consisting of 243 cases of **FMD type SAT 1** in cattle from Mavimba, Beitbridge, Matabeleland South was reported via WAHIS. Infection is suspected to have originated from buffalo that had strayed from the nearby conservancy after their fence was damaged by elephants.

WAHIS event ID: 6425 and 6588

3.8. Pool 7 (South America)

No new outbreaks of FMD were reported in South America.

3.9. Extent of global surveillance

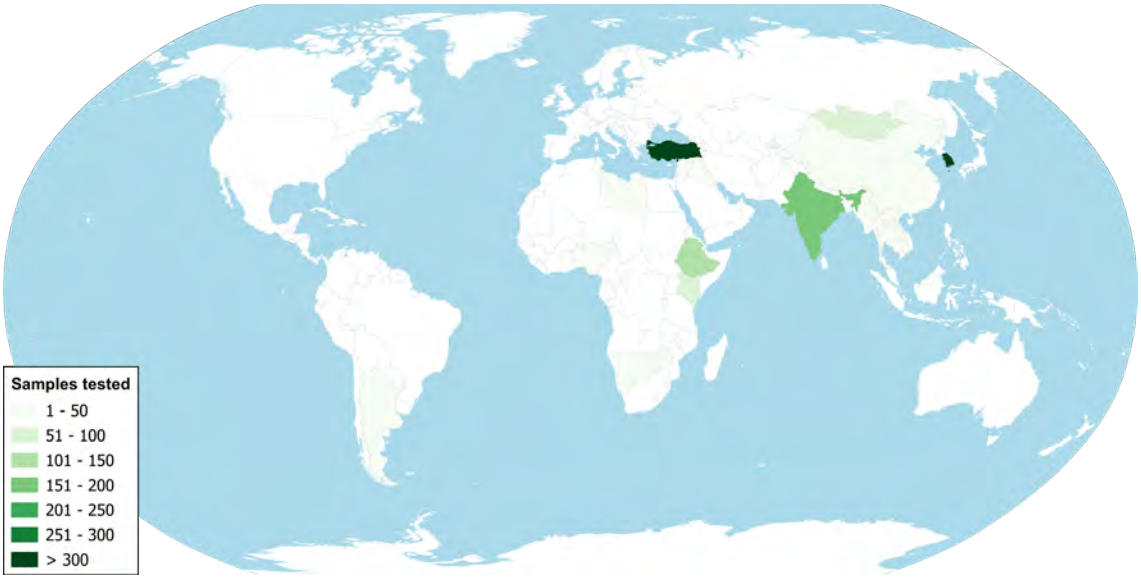


Figure 2: Review of samples received to WOAH/FAO FMD laboratories during 2025 from FMD outbreaks (routine surveillance that is undertaken in countries that are FMD-free without vaccination is not shown). (https://www.foot-and-mouth.org/Ref-Lab-Network/Network-Annual-Meeting). NB: Samples collected due to FMD incursions into Germany, Hungary and Slovakia are not shown.
Source: WRLFMD. Map conforms to the United Nations World map, June 2020.

In regions where FMD is endemic, continuous evolution of the virus generates geographically discrete lineages that are genetically distinct from FMD viruses found elsewhere. This report displays how different FMD lineages circulate in different regions; these analyses accommodate the latest epidemiological intelligence to assess the relative importance of the viral strains circulating within each region (see Table 1, below).

Table 1: Conjectured relative prevalence of circulating FMD viral lineages in each Pool (last updated October 2024). These scores can be used to inform the PRAGMATIST tool (see Annex 3:).

Lineage	South-east / Central / East Asia [Pool 1]	South Asia [Pool 2]	West Eurasia & Near East [Pool 3]	North Africa	Eastern Africa [Pool 4]	West / Central Africa [Pool 5]	Southern Africa [Pool 6]	South America [Pool 7]
O/ME-SA PanAsia-2			33					
O/ME-SA PanAsia	10							
O/SEA Mya-98	17							
O/ME-SA Ind2001	40	41	3	0				
O/ME-SA/SA-2018		40	2					
O/EA or O/WA			1	60	53.5	55	16	
O/EURO-SA								90
O/CATHAY	15							
A/ASIA Sea-97	18							
A/ASIA Iran-05	0	1	28					
A/ASIA G-VII		15	2					
A /AFRICA				28	12	15		
A/EURO-SA								10
Asia1	0	3	13					
SAT 1			1		15	1	15	
SAT 2			17	12	19	29	50	
SAT 3					0.5		19	
C								

Note: For each of the regions, data represent the relative importance of each viral lineage (prevalence score estimated as a percentage [percent] of total FMD cases that occur in domesticated hosts). These scores are reviewed at the annual WOAH/FAO FMD reference laboratory network meeting. Changes to increase risks are shown in **red**, while a reduction in risk is shown in **green**.

A number of outbreaks have occurred where samples have not been sent to the WRLFMD or other laboratories in the WOAH/FAO FMD Laboratory Network. An up-to-date list and reports of FMD viruses characterised by sequencing can be found at the following website: http://www.wrlfmd.org/country-reports/country-reports-2025.

Results from samples or sequences received at WRLFMD (status of samples being tested) are shown in Table 2 and a complete list of clinical sample diagnostics made by the WRLFMD from July - September 2025 is shown in Annex 1: (Summary of submissions). A record of all samples received by WRLFMD is shown in Annex 1: (Clinical samples).

Table 2: Status of sequencing of samples or sequences received by the WRLFMD from July - September 2025.

WRLFMD Batch No.	Date received	Country	Total No. samples	Serotype	No. of samples	No. of sequences	Sequencing status
WRLFMD/2025/000013	02/06/2025	Nigeria	21	O SAT 2	8 2	8 2	Finished
WRLFMD/2025/000014	19/06/2025	Thailand	14	O	14	14	Finished
WRLFMD/2023/000070	16/08/2023	Thailand	16	O	16	16	Finished
WRLFMD/2025/000015	03/07/2025	Nepal	30	O	10	12	Finished
Totals			**66**		**35**	**37**	

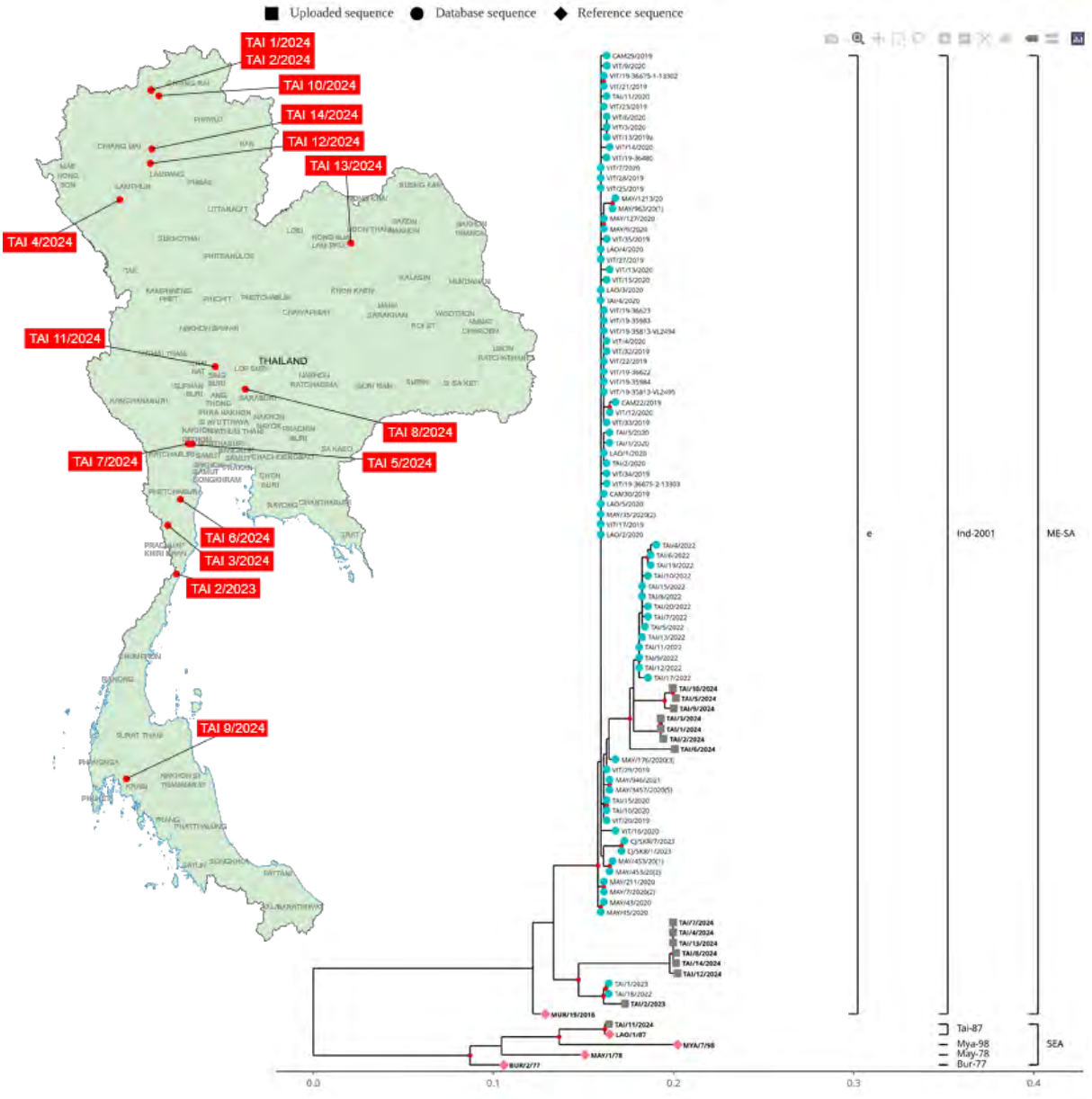
Table 3: VP1 sequences submitted by other FMD laboratories to the WRLFMD from July - September 2025.

WRLFMD Batch No.	Date received	Country	Serotype	Date Collected	No. of sequences	Submitting laboratory
WRLMEG/2025/000022	10/07/2025	Namibia	A	2025	1	BVI, Botswana
WRLMEG/2025/000023	10/07/2025	Mozambique	SAT 1	2024	1	BVI, Botswana
WRLMEG/2025/000024	25/08/2025	Egypt	SAT 1	2025	3	GenBank
				Total	**5**	

4. Detailed analysis

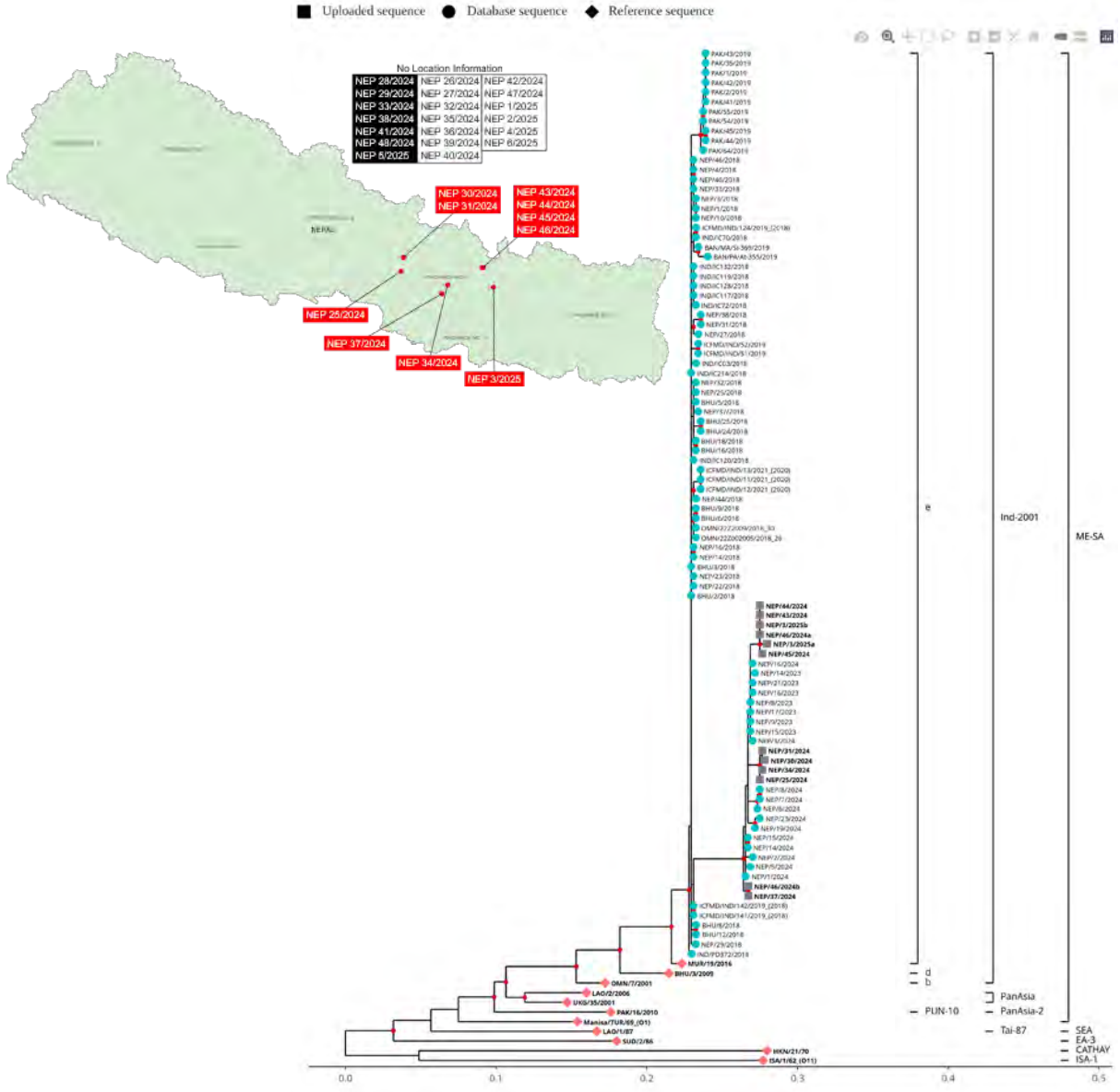
4.1. Pool 1 (Southeast Asia/Central Asia/East Asia)

