



# Foot-and-mouth disease: New risks for southeast Asia

**Donald King**  
*on behalf of the WOA/FAO FMD Ref lab Network*  
[donald.king@pirbright.ac.uk](mailto:donald.king@pirbright.ac.uk)

*United Kingdom National Reference Laboratory for Vesicular Diseases  
WOAH Reference Laboratory for FMD and SVD  
FAO World Reference Laboratory for FMD (WRLFMD)*

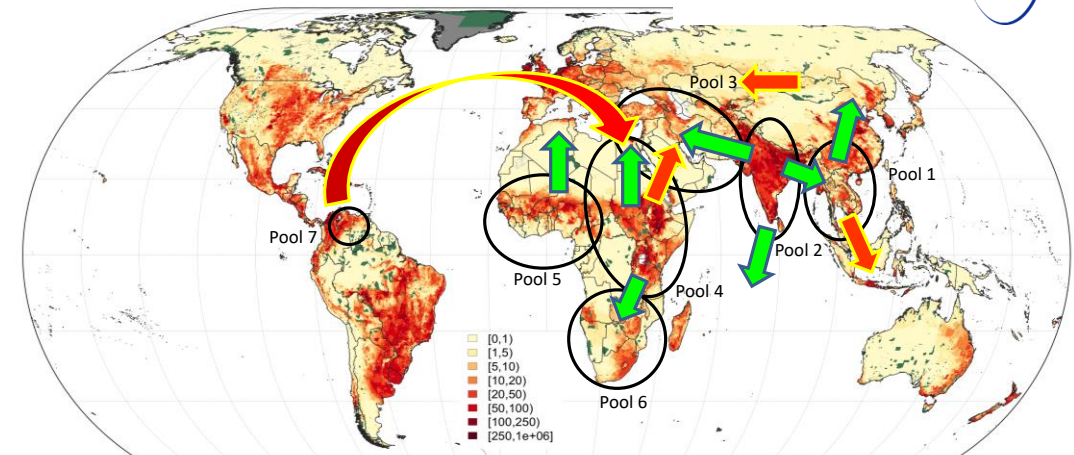
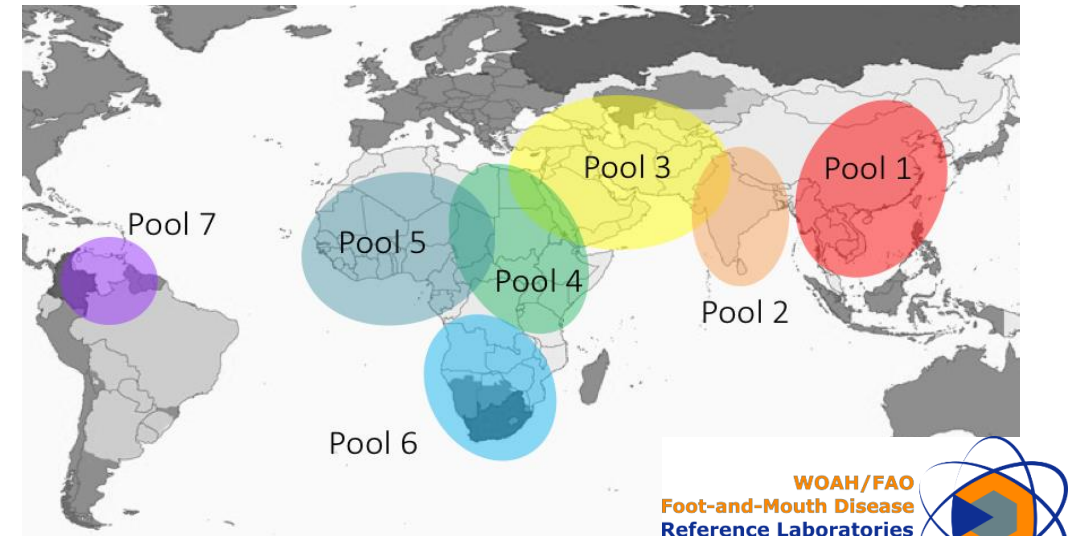
Work funded by:



[www.pirbright.ac.uk](http://www.pirbright.ac.uk)

