Food and Agriculture Organization of the United Nations

eufmd
european commission for the control of foot-and-mouth disease

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

Foot-and-Mouth Disease

2022

Quarterly report

July-September

Funded by the European Union

EuFMD's programme, tools and initiatives

FAST
Foot-and-mputh And Similar Transboudary animal diseases

Dt
eufmd digital transformation

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vlearning
eufmd virtual learning centre

microLearning
eufmd virtual learning

vlc EA
virtual learning centre for East Africa

Tom
eufmd training management system

SimExOn
simulation exercises online

KnowBank
eufmd knowledge bank

GetPrepared
emergency preparedness toolbox

RiskComms
risk communications

SQRA
a method for spatial qualitative risk analysis applied to fmd.

Pragmatist
prioritization of antigen management with international surveillance tool

EuFMDiS
european foot-and-mouth disease spread model

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

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Vademos
fmd vaccine demand estimation model

GVS
global vaccine security

PQv
vaccine prequalification

PCP
progressive control pathway

PSO
pcp practicioner officers

VPP
veterinary paraprofessionals

PPP
public private partnership

Sustainable Development Goals, UN-SDGs. EuFMD's programme has a focus on

Together against wasting resources, think twice before printing.

Foot-and-Mouth Disease

Quarterly Report
July-September 2022

Food and Agriculture Organization of the United Nations
Rome, 2022

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This report is version 1

Note: Previous reports have been revised:

- The October-December 2021 report has been revised [to version 2] to correct the collection date of Cambodian sequences analysed by the WRLFMD to January 2019.
- The April-June 2022 report has been revised [to version 2] to correct the origin of samples reported for Algeria. These samples were submitted from the Institut National de la Medecine Veterinaire, Algeria.

The revised reports can be retrieved from the WRLFMD website (www.wrlfmd.org).

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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

BVI	Botswana Vaccine Institute
EIDRA	Emerging Infectious Disease Research Association
EuFMD	European Commission for the Control of Foot-and-Mouth Disease
FAST reports	Foot-and-mouth and similar transboundary animal diseases reports
FGBI “ARRIAH”	Federal Governmental Budgetary Institution “Federal Centre for Animal Health”
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
LVRI	Lanzhou Veterinary Research Institute
MEVAC	International Facility for Veterinary Vaccines Production (Egypt)
MNFMDL	Malaysian National Foot-and-Mouth Disease Laboratory
NT	not tested
NVD	no virus detected
OIE	Office International des Epizooties
PIADC	Plum Island Animal Disease Center
Pusvetma	Pusat Veteriner Farma
rRT-PCR	real-time reverse transcription polymerase chain reaction
SAARC	South Asian Association for Regional Cooperation
SADC	Southern African Development Community
SAT	Southern African Territories
SEACFMD	South-East Asia and China FMD campaign
SSARRL	Sub-Saharan Africa Regional Reference Laboratory
SVD	swine vesicular disease
VETBIS	Veterinary Information System of Türkiye
VI	virus isolation
WAHIS	World Animal Health Information System (of the WOAH)
WOAH	World Organisation for Animal Health (founded as OIE)
WRLFMD	World Reference Laboratory for Foot-and-Mouth Disease

1. Highlights and headlines

Welcome to this new quarterly report covering foot-and-mouth disease (FMD) activities for July-September 2022. During the past three months, the World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD) has reported test results for samples received from Ethiopia, Indonesia, Israel, Mongolia, Palestine, Thailand, the United Arab Emirates. There have also been sequence submissions from Botswana (BVI), Egypt (from GenBank), Ghana (NCFAD), Indonesia (Pusvetma), Niger (LABOCEL & ANSES) and Zimbabwe (BVI).

Following on from a peer-reviewed paper describing a serotype O virus of South America origin in Egypt that was published earlier in the year, another paper from a different Egyptian group (https://pubmed.ncbi.nlm.nih.gov/36209919/) has recently reported serotype A viruses from the A/EURO-SA topotype in the country. These unexpected events represent the introduction of completely new viral lineages into North Africa and raise many questions regarding the routes by which these viruses have transited from South America, as well as the potential for these lineages to become established and spread in the region. Elsewhere in Africa, outbreaks due to serotype SAT 2 have occurred within a disease control zone in Botswana, where sequences shared by BVI, Botswana show closest relationship to FMD viruses previously collected across the border in Zimbabwe. In South Africa, new FMD outbreaks due to serotypes SAT 2 (KwaZulu-Natal and Free State) and SAT 3 (Free-state, Gauteng, Mpumalanga, and North-West Provinces) have been reported. FMD cases also continue to be reported in Indonesia and WRLFMD has received representative samples from representative cases (caused by the O/ME-SA/Ind-2001e lineage), where vaccine matching data described in this report provides reassurance about the use of certain FMD vaccines to control these outbreaks.

Further published information including the individual laboratory reports from WRLFMD can be retrieved from the following website (http://www.wrlfmd.org/). I am looking forward to catching up with you during the Open Session of EuFMD (https://www.eufmd.info/os22) in October either in person or via the virtual sessions.

Don King, Pirbright, October 2022

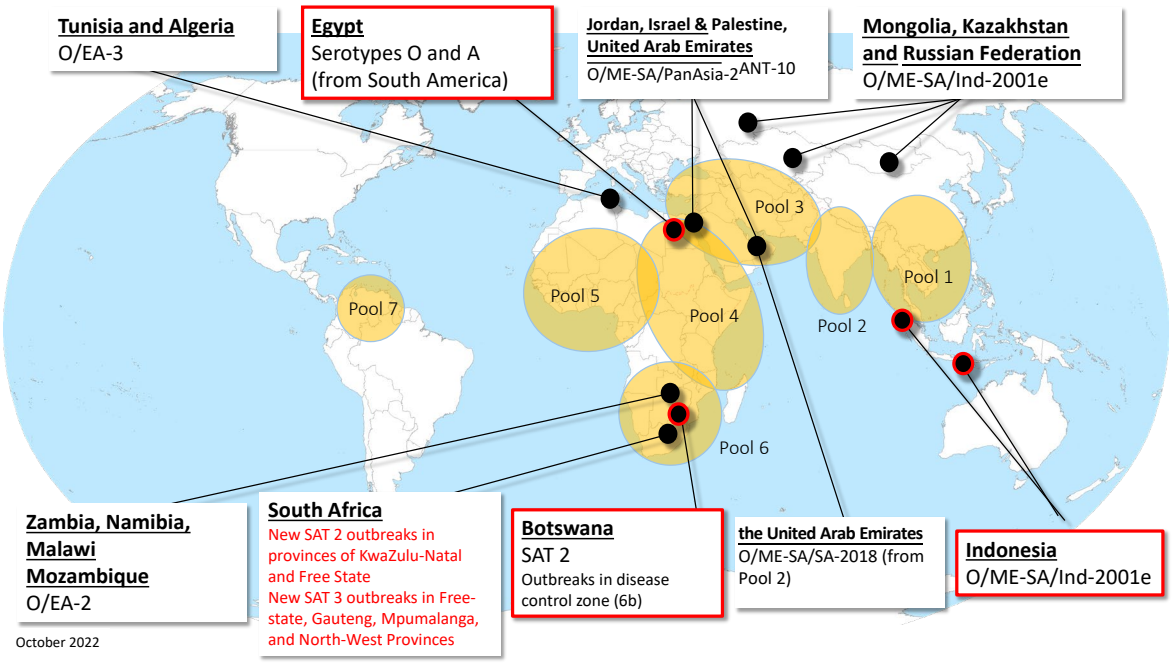


Figure 1: Recent FMD global outbreaks (new headline events reported July to September 2022 are highlighted in red) with endemic pools highlighted in orange. Source: WRLFMD. Map conforms to the United Nations World Map, June 2020.

2. General overview

Endemic Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below are continuously circulating in parts of the pool area 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, Asia 1 and O
2	**SOUTH ASIA** Bangladesh, Bhutan, India, Mauritius[1], Nepal, Sri Lanka	A, Asia 1 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, Asia 1 and O (SAT 2)
4	**EASTERN AFRICA** Burundi, Comoros, Djibouti, Egypt[3], Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Uganda, United Republic of Tanzania, Yemen	O, A, SAT 1, SAT 2 and SAT 3
	NORTH AFRICA[2] Algeria, Libya, Morocco, Tunisia	A, O and SAT 2
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, SAT 1 and SAT 2
6	**SOUTHERN AFRICA** Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe	SAT 1, SAT 2 and SAT 3 (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.

[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 SAT 1 and SAT 3 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. Global overview of samples received and tested

The location of all samples detailed 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.

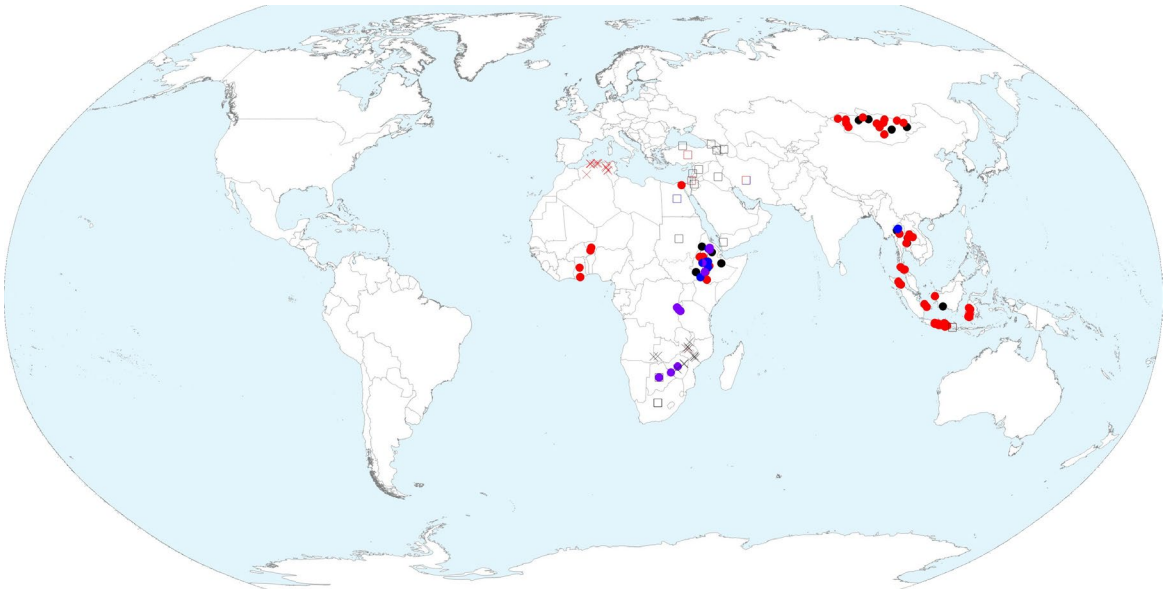
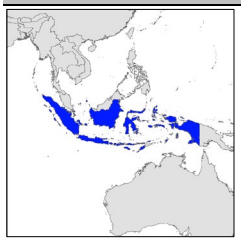


Figure 2: Samples tested by WRLFMD or reported in this quarter. ● indicates samples analysed; × indicates new outbreaks reported to the WOAH; □ indicates reports of FMD from other sources. Shape colours define the serotype detected ●O; ●A; ●C; ●Asia1, ●SAT1, ●SAT2, ●SAT3, ○ FMD not detected, ● serotype undetermined/not given in the report.

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

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

The Republic of the Indonesia

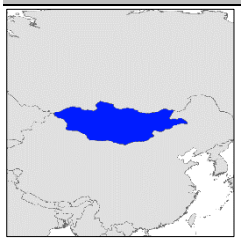


On the 18 June 2022, six samples were received from the Pusvetma laboratory. **FMD type O** virus was recovered from one sample and FMDV genome was detected (FMDV-GD) in a further four samples. One sample was no virus detected (NVD). Complete VP1 sequence data was obtained for the virus isolate and for two of the FMDV-GD samples. These sequences belonged to the O/ME-SA/Ind-2001e sublineage and were closely related to sequences previously provided by the PUSVETMA laboratory. Subsequently, on 31 July 2022 and a further 26 VP1 sequences were released on GenBank by the Disease Investigation Center Wates - Yogyakarta (DICWY). On 31 August 2022, the PUSVETMA laboratory provided a further six VP1 sequences. Phylogenetic analyses of all these sequences are shown below.

Local media have reported on the controls being put in place throughout Indonesia to reduce the spread of FMD as well us updates on the number of infected animals and affected areas. New biosecurity response zones for travellers arriving from Indonesia have been implemented in Australian airports

ProMED posts: 20220708.8704299, 20220711.8704348, 20220723.8704604 & 20220929.8705850

Mongolia



A batch of 17 samples collected from cattle in 15 different provinces between August 2021 and February 2022 was received by WRLFMD. **FMD type O** virus was isolated from 13 samples, while four were FMDV-GD. Genotyping showed that they all belonged to the **FMD type O ME-SA/Ind-2001e** sublineage and were most closely related to viruses from Vietnam in 2020, Thailand in 2021, Kazakhstan in 2021 the Russian Federation in 2022 (see below).

The Kingdom of Thailand

On 06 May 2022, a batch of 16 samples was received. **FMD type O** virus was isolated from eight samples, while **FMD type A** virus was isolated from five samples; three samples were FMDV-GD. Genotyping showed the eight **FMD type O** viruses belonged to **ME-SA/Ind-2001e** sublineage and the five **FMD type A** viruses belonged to the **ASIA/Sea-97** lineage (see below).

3.3. Pool 2 (South Asia)

No new outbreaks of FMD were reported in South Asia.

3.4. Pool 3 (West Eurasia and Near East)

The Republic of Armenia

Passive surveillance is being used in Armenia. During this quarter

228 461 large and 100 592 small ruminants were vaccinated.