The Kingdom of Thailand	
Batch:	WRLFMD/2025/000014
Samples/sequences provided by:	RRL-Pakchong
Date Received:	19 June 2025
Number Of Samples:	15
O (O/ME-SA/Ind-2001e)	14
O (O/SEA/Tai-87)	NB: the presence of O/SEA-Tai-87 as a circulating field lineage in Thailand has been subsequently eliminated after formal investigation of the sample testing process by RRL-SEA and the WRLFMD (a updated Genotyping Report has been circulated by WRLFMD)



4.2. Pool 2 (South Asia)

Nepal	
Batch:	WRLFMD/2025/000015
Samples/sequences provided by:	National FMD and TADs Laboratory
Date Received:	3 July 2025
Number Of Samples:	10
O (O/ME-SA/SA-2018)	12

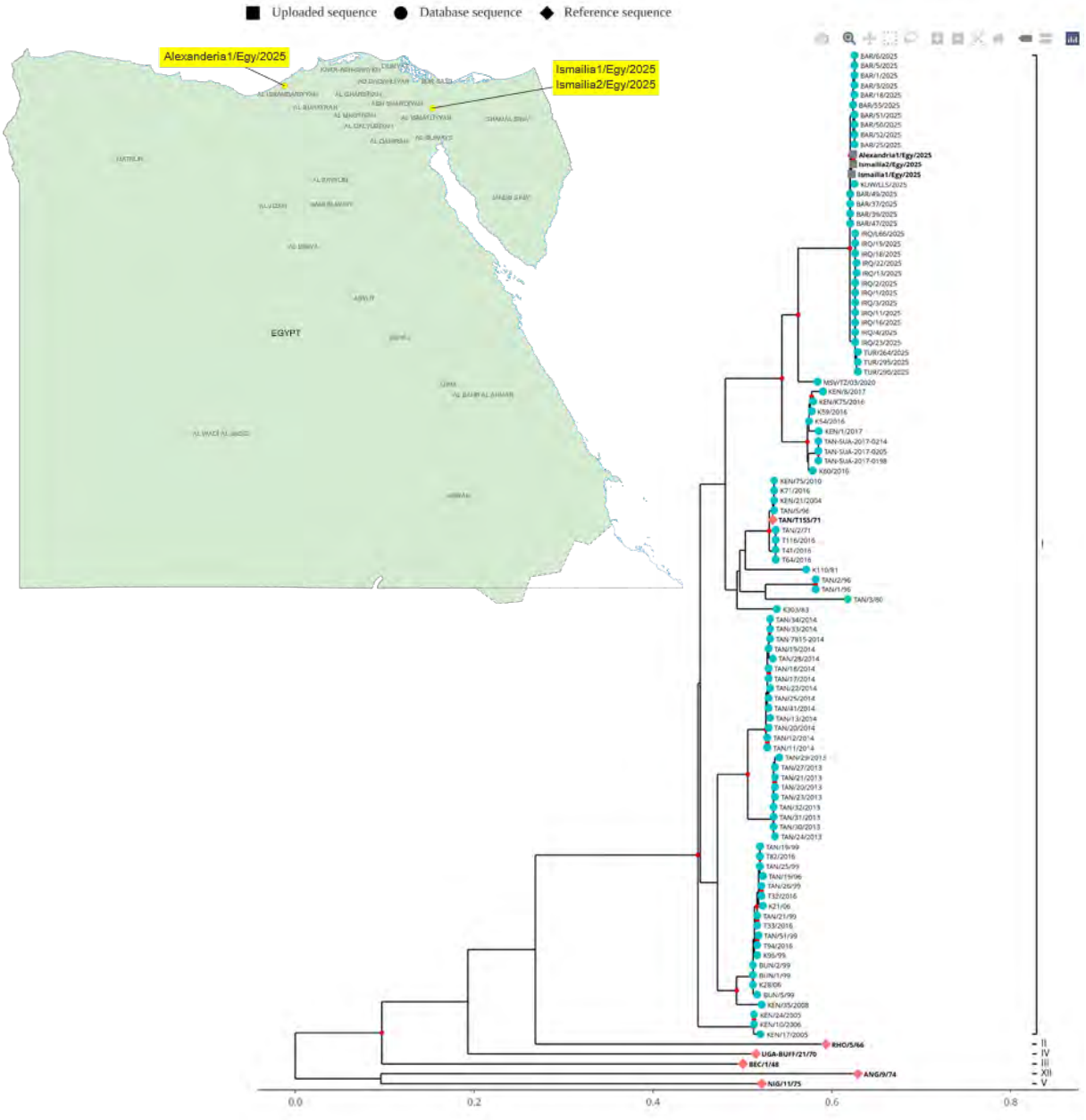


4.1. Pool 3 (West Eurasia and Near East)

No samples/sequences received.

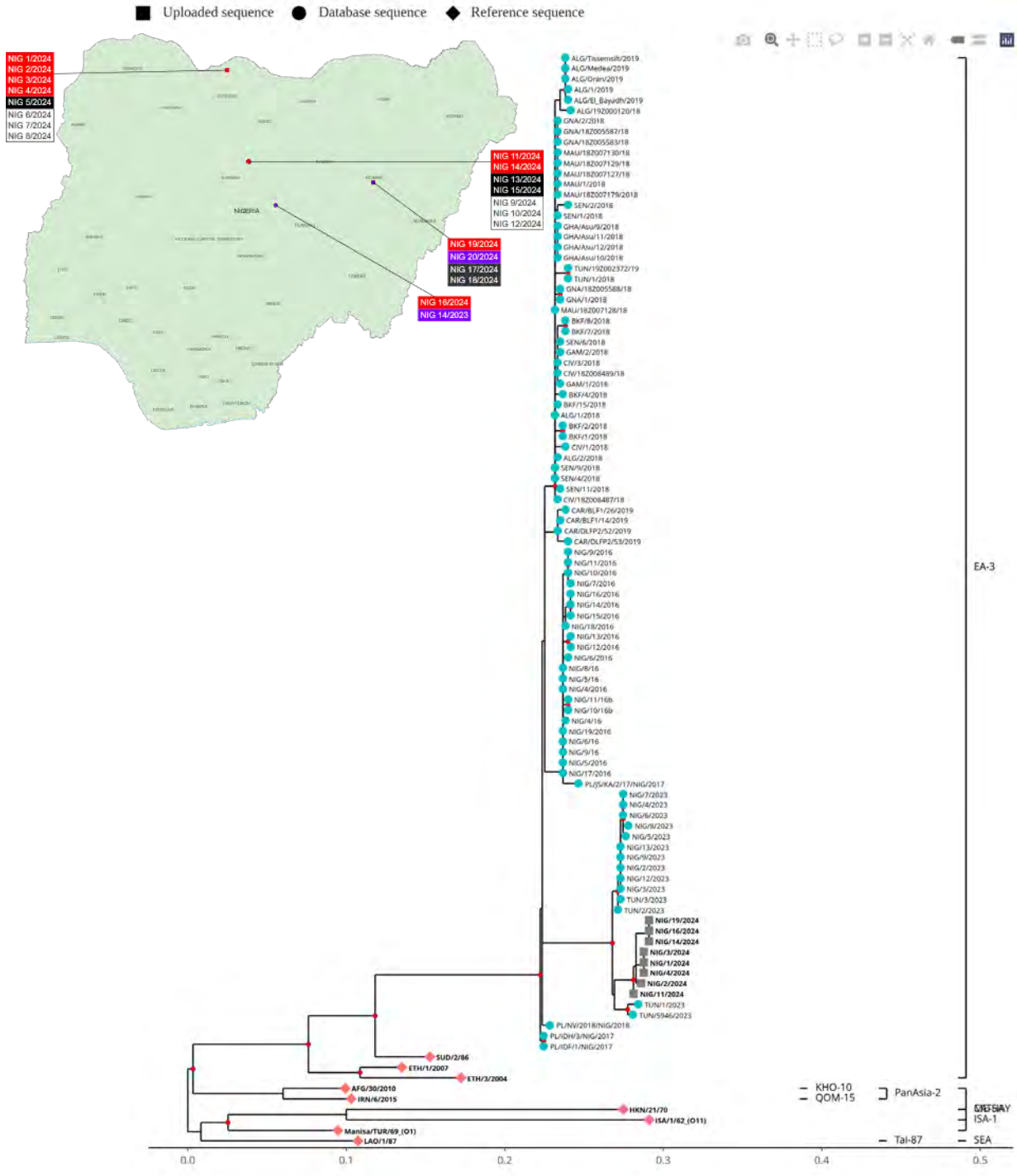
4.2. Pool 4 (North and East Africa)

The Arab Republic of Egypt	
Batch:	WRLMEG/2025/000024
Samples/sequences provided by:	GenBank (Note: these sequences do not represent an official report from the Egyptian Authorities)
Date Received:	25 August 2025
Number Of Samples:	3
SAT 1 (SAT 1/I (NWZ))	3

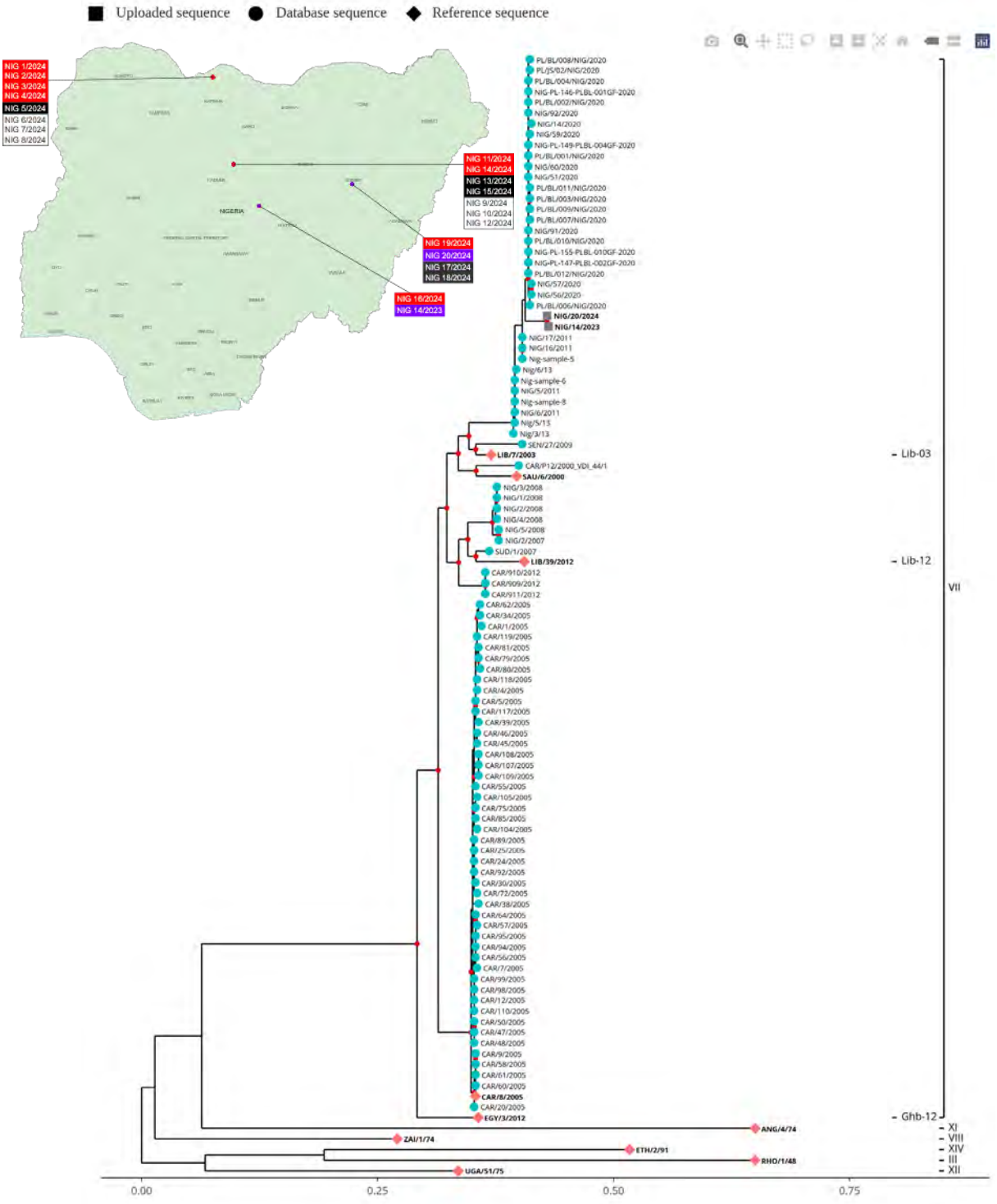


4.3. Pool 5 (West/Central Africa)

The Federal Republic of Nigeria	
Batch:	WRLFMD/2025/000013
Samples/sequences provided by:	National Veterinary Research Institute
Date Received:	2 June 2025
Number Of Samples:	8
O (O/EA-3)	8