# FMD epidemiology: global summary

- The epidemiology of FMD is dynamic, and defined by:
  - Six\* circulating serotypes that have unequal global distribution (\*serotype C not detected since 2004)
  - Seven virus ecosystems (Pools) that maintain specific FMDV strains
  - Long-distance “trans-pool” movements of FMDV lineages which are often unpredictable – and impact upon vaccine selection
- New risk pathways in Africa and in Asia where surveillance is fragmentary and resources for diagnostics are often lacking
- **International partnerships are essential to collate, share and analyse data**



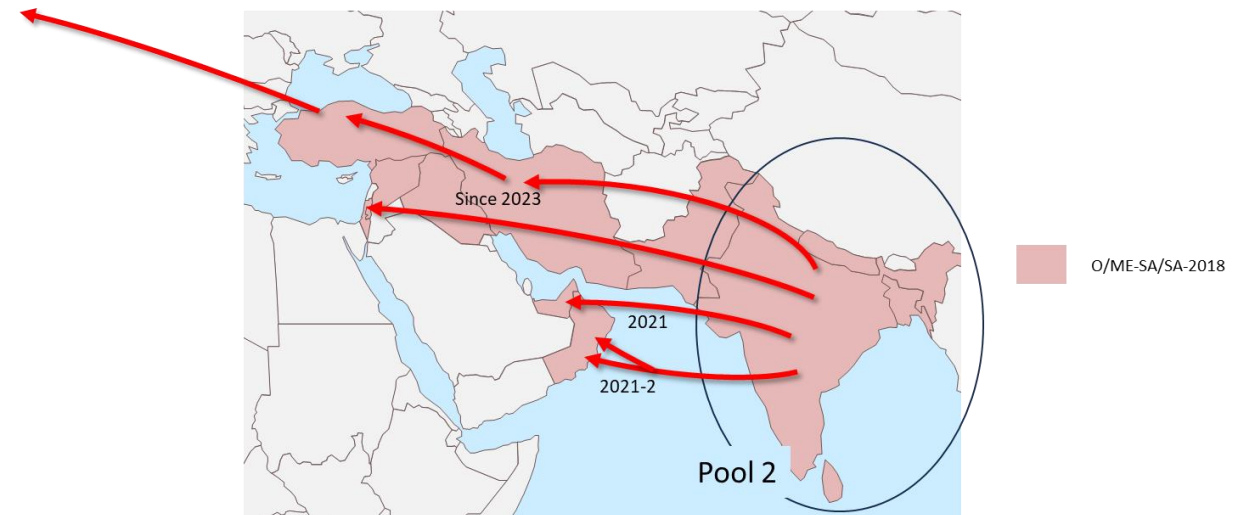
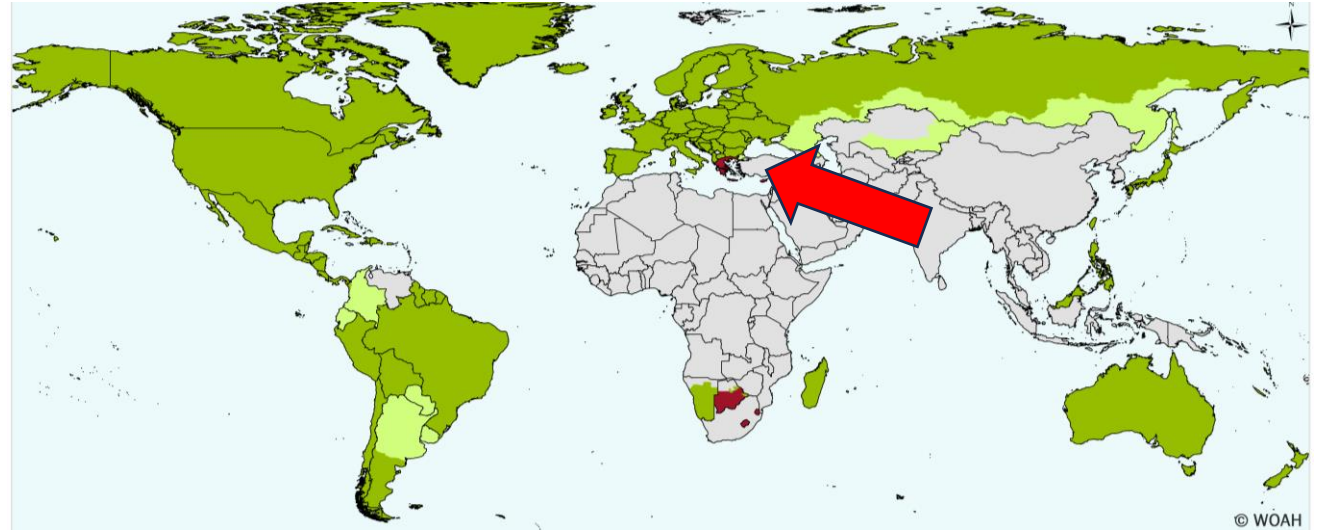
Cattle density map