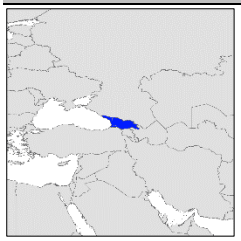
FAO EuFMD FAST report Jul-Sep 2022

The Republic of Azerbaijan

Passive surveillance is being used in Azerbaijan and 773 864 animals were vaccinated in this quarter, bringing the total number of animals vaccinated in this year's spring vaccination campaign to 5 650 450.

FAO EuFMD FAST report Jul-Sep 2022

Georgia



The spring prophylactic vaccination has finished and NSP sero-surveillence is planned. During the reporting period 187,567 large and 526 421 small ruminants were vaccinated.

FAO EuFMD FAST report Jul-Sep 2022

The Islamic Republic of Iran

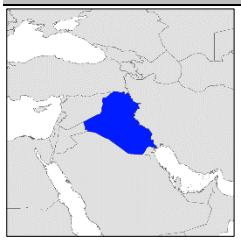
Eight outbreaks have been reported in this quarter. The circulating FMDV strains are O/ME-SA/PanAsia-2^{ANT-10} and A/ASIA/Iran-05^{FAR-11}.

Passive and (risk-based & enhanced) active surveillance activities are on-going.

Over 26 million animals have been vaccinated using trivalent vaccines (O, A & Asia-1) and post-vaccination monitoring has been completed.

FAO EuFMD FAST report Jul-Sep 2022

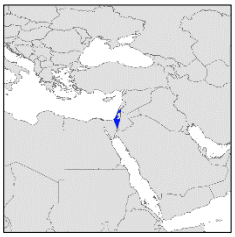
The Republic of Iraq



FMD cases (n=1707) in sheep, goats, cattle and buffalo have been reported to the veterinary directorate so far in 2022. Of the 50 clinical samples submitted to the Central Veterinary Laboratory, 32 percent were positive. Due to the unavailablity of vaccine, no vaccination campaign has been conducted in 2022.

FAO EuFMD FAST report Jul-Sep 2022

The State of Israel



In July 2022, three new outbreaks of **FMD type O** were reported and two on-going outbreaks reported further cases from the Northern and Haifa districts. These all occurred in cattle and were attributed to the O/ME-SA/PanAsia-2^{ANT-10} lineage.

WOAH World Animal Health Information System (event ID: evt_4305)

The Hashemite Kingdom of Jordan

Active surveillance is being used in Jordan. A vaccination campaign (provided for free) and post-vaccination monitoring are planned.

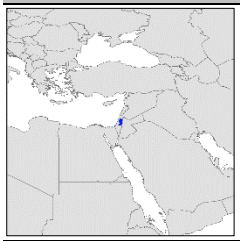
FAO EuFMD FAST report Jul-Sep 2022

The Lebanese Republic

A vaccination campaign is planned, targeting 90 percent of all dairy cattle and 63 percent of small ruminants in the country.

FAO EuFMD FAST report Jul-Sep 2022

The State of Palestine



Vaccination occurs twice a year for dairy cattle and once a year for sheep. Since the beginning of June 2022, 577 995 animals have been vaccinated.

FAO EuFMD FAST report Jul-Sep 2022

The Syrian Arab Republic

Passive and active surveillance activities occur in the country. FMD vaccination in risk areas and borders is obligatory and free of charge and is followed by sero-surveillance.

FAO EuFMD FAST report Jul-Sep 2022

The Republic of Türkiye

During this quarter there were 19 outbreaks of FMD in the Anatolia region. Most typed as O/ME-SA/PanAsia-2^{QOM-15}, only one was O/ME-SA/PanAsia-2^{ANT-10}.

More than 25 000 animals were clinically examined for FMD under the Thrace RBSP. Clinical surveillance (24 320 animals) was achieved in >80 percent epi-units in the buffer zone area.

FAO EuFMD FAST report Jul-Sep 2022

FMD was detected in two villages in Taşköprü district, Kastamonu Province. Quarantine and movement restrictions were applied to the affected villages and Taşköprü Livestock Market was closed until further notice as a precaution.

ProMED post: 20220918.8705649

The Republic of Yemen

Yemeni officials and FAO specialists visited areas in the Directorate of Al-Haima Al-Kharjiya following reports about infection and death from FMD. Examination and sampling was done to ascertain the nature of the disease causing the problem.

ProMED post: 20220919.8705670

3.5. Pool 4 (North and Eastern Africa)

The Republic of Burundi

Eighteen VP1 sequences, which had been determined at SCIENSANO, were retrieved from GenBank. Three belonged to **FMD type A** and 15 to **FMD type SAT 2**. They were from samples collected from cattle in the Cibitoke, Mwaro and Rutana provinces in 2016. The type A viruses belonged to the AFRICA/G-I lineage and were most closely related to viruses from Uganda and Kenya. The SAT 2 viruses belonged to topotype IV and were most closely related to viruses from Uganda.

The People's Democratic Republic of Algeria

In September 2022, 16 outbreaks of **FMD type O** were reported in cattle, sheep and goats in nine provinces.

WOAH World Animal Health Information System (event ID: 4432)

The Arab Republic of Egypt

From April there were an increasing number of FMD (A/AFRICA/IV and A/Euro-SA) notifications. Vaccination campaigns and a post-vaccination monitoring study are on-going and have covered 54.3 percent of large and 32 percent of small ruminants.

ProMED post: 20221002.8705896

FAO EuFMD FAST report Jul-Sep 2022

The Federal Democratic Republic of Ethiopia

On 18 May 2022, a batch of 49 samples were received. **FMD type O** virus was isolated from 19 samples, **FMD type A** virus from nine samples and **FMD type SAT 2** virus from five samples; nine samples were FMDV-GD and seven were NVD. VP1 genotyping showed that the **FMD type O** viruses fell into either EA-3 (n=13) or EA-4 (n=6) topotypes. The nine **FMD type A** viruses all belonged to the AFRICA/G-IV lineage. The **FMD type SAT 2** viruses belonged to one of three topotypes, VII/Lib-12 (n=2), XIII (n=1) or XIV (n=2). SAT 2 topotype XIII has only been detected on one occasion in the past, in Ethiopia in 1991, while topotype XIV was last detected in 2010 in Ethiopia.

The Republic of the Sudan

A batch of 40 samples was received on 27 June 2022 and results are pending.

Vaccination is mainly practiced on large-scale dairy farms.

FAO EuFMD FAST report Jul-Sep 2022

3.6. Pool 5 (West/Central Africa)

The Republic of Ghana

On 29 July 2022, eight **FMD type O** sequences were received from NCFAD/CFIA. They were from samples collected from cattle in the Central Region in 2021. Genotyping of the VP1 region for seven of the viruses (one had too many ambiguous bases) showed that they belonged to the EA-3 topotype and were closely related to other recent West and North African EA-3 viruses (see below).

3.7. Pool 6 (Southern Africa)

The Republic of Botswana

Between 27 August 2022 and 19 September 2022, six **FMD type SAT 2** partial VP1 sequences were received from the BVI. The first was from a sample collected from cattle on 24 August 2022 at Butale crush, Masungu, north-east district (close to the border with Zimbabwe). No information was given for the subsequent five samples. Genotyping showed that all the sequences belonged to SAT 2 topotype II and were closely related to each other. They were also closely related to a partial VP1 sequence from Zimbabwe (also provided by the BVI). See below.

WOAH World Animal Health Information System (event ID: 4594)

Beef exports have been suspended while a suspected FMD outbreak in the Northeast district is being investigated.

ProMED posts: 20220826.8705242

Malawi

In August 2022, unsampled outbreaks of **FMD** were reported in cattle in Chikwawa and Nsanje districts in the Southern Region of the country. Previously, in February 2022, O/EA-2 was reported in the Central region.

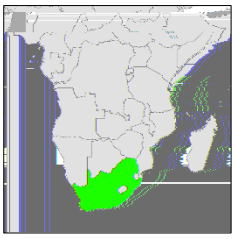
WOAH World Animal Health Information System (event ID: 4561)

The Republic of Mozambique

An outbreak of **FMD type O** was reported (in July 2022) in cattle at Nsadzo, Mualadzi, Chifunde, Tete province. In August, a second untyped outbreak was also reported in Chinheche, Kambulatsitsi, Moatize, Tete province. Genotyping of a **FMD type O** virus from a previous outbreak in the province revealed the topotype to be EA-2 (see previous Quarterly Report).

WOAH World Animal Health Information System (event ID: 4413 & 4566)

The Republic of South Africa



23 new **FMD type SAT 2** outbreaks were reported this quarter. Most were from Umgungundlovu, Umkhanyakude & Zululand districts in Kwazulu-Natal Province. Two (late August and early September) were reported from the neighbouring district of Thabo Mofutsanyane, Free State.

WOAH World Animal Health Information System (event ID: evt_4305)

Between July and September 40 new outbreaks for **FMD type SAT 3** were reported from the provinces of Free State, Gauteng, Mpumalanga and north-west.

WOAH World Animal Health Information System (event ID: evt_4368)

Movement of cattle across the whole country was suspended for 28 days (with exemptions for the movement of animals to registered abattoirs for slaughter) in response to the on-going outbreak that started in March and has been affecting animals in KwaZulu-Natal, Limpopo, the north-west, Gauteng, Mpumalanga, and the Free State.

ProMED posts: 20220817.8705081, 20220824.8705200, 20220831.8705325.& 20220906.8705427

The Republic of Zimbabwe

In July 2022, untyped FMD outbreaks were reported in two areas, i) Masikana dip tank, Marondera, Mashonaland East and ii) Gweru, Midlands.

WOAH World Animal Health Information System (event ID: 4520)

On 25 July 2022, a single FMD type SAT 2 VP1 sequence was received from the BVI (from an epithelium sample from cattle; no location given). Genotyping showed that it belonged to SAT 2 topotype III (see below). On 19 September 2022, a partial FMD type SAT 2 VP1 sequence was received from the BVI (no location given) which belonged to SAT 2 topotype II, closely related to recent viruses from Botswana (north-east district).

3.8. Pool 7 (South America)

No new outbreaks of FMD were reported in South America.

3.9. Extent of global surveillance

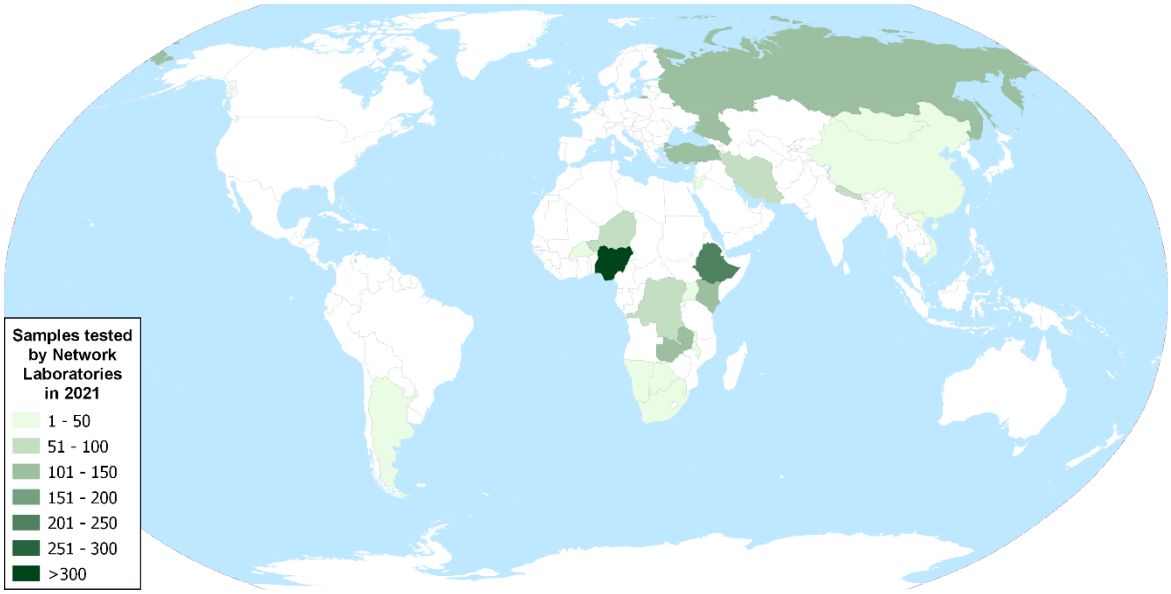


Figure 3: Samples received during 2021 from FMD outbreaks (routine surveillance that is undertaken in countries that are FMD-free without vaccination is not shown). Data from presentations given at the WOAH/FAO FMD reference laboratory network annual meeting (https://www.foot-and-mouth.org/Ref-Lab-Network/Network-Annual-Meeting). 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. 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 (reviewed at the WOAH/FAO FMD reference laboratory network meeting in December 2021) can be used to inform the PRAGMATIST tool (see Annex 3). Recent changes to increase risks are shown in **red**, while a reduction in risk is shown in **green**.

Lineage	Southeast / 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			35					
O ME-SA PanAsia	10							
O SEA Mya-98	**21.5**							
O ME-SA Ind2001	**40**	**86**[1]	7	**2**				
O EA or O WA			3	55	**55.5**	**65**	16	
O EURO-SA								**90**
O CATHAY	10.5							
A ASIA Sea-97	**18**							
A ASIA Iran-05	0		**32**					
A ASIA G-VII		**10**	**10**					

A AFRICA				33	22	17		
A EURO-SA								10
Asia-1	0	4	12.5					
SAT 1				0	8	3	16	
SAT 2			0.5	10	14	15	52	
SAT 3					0.5		16	
C								

[1] It includes cases due to the emerging O/ME-SA/SA-18 lineage that has been recently detected in Pool 2.