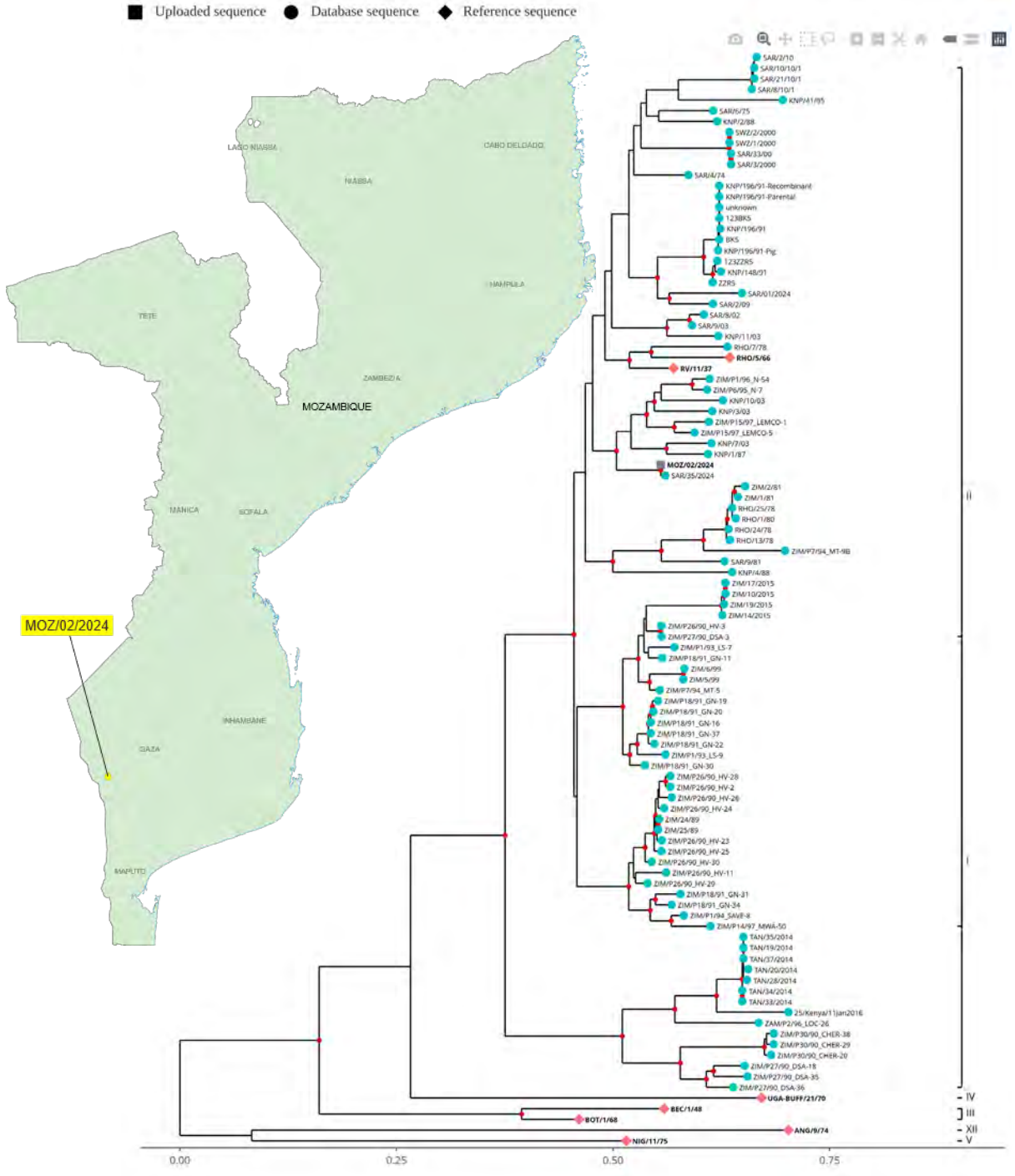


The Federal Republic of Nigeria	
Batch:	WRLFMD/2025/000013
Samples/sequences provided by:	National Veterinary Research Institute
Date Received:	2 June 2025
Number Of Samples:	2
SAT 2 (SAT 2/VII)	2

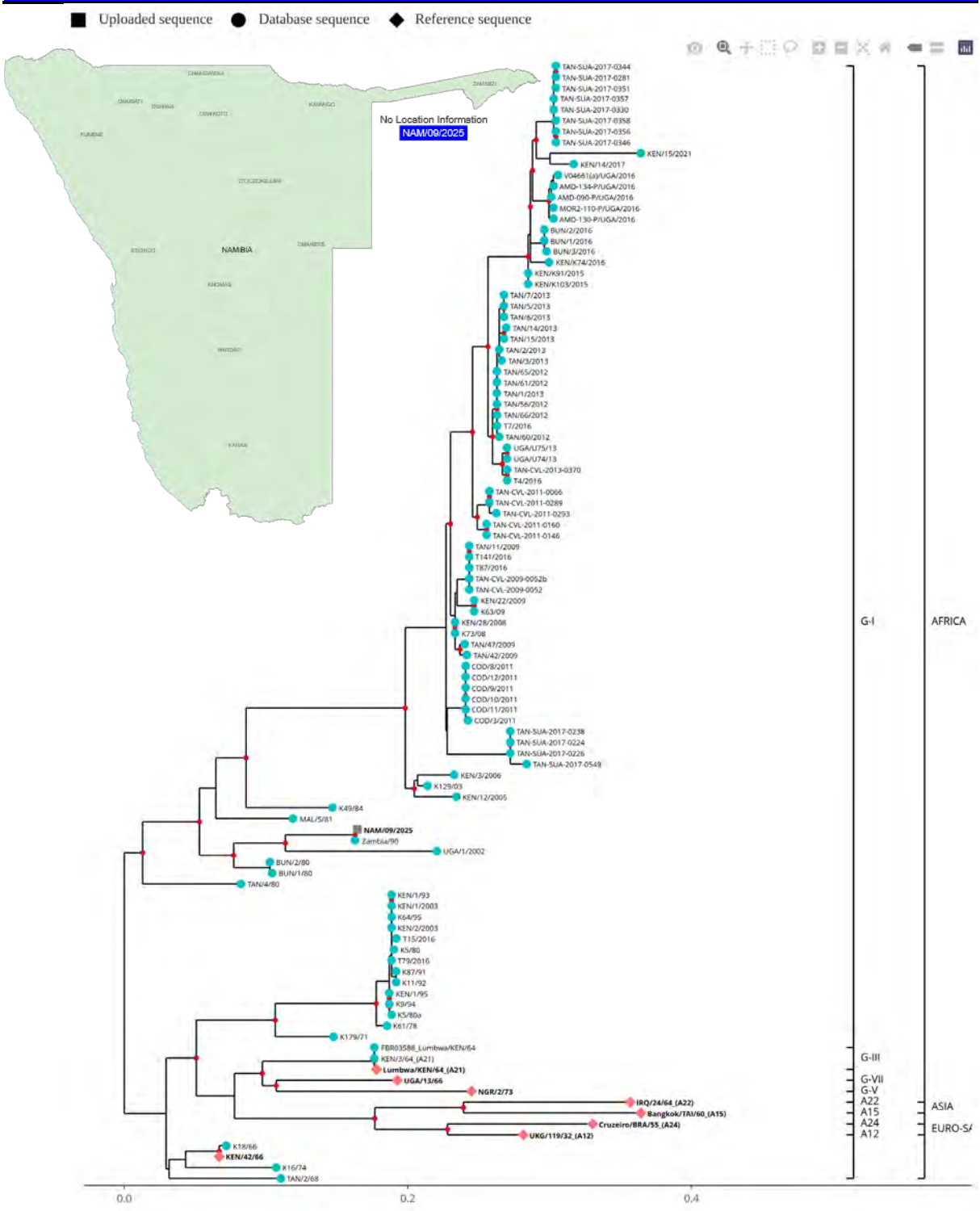


4.4. Pool 6 (Southern Africa)

The Republic of Mozambique	
Batch:	WRLMEG/2025/000023
Samples/sequences provided by:	Botswana Vaccine Institute (BVI)
Date Received:	10 July 2025
Number Of Samples:	1
SAT 1 (SAT 1/II (SEZ))	1



The Republic of Namibia	
Batch:	WRLMEG/2025/000022
Samples/sequences provided by:	Botswana Vaccine Institute (BVI)
Date Received:	10 July 2025
Number Of Samples:	1
A (A/AFRICA/G-I)	1



4.5. Pool 7 (South America)

No samples/sequences received.

4.6. Vaccine matching

Antigenic characterisation of FMD field isolates by matching with vaccine strains by 2dmVNT from July - September 2025.

NOTES:

1. Vaccine efficacy is influenced by vaccine potency, antigenic match and vaccination regime. Therefore, it is possible that a less than perfect antigenic match of a particular antigen may be compensated by using a high potency vaccine and by administering more than one vaccine dose at suitable intervals. Thus, a vaccine with a weak antigenic match to a field isolate, as determined by serology, may nevertheless afford some protection if it is of sufficiently high potency and is administered under a regime to maximise host antibody responses (Brehm, 2008[1]).
2. Vaccine matching data generated in this report only considers antibody responses in cattle after a single vaccination (typically 21 days after vaccination). The long-term performance of FMD vaccines after a second or multiple doses of vaccine should be monitored using post-vaccination serological testing.

Table 4: Summary of samples tested by vaccine matching.

Serotype	O	A	C	Asia 1	SAT 1	SAT 2	SAT 3
Nigeria	2					2	
Thailand	4						
Total	**6**	**0**	**0**	**0**	**0**	**2**	**0**

Abbreviations used in tables

For each field isolate the r_1 value is shown followed by the heterologous neutralisation titre (r_1-value / titre). The r_1 values shown below, represent the one-way serological match between vaccine strain and field isolate, calculated from the comparative reactivity of antisera raised against the vaccine in question. Heterologous neutralisation titres for vaccine sera with the field isolates are included as an indicator of cross-protection.

[1] Brehm, *et al.* (2008). High potency vaccines induce protection against heterologous challenge with foot-and-mouth disease virus. *Vaccine*, **26**(13):1681-7. doi: 10.1016/j.vaccine.2008.01.038.

M	**Vaccine Match** *r_1 = ≥ 0.3 - suggests that there is a close antigenic relationship between field isolate and vaccine strain. A potent vaccine containing the vaccine strain is likely to confer protection.*
N	**No Vaccine Match** *r_1 = < 0.3* - suggest that the field isolate is antigenically different to the vaccine strain. Where there is no alternative, the use of this vaccine should carefully consider vaccine potency, the possibility to use additional booster doses and monitoring of vaccinated animals for heterologous responses.
NT	**Not tested against this vaccine**

NOTE: A "0" in the neutralisation columns indicates that for that particular field virus no neutralisation was observed at a virus dose of a 100 $TCID_{50}$.

NOTE: This report includes the source of the vaccine virus and bovine vaccinal serum. Vaccines from different manufactures may perform differently and caution should be taken when comparing the data.

Table 5: Vaccine matching studies for O FMDV

Serotype O			O 3039 *Boehringer Ingelheim*		O_1 Campos *Biogénesis Bagó*		O Manisa *Boehringer Ingelheim*		PanAsia 2 *Boehringer Ingelheim*		O/TUR/5/09 *MSD*	
Isolate	Topotype	Lineage	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*
NIG 19/2024	EA-3	-	1	*1.85*	0.95	*2.65*	1	*2.47*	0.61	*2.12*	1	*2.32*
NIG 2/2024	EA-3	-	0.79	*1.74*	0.61	*2.46*	0.73	*2.16*	0.32	*1.84*	0.92	*2.21*
TAI 10/2024	ME-SA	Ind-2001	0.68	*1.74*	0.56	*2.36*	0.58	*2.08*	0.34	*1.96*	0.51	*2.01*
TAI 12/2024	ME-SA	Ind-2001	0.84	*1.83*	0.97	*2.59*	1	*2.34*	0.54	*2.16*	0.57	*2.06*
TAI 2/2023	ME-SA	Ind-2001	0.68	*1.74*	0.77	*2.5*	0.89	*2.27*	0.4	*2.02*	0.68	*2.13*
TAI 11/2024	SEA	Tai-87	0.84	*1.83*	0.84	*2.53*	0.82	*2.24*	0.77	*2.31*	0.99	*2.3*

Table 6: Vaccine matching studies for SAT 2 FMDV

Isolate	Serotype SAT 2		SAT2 Eritrea 98 *Boehringer Ingelheim*		SAT2 Zim 83 *Boehringer Ingelheim*		SAT2 OMN 2015 *Biogénesis Bagó*	
	Topotype	Lineage	r_1	*titre*	r_1	*titre*	r_1	*titre*
NIG/14/2023	VII	-	0.62	*1.56*	0.24	*1.82*	0.93	*2.66*
NIG/20/2024	VII	-	0.73	*1.63*	0.35	*1.99*	0.78	*2.58*

Annex 1: Sample data

Summary of submissions

Table 7: Summary of samples collected and received to WRLFMD July - September 2025

Country	Nº of samples	Virus isolation in cell culture/ELISA								RT-PCR for FMD	
		FMD virus serotypes							No Virus Detected		
		O	*A*	*C*	*SAT 1*	*SAT 2*	*SAT 3*	*ASIA1*		*Positive*	*Negative*
NEPAL	30	10	0	0	0	0	0	0	20	16	14
NIGERIA	21	8	0	0	0	2	0	0	11	15	6
THAILAND	15	15	0	0	0	0	0	0	0	15	0
TOTAL	**66**	**33**	**0**	**0**	**0**	**2**	**0**	**0**	**31**	**46**	**20**

Clinical samples

Table 8: Clinical sample diagnostics made by the WRLFMD July - September 2025

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
Nepal	03 Jul 2025	29 Jul 2025	NEP 25/2024	GOAT	21 May 2024	O	FMDV GD	O
			NEP 26/2024	CATTLE	21 May 2024	NVD	NGD	NVD
			NEP 27/2024	CATTLE	11 Jun 2024	NVD	NGD	NVD
			NEP 28/2024	CATTLE	11 Jun 2024	NVD	FMDV GD	NVD
			NEP 29/2024	CATTLE	11 Jun 2024	NVD	FMDV GD	NVD
			NEP 30/2024	CATTLE	19 Jun 2024	O	FMDV GD	O
			NEP 31/2024	BUFFALO	19 Jun 2024	O	NGD	O
			NEP 32/2024	BUFFALO	05 Jul 2024	NVD	NGD	NVD
			NEP 33/2024	CATTLE	12 Jul 2024	NVD	FMDV GD	NVD
			NEP 34/2024	GOAT	12 Jul 2024	O	FMDV GD	O
			NEP 35/2024	GOAT	01 Aug 2024	NVD	NGD	NVD
			NEP 36/2024	GOAT	01 Aug 2024	NVD	NGD	NVD
			NEP 37/2024	CATTLE	06 Aug 2024	O	FMDV GD	O
			NEP 38/2024	BUFFALO	06 Aug 2024	NVD	FMDV GD	NVD
			NEP 39/2024	SHEEP	07 Sep 2024	NVD	NGD	NVD
			NEP 40/2024	GOAT	24 Nov 2024	NVD	NGD	NVD
			NEP 41/2024	CATTLE	24 Nov 2024	NVD	FMDV GD	NVD
			NEP 42/2024	CATTLE	24 Nov 2024	NVD	NGD	NVD
			NEP 43/2024	GOAT	24 Nov 2024	O	FMDV GD	O
			NEP 44/2024	CATTLE	24 Nov 2024	O	FMDV GD	O