Robinson et al., 2007

# FMD headline events – 2026: incursions from South Asian countries

- History tells us that pandemic serotype O lineages can emerge from South Asia (Pool 2)
- The **O/ME-SA/SA-2018** lineage is frequently detected in India, Nepal, Bangladesh and Sri Lanka
- Since 2021: increasingly detected in the Gulf States and West Asian countries via multiple incursions
- Caused outbreak in Germany in 2025
- Scope to spread more widely – into **Southeast Asia** following similar pathways for O/ME-SA/Ind-2001

WOAH Members' official FMD status map (April 2026)



# O/ME-SA/SA-2018: vaccine matching

- Vaccine matching data:

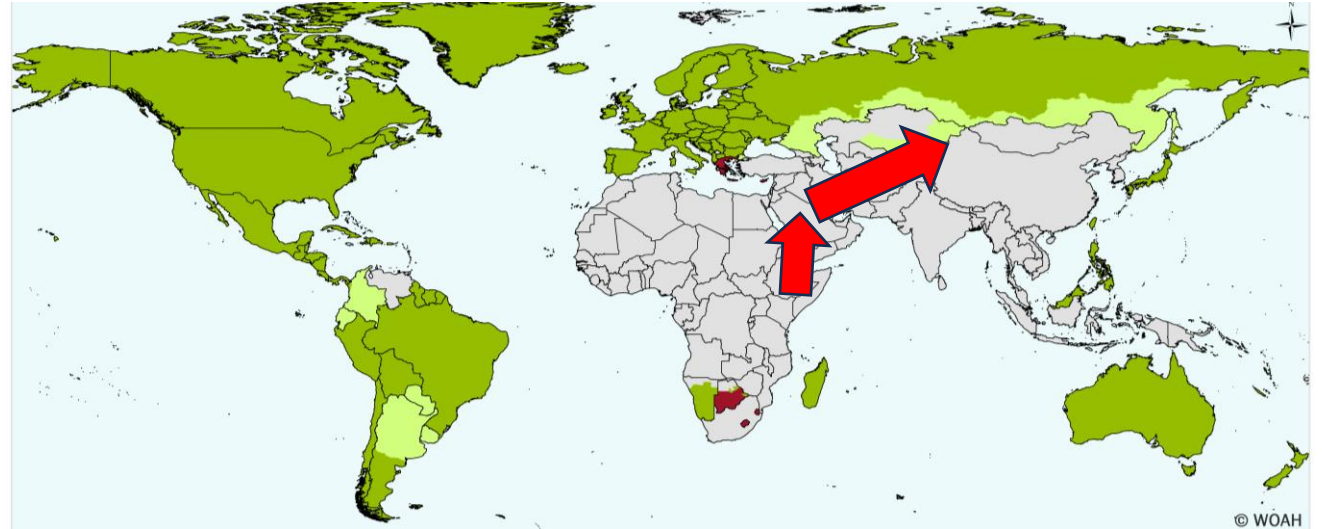
Isolate	O1-Manisa <sup>BI</sup>		O-TUR/5/09 <sup>MSD</sup>		O-3039 <sup>BI</sup>		O-Campos <sup>BI</sup>		O-PanAsia-2 <sup>BI</sup>		O-Campos <sup>BB</sup>	
	r1value	heterologous titre (log <sub>10</sub> )	r1value	heterologous titre (log <sub>10</sub> )	r1value	heterologous titre (log <sub>10</sub> )	r1value	heterologous titre (log <sub>10</sub> )	r1value	heterologous titre (log <sub>10</sub> )	r1value	heterologous titre (log <sub>10</sub> )
UAE/15/2021	0.56	2.15	0.69	2.32	0.75	1.94	0.28	2.19	0.47	2.30	0.51	2.63
UAE/9/2021	0.44	2.04	0.68	2.32	0.59	1.83	0.23	2.10	0.32	2.13	0.60	2.70
NEP/13/2022	0.63	2.33	1.00	2.32	1.00	2.02	0.40	2.28	0.57	2.35	0.51	2.65
NEP/26/2022	0.32	2.04	0.68	2.15	0.66	1.82	0.23	2.03	0.32	2.10	0.20	2.29
NEP/38/2022	0.98	2.45	0.89	2.29	0.84	2.00	0.45	2.17	0.50	2.31	0.66	2.71
NEP/13/2024	0.88	2.40	0.78	2.23	0.82	1.99	0.74	2.27	0.99	2.49	0.68	2.72
IRQ/10/2025	0.73	2.23	0.62	2.23	0.46	1.87	0.38	2.22	0.50	2.21	0.59	2.64
IRQ/21/2025	0.70	2.22	0.71	2.29	0.64	2.01	0.39	2.23	0.54	2.24	0.50	2.56
GER/1/2025	1.00	2.41	0.97	2.37	0.84	1.96	0.48	2.06	0.56	2.15	0.58	2.44