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-2021.

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 to September 2022 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 to September 2022.

WRLFMD Batch No.	Date received	Country	Total No. samples	Serotype	No. of samples	No. of sequences	Sequencing status
WRLFMD/2022/000010	16/05/2022	Mongolia	17	O	13	13	Finished
				FMDV-GD	4	-	
WRLFMD/2022/000012	18/05/2022	Ethiopia	48*	O	19	19	Finished
				A	9	9	
				SAT 2	5	5	
				FMDV GD	9	-	
				NVD	7	-	
WRLFMD/2022/000015	18/06/2022	Indonesia	6	O	3	3	Finished
				FMDV GD	2		
				NVD	1	-	
WRLFMD/2022/000016	06/05/2022	Thailand	16	O	8	8	Finished
				A	5	5	
				FMDV GD	3	-	
WRLFMD/2022/000039	27/06/2022	Sudan	40	pending			
Totals			**127**		**88**	**62**	

* One sample tested positive for serotypes A and SAT 2

Table 3: VP1 sequences submitted by other FMD Network laboratories to the WRLFMD from July to September 2022.

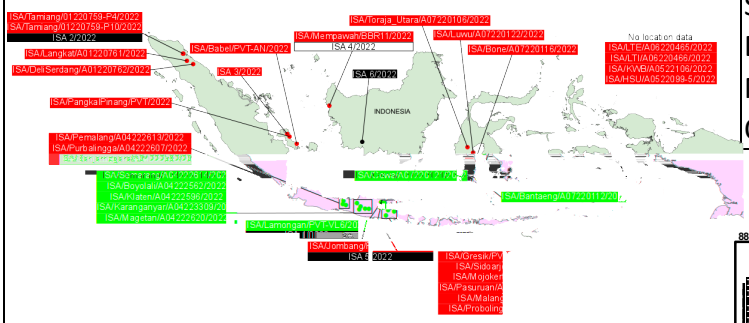
WRLFMD Batch No.	Date received	Country	Serotype	Date Collected	No. of sequences	Submitting laboratory
WRLMEG/2022/00023	25/07/2022	Zimbabwe	SAT 2	2022	1	BVI
WRLMEG/2022/00024	29/07/2022	Ghana	O	2021	8	NCFAD / CFIA
WRLMEG/2022/00025		Indonesia	O	May 2022	26	DICWY
WRLMEG/2022/00026		Burundi	O SAT 2	2016 2016	3 14	SCIENSANO
WRLMEG/2022/00027	04/08/2022	Niger	O	04/08/2022	3	ANSES
WRLMEG/2022/00029	27/08/2022	Botswana	SAT 2	24/08/2022	1	BVI
WRLMEG/2022/00030	31/08/2022	Indonesia	O	31/08/2022	6	PUSVETMA
WRLMEG/2022/00032	14/09/2022	Botswana	SAT 2	14/09/2022	1	BVI
WRLMEG/2022/00033	19/09/2022	Botswana	SAT 2	19/09/2022	4	BVI
WRLMEG/2022/00034	19/09/2022	Zimbabwe	SAT 2	19/09/2022	1*	BVI
				Total	**51**	

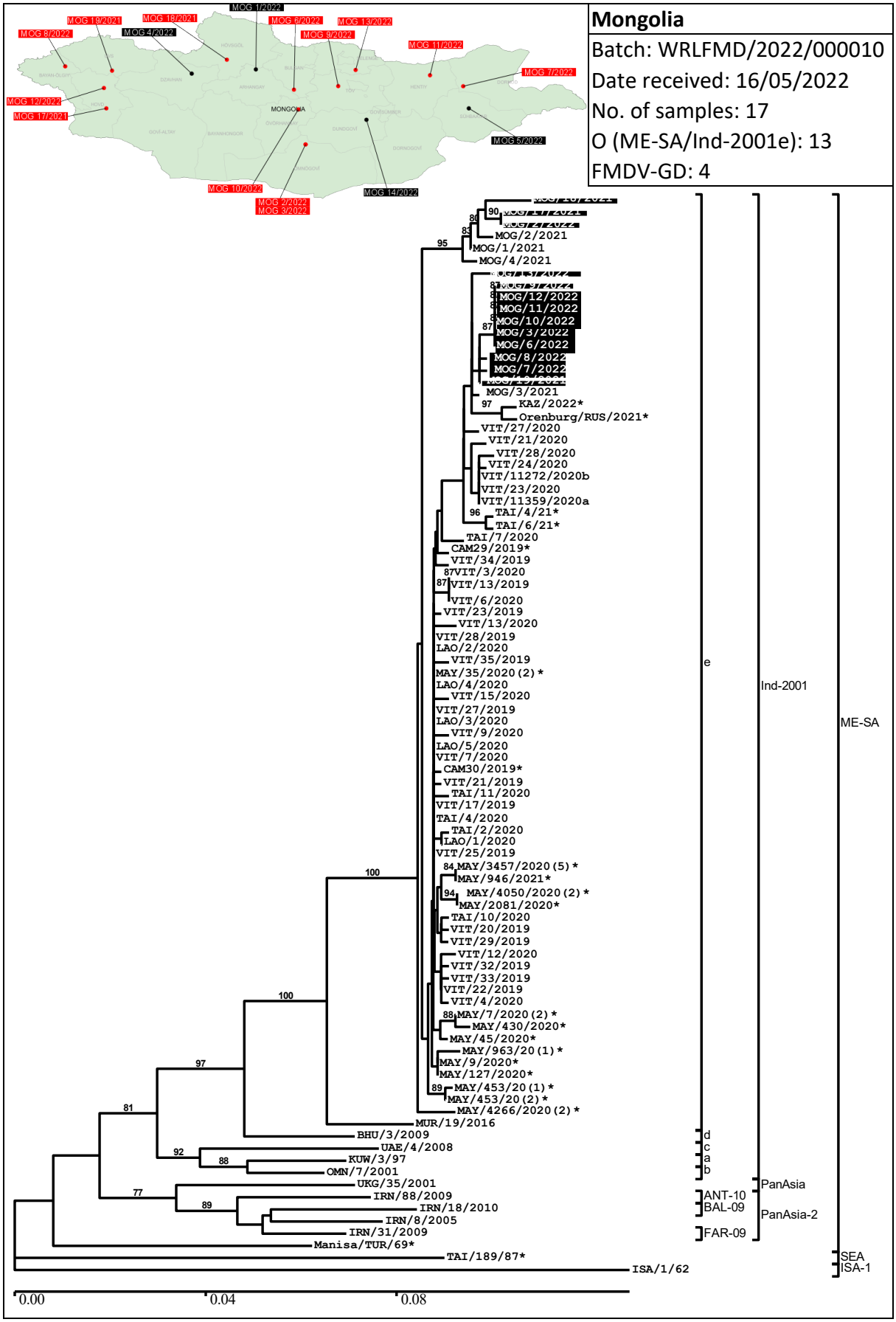
* partial VP1 sequences received for WRLMEG/2022/00034

4. Detailed analysis

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

Republic of Indonesia	
Batch: WRLFMD/2022/000015 Date received: 18/06/2022 No. of samples: 6 O (ME-SA/Ind-2001e): 3 FMDV-GD: 2 NVD: 1	Batch: WRLMEG/2022/00025 Sequence provided by: DICWY Date received: 31/07/2022 No. of sequences: 26 O (ME-SA/Ind-2001e): 26
	Batch: WRLMEG/2022/00030 Sequence provided by: PUSVETMA Date received: 31/08/2022 No. of sequences: 6 O (ME-SA/Ind-2001e): 6





Mongolia

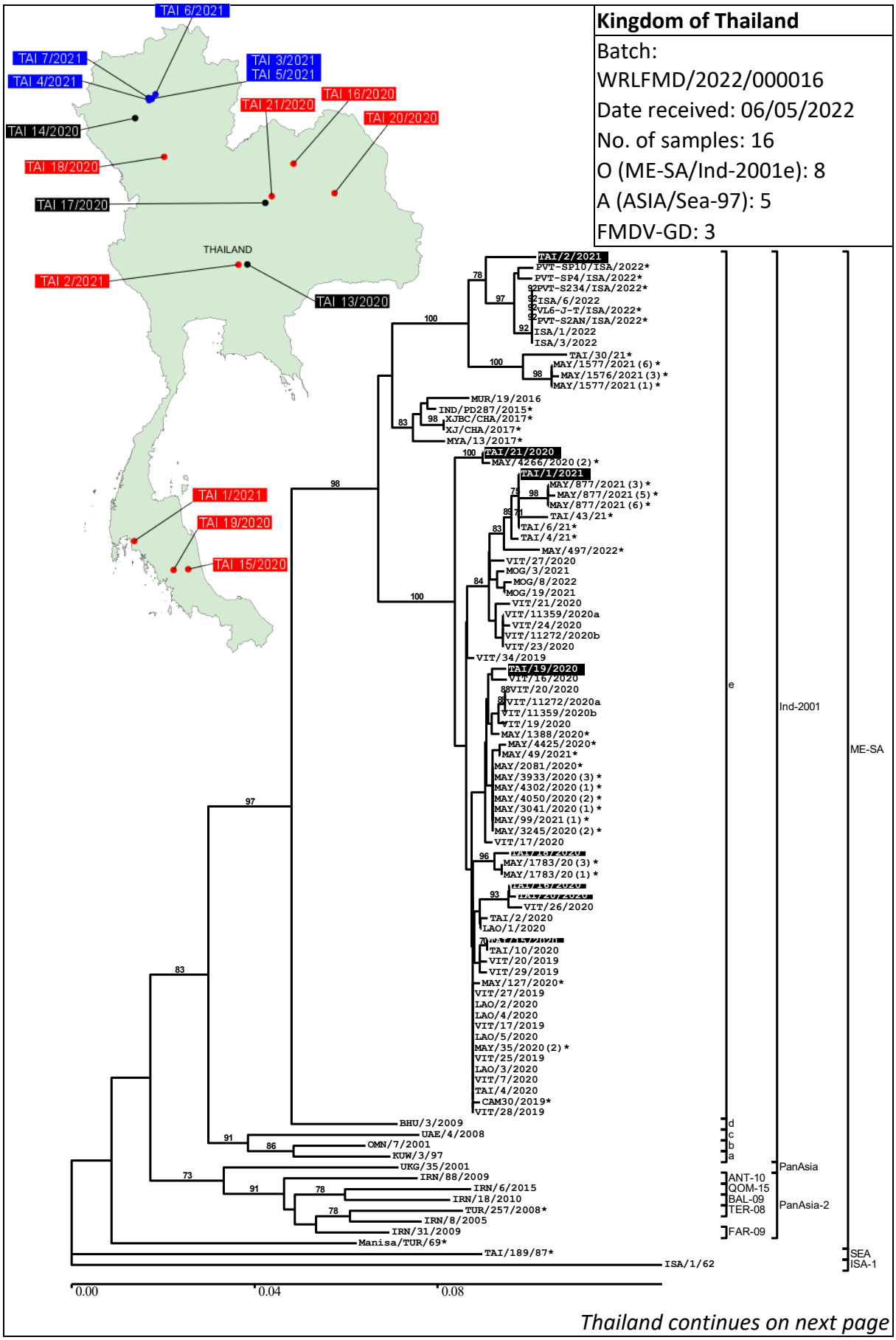
Batch: WRLFMD/2022/000010

Date received: 16/05/2022

No. of samples: 17

O (ME-SA/Ind-2001e): 13

FMDV-GD: 4

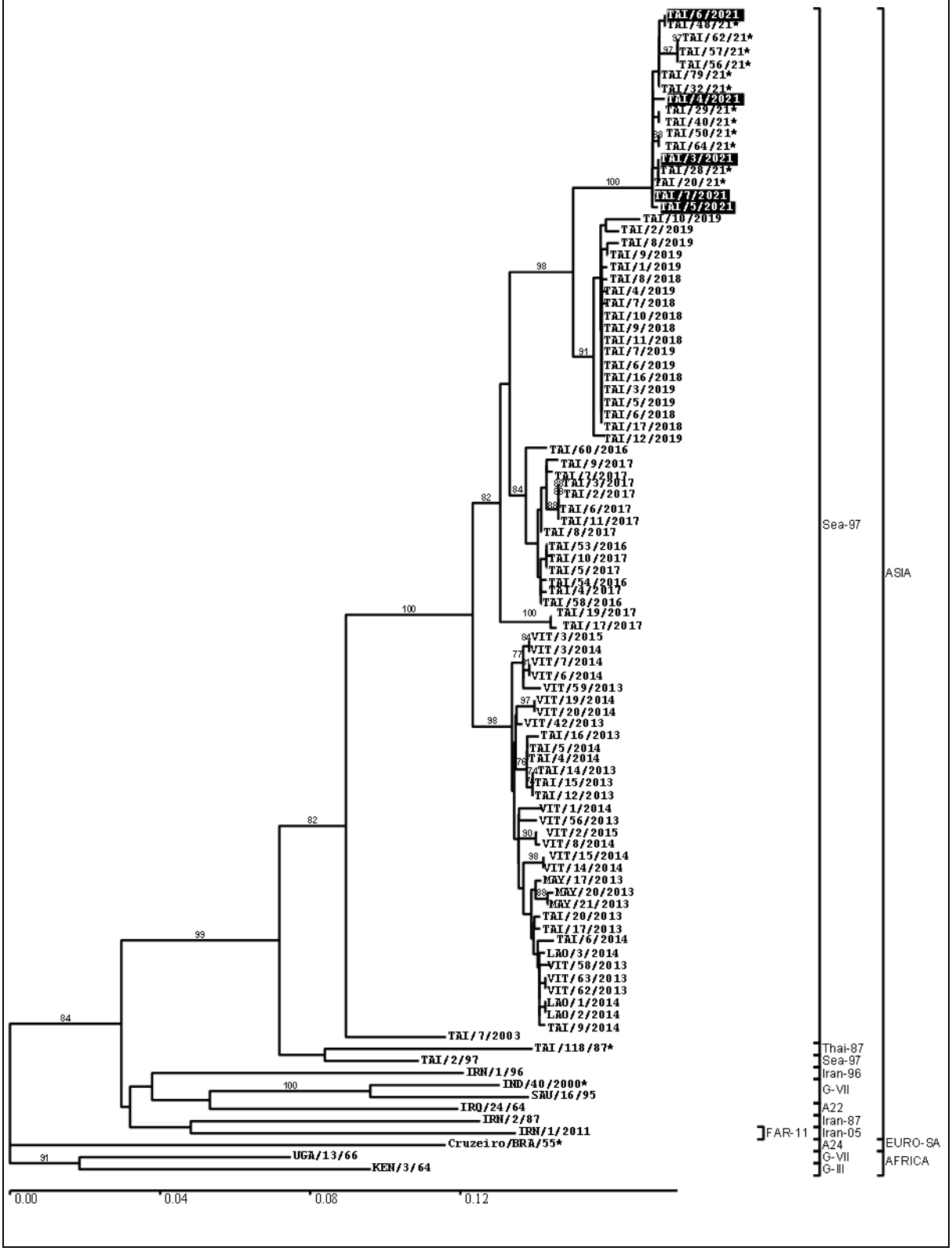


Kingdom of Thailand

Batch: WRLFMD/2022/000016
Date received: 06/05/2022
No. of samples: 16
O (ME-SA/Ind-2001e): 8
A (ASIA/Sea-97): 5
FMDV-GD: 3