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			NEP 45/2024	CATTLE	24 Nov 2024	O	FMDV GD	O
			NEP 46/2024	CATTLE	24 Nov 2024	O	FMDV GD	O
			NEP 47/2024	CATTLE	29 Dec 2024	NVD	NGD	NVD
			NEP 48/2024	BUFFALO	29 Dec 2024	NVD	FMDV GD	NVD
			NEP 1/2025	BUFFALO	10 Jan 2025	NVD	NGD	NVD
			NEP 2/2025	BUFFALO	20 Feb 2025	NVD	NGD	NVD
			NEP 3/2025	CATTLE	01 Apr 2025	O	FMDV GD	O
			NEP 4/2025	BUFFALO	28 Apr 2025	NVD	NGD	NVD
			NEP 5/2025	CATTLE	02 Jun 2025	NVD	FMDV GD	NVD
			NEP 6/2025	CATTLE	06 Jun 2025	NVD	NGD	NVD
Nigeria	02 Jun 2025	27 Aug 2025	NIG 14/2023	CATTLE	01 Dec 2023	SAT2	FMDV GD	SAT2
			NIG 1/2024	CATTLE	01 Apr 2024	O	FMDV GD	O
			NIG 2/2024	CATTLE	01 Apr 2024	O	FMDV GD	O
			NIG 3/2024	CATTLE	01 Apr 2024	O	FMDV GD	O
			NIG 4/2024	CATTLE	01 Apr 2024	O	FMDV GD	O
			NIG 5/2024	CATTLE	01 Sep 2024	NVD	FMDV GD	NVD
			NIG 6/2024	CATTLE	01 Sep 2024	NVD	NGD	NVD
			NIG 7/2024	CATTLE	01 Sep 2024	NVD	NGD	NVD
			NIG 8/2024	CATTLE	01 Sep 2024	NVD	NGD	NVD
			NIG 9/2024	CATTLE	01 Sep 2024	NVD	NGD	NVD
			NIG 10/2024	CATTLE	01 Sep 2024	NVD	NGD	NVD
			NIG 11/2024	CATTLE	01 Sep 2024	O	FMDV GD	O
			NIG 12/2024	CATTLE	01 Sep 2024	NVD	NGD	NVD
			NIG 13/2024	CATTLE	01 Dec 2024	NVD	FMDV GD	NVD
			NIG 14/2024	CATTLE	01 Dec 2024	O	FMDV GD	O
			NIG 15/2024	CATTLE	01 Dec 2024	NVD	FMDV GD	NVD
			NIG 16/2024	CATTLE	01 Dec 2024	O	FMDV GD	O
			NIG 17/2024	CATTLE	01 Dec 2024	NVD	FMDV GD	NVD
			NIG 18/2024	CATTLE	01 Dec 2024	NVD	FMDV GD	NVD
			NIG 19/2024	CATTLE	01 Dec 2024	O	FMDV GD	O
			NIG 20/2024	SHEEP	01 Dec 2024	SAT2	FMDV GD	SAT2
Thailand	19 Jun 2025	06 Aug 2025	TAI 2/2023	CATTLE	03 Mar 2023	O	FMDV GD	O
			TAI 1/2024	CATTLE	18 Jan 2024	O	FMDV GD	O
			TAI 2/2024	CATTLE	02 Feb 2024	O	FMDV GD	O
			TAI 3/2024	CATTLE	04 Mar 2024	O	FMDV GD	O
			TAI 4/2024	CATTLE	24 Jul 2024	O	FMDV GD	O
			TAI 5/2024	CATTLE	30 Jul 2024	O	FMDV GD	O
			TAI 6/2024	CATTLE	01 Aug 2024	O	FMDV GD	O
			TAI 7/2024	CATTLE	20 Aug 2024	O	FMDV GD	O
			TAI 8/2024	CATTLE	29 Aug 2024	O	FMDV GD	O

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			TAI 9/2024	CATTLE	02 Sep 2024	O	FMDV GD	O
			TAI 10/2024	CATTLE	19 Sep 2024	O	FMDV GD	O
			TAI 11/2024	CATTLE	25 Sep 2024	O	FMDV GD	O
			TAI 12/2024	CATTLE	25 Sep 2024	O	FMDV GD	O
			TAI 13/2024	CATTLE	27 Sep 2024	O	FMDV GD	O
			TAI 14/2024	CATTLE	30 Sep 2024	O	FMDV GD	O
Total			**66**					

Annex 2: FMD publications

Recent FMD Publications July - September 2025 cited by Web of Science.

1. (2025). Disease surveillance in England and Wales, May 2025. *Veterinary Record*, **196**(11): 425-429. DOI: 10.1002/vetr.5626.
2. (2025). ANIMAL DISEASES Germany again completely free of FMD. *Fleischwirtschaft*, **105**(5): 7-7.
3. Abbas, R.Z., S. Ambrose, A.M.A. Khan, M. Mobashar, and K. Mohamed (2025). Nanoparticles as an alternative strategy to control *Foot-and-mouth disease virus* in bovines. *Biological Trace Element Research*, **203**(9): 4590-4606. DOI: 10.1007/s12011-025-04533-0.
4. Abdaal, K., A. Batool, and M.T. Navid (2025). *In silico* design of multi-epitope vaccines against the *Foot-and-mouth disease virus* (FMDV) structural protein (P1) region of serotype O by integrated structural vaccinology and molecular modeling approaches. *Network Modeling and Analysis in Health Informatics and Bioinformatics*, **14**(1): 9. DOI: 10.1007/s13721-025-00597-z.
5. Abdel-Hamied, E., S. Kamel, and H.E. Saeed (2025). Upregulation of heat stress and inflammatory genes expression, clinical and hemato- biochemical changes in cattle with heat intolerance syndrome following FMD infection in Egypt. *Veterinary Immunology and Immunopathology*, **288**: 7. DOI: 10.1016/j.vetimm.2025.110998.
6. Abousenna, M.S., H.A. Khafagy, A.A.E.M. Mohamed, S.E.A.E. Sawy, F.A.E.M. Shasha, D.M. Darwish, and N.G. Shafik (2025). Emergency response for recently isolated *Foot-and-mouth disease virus* type A Africa in Egypt 2022. *Scientific Reports*, **15**(1). DOI: 10.1038/s41598-025-88906-4.
7. Abualghusein, I.H.M., M.M.K. Ababneh, M.B.F. Al-Zghoul, D.A.A. Alghizzawi, and H.A.A. Aboomer (2025). Detection and genomic characterization of *Foot-and-mouth disease virus* SAT2 XIV topotype using amplicon-based nanopore sequencing. *Veterinary Research Communications*, **49**(3). DOI: 10.1007/s11259-025-10718-8.
8. Adwitiya, D., C.S. Tilak, S. Dubey, L. Katrapati, P. Dhakarwal, P. Chaudhuri, and S. Paramasivam (2025). Bulk production of *Baculovirus* expressed stable virus like particles of FMD virus: concentration, purification and semi quantification. *Indian Journal of Veterinary Sciences and Biotechnology*, **21**(3): 53-57. DOI: 10.48165/ijvsbt.21.3.11.
9. Al-Majhali, S.H., S. Saravankumar, M.C. Manikam, M.N.A. Odhah, Z.K. Mahmood, and G. Bashiru (2025). Concurrent foot-and-mouth disease and coccidiosis in a 4-year-old Friesian cow: Case report. *Yemeni Journal of Agriculture & Veterinary Sciences*, **6**(1): 33-39. DOI: 10.70022/yjavs.v6i1.2599.
10. Alamri, A., S. Imran, M.A. Abdel-Maksoud, S. Almutairi, H. Ebaid, B.H. Kiani, Q. Akram, T. Hussain, and M.A. Naeem (2025). Immunoinformatics-driven multi-epitope vaccine design for *Foot-and-mouth disease virus*. *Journal of Animal and Plant Sciences*, **35**(4): 1020-1036. DOI: 10.36899/japs.2025.4.0087.
11. Ali, M.Z., N. Tasnim, M.A. Rahman, M.H. Rahman, M.M. Meher, and M. Giasuddin (2025). Molecular characterization of the emerging sublineage Ind2001e of *Foot-and-mouth disease virus* serotype O in buffalo in Manikganj, Bangladesh. *Macedonian Veterinary Review*. DOI: 10.2478/macvetrev-2025-0028.

12. Aparna, P.A., K.J. Davis, K. Karun, P.V. Tresamol, K. Vinodkumar, and D. Jolly (2025). Analysing the dynamics of foot-and-mouth disease transmission: a model-based approach. *Journal of Veterinary and Animal Sciences*, **56**(1): 45-52. DOI: 10.51966/jvas.2025.56.1.45-52.

13. Asmara, A., Y.L. Purnamadewi, W. Rindayanti, M.N.F. Achsani, A. Abdullah, N. Fadhillah, and T.A. Fitri (2025). The analysis of dairy farming efficiency in East Java: evidence post the foot-and-mouth disease outbreak. *Jurnal Manajemen dan Agribisnis*, **22**(1): 65-65. DOI: 10.17358/jma.22.1.65.

14. Barnes, T., E. Brayley, T. Moore, R. Allavena, J. Meers, D. McNab, R. Thompson, J. Hunnam, D. Worsfold, and R. Cobbold (2025). Predicted *Foot-and-mouth disease virus* and *African swine fever virus* inactivation within carcases undergoing field decomposition in three Australian climate zones. *Australian Veterinary Journal*. DOI: 10.1111/avj.70002.

15. Bellini, S., A. Scaburri, M. Tironi, V. Cappa, A. Mannelli, and G.L. Alborali (2025). Simulating the spread of foot-and-mouth disease in densely populated areas as part of contingency plans to establish the best control options. *Pathogens*, **14**(9): 13. DOI: 10.3390/pathogens14090933.

16. Bellucci, M.A., M. Amiri, S. Berryman, A. Moshari, C.O. Owino, R.D. Luteijn, T.J. Tuthill, Y. Svitkin, G.J. Belsham, F.J.M. van Kuppeveld, and N. Sonenberg (2025). ITAF45 is a pervasive trans-acting factor for *Picornavirus* Type II IRES elements. *Proceedings of the National Academy of Sciences of the United States of America*, **122**(33). DOI: 10.1073/pnas.2506281122.

17. Berdah, D. (2025). Situated efficacy: FMD vaccines in France and Britain, 1930s-1960s. *Medical History*. DOI: 10.1017/mdh.2025.10016.

18. Bihon, A. and G. Derbew (2025). Sero-epidemiological survey on major cattle diseases in Awsiresu Zone of Afar Region. *Approaches in Poultry Dairy & Veterinary Sciences*, **9**(5). DOI: 10.31031/apdv.2025.09.000723.

19. Biswal, J.K., R. Ranjan, J.K. Mohapatra, N.R. Sahoo, and R.P. Singh (2025). Pan-serotype reverse transcription loop-mediated isothermal amplification (RT-LAMP) assay targeting 2B-NSP coding region for colorimetric detection of *Foot-and-mouth disease virus* in clinical samples. *Virus Genes*, **61**(4): 490-497. DOI: 10.1007/s11262-025-02158-y.

20. Buckle, K. (2025). Quarterly report of investigations of suspected exotic diseases: January to March 2025. *Surveillance (Wellington)*, **52**(2): 10-25.

21. Byamukama, B., A. Amin, F.N. Mwiine, and A.B. Ekiri (2025). Epidemiology and control strategies for foot-and-mouth disease in livestock and wildlife in Uganda: systematic review. *Veterinary Research Communications*, **49**(4). DOI: 10.1007/s11259-025-10791-z.

22. Canbar, R. and M. Uslu (2025). Effects of coadministration of foot-and-mouth disease vaccine and inactivated *Parapoxvirus ovis* on humoral immunity in cattle. *Polish Journal of Veterinary Sciences*, **28**(2): 225-231. DOI: 10.24425/pjvs.2025.154941.

23. Cao, N., Y.M. Li, Q.Q. Zhao, M.M. Yao, X.J. Ren, L.X. Tian, Z.H. Hu, F.F. Diao, H.H. Li, Z.J. Lu, G.B. Rao, H.W. Zhang, K. Li, S. Cao, X.M. Li, and P. Qian (2025). Self-assembled nanoparticle vaccines elicit robust protective immune responses against type O *Foot-and-mouth disease virus* infection. *ACS Nano*, **19**(37): 33134-33155. DOI: 10.1021/acsnano.5c04881.

24. Cardenas, N.C., T.C. de Menezes, A.M. Countryman, F.P.N. Lopes, F.H.S. Groff, G.M. Rigon, M. Gocks, and G. Machado (2025). Integrating epidemiological and economic models to estimate the cost of simulated foot-and-mouth disease outbreaks in Brazil. *Preventive Veterinary Medicine*, **242**. DOI: 10.1016/j.prevetmed.2025.106558.

25. Chen, W., X. Niu, W. Zeng, Y. Fang, Z. Zhu, L. Yi, M. Zhao, H. Ding, S. Fan, Z. Li, and J. Chen (2025). Development of nucleic acid-based RAA test strip assay for the rapid detection of *Foot-and-mouth disease virus*. *Frontiers in Veterinary Science*, **12**. DOI: 10.3389/fvets.2025.1526005.

26. Chumsang, P., T. Singhla, and W. Chaisowwong (2025). Qualitative risk assessment of *Foot-and-mouth disease virus* introduction and transmission to dairy farms via raw milk transportation in Thailand: a scenario-based approach. *Veterinary Sciences*, **12**(7). DOI: 10.3390/vetsci12070623.