Heterologous titres



# FMD headline events – 2026: exotic serotypes from East Africa

WOAH Members' official FMD status map (April 2026)



- 2022 **SAT2/XIV** in Iraq, Jordan, Türkiye, Oman and Bahrain
- Early 2025 **SAT1/I** in Iraq and Bahrain - spread to Kuwait, Türkiye and Egypt
- Late 2025 Detection of **SAT1/III** in Iran and Türkiye closely related to a vaccine strain (>99% identity)
- 2025-2026 **SAT1/III** outbreaks in Europe (Cyprus and Greece)
- Mar/Apr 2026 **SAT1/III** cases reported in China (two provinces)
- May 2026 **SAT1/III** cases in Mongolia (Bayan-Olgii Province)

Affected Provinces in China:

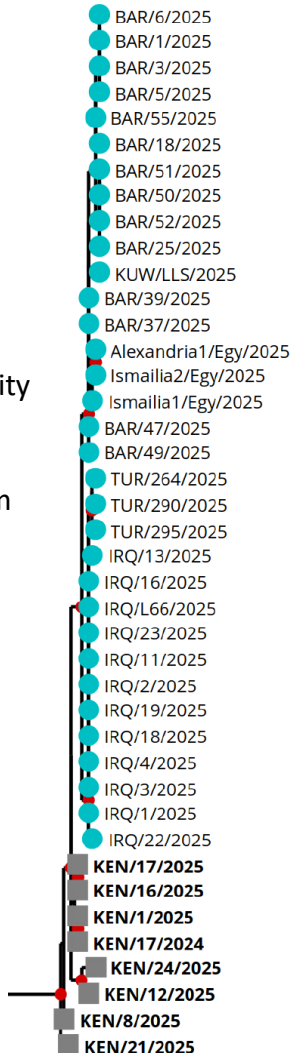


Powered by Bing  
© GeoNames, Microsoft, Navinfo, TomTom

# Co-circulating SAT 1 topotypes

## SATI/I

- Close identity to viruses from Kenya
- Source from East Africa



## Earliest SAT1 reports by country and topotype country

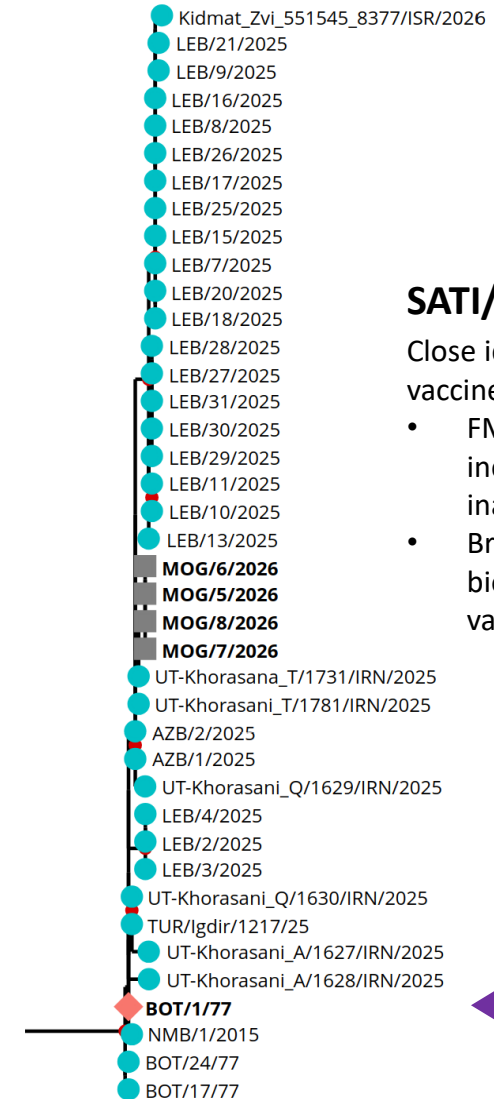
Country	SAT 1/I	SAT 1/III
Bahrain	January 2025	
Iraq	February 2025	
Kuwait	April 2025	
Türkiye	May 2025	November 2025
Iran	*	*
Egypt	July 2025	
Azerbaijan		October 2025
Lebanon		November 2025
Israel		January 2026
Cyprus		Dec 2025/Feb 2026
Syria		January 2026*
China		March 2026
Greece (Lesvos)		March 2026
Mongolia		May 2026
Palestine		April 2026: topotype - not yet reported