Thailand continues on next page

Thailand continued



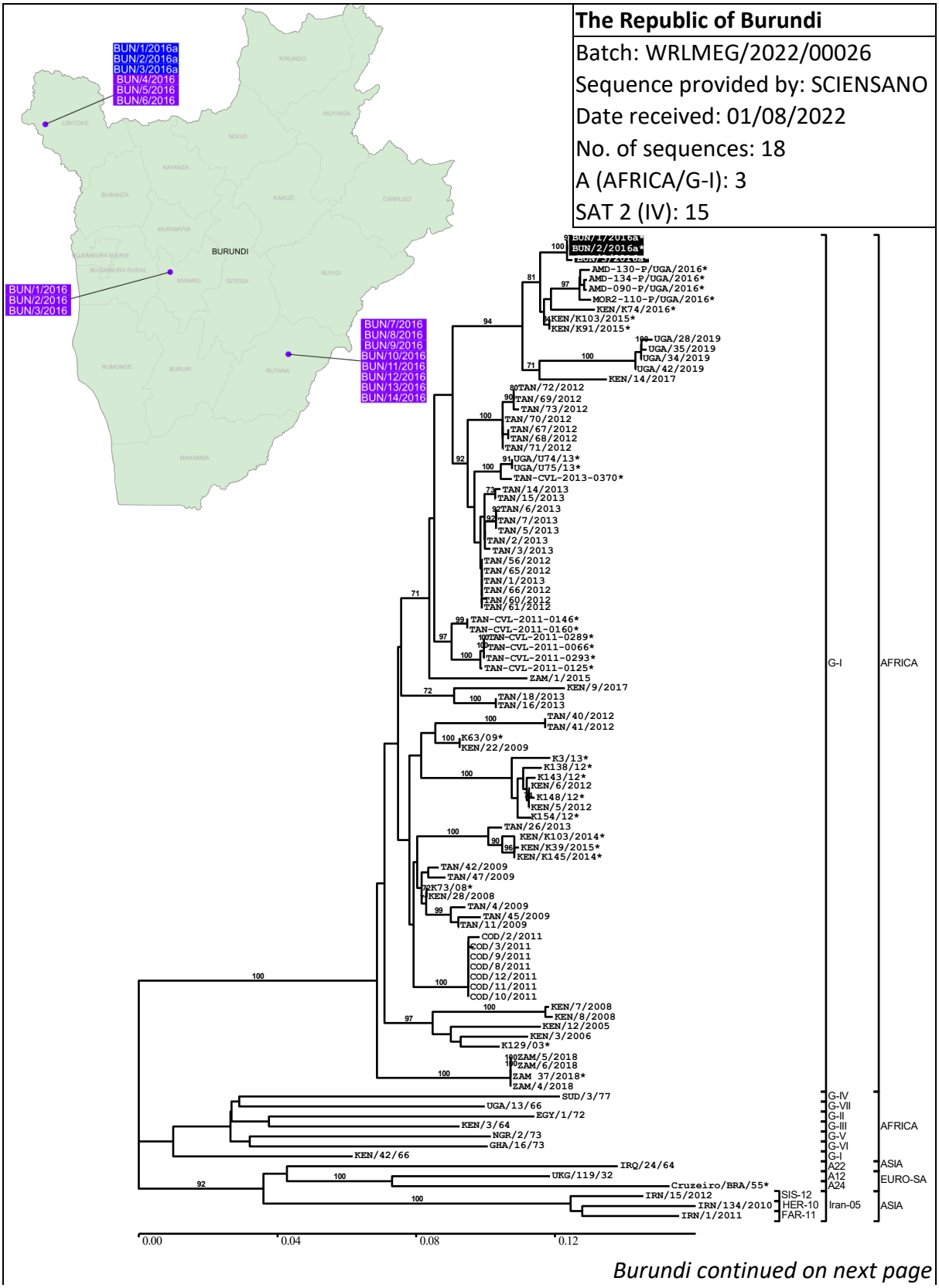
4.2. Pool 2 (South Asia)

No samples/sequences received.

4.3. Pool 3 (West Eurasia and Near East)

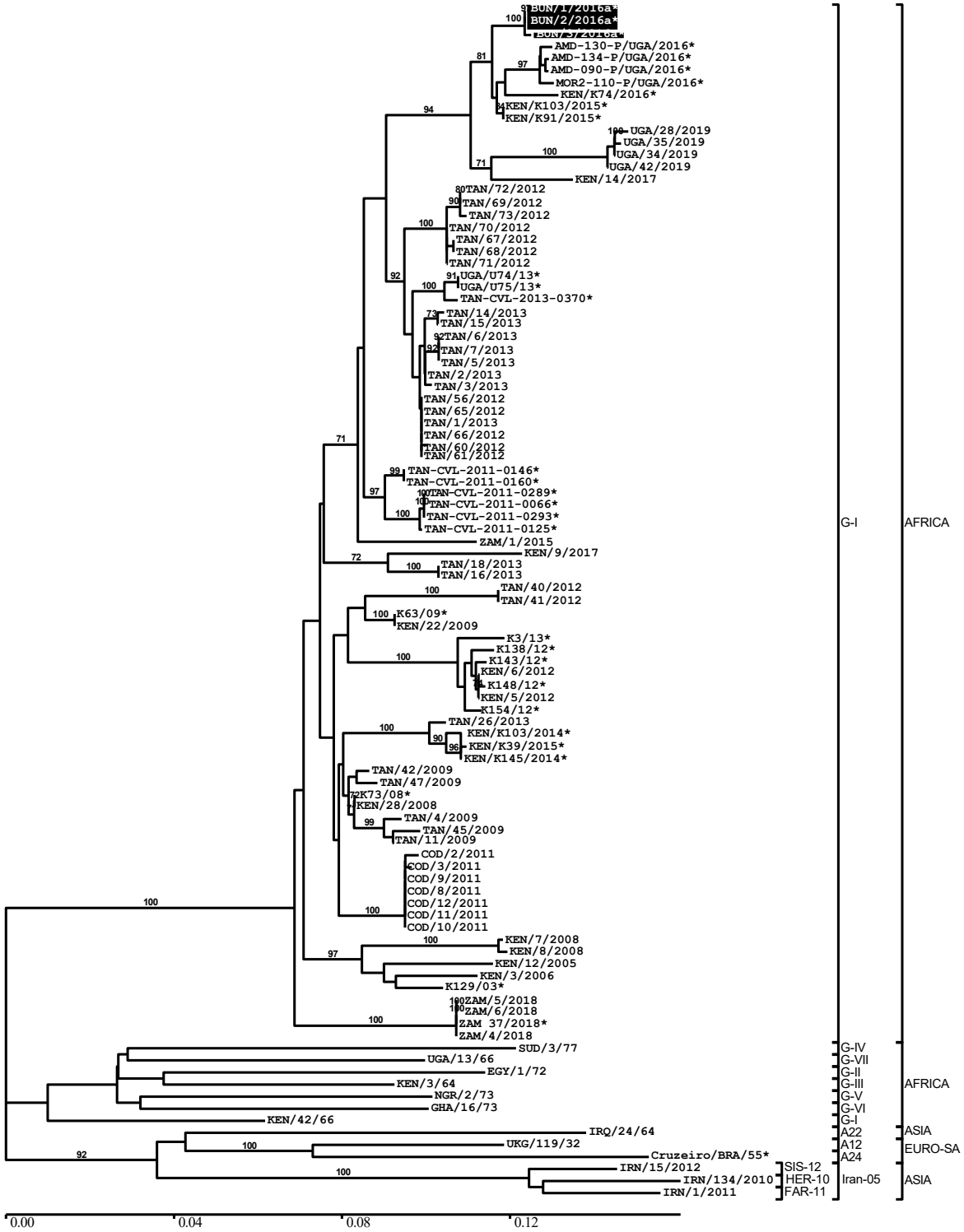
No samples/sequences received.

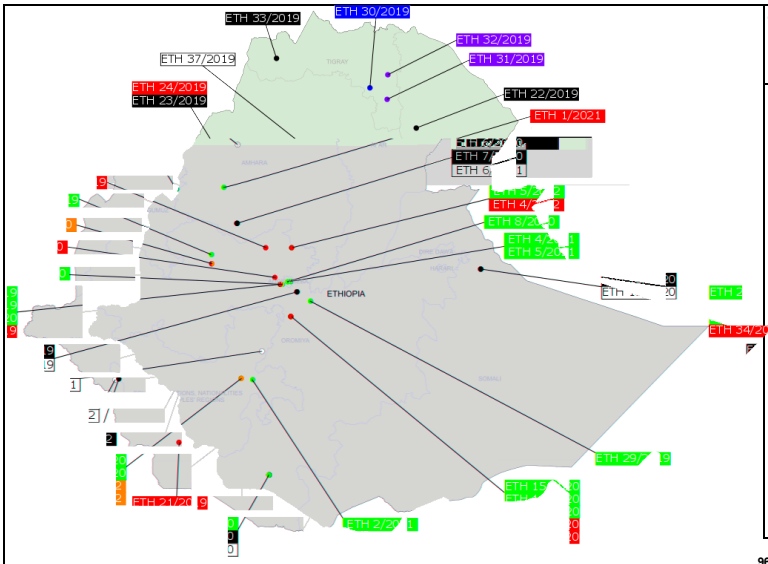
4.4. Pool 4 (North and East Africa)