27. Costa, J., L.G. Corbellini, N.C. Cárdenas, F.H.S. Groff, and G. Machado (2025). Assessing epidemiological parameters and dissemination characteristics of the 2000 and 2001 foot-and-mouth disease outbreaks in Rio Grande do Sul, Brazil. *Ciencia Rural*, **55**(10): 10. DOI: 10.1590/0103-8478cr202405401.

28. Costa, J.M.N.d., L.G. Corbellini, N.C. Cárdenas, F.H.S. Groff, and G. Machado (2025). Assessing epidemiological parameters and dissemination characteristics of the 2000 and 2001 foot-and-mouth disease outbreaks in Rio Grande do Sul, Brazil. *Ciência Rural*, **55**(10): e20240540-e20240540. DOI: 10.1590/0103-8478cr20240540.

29. Dagnaw, G.G. and H. Dejene (2025). Seroprevalence of foot-and-mouth disease in cattle in East Africa between 2014 and 2024: a systematic review and meta-analysis. *BMC Veterinary Research*, **21**(1). DOI: 10.1186/s12917-025-04834-5.

30. Demil, E. and B. Tadesse (2025). Spatio-temporal distribution of foot-and-mouth disease outbreaks in Western Amhara region from January 2018 to June 2023. *PLoS One*, **20**(2). DOI: 10.1371/journal.pone.0313305.

31. Dzikri Triyanto, R. (2025). The spread of foot-and-mouth disease on livestock in the ex Semarang Residency 1981-1986. *Santhet (Jurnal Sejarah Pendidikan Dan Humaniora)*, **9**(3): 1089-1096. DOI: 10.36526/santhet.v9i3.5473.

32. Edwards, N., A.E. Shaw, A. Di Nardo, A. Sowood, H.M. Hicks, J. Wadsworth, K. Parekh, A. McCarron, P.L. Kumarawadu, Y.M. Eltahir, M.S. Mohamed, L.R. Dahal, K.R. Pandey, N. Poudel, E. Taylor, D.L. Horton, V. Mioulet, A. Ludi, N.J. Knowles, D.P. King, and L. Lasecka-Dykes (2025). *Foot-and-mouth disease virus* O/ME-SA/SA-2018: A new emerging threat posed by viruses circulating in Asia? *Infection Genetics and Evolution*, **132**. DOI: 10.1016/j.meegid.2025.105771.

33. Eid, S., S.A. Rizk, D. Ayman, M. Ali, M. Saad, A.A. El-Sanousi, A.A. Yousif, and M.A. Shalaby (2025). Cost-effective suspension adaptation of BHK-21 cells for scalable FMD vaccine production in resource-limited settings. *Open Veterinary Journal*, **15**(7): 3193-3205. DOI: 10.5455/OVJ.2025.v15.i7.30.

34. Febrianto, N., B. Hartono, E. Nugroho, A.E. Kusumastuti, P.S. Winarto, P. Akhiroh, T. Susilawati, A.P.A. Yekti, P. Utami, N.N. Ramli, and M. Helmi (2025). The effects of foot-and-mouth disease on the profitability of smallholder dairy farms: evidence from East Java, Indonesia. *Jurnal Ilmu-Ilmu Peternakan*, **35**(1): 138-151. DOI: 10.21776/ub.jiip.2025.035.01.13.

35. Ganter, M., K. Mueller, J. Boettcher, K. Donat, J. Gethmann, M. Holsteg, J. Hilke, U. Truyen, S. Rautenschlein, M. Bastian, and S. Arbeitskreis Wiederkauer (2025). Guidelines for the vaccination of cattle and small ruminants - a summary. *Tieraerztliche Praxis Ausgabe Grosstiere Nutztiere*, **53**(03): 180-190. DOI: 10.1055/a-2556-7199.

36. Gao, J., H. Yuan, Y.-J. Jiao, K. Li, P.-H. Li, Y.-X. Yang, S.-L. Huang, H.-Y. Guo, Y.-F. Qiu, H.-F. Bao, P. Sun, L. Li, Z.-X. Liu, Z.-J. Lu, and X.-W. Bai (2025). Development and immunogenicity

evaluation of a bivalent vaccine for classical swine fever and foot-and-mouth disease. *Zhongguo Yufang Shouyi Xuebao*, **47**(2): 172-178.

37. Gardezi, S.A.M., M. Rabbani, M.H. Mushtaq, and M.Z. Shabbir (2025). Molecular characterization and epidemiological insights into serotypes of *Foot-and-mouth disease virus* in Pakistan. *Archives of Virology*, **170**(7). DOI: 10.1007/s00705-025-06319-0.

38. Ghougal, K., A. Azizi, and S. Baghezza (2025). Determinants of foot and mouth virus in eastern Algeria. *Tropical Animal Health and Production*, **57**(3). DOI: 10.1007/s11250-025-04413-8.

39. Giangaspero, M., S. Al Mahdhouri, S. Al Bulushi, and M.K. Al-Ghafri (2025). Wild Fauna in Oman: Foot-and-Mouth Disease Outbreak in Arabyan Oryx (*Oryx leucorix*). *Animals*, **15**(16). DOI: 10.3390/ani15162389.

40. Gomez, A. and R. Reina (2025). Recombinant *Sendai virus* vectors as novel vaccine candidates against animal viruses. *Viruses-Basel*, **17**(5). DOI: 10.3390/v17050737.

41. Greiner, A., J.L. Herrera-Diestra, M. Tildesley, K. Shea, and M. Ferrari (2025). Allocating limited surveillance effort for outbreak detection of endemic foot-and-mouth disease. *PLoS Computational Biology*, **21**(7). DOI: 10.1371/journal.pcbi.1012395.

42. Gunasekera, U., M.A. Alkhamis, S. Puvanendiran, M. Das, P.L. Kumarawadu, M. Sultana, M.A. Hossain, J. Arzt, and A. Perez (2025). Ecological niche modeling for surveillance of foot-and-mouth disease in South Asia. *PLoS One*, **20**(4). DOI: 10.1371/journal.pone.0320921.

43. Guyver-Fletcher, G., E.E. Gorsich, C. Jewell, and M.J. Tildesley (2025). Controlling endemic foot-and-mouth disease: Vaccination is more important than movement bans. A simulation study in the Republic of Turkey. *Infectious Disease Modelling*, **10**(2): 702-715. DOI: 10.1016/j.idm.2025.02.006.

44. Hammadi, M. (2025). Current trends and challenges in the management of foot-and-mouth disease in Saudi Arabia: A review. *Open Veterinary Journal*, (0): 1-1. DOI: 10.5455/ovj.2025.v15.i5.6.

45. Harmsen, M.M., N. Gupta, Q. Dijkstra, S. van de Water, M. van Setten, and A. Dekker (2025). Single-domain antibodies that specifically recognize intact capsids of multiple foot-and-mouth disease serotype O strains. *Vaccines*, **13**(5). DOI: 10.3390/vaccines13050500.

46. Hasibuan, L.S., L. Prayitno, E.P. Giri, A. Kustiyo, and H.A. Adrianto (2025). Enhancing farmers' literacy on foot-and-mouth disease through a mobile expert system application in Labuhanbatu Utara. *Dinamisia Jurnal Pengabdian Kepada Masyarakat*, **9**(2): 608-616. DOI: 10.31849/dinamisia.v9i2.23983.

47. Henning, A., L. Odendaal, A. Loots, and M. Quan (2025). The optimisation and application of a novel BaseScopeTM RNA-ISH assay for the detection of *Foot-and-mouth disease virus* in carrier African buffalo (*Syncerus caffer*) from South Africa. *Journal of Virological Methods*, **338**. DOI: 10.1016/j.jviromet.2025.115237.

48. Humphreys, J.M., C. Stenfeldt, D.P. King, T. Knight-Jones, A.M. Perez, K. Vanderwaal, M.W. Sanderson, A. Di Nardo, W.T. Jemberu, N. Pamornchainavakul, and J. Arzt (2025). Epidemiology and economics of foot-and-mouth disease: current understanding and knowledge gaps. *Veterinary Research*, **56**(1). DOI: 10.1186/s13567-025-01561-5.

49. Hussain, M., S. Bhowmick, D. Medhi, S.S. Begum, S. Subramaniam, R.P. Singh, and M. Sarkar (2025). Longitudinal study on *Foot-and-mouth disease virus* in Arunachali yak and yak - cattle hybrid. *Indian Journal of Animal Sciences*, **95**(1). DOI: 10.56093/ijans.v95i1.157420.

50. Ivani, Z., B. Hemati, N. Harzandi, S.M. Azimi, and M.M. Ranjbar (2025). Development of solid phase competitive enzyme-linked immunosorbent assay to detect *Foot-and-mouth disease virus* A serotype specific antibodies based on immunoglobulin Y antibody. *Veterinary Research Forum*, **16**(5): 285-292. DOI: 10.30466/vrf.2024.2025842.4226.

51. Jiang, L., H. Liu, Y. Liu, Y. Ma, S. Sun, Z. Zheng, and H. Guo (2025). Expression efficiency of three DNA plamids and their mRNAs expressing *Foot-and-mouth disease virus* (FMDV) antigenic proteins. *Sheng wu gong cheng xue bao*, **41**(7): 2623-2633. DOI: 10.13345/j.cjb.250123.

52. Jiao, J., H. Yang, Z. Liang, Y. Pan, J. Yang, W. Zhang, and P. Wu (2025). A meta-analysis on the effectiveness of serotype O foot-and-mouth disease vaccines. *Scientific Reports*, **15**(1). DOI: 10.1038/s41598-025-99518-3.

53. Jones, R., D.P. King, and V. Busin (2025). Retrospective analysis of submissions to the World Reference Laboratory for foot-and-mouth disease: What can these data tell us about the role of small ruminants in disease epidemiology? *Preventive Veterinary Medicine*, **239**. DOI: 10.1016/j.prevetmed.2025.106526.

54. Jones, R., D.P. King, and V. Busin (2025). Retrospective analysis of submissions to the World Reference Laboratory for foot-and-mouth disease: What can these data tell us about the role of small ruminants in disease epidemiology? (vol 239, 106526, 2025). *Preventive Veterinary Medicine*, **240**. DOI: 10.1016/j.prevetmed.2025.106542.

55. K Al-Anbagi, G. and A. B Allawe (2025). Isolation of SAT 2 *Foot-and-mouth disease virus* in Iraq. *The Iraqi Journal of Veterinary Medicine*, **49**(1): 16-22. DOI: 10.30539/pnc4zf32.

56. Kabir, A., A.A. Kamboh, M. Abubakar, K. Kumar, and A.M. Matar (2025). Knowledge, attitude and practices towards foot-and-mouth disease among farmers and veterinary practitioners in selected border regions of Pakistan adjoining to Afghanistan. *Veterinary Medicine and Science*, **11**(4). DOI: 10.1002/vms3.70215.

57. Khan, S., M.T. Ahmad, B. Abbas, E. Kakar, A. Nasir, M.F. Taj, M.A. Raza, A. Samad, A. Raza, and S. Abbas (2025). DNA vaccines against foot-and-mouth disease: a novel biotechnological strategy. *Futuristic Biotechnology*: 02-09. DOI: 10.54393/fbt.v5i2.167.

58. Khoshnood, S., S.M. Azimi, Z.Z. Kafi, H. Najafi, and A.G. Langeroudi (2025). Comparison of two continuous cell lines BHK-21 and IB-IS2 for isolating field serotypes O and A of *Foot-and-mouth disease virus*. *Virus Genes*, **61**(4): 498-504. DOI: 10.1007/s11262-025-02166-y.

59. Khoshnood, S., S.M. Azimi, Z. Ziafati Kafi, H. Najafi, and A. Ghalyanchilangeroudi (2025). Molecular epidemiology of *Foot-and-mouth disease virus* in Iran during 2019 and 2023. *Scientific Reports*, **15**(1). DOI: 10.1038/s41598-025-16115-0.

60. Kibebew, K. and H. Gelcha (2025). An investigation of the common factors affecting disease incidence in dairy cows: a case study of smallholder dairy farms in Shashemene District. *International Journal of Animal Science and Technology*, **9**(2): 20-28. DOI: 10.11648/j.ijast.20250902.11.

61. Kim, A., J.-H. Hwang, G. Lee, J.-H. Park, M.J. Lee, and S.-M. Kim (2025). Immunostimulatory effects of multiple short-hairpin RNAs enhance foot-and-mouth disease vaccine-induced humoral immunity. *Antiviral Research*, **240**. DOI: 10.1016/j.antiviral.2025.106202.

62. Kim, J.Y., S.Y. Park, G. Lee, M. Kwon, J.S. Jin, J.-H. Park, and Y.-J. Ko (2025). Evaluation of recombinant foot-and-mouth disease SAT2 vaccine strain in terms of antigen productivity, virus inactivation kinetics, and immunogenicity in pigs for domestic antigen bank. *Vaccines*, **13**(7). DOI: 10.3390/vaccines13070704.

63. Kim, U.-H., S.-S. Kang, M.-S. Park, and S. Ha (2025). Interference effect of foot-and-mouth disease maternal antibodies following foot-and-mouth disease vaccination and its related factors in Hanwoo beef calves. *Veterinary Journal*, **313**. DOI: 10.1016/j.tvjl.2025.106397.

64. Kong, L., J. Siengsanan-Lamont, S. Tum, P.W. Selleck, J. Areerob, J.R. Young, L.J. Gleeson, and S.D. Blacksell (2025). Using abattoir-based surveillance to establish foot-and-mouth disease non-structural protein seropositivity in cattle and pigs in Cambodia. *Animals*, **15**(11). DOI: 10.3390/ani15111624.

65. Krisnawijaya, N.N.K., C. Catal, B. Tekinerdogan, R. van der Tol, H. Hogeveen, and Y. Herdiyeni (2025). A machine learning approach to identifying foot-and-mouth disease incidence in Dairy Farms with suboptimal veterinary infrastructure. *Smart Agricultural Technology*, **12**. DOI: 10.1016/j.atech.2025.101261.