\* Outbreaks not confirmed by national authority

## SATI/III

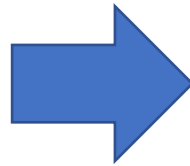
Close identity to BOT/1/77 vaccine strain

- FMD vaccine incorrectly inactivated?
- Breach of biocontainment at vaccine plant?



# SAT 1 potential impacts and preparedness

- Reports of SAT1/III cases in cattle, small ruminants and pigs (Cyprus)
- Most livestock in Asia are immunologically naïve
- Risk pathways in the region and to China/Mongolia are not well understood
- **Potential scope for rapid onward spread to other countries in the Middle East, Central Asia and East/Southeast Asia**
- High demand for vaccines for a previously neglected serotype



- FAO has issued alerts to raise global awareness of these new risks
- Recent GF-TADs seminars on epidemiology and vaccines
- Importance of laboratory preparedness
  - Support from WOAHA and FAO reference laboratories
  - SAT1/I and SAT1/III lineage-specific real-time RT-PCRs developed (by ANSES and WRLFMD)
  - Sequencing approaches (primers) are also available
  - [www.foot-and-mouth.org](http://www.foot-and-mouth.org)
  - Ag-ELISA (from IZSLER) detects and discriminates viruses from this topotype

# Further information.....

- FMD reports and lab testing (<https://www.wrlfmd.org/ref-lab-reports>)
  - *Genotyping reports, Vaccine matching and Serotyping reports*
- Other data sources:
  - Quarterly WRLFMD/EuFMD report (<https://www.wrlfmd.org/ref-lab-reports>)
  - Annual report of the WOAHA/FAO FMD Laboratory Network (<http://foot-and-mouth.org/>)
  - OpenFMD ([www.openfmd.org](http://www.openfmd.org)) – sequences, genotyping, vaccine selection and surveillance



Welcome



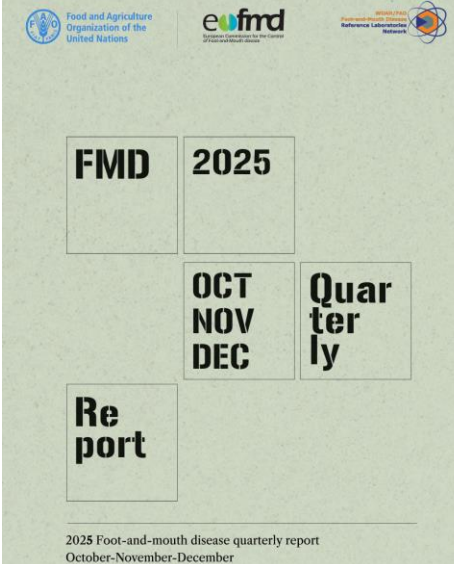
The Pirbright Institute is designated as the World Reference Laboratory for Foot-and-Mouth Disease by the Food and Agriculture Organization (FAO) of the United Nations and as a reference laboratory for FMD by the Office International des Epizooties (OIE).

Country FMD Reports



Details of samples tested for FMD at WRLFMD from around the world.

Country Reports >



Food and Agriculture Organization of the United Nations

eu fmd

World Reference Laboratory Network

**FMD 2025**

**OCT NOV DEC**

**Quarterly Report**

2025 Foot-and-mouth disease quarterly report  
October-November-December

# Thanks:



- Collaborating FMD Reference Laboratories and field teams
- Partners within the WOAAH/FAO FMD Lab Network
- Support for the WRLFMD and research projects