Burundi continued on next page

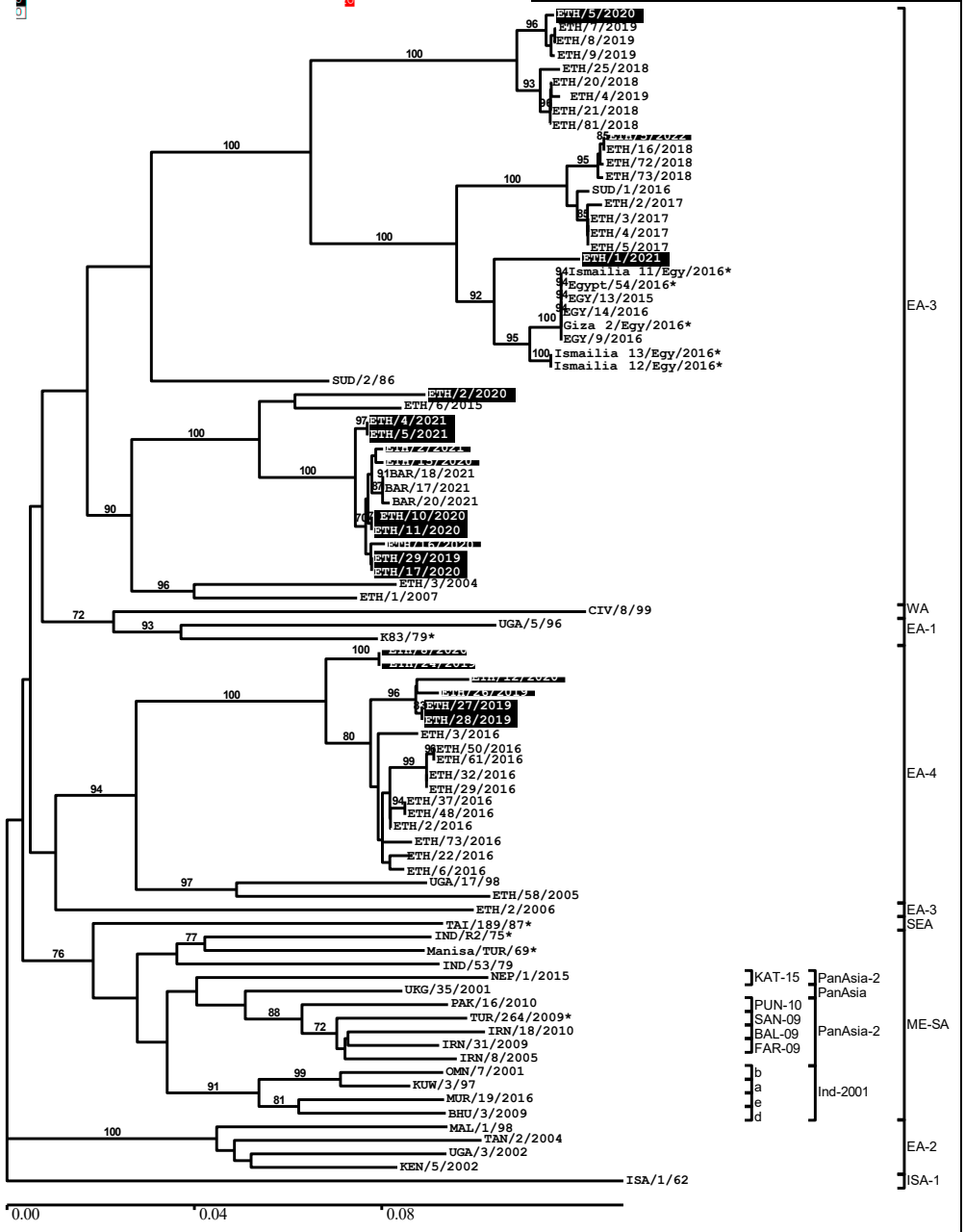
Burundi continued





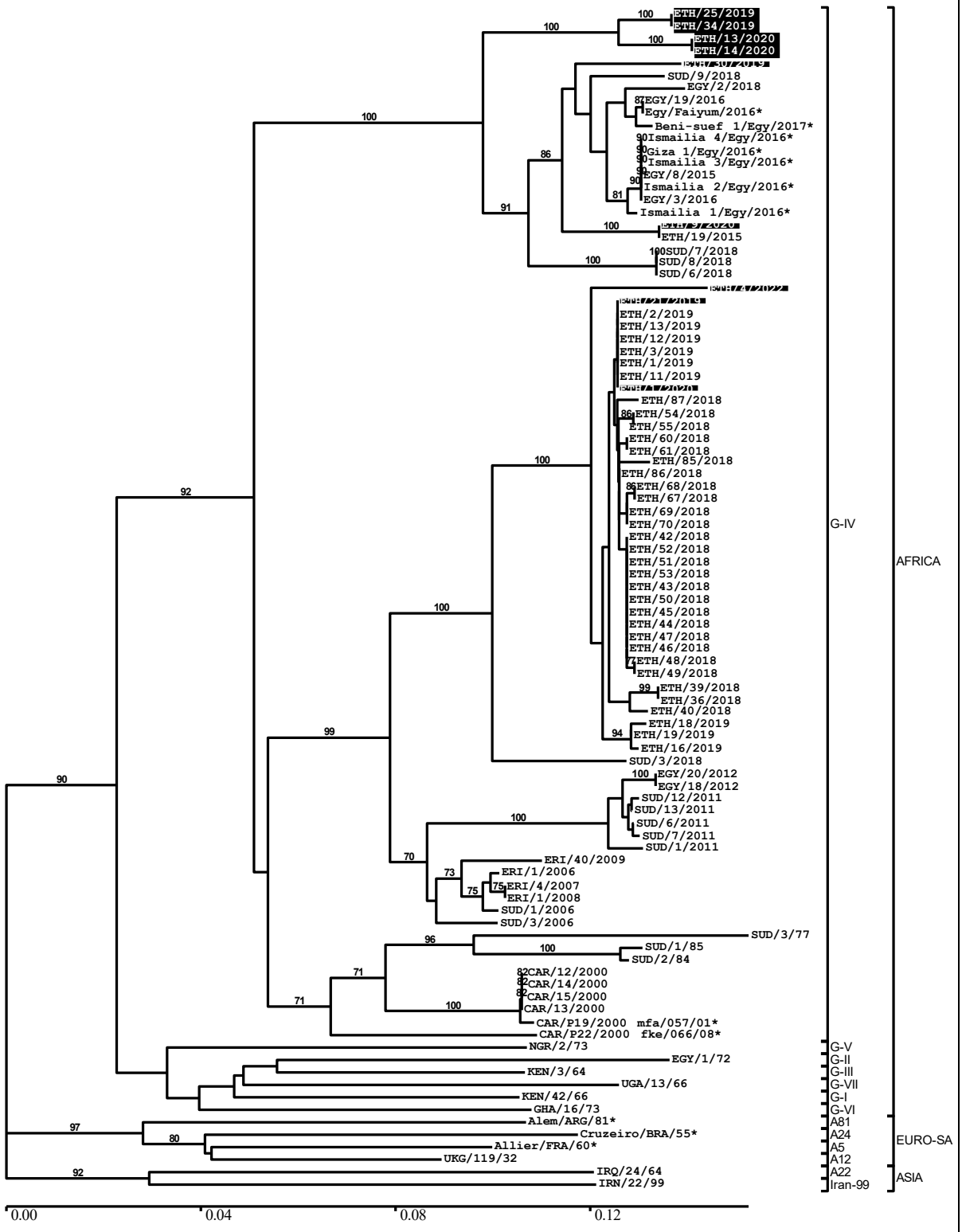
The Federal Democratic Republic of Ethiopia

Batch: WRLFMD/2022/000012
Date received: 18/05/2022
No. of samples: 49
O (EA-3): 13
O (EA-4): 6
A (AFRICA/G-IV): 9
SAT2 (VII/Lib-12): 2
SAT2 (XIII): 1
SAT2 (XIV): 2
FMDV-GD: 9
NVD: 7