66. Le, V.T.H., T.T. Mỹ, N.T.T. Hiền, N.Đ. Tiến, C.T. Tâm, T.T. Cúc, F. Faculty of Agriculture, N.A.U. Fisheries, Vietnam, and N.A.P.V. Th True Milk Food Joint Stock Company (2025). Current status and challenges in the control of foot-and-mouth disease in Vietnam: epidemiological, vaccination, and molecular perspectives (2021–2024). *RA Journal Of Applied Research*, **11**(07). DOI: 10.47191/rajar/v11i7.02.

67. Letho, S. and C. Compton (2025). Spatial and temporal epidemiology of FMD in Bhutan (2011-2019). *BMC Veterinary Research*, **21**(1). DOI: 10.1186/s12917-025-04815-8.

68. Li, H., A. Dekker, Y. Zhang, Y. Zhang, M. Harmsen, W. van der Poel, H. Guo, and S. Sun (2025). Novel liquid-phase blocking ELISA using single-domain antibody M8 and virus-like particles for *in vitro* potency assessment of *Foot-and-mouth disease virus*-like particle vaccine. *Vaccine*, **62**. DOI: 10.1016/j.vaccine.2025.127466.

69. Li, Z., M. Bai, S. Yin, Y. Yang, H. Dong, Z. Teng, S. Sun, E. Bao, and H. Guo (2025). Evaluation of the immune effect of *Foot-and-mouth disease virus*-like particles derived from *Pichia Pastoris* on mice and pigs. *Frontiers in Microbiology*, **16**. DOI: 10.3389/fmicb.2025.1551395.

70. Li, Z., H. Dong, S. Yin, M. Bai, Y. Zhang, Y. Ding, S. Sun, and H. Guo (2025). 3C protease-independent production of *Foot-and-mouth disease virus*-like particles in *Pichia Pastoris*. *Applied Microbiology and Biotechnology*, **109**(1). DOI: 10.1007/s00253-025-13510-5.

71. Loeb, J. (2025). Foot-and-mouth disease restrictions extended. *Veterinary Record*, **196**(8): 294-294. DOI: 10.1002/vetr.5443.

72. Loeb, J. (2025). New 'slaughter power' for foot-and-mouth. *Veterinary Record*, **197**(4): 124-125. DOI: 10.1002/vetr.5880.

73. Makarov, V. and Y. Barsukov (2025). Foot-and-mouth disease: recent history. *Russian veterinary journal*, **2025**(2): 13-24. DOI: 10.32416/2500-4379-2025-2-13-24.

74. Makau, D.N., J. Arzt, and K. Vanderwaal (2025). Opportunities for machine learning to predict cross-neutralization in FMDV serotype O. *PLoS Computational Biology*, **21**(9): 15. DOI: 10.1371/journal.pcbi.1013491.

75. Mallick, S., J.K. Mohapatra, J.K. Biswal, M. Rout, R. Ranjan, R. Samanta, and R.P. Singh (2025). Monoclonal antibody based competitive 3AB non-structural protein ELISA for detection of *Foot-and-mouth disease virus* infection. *Veterinary Research Communications*, **49**(4). DOI: 10.1007/s11259-025-10767-z.

76. Meng, P., B. Ni, C. Li, Z. Sha, C. Liu, W. Ren, R. Wei, F. Liu, J. Li, and Z. Wang (2025). Establishment and implementation of the point-of-care RT-RAA-CRISPR/Cas13a diagnostic test for *Foot-and-mouth disease virus* serotype O in pigs. *Viruses-Basel*, **17**(5). DOI: 10.3390/v17050721.

77. Merdekawati, I., M. Kurniawan, A. Jamalurrusid, and S.E. Cahyaningati (2025). Socio-economic impact of outbreak cases foot-and-mouth disease (FMD) on livestock farmers. *Journal of Posthumanism*, **5**(5): 4569-4580. DOI: 10.63332/joph.v5i5.1938.

78. Mignaqui, A.C., A. Ferella, C. Sanchez, M. Stuible, R. Scian, J. Filippi, S.B. Cardillo, Y. Durocher, and A. Wigdorovitz (2025). Optimized production of virus-like particles in a high-CHO-cell-density transient gene expression system for foot-and-mouth disease vaccine development. *Vaccines*, **13**(6). DOI: 10.3390/vaccines13060581.

79. Mishra, N., R. Singh, R. Sirohi, B. Ganguly, S. Gupta, and A.K. Gupta (2025). Effect of a polyherbal immunomodulator on the immunogenicity of booster dose of FMD and FMD-HS-BQ vaccines in dairy cattle. *Indian Journal of Animal Sciences*, **95**(2): 103-106. DOI: 10.56093/ijans.v95i2.151036.

80. Mogulothu, A., D. Hickman, S. Attreed, P. Azzinaro, M. Rodriguez-Calzada, M. Dittmann, T. de los Santos, S. Szczepanek, and G.N. Medina (2025). Interferon-stimulated gene MCL1 inhibits *Foot-and-mouth disease virus* replication by modulating mitochondrial dynamics and autophagy. *Journal of Virology*, **99**(7). DOI: 10.1128/jvi.00581-25.

81. Mohamadin, M., R. Manzoor, A. Elolimy, M. Abdelmegeid, S. Mosad, and S. Abd El Rahman (2025). Advancements in antiviral approaches against *Foot-and-mouth disease virus*: a comprehensive review. *Frontiers in Veterinary Science*, **12**. DOI: 10.3389/fvets.2025.1574193.

82. Mohamed, A., M. Atwa, E. Abdo, and D. Magd (2025). The role of *Parapox virus* (Zylexis) in enhancing humeral and cellular immune response in sheep vaccinated with FMD vaccine. *Alexandria Journal of Veterinary Sciences*, **86**(0): 130-130. DOI: 10.5455/ajvs.259075.

83. Mozisova Vascinec, J. (2025). Foot-and-mouth disease - basic facts about the disease and its occurrence in Europe. *Slovensky Veterinarsky Casopis*, **50**(1): 11-14.

84. Mufoya, B., D. Mathebula, and W. Garira (2025). Individual-based multiscale model for foot-and-mouth disease. *Frontiers in Applied Mathematics and Statistics*, **11**. DOI: 10.3389/fams.2025.1608265.

85. Nufus, M.T. and R. Yani (2025). Model matematika seir penyakit mulut dan kuku pada sapi potong. *Jurnal Riset Matematika*: 41-50. DOI: 10.29313/jrm.v5i1.6485.

86. Ochwo, S., Z. Ahmed, L. Velazquez-Salinas, A. Perez, K. Vanderwaal, F.N. Mwiine, and E. Rieder (2025). Near complete genome sequences of 12 foot-and-mouth disease viruses of serotype O, isolated from cattle in eastern and northern Uganda between 2014 and 2017. *Microbiology Resource Announcements*. DOI: 10.1128/mra.00819-24.

87. Olorunshola, O.E., N.E. Lakan, F. Adamu-Fika, and A.K. Ademuwagun (2025). Hybrid CNN-haralick framework for foot-and-mouth disease classification in cattle. *Asian Journal of Research in Computer Science*, **18**(6): 390-402. DOI: 10.9734/ajrcos/2025/v18i6709.

88. Pamia, J., R. Ranjan, M.K. Gupta, J.K. Biswal, S. Mallick, P.P. Lakra, and S. Kumar (2025). Effect of *Foot-and-mouth disease virus* infection on hematobiochemical profile in goats under natural conditions. *Indian Journal of Veterinary Pathology*, **49**(1): 68-72. DOI: 10.5958/6r4gn257.

89. Pan, H., S.-s. Zhou, H.-g. Yuan, and Y.-f. Song (2025). Screening of host proteins for *Foot-and-mouth disease virus* 3'UTR negative-strand interaction. *Acta Veterinaria et Zootechnica Sinica*, **56**(5): 2279-2291. DOI: 10.11843/j.issn.0366-6964.2025.05.026.

90. Paton, D.J., G. Wilsden, C.F.J. Browning, E.A. Foglia, A. Di Nardo, N.J. Knowles, J. Wadsworth, S. Gubbins, E. Chitsungo, C.R.M. Boukary, G. Ayelet, C.S. Bodjo, N. Nwankpa, E. Brocchi, S.

Grazioli, A. Ludi, and D.P. King (2025). An antigen panel to assess the regional relevance of foot-and-mouth disease vaccines. *NPJ Vaccines*, **10**(1). DOI: 10.1038/s41541-025-01128-7.

91. Pejsak, Z. and K. Tarasiuk (2025). Foot-and-mouth disease outbreaks in Europe, a serious treat to cattle, swine and sheep production. *Zycie Weterynaryjne*, **100**(5): 29-35.

92. Permatasari, D.A., D. Raharjo, M.H. Effendi, and B. Budiarto (2025). Improvement dairy cattle barn management after foot-and-mouth disease (FMD) outbreak in Medowo, Kediri. *Jurnal Layanan Masyarakat*, **9**(2): 260-270. DOI: 10.20473/.v9i2.2025.260-270.

93. Ploquin, O., V. Grosbois, M. Ndlovu, S. Ndozore, M. Munzamba, E. Porovha, K. Nkomo, O. Basso, G. Corbel, R. Shumba, M.D. Mhlanga, E. Mwandirigana, B. Musekiwa, E. Takayindisa, A. Loisier, H. Fritz, F. Liegeois, A. Caron, F. Prugnolle, and E. Miguel (2025). Foot-and-mouth disease dynamics in multi-species livestock systems at the interface of African protected areas. *Veterinary Research*, **56**(1). DOI: 10.1186/s13567-025-01487-y.

94. Prasetia, B.E., R.A. Primatika, and W.S. Nugroho (2025). Spatial risk assessment of foot-and-mouth disease in Sukabumi regency, Indonesia: A GIS and multicriteria decision analysis approach. *Research in Veterinary Science*, **192**. DOI: 10.1016/j.rvsc.2025.105694.

95. Punyapornwithaya, V., S. Srisawang, C. Jainonthee, W.G. Li, R. Abila, K. Rinzin, A. Sutar, and B. Purevsuren (2025). Insights into the epidemiological characteristics, temporal changepoints, and space-time clusters of foot-and-mouth disease outbreaks in the SEACFMD region to support eradication efforts. *Preventive Veterinary Medicine*, **245**: 11. DOI: 10.1016/j.prevetmed.2025.106683.

96. Rehman, S., S. Ullah, M. Abuzahra, M.H. Effendi, B. Budiastuti, K. Kholik, M. Munawarah, A. Zaman, A.U. Rahman, M.I. Malik, S. Ullah, and S.A. Rustam (2025). Determination of risk factors for foot-and-mouth disease emergence in East Java, Indonesia. *Open Veterinary Journal*, **15**(5): 2049-2058. DOI: 10.5455/OVJ.2025.v15.i5.21.

97. Rodriguez-Pulido, M., M.A. Sanz, L. Camacho, R. Ramos, and M. Saiz (2025). Dicer is cleaved by the Leader protease encoded by *Foot-and-mouth disease virus* to promote infection in mammalian cells. *Science Advances*, **11**(27). DOI: 10.1126/sciadv.adt3751.

98. Rout, M., L. Bhatt, J.K. Mohapatra, S. Subramaniam, and R.P. Singh (2025). Serological field investigations revealing natural exposure of one-humped dromedary camels (*Camelus dromedarius*) to *Foot-and-mouth disease virus* in India. *Frontiers in Cellular and Infection Microbiology*, **15**. DOI: 10.3389/fcimb.2025.1615461.

99. Rout, M., L.K. Pandey, B.R. Prusty, J.K. Mohapatra, and R.P. Singh (2025). Indirect ELISA diagnostic based on recombinant 3AB3 nonstructural protein of *Foot-and-mouth disease virus* for use in porcine serology. *Journal of Immunological Methods*, **542**. DOI: 10.1016/j.jim.2025.113897.

100. Rout, M., J.P. Tripathy, P. Giri, S.S. Rautaray, S.S. Dahiya, J.K. Biswal, S. Subramaniam, J.K. Mohapatra, and R.P. Singh (2025). Co-circulation of multiple serotypes of *Foot-and-mouth disease virus* among susceptible multispecies animal population in India during 2021-2022. *Acta Tropica*, **268**. DOI: 10.1016/j.actatropica.2025.107709.

101. Rysdayeni, N.L.P.D., I.K. Puja, and I.W. Sukernayasa (2025). Association of foot-and-mouth disease vaccination with fertility performance of Bali cattle on farmers in Badung District. *Buletin Veteriner Udayana*: 417-423. DOI: 10.24843/bulvet.2025.v17.i02.p20.

102. Sahoo, M., R. Singh, S. Patel, S.K. Panda, A.P. Acharya, R. Patra, M. Saminathan, S.D.V. Kumar, R.K. Vandre, J. Rana, M. Pasayat, J.P. Tripathy, N.R. Sahoo, J.K. Biswal, and R.P. Singh (2025). *Foot-and-mouth disease virus* alters MUC genes expression and function of goblet

cells in the intestines of naturally infected cattle calves. *Microbial Pathogenesis*, **207**. DOI: 10.1016/j.micpath.2025.107952.

103. Sahoo, S., H.-K. Lee, and D. Shin (2025). Elucidating the structural dynamics induced by active site mutations in 3C protease of *Foot-and-mouth disease virus*. *PLoS One*, **20**(4). DOI: 10.1371/journal.pone.0321079.

104. Saputri, A., K. Muatip, D.N. Cahyo, and F.A. Santoso (2025). The influence of the number of livestock deaths and group support due to foot-and-mouth disease on farmers' commitment to continuing beef cattle businesses in Kebumen Regency. *Jurnal Ilmiah Peternakan Terpadu*, **13**(2): 590-590. DOI: 10.23960/jipt.v13i2.p590-607.

105. Sareyyupoglu, B. and O. Ilk (2025). A meta-analysis to re-evaluate the sensitivity and specificity of FMDV NSP ELISA tests. *Biologicals*, **91**. DOI: 10.1016/j.biologicals.2025.101846.