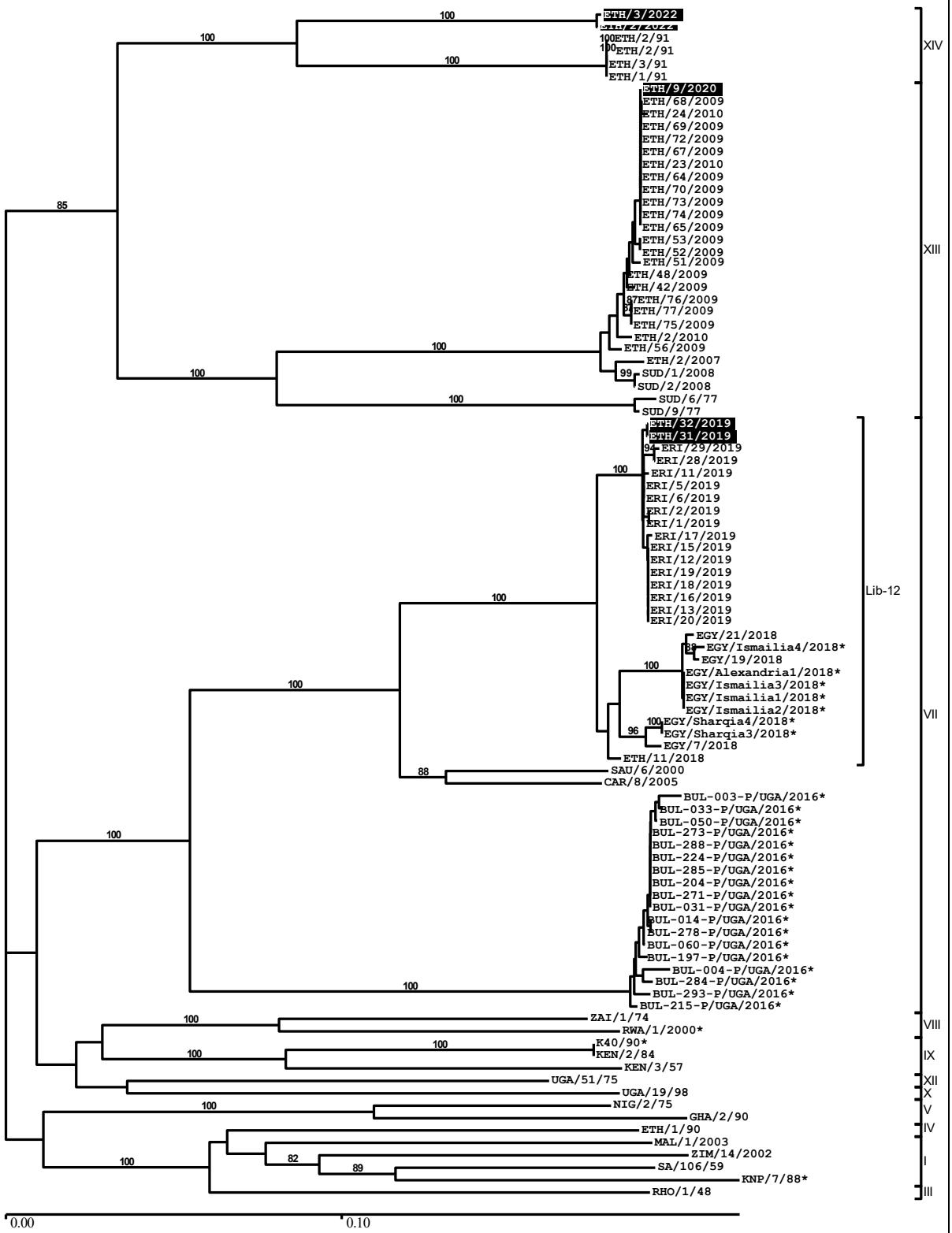
Ethiopia continued on next page

Ethiopia continued

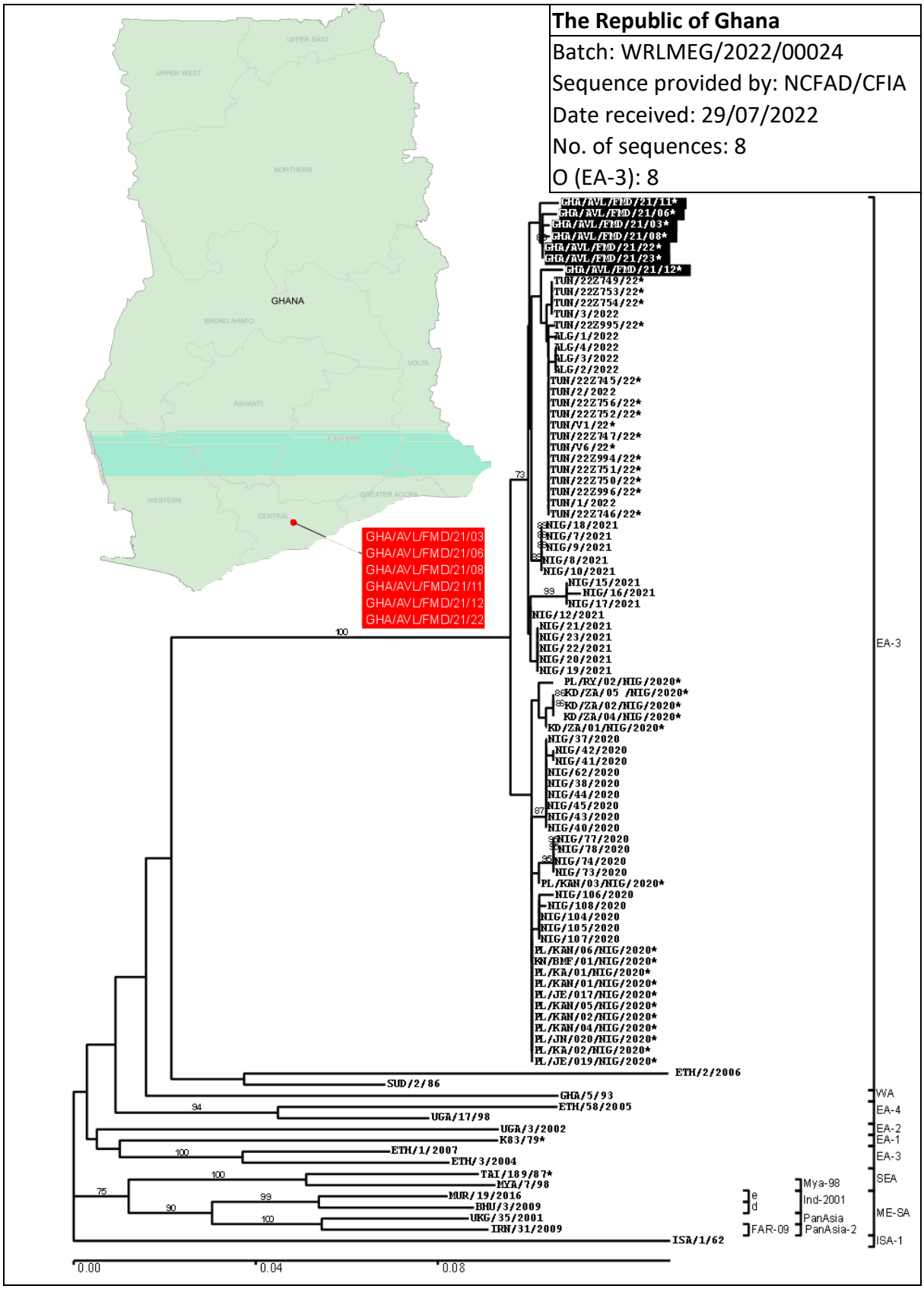


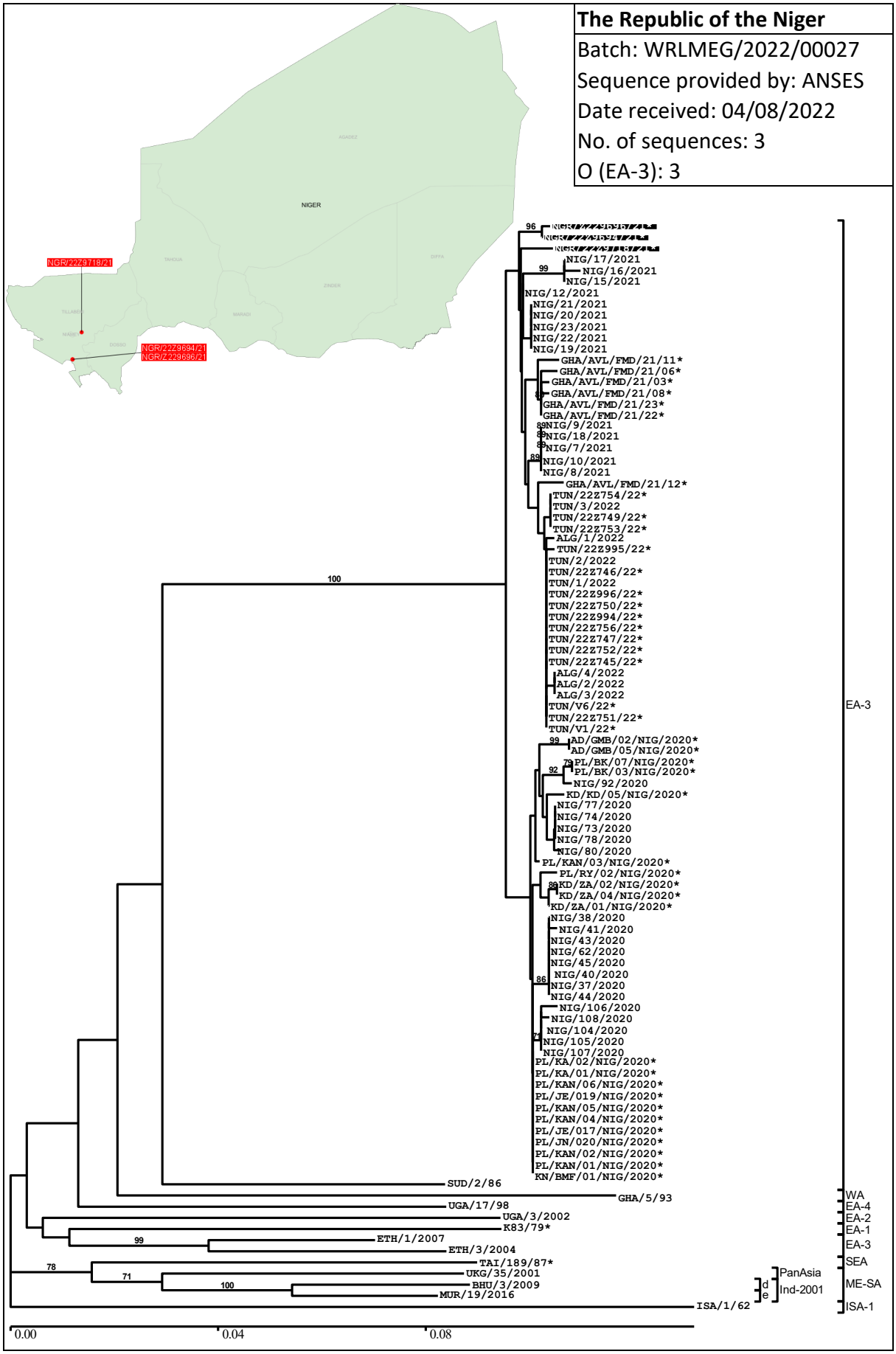
Ethiopia continued on next page

Ethiopia continued



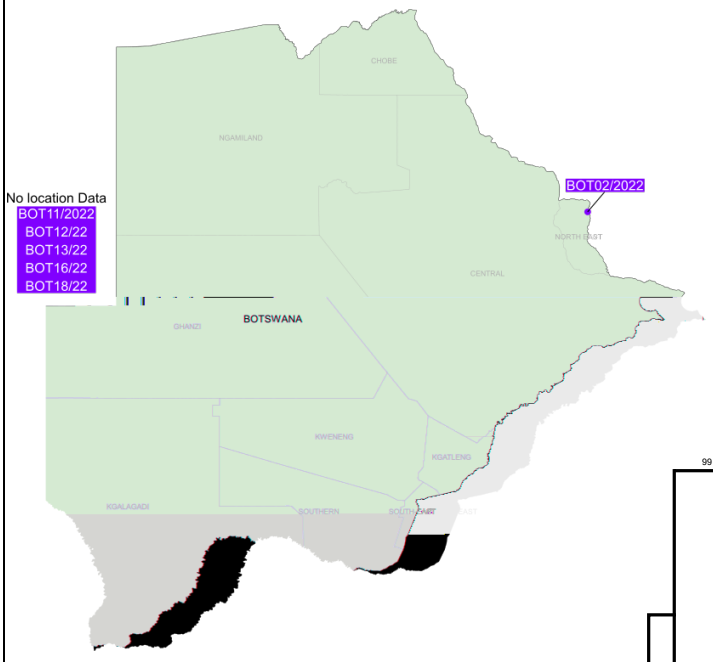
4.5. Pool 5 (West Africa)

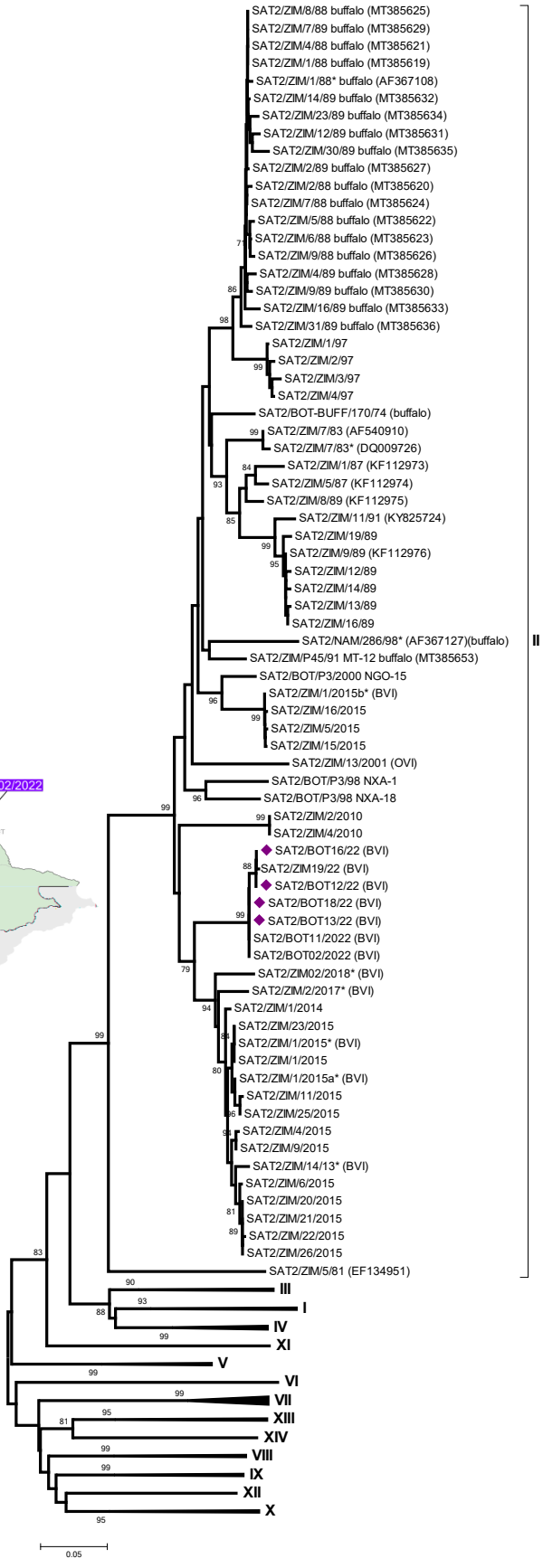


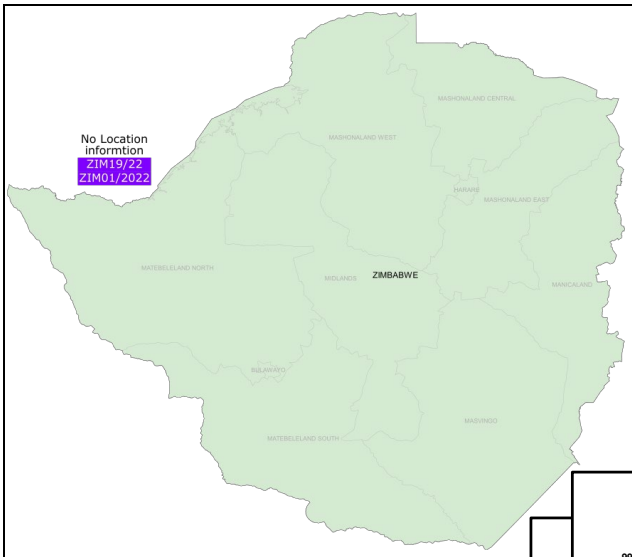

The Republic of the Niger
Batch: WRLMEG/2022/00027
Sequence provided by: ANSES
Date received: 04/08/2022
No. of sequences: 3
O (EA-3): 3
NIGER
NGR/22Z9718/21
NGR/22Z9694/21
NGR/22Z9696/21
NIG/17/2021
NIG/16/2021
NIG/15/2021
NIG/12/2021
NIG/21/2021
NIG/20/2021
NIG/23/2021
NIG/22/2021
NIG/19/2021
GHA/AVL/FMD/21/11*
GHA/AVL/FMD/21/06*
GHA/AVL/FMD/21/03*
GHA/AVL/FMD/21/08*
GHA/AVL/FMD/21/23*
GHA/AVL/FMD/21/22*
NIG/9/2021
NIG/18/2021
NIG/7/2021
NIG/10/2021
NIG/8/2021
GHA/AVL/FMD/21/12*
TUN/22Z754/22*
TUN/3/2022
TUN/22Z749/22*
TUN/22Z753/22*
ALG/1/2022
TUN/22Z995/22*
TUN/2/2022
TUN/22Z746/22*
TUN/1/2022
TUN/22Z996/22*
TUN/22Z750/22*
TUN/22Z994/22*
TUN/22Z756/22*
TUN/22Z747/22*
TUN/22Z752/22*
TUN/22Z745/22*
ALG/4/2022
ALG/2/2022
ALG/3/2022
TUN/V6/22*
TUN/22Z751/22*
TUN/V1/22*
AD/GMB/02/NIG/2020*
AD/GMB/05/NIG/2020*
PL/BK/07/NIG/2020*
PL/BK/03/NIG/2020*
NIG/92/2020
KD/KD/05/NIG/2020*
NIG/77/2020
NIG/74/2020
NIG/73/2020
NIG/78/2020
NIG/80/2020
PL/KAN/03/NIG/2020*
PL/RY/02/NIG/2020*
KD/ZA/02/NIG/2020*
KD/ZA/04/NIG/2020*
KD/ZA/01/NIG/2020*
NIG/38/2020
NIG/41/2020
NIG/43/2020
NIG/62/2020
NIG/45/2020
NIG/40/2020
NIG/37/2020
NIG/44/2020
NIG/106/2020
NIG/108/2020
NIG/104/2020
NIG/105/2020
NIG/107/2020
PL/KA/02/NIG/2020*
PL/KA/01/NIG/2020*
PL/KAN/06/NIG/2020*
PL/JE/019/NIG/2020*
PL/KAN/05/NIG/2020*
PL/KAN/04/NIG/2020*
PL/JE/017/NIG/2020*
PL/JN/020/NIG/2020*
PL/KAN/02/NIG/2020*
PL/KAN/01/NIG/2020*
KN/BMF/01/NIG/2020*
SUD/2/86
GHA/5/93
UGA/17/98
UGA/3/2002
K83/79*
ETH/1/2007
ETH/3/2004
TAI/189/87*
UKG/35/2001
BHU/3/2009
MUR/19/2016
ISA/1/62
EA-3
WA
EA-4
EA-2
EA-1
EA-3
SEA
PanAsia
Ind-2001
ME-SA
ISA-1
0.00
0.04
0.08

4.6. Pool 6 (Southern Africa)

The Republic of Botswana
Batch: WRLMEG/2022/00029 Sequence provided by: BVI Date received: 27/08/2022 No. of sequences: 1 SAT2 (II): 1
Batch: WRLMEG/2022/00032 Sequence provided by: BVI Date received: 14/09/2022 No. of sequences: 1 (partial VP1) SAT2 (II): 1
Batch: WRLMEG/2022/00033 Sequence provided by: BVI Date received: 19/09/2022 No. of sequences: 4 (partial VP1) SAT2 (II): 4



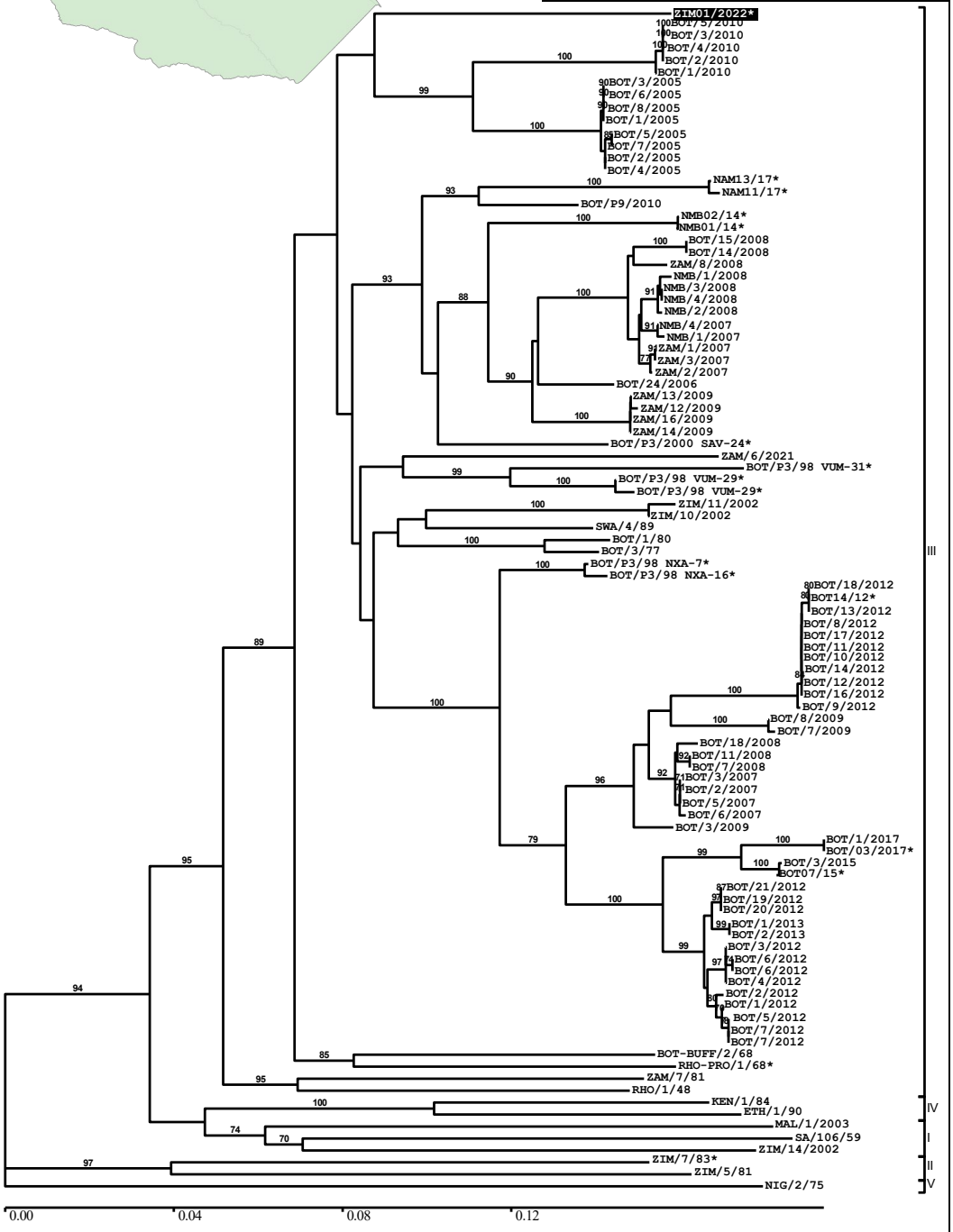




The Republic of Zimbabwe

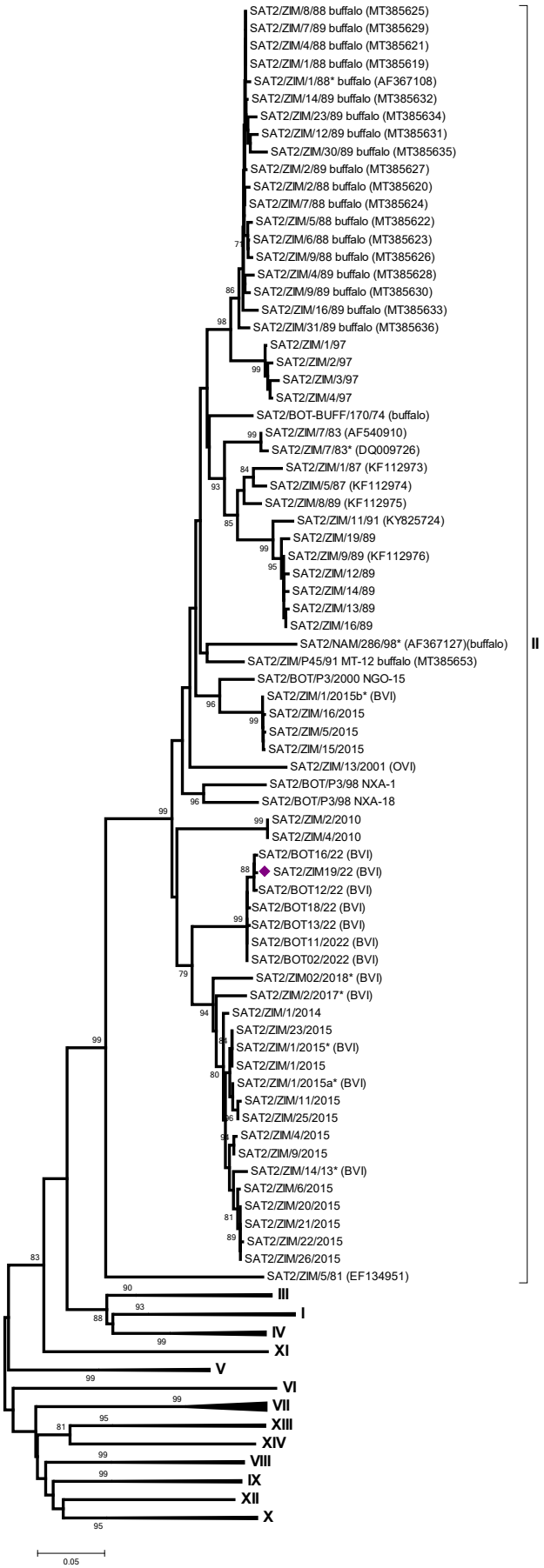
Batch: WRLMEG/2022/00023
Sequence provided by: BVI
Date received: 25/07/2022
No. of sequences: 1
SAT2 (III): 1

Batch: WRLMEG/2022/00034
Sequence provided by: BVI
Date received: 19/09/2022
No. of sequences: 1 (partial VP1)
SAT2 (II): 1



Zimbabwe continued on next page

Zimbabwe continued



4.7. Pool 7 (South America)

No samples/sequences received.

4.8. Vaccine matching

Antigenic characterization of FMD field isolates by matching with vaccine strains by 2dmVNT from July to September 2022.

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).
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
Indonesia	1	-	-	-	-	-	-
Israel	2	-	-	-	-	-	-
Mongolia	2	-	-	-	-	-	-
Palestine	3	-	-	-	-	-	-
Thailand	3	2	-	-	-	-	-
United Arab Emirates	3	-	-	-	-	-	-
Total	**14**	**2**	**0**	**0**	**0**	**0**	**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.

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

Isolate	Serotype O		O 3039 *Boehringer Ingelheim*		O Campos *Boehringer Ingelheim*		O_1 Campos *Biogénesis Bagó*		O Manisa *Boehringer Ingelheim*		PanAsia 2 *Boehringer Ingelheim*		O/TUR/5/09 *MSD*	
	Topotype	Lineage	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*
PAT/10/2021	EA-3	-	0.48	*1.73*	0.27	*1.98*	0.52	*2.62*	0.49	*2.10*	0.50	*2.12*	0.57	*2.20*
ISA/3/2022	ME-SA	Ind-2001	0.69	*1.76*	0.20	*1.92*	0.47	*2.46*	0.54	*2.14*	0.40	*2.12*	0.50	*2.09*
MOG/17/2021	ME-SA	Ind-2001	0.94	*2.04*	0.59	*2.28*	0.63	*2.73*	0.97	*2.33*	0.84	*2.25*	0.91	*2.42*
MOG/7/2022	ME-SA	Ind-2001	0.75	*1.94*	0.33	*2.02*	0.47	*2.60*	0.65	*2.15*	0.61	*2.11*	0.78	*2.35*
TAI/15/2020	ME-SA	Ind-2001	0.69	*1.86*	0.35	*2.12*	0.62	*2.57*	0.56	*2.32*	0.43	*2.13*	0.94	*2.32*
TAI/21/2020	ME-SA	Ind-2001	0.69	*1.85*	0.14	*1.70*	0.55	*2.51*	0.32	*2.08*	0.35	*2.03*	0.57	*2.10*
TAI/2/2021	ME-SA	Ind-2001	0.51	*1.73*	0.16	*1.79*	0.37	*2.34*	0.32	*2.08*	0.45	*2.15*	0.62	*2.15*
ISR/5/2022	ME-SA	PanAsia-2	0.48	*1.69*	0.18	*1.78*	0.42	*2.37*	0.33	*1.97*	0.32	*2.09*	0.57	*2.18*
ISR/9/2022	ME-SA	PanAsia-2	0.57	*1.76*	0.25	*1.92*	0.58	*2.51*	0.33	*1.97*	0.39	*2.18*	0.54	*2.16*
PAT/1/2021	ME-SA	PanAsia-2	0.53	*1.78*	0.29	*2.01*	0.36	*2.46*	0.40	*2.01*	0.53	*2.15*	0.72	*2.31*
PAT/1/2022	ME-SA	PanAsia-2	0.56	*1.79*	0.26	*1.95*	0.51	*2.61*	0.50	*2.10*	0.64	*2.23*	0.60	*2.23*
UAE/1/2021	ME-SA	PanAsia-2	0.38	*1.64*	0.19	*2.02*	0.43	*2.56*	0.48	*2.08*	0.32	*2.14*	0.44	*2.13*
UAE/9/2021	ME-SA	SA-2018	0.59	*1.83*	0.23	*2.10*	0.60	*2.70*	0.44	*2.04*	0.32	*2.13*	0.68	*2.32*
UAE/15/2021	ME-SA	SA-2018	0.75	*1.94*	0.28	*2.19*	0.51	*2.63*	0.56	*2.15*	0.47	*2.30*	0.69	*2.32*

Table 6: Vaccine matching studies for A FMDV

Isolate	Serotype A		A22 Iraq *Boehringer Ingelheim*		A Iran 2005 *Boehringer Ingelheim*		A GVII 2015 *Boehringer Ingelheim*		A Malaysia 97 *Boehringer Ingelheim*		A/TUR/20/06 *MSD*	
	Topotype	Lineage	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*	r_1	*titre*
TAI/5/2021	ASIA	Sea-97	0.39	*1.94*	0.07	*1.48*	0.46	*1.49*	0.33	*1.82*	0.11	*0.90*
TAI/6/2021	ASIA	Sea-97	0.32	*1.85*	0.07	*1.52*	0.50	*1.52*	0.39	*1.88*	0.08	*0.75*

Annex 1: Sample data

Summary of submissions

Table 7: Summary of samples collected and received to WRLFMD (July to September 2022)

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*	*ASIA-1*		*Positive*	*Negative*
Ethiopia	48	19	9*	-	-	5*	-	-	16	41	7
Indonesia	6	1	-	-	-	-	-	-	5	5	1
Mongolia	17	13	-	-	-	-	-	-	4	17	-
Thailand	16	8	5	-	-	-	-	-	3	16	-
TOTAL	87	41	13	0	0	4	0	0	28	79	8

* One sample tested positive for A and SAT 2.

Clinical samples

Table 8: Clinical sample diagnostics made by the WRLFMD July to September 2022

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
Mongolia	16/05/2022	04/07/2022	MOG 17/2021	CATTLE	20-Aug-21	O	Pos	O
			MOG 18/2021	CATTLE	04-Dec-21	O	Pos	O
			MOG 19/2021	CATTLE	13-Dec-21	O	Pos	O
			MOG 1/2022	CATTLE	12-Jan-22	NVD	Pos	FMDV GD
			MOG 2/2022	CATTLE	13-Jan-22	O	Pos	O
			MOG 3/2022	CATTLE	13-Jan-22	O	Pos	O
			MOG 4/2022	CATTLE	17-Jan-22	NVD	Pos	FMDV GD
			MOG 5/2022	CATTLE	18-Jan-22	NVD	Pos	FMDV GD
			MOG 6/2022	CATTLE	24-Jan-22	O	Pos	O
			MOG 7/2022	CATTLE	28-Jan-22	O	Pos	O
			MOG 8/2022	CATTLE	02-Feb-22	O	Pos	O
			MOG 9/2022	CATTLE	08-Feb-22	O	Pos	O
			MOG 10/2022	CATTLE	11-Feb-22	O	Pos	O
			MOG 11/2022	CATTLE	18-Feb-22	O	Pos	O
			MOG 12/2022	CATTLE	25-Feb-22	O	Pos	O
			MOG 13/2022	CATTLE	31-Aug-22	O	Pos	O
			MOG 14/2022	CATTLE	08-Dec-22	NVD	Pos	FMDV GD
Ethiopia	18/05/2022	16/08/2022	ETH 21/2019	BOVINE	09-Apr-19	A	Pos	A