106. Sarmin, S. (2025). Comparison of temperature in cows infected with foot-and-mouth disease (FMD) in the pre-treatment, during treatment, and recovering phases. *Indonesian Journal of Veterinary Science*, **4**(1): 1-1. DOI: 10.22146/ijvs.v4i1.82301.

107. Sarmin, S. (2025). Albumin/Globulin ratio (A/G) between before treatment, during treatment and after treatment in cattle and nail disease infection (FMD). *Indonesian Journal of Veterinary Science*, **4**(2): 47-47. DOI: 10.22146/ijvs.v4i2.83075.

108. Sarmin, S. (2025). Effect of pre-treatment phase, treatment phase, and recovery phase on fibrinogen levels in FMD cattle cases. *Indonesian Journal of Veterinary Science*, **4**(1): 22-22. DOI: 10.22146/ijvs.v3i2.83073.

109. Schambow, R.A., M.L. Schultze, and A.M. Perez (2025). Scoping review of disease surveillance practices and veterinary care use in small-scale swine farms in the United States. *Animals*, **15**(11). DOI: 10.3390/ani15111620.

110. Scharzenberger, S., J.M. Humphreys, C. Rigney, A. Freifeld, C. Stenfeldt, and J. Arzt (2025). Epidemiologic consequences of preclinical transmission of *Foot-and-mouth disease virus* in cattle. *Frontiers in Veterinary Science*, **12**: 14. DOI: 10.3389/fvets.2025.1651091.

111. Scian, R., M.P. Mejias, C. Caldevilla, S. Cardillo, V. Malirat, and I.E. Bergmann (2025). Comparative evaluation of serological assays for detecting antibodies against structural proteins elicited by *Foot-and-mouth disease virus* vaccines of serotypes O, A, Asia 1 and SAT 2. *Veterinary immunology and immunopathology*, **286**: 110978-110978. DOI: 10.1016/j.vetimm.2025.110978.

112. Scian, R., M.P. Mejias, C. Caldevilla, S. Cardillo, V. Malirat, and I.E. Bergmann (2025). Comparative evaluation of serological assays for detecting antibodies against structural proteins elicited by *Foot-and-mouth disease virus* vaccines of serotypes O, A, Asia 1 and SAT 2. *Veterinary Immunology and Immunopathology*, **286**. DOI: 10.1016/j.vetimm.2025.110978.

113. Sequeira, S.C., N. Sebunia, J.R. Page, T. Lasisi, G. Habing, and A.G. Arruda (2025). A systematic scoping review and thematic analysis: How can livestock and poultry movement networks inform disease surveillance and control at the global scale? *PLoS one*, **20**(7): e0328518-e0328518. DOI: 10.1371/journal.pone.0328518.

114. Shaw, A.E., K. Lebani, L.G. Gordon, U.E. Ihearahu, J. Wadsworth, H.M. Hicks, N. Polo, G. Freimanis, D. Muhanguzi, C. Tennakoon, R.J. Orton, N.J. Knowles, A. Di Nardo, R.A. Waters, B.M. Bronsvoort, and D.P. King (2025). Universal amplification and sequencing of *Foot-and-mouth disease virus* complete genomes using nanopore technology. *BMC Genomics*, **26**(1). DOI: 10.1186/s12864-025-11938-7.

115. Shi, X.-t., Y.-q. Zhu, Z.-w. Shi, J.-c. Luo, T. Xi, F. Zhang, Y.-d. He, S.-p. Li, H.-x. Zheng, and H. Tian (2025). Development and preliminary application of a colloidal gold

immunochromatographic strip for detecting antibodies against South African type 2 *Foot-and-mouth disease virus*. *Chinese Journal of Virology*, **41**(3): 856-867. DOI: 10.13242/j.cnki.bingduxuebao.240170.

116. Shi, X.N., Z.D. Teng, K. Yang, H.T. Song, Y. Zhang, S.Z. Tan, H. Dong, S.Q. Sun, Y.Z. Ding, and H.C. Guo (2025). Astragalus Polysaccharide Nanoemulsion: A Promising Adjuvant for *Foot-and-mouth disease virus*-Like Particle Vaccines. *Transboundary and Emerging Diseases*, **2025**(1): 11. DOI: 10.1155/tbed/6693841.

117. Simbizi, V., R. Moerane, and B. Gummow (2025). The role of smallholder pig farmers in the biosecurity of pig diseases in the Eastern Cape Province of South Africa. *Veterinary Medicine International*, **2025**(1). DOI: 10.1155/vmi/4755096.

118. Smith, M.R. and M.W. Sanderson (2025). Modeled impacts of rapid and accurate cattle tracing in a Foot-and-mouth disease outbreak in the US (vol 215, 105911, 2023). *Preventive Veterinary Medicine*, **239**. DOI: 10.1016/j.prevetmed.2025.106530.

119. Song, X., S. Tao, F. An, X. Li, Y. Chang, X. Liu, and Y. Cui (2025). The impact of $^{12}C^{6}$ heavy ion irradiation-induced cellular mutations on the replication of the *Foot-and-mouth disease virus* and the role of *Cbr3*. *Cellular and Molecular Life Sciences*, **82**(1). DOI: 10.1007/s00018-025-05628-6.

120. Sopeju, A.E., G. Onoja, V.T. Abiodun, and A.R. Peters (2025). Foot-and-mouth disease (FMD) vaccine market survey at agro-veterinary stores in rural and peri-urban areas of Nigeria. *Gates Open Research*, **9**: 40-40. DOI: 10.12688/gatesopenres.16349.1.

121. Srinivas, K., S. Das, S. Khan, P.C. Devi, S. Ghatak, and A.A.P. Milton (2025). First report of lumpy skin disease and foot-and-mouth disease co-infection in India. *Molecular Biology Reports*, **52**(1). DOI: 10.1007/s11033-025-10903-7.

122. Stenfeldt, C., M. Eschbaumer, J. Humphreys, G.N. Medina, and J. Arzt (2025). The pathogenesis of *Foot-and-mouth disease virus*: current understandings and knowledge gaps. *Veterinary Research*, **56**(1). DOI: 10.1186/s13567-025-01545-5.

123. Sun, B., X. Qin, T. Zhang, S. Dong, Y. Ye, C. Wang, Y. Zhang, R. Hao, Y. Ru, H. Tian, and H. Zheng (2025). Phospholipase PLA2G16 accelerates the host interferon signaling pathway response to FMDV. *Viruses-Basel*, **17**(7). DOI: 10.3390/v17070883.

124. Sunarta, N.M.D.P., N.L.P. Suciptawati, I.M.E. Dwipayana, I.G.A.M. Srinadi, I.P.E.N. Kencana, and K. Jayanegara (2025). Di studi penyebaran kasus pmk di pulau jawa menggunakan geographically weighted negative binomial regression. *E-Jurnal Matematika*, **14**(1): 18-18. DOI: 10.24843/mtk.2025.v14.i01.p474.

125. Tchokote, E.Y., A.O. Igwe, and H.G. Ularamu (2025). Isolation and molecular genetics of *Foot-and-mouth disease virus* from clinical infections in Nigeria. *Nigerian Veterinary Journal*, **45**(4): 15-25. DOI: 10.4314/nvj.v45i4.2.

126. Thongratsakul, S., N. Warrasuth, and C. Poolkhet (2025). Movement networks of domestic livestock susceptible to foot-and-mouth disease in Thailand. *Veterinary Medicine International*, **2025**(1): 9. DOI: 10.1155/vmi/6680248.

127. Triatmojo, A., B. Guntoro, P. Strausz, M.A.U. Muzayyanah, R. Agustiar, and S. Kusza (2025). Socioeconomic Impact of Foot-and-mouth disease Outbreaks on Smallholder Cattle Farmers in Yogyakarta, Indonesia. *Veterinary Sciences*, **12**(6). DOI: 10.3390/vetsci12060542.

128. Vensko Zico Dandi Wahyu, P. (2025). Impact of different antibiotic treatments on pregnancy maintenance in Holstein Friesian cows infected with foot-and-mouth disease. *Ovozoa Journal of Animal Reproduction*, **14**(1): 34-38. DOI: 10.20473/ovz.v14i1.2025.34-38.

129. Wada, M., J.H. Han, B. Purevsuren, K. Rinzin, A. Sutar, R. Abila, and S. Subharat (2025). Probability of freedom from *Foot-and-mouth disease virus* serotype Asia 1 in Southeast Asia, China and Mongolia. *Preventive veterinary medicine*, **244**: 106663-106663. DOI: 10.1016/j.prevetmed.2025.106663.

130. Wagner, A.J.B., A.E. Boklund, and M.P. Ward (2025). Australia versus Denmark: an analysis of foot-and-mouth disease mitigation strategies. *Australian Veterinary Journal*, **103**(9): 571-581. DOI: 10.1111/avj.13435.

131. Wang, X., H. Dong, J.e. Wu, Y. Zhang, S. Sun, and H. Guo (2025). CD44 mediates the internalization of *Foot-and-mouth disease virus* through macropinocytosis. *Veterinary Research*, **56**(1). DOI: 10.1186/s13567-025-01555-3.

132. Wang, X.Y. and J.Y. Yang (2026). The model application to the nonlocal diffusion effects of the foot-and-mouth disease with carriers. *Communications in Nonlinear Science and Numerical Simulation*, **152**: 22. DOI: 10.1016/j.cnsns.2025.109268.

133. Wang, Y.-z., X.-x. Fan, Z.-y. Zhu, D.-s. Pei, L. He, X. Li, Q.-f. Ren, H.-x. Zheng, Z.-x. Zhu, W.-w. Li, and D.-w. Jiang (2025). Construction of LULL1 gene knockout or overexpression PK-15 cell line and its effect on *Foot-and-mouth disease virus* replication. *Zhongguo Shouyi Kexue*, **55**(6): 711-718. DOI: 10.16656/j.issn.1673-4696.2025.0109.

134. Wang, Z., R. Hao, Y. Ru, B. Lu, Y. Yang, L. Zhao, Y. Li, K. Ma, F. Leng, and H. Zheng (2025). Functional analysis of prolyl oligopeptidase (POP) in *Foot-and-mouth disease virus* replication. *Sheng wu gong cheng xue bao*, **41**(7): 2658-2671. DOI: 10.13345/j.cjb.240943.

135. Wulandari, I. and H. Sri (2025). Analysis of the impact of foot-and-mouth disease on production management and business feasibility of Sapi Sonok in Sumenep Regency. *Jurnal Biosains Pascasarjana*, **27**(1): 36-42. DOI: 10.20473/jbp.v27i1.2025.36-42.

136. Yang, Y., X. Chen, M. Li, F. Xin, Y. Zhao, C. Zhang, Y. Pan, C. He, and S. He (2025). Simple and high-throughput quantification of mono- and bivalent *Foot-and-mouth disease virus* vaccine antigens by differential scanning fluorimetry. *Vaccines*, **13**(7). DOI: 10.3390/vaccines13070721.

137. Yassin, A.A., A.B. Ludi, S. Grazioli, E. Brocchi, D. Horton, D.P. King, and A.S. Asfor (2025). Mapping cross-reactive residues in the G-H loop of *Foot-and-mouth disease virus*: insights for serotype-specific design. *Frontiers in Microbiology*, **16**. DOI: 10.3389/fmicb.2025.1631386.

138. Yin, M., X. Li, M. Zhang, Q. Zhao, H. Wang, H. Zhang, Z. Lu, and P. Qian (2025). MARCH8 promotes the proteasomal degradation of *Foot-and-mouth disease virus* VP1, VP2, and VP3 to negatively regulate viral replication. *Veterinary Research*, **56**(1). DOI: 10.1186/s13567-025-01521-z.

139. Yu, S.-C., I.-K. Lee, H.-S. Kong, S.-H. Shin, S.-Y. Hwang, Y.-J. Ahn, J.-H. Park, B.-Y. Kim, and Y.-C. Song (2025). Foot-and-mouth disease virus-like particles produced in *E. coli* as potential antigens for a novel vaccine. *Veterinary Sciences*, **12**(6). DOI: 10.3390/vetsci12060539.

140. Zha, J.J., K.Q. Zhang, X.Z. Zhang, P. Sun, D. Li, Y.M. Cao, X.W. Bai, X.Q. Ma, K. Li, H. Yuan, Y.F. Fu, J. Zhang, Z.X. Zhao, J. Wang, H.F. Bao, Y.F. Ouyang, S.Y. Qi, Z.X. Liu, Z.J. Lu, and P.H. Li (2025). *Foot-and-mouth disease virus* vaccine with VP1 G-H loop substitution of the Cathay strain broadens antigen spectrum. *Applied Microbiology and Biotechnology*, **109**(1): 13. DOI: 10.1007/s00253-025-13561-8.

141. Zhang, J., Y. Wen, J. Yi, J. Ren, W. Li, J. Wu, W. Yang, D. Li, and H. Zheng (2025). *Foot-and-mouth disease virus* 3C protein acts as an anti-inflammatory factor by mediating degradation of TLR4 signaling various molecules via caspase activity. *Veterinary Microbiology*, **305**. DOI: 10.1016/j.vetmic.2025.110531.

142. Zhao, J., P. Xiao, A. Xin, H. Zhu, H. Wang, J. Xiao, and H. Gao (2025). Preliminary evaluation of a novel serotype O foot-and-mouth disease mRNA vaccine. *Frontiers in Microbiology*, **16**. DOI: 10.3389/fmicb.2025.1503191.

143. Zhao, Q., F. Li, S. Huang, X. Xing, Y. Sun, P. Li, H. Bao, Y. Fu, P. Sun, X. Bai, H. Yuan, X. Ma, Z. Zhao, J. Zhang, J. Wang, T. Wang, D. Li, Q. Zhang, P. Qian, Y. Cao, K. Li, X. Li, and Z. Lu (2025). Remapping the spatial distribution of neutralizing sites and their immunodominance on the capsid of different topotypes of FMDV serotype O by site-directed competitive ELISA for detection of neutralizing antibodies. *Microbiology Spectrum*, **13**(6). DOI: 10.1128/spectrum.03344-24.