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			ETH 22/2019	BOVINE	21-Apr-19	NVD	Pos	FMDV GD
			ETH 23/2019	BOVINE	24-Aug-19	NVD	Pos	FMDV GD
			ETH 24/2019	BOVINE	24-Aug-19	O	Pos	O
			ETH 25/2019	BOVINE	26-Aug-19	A	Pos	A
			ETH 26/2019	BOVINE	04-Oct-19	O	Pos	O
			ETH 27/2019	BOVINE	18-Oct-19	O	Pos	O
			ETH 28/2019	BOVINE	18-Oct-19	O	Pos	O
			ETH 29/2019	BOVINE	15-Nov-19	O	Pos	O
			ETH 30/2019	BOVINE	22-Nov-19	A	Pos	A
			ETH 31/2019	BOVINE	22-Nov-19	SAT2	Pos	SAT2
			ETH 32/2019	BOVINE	22-Nov-19	SAT2	Pos	SAT2
			ETH 33/2019	BOVINE	22-Nov-19	NVD	Pos	FMDV GD
			ETH 34/2019	BOVINE	20-Dec-19	A	Pos	A
			ETH 35/2019	BOVINE	28-Dec-19	NVD	Neg	NVD
			ETH 36/2019	BOVINE	28-Dec-19	NVD	Pos	FMDV GD
			ETH 37/2019	BOVINE	30-Dec-19	NVD	Neg	NVD
			ETH 1/2020	BOVINE	15-Jan-20	A	Pos	A
			ETH 2/2020	BOVINE	20-Jan-20	O	Pos	O
			ETH 3/2020	BOVINE	20-Jan-20	NVD	Neg	NVD
			ETH 4/2020	BOVINE	20-Jan-20	NVD	Pos	FMDV GD
			ETH 5/2020	BOVINE	10-Feb-20	O	Pos	O
			ETH 6/2020	BOVINE	06-Mar-20	NVD	Pos	FMDV GD
			ETH 7/2020	BOVINE	06-Mar-20	NVD	Pos	FMDV GD
			ETH 8/2020	BOVINE	23-Apr-20	O	Neg	O
			ETH 9/2020	BOVINE	09-May-20	A & SAT2	Pos	A & SAT2
			ETH 10/2020	BOVINE	21-May-20	O	Pos	O
			ETH 11/2020	BOVINE	21-May-20	O	Pos	O
			ETH 12/2020	BOVINE	21-Oct-20	O	Pos	O
			ETH 13/2020	BOVINE	11-Nov-20	A	Pos	A
			ETH 14/2020	BOVINE	11-Nov-20	A	Pos	A
			ETH 15/2020	BOVINE	15-Dec-20	O	Pos	O
			ETH 16/2020	BOVINE	15-Dec-20	O	Pos	O
			ETH 17/2020	BOVINE	15-Dec-20	O	Pos	O
			ETH 18/2020	BOVINE	29-Dec-20	NVD	Neg	NVD
			ETH 19/2020	BOVINE	29-Dec-20	NVD	Pos	FMDV GD
			ETH 1/2021	BOVINE	22-Jan-21	O	Pos	O
			ETH 2/2021	BOVINE	21-May-21	O	Pos	O
			ETH 3/2021	BOVINE	21-May-21	NVD	Neg	NVD
			ETH 4/2021	BOVINE	21-Sep-21	O	Pos	O
			ETH 5/2021	BOVINE	21-Sep-21	O	Pos	O
			ETH 6/2021	BOVINE	11-Dec-21	NVD	Neg	NVD

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			ETH 1/2022	BOVINE	16-Feb-22	NVD	Pos	FMDV GD
			ETH 2/2022	BOVINE	29-Mar-22	SAT2	Pos	SAT2
			ETH 3/2022	BOVINE	29-Mar-22	SAT2	Pos	SAT2
			ETH 4/2022	BOVINE	30-Mar-22	A	Pos	A
			ETH 5/2022	BOVINE	30-Mar-22	O	Pos	O
			ETH 6/2022	BOVINE	05-Apr-22	NVD	Neg	NVD
Indonesia	18/06/2022	04/07/2022	ISA 1/2022	CATTLE	04-May-22	NVD	Pos	FMDV GD
			ISA 2/2022	CATTLE	04-May-22	NVD	Pos	FMDV GD
			ISA 3/2022	CATTLE	06-May-22	O	Pos	O
			ISA 4/2022	GOAT	08-May-22	NVD	Neg	NVD
			ISA 5/2022	GOAT	09-May-22	NVD	Pos	FMDV GD
			ISA 6/2022	CATTLE	10-May-22	NVD	Pos	FMDV GD
Thailand	06/05/2022	25/07/2022	TAI 13/2020	CATTLE	31-Mar-20	NVD	Pos	FMDV GD
			TAI 14/2020	CATTLE	08-May-20	NVD	Pos	FMDV GD
			TAI 15/2020	CATTLE	12-May-20	O	Pos	O
			TAI 16/2020	CATTLE	03-Sep-20	O	Pos	O
			TAI 17/2020	CATTLE	19-Sep-20	NVD	Pos	FMDV GD
			TAI 18/2020	CATTLE	07-Oct-20	O	Pos	O
			TAI 19/2020	CATTLE	07-Oct-20	O	Pos	O
			TAI 20/2020	CATTLE	12-Nov-20	O	Pos	O
			TAI 21/2020	CATTLE	28-Nov-20	O	Pos	O
			TAI 1/2021	CATTLE	07-Mar-21	O	Pos	O
			TAI 2/2021	CATTLE	28-Apr-21	O	Pos	O
			TAI 3/2021	CATTLE	06-Sep-21	A	Pos	A
			TAI 4/2021	CATTLE	08-Oct-21	A	Pos	A
			TAI 5/2021	CATTLE	08-Oct-21	A	Pos	A
			TAI 6/2021	CATTLE	09-Oct-21	A	Pos	A
			TAI 7/2021	CATTLE	11-Oct-21	A	Pos	A
TOTAL					**55**			

Annex 2: FMD publications

Recent FMD Publications (July to September 2022) cited by Web of Science.

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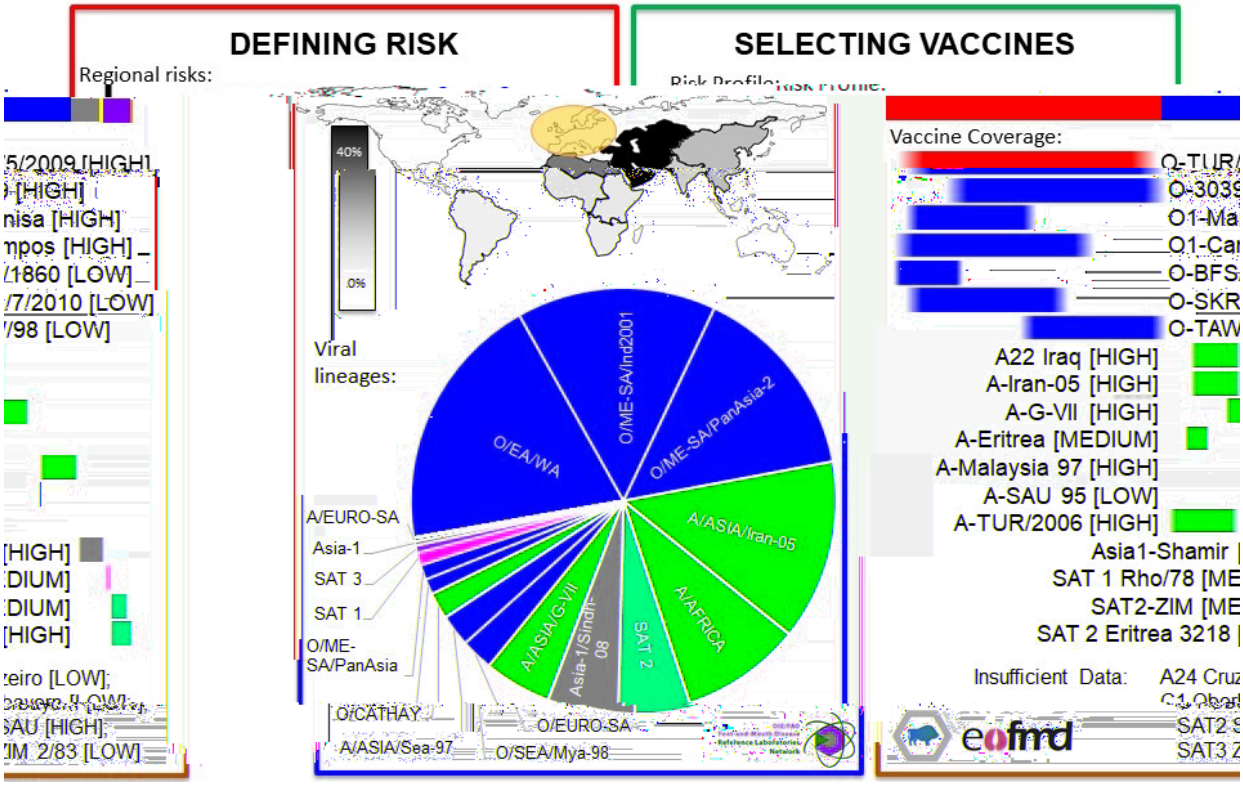
Annex 3: Vaccine recommendations

This report provides recommendations of FMDV vaccines to be included in antigen banks. These outputs are generated with a new tool (called PRAGMATIST) that has been developed in partnership between WRLFMD and EuFMD (http://www.fao.org/3/cb1799en/cb1799en.pdf). 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.

Vaccine prioritisation (for Europe): September 2022:



Please contact WRLFMD or EuFMD for assistance to tailor these outputs to other geographical regions. 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 will be published shortly in *Frontiers in Veterinary Science*.

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

Courses

- The EuFMD's Open Access Courses provide convenient self-paced training which you may study anytime, anywhere, free of charge. There are currently 8 courses in English and 1 in Arabic:
  - **Introduction to Foot-and-Mouth Disease** (available in English and French), introducing 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.
  - **Introduction to Lumpy Skin Disease**, a short open-access module made available to support countries in Asia and the Pacific facing this rapidly emerging threat.
  - **Introduction to Rift Valley Fever** aims to build your understanding of Rift Valley fever diagnosis, surveillance, prevention and control.
  - **What is the Progressive Control Pathway** (available in English and, for anyone who is new to the PCP-FMD, a short e-learning module is also available in Arabic) providing 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.
  - **Introduction to the Risk-Based Strategic Plan** introducing the Risk-Based Strategic Plan (RBSP).
- **Public Private Partnerships in the Veterinary Domain** course, developed in partnership with the World Organisation for Animal Health (WOAH), applying public-private partnerships to the control of FMD and similar transboundary animal diseases.
- **Simulation Exercises for Animal Disease Emergencies** (available through FAO eLearning academy) aiming at building your understanding of simulation exercises and their value as part of the emergency preparedness cycle.
- A course on **Introduction to the FMD Minimum Biorisk Management Standards** is currently in development. The virtual course will be open access, will target National Competent Authorities, Institute directors for FMD facilities, biorisk managers and laboratory personnel in laboratories handling infectious FMD. The learning objectives will include introduce the importance, implications and responsibilities of implementing the FMD Minimum Biorisk Management Standards.
- **FMD Laboratory investigation training**, in partnership with The Pirbright Institute, is currently in preparation. The course will start in November 2022 and will cover selection of diagnostic tests to detect *Foot-and-mouth disease virus* and specific antibodies, interpretation of test results, outline of techniques for further characterization of FMD virus, basic principles of laboratory quality assurance, key principles of biosecurity, and biosafety measures. The course will be targeting laboratory professionals working in European, African and Asian countries. The course will be accessible on nominations, but a number of seats will be reserved to self-applications
- The next **WRLFMD residential training course on FMD diagnostic methods** is scheduled for 15th to 26th May 2023.

- European Commission for the control Foot-and-mouth disease (EuFMD) Real-time training course in Kenya. To be held on 6th to 9th December 2022 and 7th to 10th February 2023.

Other resources

Podcasts

We have a constantly updated series of short podcasts relating to the FAST world (http://www.fao.org/eufmd/resources/podcasts/en/)

- The EuFMD has opened an FMD Emergency Toolbox (EN, FR).
- A series of videos on foot-and-mouth disease in English, Bulgarian, Greek and Turkish (https://www.fao.org/eufmd/who-we-are/fr/)
- Leaflets on FMD in English, Turkish, Bulgarian and Greek, for the Thrace region (https://www.fao.org/publications/card/en/c/CB4903EN)
- Join our Telegram channel to receive EuFMD updates (https://t.me/eufmd)
- Find out who TOM is and why you need him (https://www.eufmd.info/tom-training)

Emergency Preparedness Network (http://www.fao.org/eufmd/network/en/)

The Emergency Preparedness Network is a forum for emergency preparedness experts to share information and experience. You will regularly receive the latest information on topics related to prevention and control of foot-and-mouth and other similar transboundary animal diseases ("FAST" diseases).

Meetings

- European Commission for the control Foot-and-mouth disease (EuFMD) Open Session 2022 will be held on 26th to 28th October 2022 in Marseille, France.
    - *Digitalization and innovation applied to the prevention and control of foot-and-mouth and similar transboundary animal diseases (FAST)* https://www.eufmd.info/os22
- 45th General Session of the European Commission for the control Foot-and-mouth disease (EuFMD) will be held in Rome, Italy, on 4th and 5th May 2023.

Proficiency test scheme organised by WRLFMD

Phase XXXIII of the WRLFMD proficiency testing scheme (PTS) has been concluded, and the participating laboratories should have received their feedback letters. The final report for this exercise will be distributed shortly.

Invitation letters should have been received for the next exercise (Phase XXXIV) and WRLFMD anticipate that shipments will be organised in the next few months. Any interested laboratories should contract the WRLFMD for further information. Progress of this PTS will be described in future quarterly reports.

EuFMD Committees

Executive Committee, Standing Technical Committee (STC), Special Committee for Surveillance and Applied Research (SCSAR), Special Committee on Biorisk Management (SCBRM), Tripartite Groups.

Hold-FAST tools

AESOP. Assured emergency supply options; **EuFMDiS**, FMD spread model; **GET PREPARED** toolbox. Emergency preparedness; **GVS**. Global Vaccine Security; **Online Simulation Exercises**; **Outbreak Investigation application**; **Pragmatist**. Prioritization of antigen management with international surveillance management tool; **PCP-FMD**. Progressive Control Pathway for foot-and-mouth disease; **PCP-Support Officers**; **SAT**. PCP Self-Assessment Tool; **RTT**. Real Time Training; **SMS Disease reporting**; **SQRA toolkit**. A method for spatial qualitative risk analysis applied to FMD; **Telegram**; **TOM**. EuFMD training management system; **Global Monthly reports**; **VADEMOS**. Vaccine Demand Estimation Model; **VLC**. Virtual Learning Center. **Microlearning**.

United Nations Sustainable Development Goals (UN-SDGs)

EuFMD's programme has a main focus on

Thinking of the environmental footprint

Together against wasting resources, think twice before printing.

Animal Production and Health Division, NSHA / European Commission for the Control of Foot-and-Mouth Disease (EuFMD)

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