144. Zheng, D.-d., X.-l. Qi, B. Yang, Z.-l. Yan, H.-x. Zheng, T. Feng, and H.-w. Xu (2025). Construction and applications of CRISPR/Cas13d transgenic cell lines targeting *Foot-and-mouth disease virus* 3B and 3Cpro genes. *Zhongguo Shouyi Kexue*, **55**(6): 732-739. DOI: 10.16656/j.issn.1673-4696.2025.0104.

145. Zheng, D.-d., X.-l. Qi, B. Yang, Z.-l. Yan, H.-x. Zheng, T. Feng, and H.-w. Xu (2025). Construction and applications of CRISPR/Cas13d transgenic cell lines targeting *Foot-and-mouth disease virus* 3B and 3Cprogenes. *Zhongguo Shouyi Kexue*, **55**(6): 732-739. DOI: 10.16656/j.issn.1673-4696.2025.0104.

146. Zhou, S., S. Mu, S. Yu, Y. Tian, S. Lu, Z. Li, H. Wu, J. Zhao, H. Chen, S. Sun, and Y. Song (2025). Discovery of small molecules against Foot-and-mouth disease virus replication by targeting 2C helicase activity. *Viruses-Basel*, **17**(6). DOI: 10.3390/v17060785.

147. Zhu, Z.-y., X.-x. Fan, D.-s. Pei, Y.-z. Wang, L. He, X. Li, Q.-f. Ren, H.-x. Zheng, W.-w. Li, and Y. Gao (2025). Construction and biological characteristic analysis of 3D mutant strain of O-type *Foot-and-mouth disease virus*. *Zhongguo Shouyi Kexue*, **55**(6): 719-724. DOI: 10.16656/j.issn.1673-4696.2025.0088.

148. Zouyed, I., S. Boussena, N. Ramdani, H.E. Damerdji, J.A. Benavides, and H. Medkour (2025). Spatiotemporal dynamics of emerging foot-and-mouth disease, bluetongue, and peste des petits ruminants in Algeria. *Viruses-Basel*, **17**(7). DOI: 10.3390/v17071008.

149. Zulfah, E.K. Sabdoningrum, S. Hidanah, W.P. Lokapirnasari, and I.S. Yudanianyi (2025). Analysis of reproductivity of Madrasin cattle before and after foot-and-mouth disease on Gili Iyang Island, Sumenep, Madura. *Jurnal Biosains Pascasarjana*, **27**(1): 32-35. DOI: 10.20473/jbp.v27i1.2025.32-35.

Annex 3: Vaccine recommendations

This report provides recommendations of FMDV vaccines to be included in antigen banks. These outputs are generated with a tool (called PRAGMATIST) that has been developed in partnership between WRLFMD and EuFMD (http://www.fao.org/3/cb1799en/cb1799en.pdf; https://doi.org/10.3389/fvets.2022.1029075). These analyses accommodate the latest epidemiological data collected by the WOAH/FAO FMD reference laboratory network regarding FMDV lineages that are present in different *source regions* (see Table 1 in Section 3.9, above), as well as available *in vitro, in vivo* and field data to score the ability of vaccines to protect against these FMDV lineages.

Region	Risk (%)
North Africa	22.64
West and Central Africa	4.9
East Africa	3.95
Southern Africa	3.21
West Eurasia	42.94
India and Southern Asia	8.38
East Asia	11.25
South America	2.73

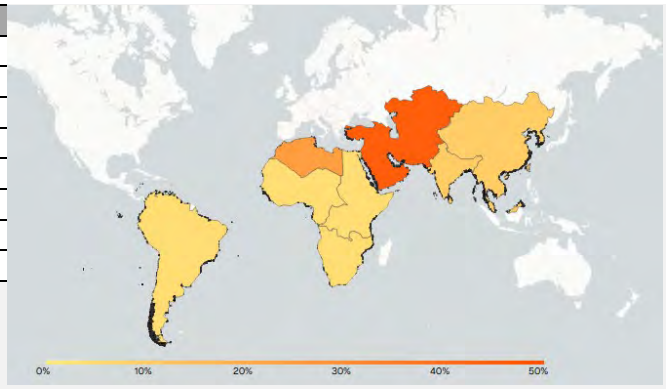


Figure 3: Recommendations from WRLFMD on FMD virus strains to be included in FMDV vaccine antigen bank for Europe (October 2025)

Please contact WRLFMD or EuFMD for assistance to tailor these outputs to other geographical regions. An online version of the tool is available on https://www.openfmd.org/dashboard/pragmatist/.

NB: Vaccine-coverage data presented is based on available data and may under-represent the true performance of individual vaccines.

Further information about the PRAGMATIST system has been published in *Frontiers in Veterinary Science* - see: https://doi.org/10.3389/fvets.2022.1029075.

Annex 4: Brief round-up of EuFMD and WRLFMD activities

Courses & Training

- The EuFMD's open-access Courses provide convenient self-paced training which you may study anytime, anywhere, free of charge:
  - **Introduction to Foot-and-Mouth Disease** *(also available in French and German)*; This course introduces foot-and-mouth disease (FMD), its importance, diagnosis, outbreak investigation and the control measures that might apply in a previously free country experiencing an outbreak.
    This course is suitable for all of those with an interest in FMD control. No prior knowledge of FMD is required.
  - **Introduction to the socioeconomics of foot-and-mouth and similar transboundary animal diseases**; This course aims to introduce non-expert learners to the fundamental concepts required to understand the socioeconomic analysis of animal disease. It also forms the basis for further, in-depth training on socioeconomic impact assessment and practical cost-benefit analysis of FMD and similar transboundary animal diseases.
  - **Introduction to sheep pox and goat pox**; This short, open-access and self-directed course aims to provide an overview of sheep pox and goat pox, recognise or suspect the disease in the field, identify the correct samples to collect and the relevant control measures.
  - **Introduction to Lumpy Skin Disease** *(also available in French)*; This short module introduces lumpy skin disease, its distribution, impacts, aetiology, diagnosis epidemiology and control options.
    This course is suitable for all of those with an interest in LSD, in affected countries or those at-risk.
  - **Introduction to Rift Valley Fever** *(also available in French)*; This course introduces the diagnosis, prevention and control of RVF, and is suitable for those based in countries that are either endemic or at-risk. The course is designed to be easy to study on a smartphone.

    This course is suitable for anybody who would like to know more about RVF. It will be of particular interest to field veterinarians (public and private) and veterinary paraprofessions who are working in countries that are either endemic or at high risk of RVF. No prior knowledge of RVF is required.
  - **Introduction to Animal Health Surveillance**; This short, open access and self-directed course aims to provide an overview of the importance and key activities of animal health surveillance. It also forms the basis for further, in-depth courses on passive surveillance.
  - **What is the Progressive Control Pathway?** (also available in Arabic); This short e-learning module provides an overview of the Progressive Control Pathway for Foot-and-Mouth Disease (PCP-FMD), the tool used to FMD control under the GF-TADs Global Strategy.

This course is suitable for all of those with an interest in FMD control in countries which are not free of the disease, and is a good introduction for those new to the PCP-FMD.

- **Introduction to the Risk Assessment Plan** *(also available in French)*; This course is part of a series of self-directed online courses that aim to support progress on the Progressive Control Pathway for Foot-and-Mouth Disease (PCP-FMD).

  The Risk Assessment Plan describes how the country intends to embark on the PCP-FMD and gain an understanding of the epidemiology of FMD in the country. Ultimately, the country will use that knowledge to develop a risk-based plan to reduce the impact of FMD (Risk-Based Strategic Plan).

  This course will be of interest to anyone who is involved in control of FMD in countries which are not currently free of the disease. It is particularly aimed at veterinarians who are working with countries in PCP-FMD Stage Zero and beginning the process of developing a RAP.

- **Introduction to the Risk-Based Strategic Plan**; This course introduces the Risk-Based Strategic Plan (RBSP). The RBSP describes how a country will reduce the impact of FMD in at least one husbandry sector or geographical area. The RBSP applies the outputs and knowledge gained through the implementation of the activities in PCP-FMD Stage One. An accepted RBSP is required for countries to be recognized as in PCP-FMD Stage Two.

  This course will be of interest to anyone who is involved in control of FMD in countries which are not currently free of the disease. It is particularly aimed at veterinarians who are working with countries in PCP-FMD Stage One, and beginning the process of developing an RBSP.

- **Introduction to the Official Control Programme**; This course is part of a series of self-directed online courses that aim to support progress on the Progressive Control Pathway for Foot-and-Mouth Disease (PCP-FMD).

  The OCP describes how the country will eliminate virus circulation of FMD in at least one zone of the country, to mitigate the risks of FMD to the point where an application to WOAH for official recognition of freedom from FMD may be successful and suitable. Completion of the OCP is the indicator outcome for entry into PCP-FMD Stage 3, as defined in the PCP-FMD guidelines.

  This course will be of interest to anyone who is involved in control of FMD in countries which are not currently free of the disease. It is particularly aimed at veterinarians who are working with countries in PCP-FMD Stage Two and beginning the process of developing an OCP.

- **Introduction to the FMD Minimum Biorisk Management Standards**; This course aims to provide an overview of the Minimum Biorisk Management Standards for foot-and-mouth disease laboratories (MBRMS), explaining the scope and the risks associated with the standards.

  This course is directed to National Competent Authorities, Institute directors for FMD facilities and biorisk managers in FMD free countries in the European region to ensure they are aware of the importance and implications of their role in ensuring that laboratories handling infectious FMD virus (Tier D) and performing FMD diagnostic tests without handling infectious FMD virus (Tier C) adhere to the FMD Minimum Biorisk Management Standards.

- **Simulation Exercises for Animal Disease Emergencies**; The Simulation Exercise for Animal Disease Emergencies online training course introduces simulation exercises as part of preparedness for animal disease emergencies and explains the processes involved in planning, conducting and evaluating simulation exercises. It also describes the various tools, approaches and strategies to support decision-making, as well as the different phases of an exercise.
  This course is designed for a range of stakeholders with an interest in learning about animal health emergency preparedness and planning.

- **Diagnosis of foot-and-mouth disease (FMD) : Instructor-led**; WRLFMD, Pirbright, UK – 11-22 May 2026
  This course has been specifically designed for laboratory staff who are responsible for implementing FMDV diagnostic techniques in the laboratory. This course is not suitable for research or group leaders who are not based in the laboratory. The course is designed and taught by subject matter experts within the World Reference Laboratory for FMD. The course will include a combination of hands-on practical sessions, demonstrations, lectures, and eLearning.
- **Real time training - NTC37**; Nakuru, Kenya – 11-14 November 2025
  This is a four-day intensive course which allows to see foot-and-mouth in an endemic country, discuss with farmers, peers and expert trainers. The course is preceded by a six-hour virtual Learning induction course. It can give you the unique opportunity to visit farms with suspected FMD cases and carry out clinical and epidemiological investigations in real time.

Meetings

- **Standing Technical Committee (EuFMD)**; Berlin, Germany – 20-21 November 2025.
- **Open Session of the Standing Technical Committee of the EuFMD - OS26**; Location to be confirmed – 28 October 2026.
- **107th Session of the Executive Committee (EuFMD)**; FAO HQ, Rome, Italy – 16 April 2026.
- **47th General Session of the EuFMD**; FAO HQ, Rome, Italy – 5-6 May 2027.
- The Commission's Member Nations meet in General Session every two years – most of the delegates are the Chief Veterinary Officers of their respective countries. At the General Session, the Member Nations review the activities of the previous biennium, agree a work plan and budget for the next biennium and elect an Executive Committee and a Standing Technical Committee.
- **108th Session of the Executive Committee (EuFMD)**; FAO HQ, Rome, Italy – 28 October 2026.

Other sources of information from EuFMD

- EuFMD webpages (https://www.fao.org/eufmd/).
- EuFMD has a constantly updated series of short podcasts relating to the FAST world (http://www.fao.org/eufmd/resources/podcasts/).
- EuFMD Emergency Toolbox (https://www.fao.org/eufmd/resources/emergency-toolbox/en/) listing all open-access resources concerning FAST diseases, available in multiple languages.
- Leaflets for the purpose of raising awareness of FMD in the Thrace region. Available in

Arabic, Bosnian, Bulgarian, English, Greek and Montenegrin, Portuguese, Serbian and Turkish (https://www.fao.org/publications/card/en/c/CB4903EN).

- Join the EUFMD Telegram channel to receive EuFMD updates (https://t.me/eufmd).

Proficiency test scheme organised by WRLFMD

Most sample panels for the FMD PTS Phase XXXVI have been shipped to the participating laboratories. There are a few outstanding due to export and import permit requirements. Results have been received and analysed. Feedback letters are being drafted and will be sent out shortly.

FAO four betters. Better life, better environment, better nutrition, better production.

EuFMD's programme, tools and initiatives

FAST
Foot-and-mouth And Similar Transboundary animal diseases

Dt
EuFMD digital transformation

Tom
EuFMD training management system

Microlearning
EuFMD micro learning

Vlearning
EuFMD virtual learning

SimExOn
Simulation exercises online

Get prepared
Emergency preparedness toolbox

Risk Comms
EuFMD risk communications

RMT-FAST
Risk monitoring tool for foot-and-mouth and similar transboundary animal diseases

Pragmatist
Prioritization of antigen management with international surveillance tool

EuFMDiS
European foot-and-mouth disease spread model

Vademos
FMD vaccine demand estimation model

GVS
Global vaccine security

PQv
Vaccine prequalification

PCP
Progressive control pathway

PSO
Pcp practitioner officers

PPP
Public private partnership

PROTECT
RESPOND
CONTROL

MOVE FAST

FAST, Foot-and-mouth
And Similar Transboundary
animal diseases.

EuFMD structure

Secretariat, Executive Committee, Standing Technical Committee (STC), Special Committee on Risk Monitoring, Integrated Surveillance and Applied Research (SCRISAR), Special Committee on Biorisk Management (SCBRM), Regional Groups for FAST Coordination, Standing Committee on Prequalification of Vaccines against FAST diseases (SCPQv), Steering Committee TOM (SCTOM).

EuFMD Secretariat

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