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MONTHLY REPORT
FOOT-AND-MOUTH DISEASE SITUATION

Food and Agriculture Organization of the United Nations

European Commission

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

Foot-and-Mouth Disease Situation
Food and Agriculture Organization of the United Nations
Monthly Report

June 2018

Guest Editor:
Donald King, WRLFMD, Pirbright

#INFORMATION SOURCES USED:

Databases:
OIE WAHID World Animal Health Information Database
FAO World Reference Laboratory for FMD (WRLFMD)
FAO Global Animal Disease Information System (EMPRES-i)

Other sources:
FAO/EuFMD supported FMD networks
FAO/EuFMD projects and field officers

The sources for information are referenced by using superscripts.
The key to the superscripts is on the last page.

Please note that the use of information and boundaries of territories should not be considered to be the view of the U.N. Please, always refer to the OIE for official information on reported outbreaks and country status.

Contents

Guest Editor's comments:

During the past three months, the WRLFMD has tested sample submissions from Afghanistan, Bhutan, Ethiopia, Hong Kong, Israel, Iran, Republic of Korea (South Korea), Sri Lanka, Vietnam and Zambia. In addition, sequence data generated from samples collected in Botswana, PR China, Israel, Republic of Korea and Zambia were also analysed. Detailed reports describing the sequencing results for these samples can be retrieved from http://www.wrlfmd.org/. Recent outbreaks in Algeria (reported to the OIE on 28/6/2018) have raised the greatest concerns. Samples from cases detected initially in cattle in Mekla, Tizi Ouzou, Algeria have been sent to WRLFMD for testing; sequence data shows that FMD viruses present belong to the O/EA-3 lineage. This is a new virus introduction into the Maghreb since these viruses are genetically distinct to previously circulating serotype O viruses that caused FMD outbreaks across North Africa in 2013-15 (due to the O/ME-SA/Ind-2001 lineage), and different to cases due to the O/EA-3 topotype in Libya (in 2012). In common with A/AFRICA/G-IV FMD viruses detected in Algeria and Tunisia (in 2017), phylogenetic analyses place West Africa as the source of these outbreaks (closest viral sequences are from Nigeria). However, without obvious direct epidemiological connections, we should be cautious in attributing specific sources since there are many countries in West and Central Africa that do not submit samples for analyses. Vaccine-matching is underway, and results will be reported shortly.

I was pleased to attend the East Africa FMD RoadMap Meeting held in Entebbe, Uganda, during the first week of July. This meeting highlighted the challenges of FMD control in a region that is endemic and where viral serotypes O, A, SAT 1 and SAT 2 regularly cause outbreaks in domesticated species. Serotype SAT 3 is also present in buffalo populations, and occasional spill-over into livestock is reported, while serotype C has not been reported anywhere globally since 2004. The OIE/FAO FMD Reference Laboratory Network (including East African partners) collates laboratory and epidemiological data from the different FMD endemic pools; to define the distribution of FMD virus lineages and to monitor changing patterns of risk. For serotype O, viral sequence data indicates that topotype O/EA-3 is present in countries in the northern part of East Africa (such as Ethiopia and Sudan) and that this lineage has spread from this region to affect countries in West Africa (Nigeria), North Africa (Egypt), and beyond (such as recently into Algeria [as described above] as well as Israel and Palestine). A second topotype (O/EA-4) is also detected in Ethiopia. In contrast, countries to the south of the East Africa region maintain different serotype O topotypes, including O/EA-2 which has the widest distribution (Kenya, Uganda, Tanzania, and including new FMD outbreaks in the Central Province of Zambia), while O/EA-1 appears to be restricted to Kenya (last detected in 2009). This observed segregation between viruses found in the northern and southern parts of the East Africa region is mirrored for serotypes A, SAT 1 and SAT 2 FMD viruses. Taken together, these patterns of FMD virus distribution support the idea that there are two separate sub-regional pools of endemic virus circulation. This underlying epidemiological picture may influence the performance of vaccines in these different parts of the region and should be carefully considered when transporting clinical specimens between countries in East Africa to minimise the potential for the introduction of exotic FMDV strains.

There are still important gaps in (i) our understanding of the way that FMDV lineages are maintained in endemic countries, as well as (ii) robust evidence to demonstrate that vaccines confer protection against different viral lineages that are present. The OIE/FAO FMD Laboratory Network (https://www.foot-and-mouth.org) encourages countries to submit appropriate clinical samples for laboratory analyses – testing is free-of-charge, for further information or assistance with shipments, please contact donald.king@pirbright.ac.uk.

Don King (Pirbright, July 2018)

I. GENERAL OVERVIEW

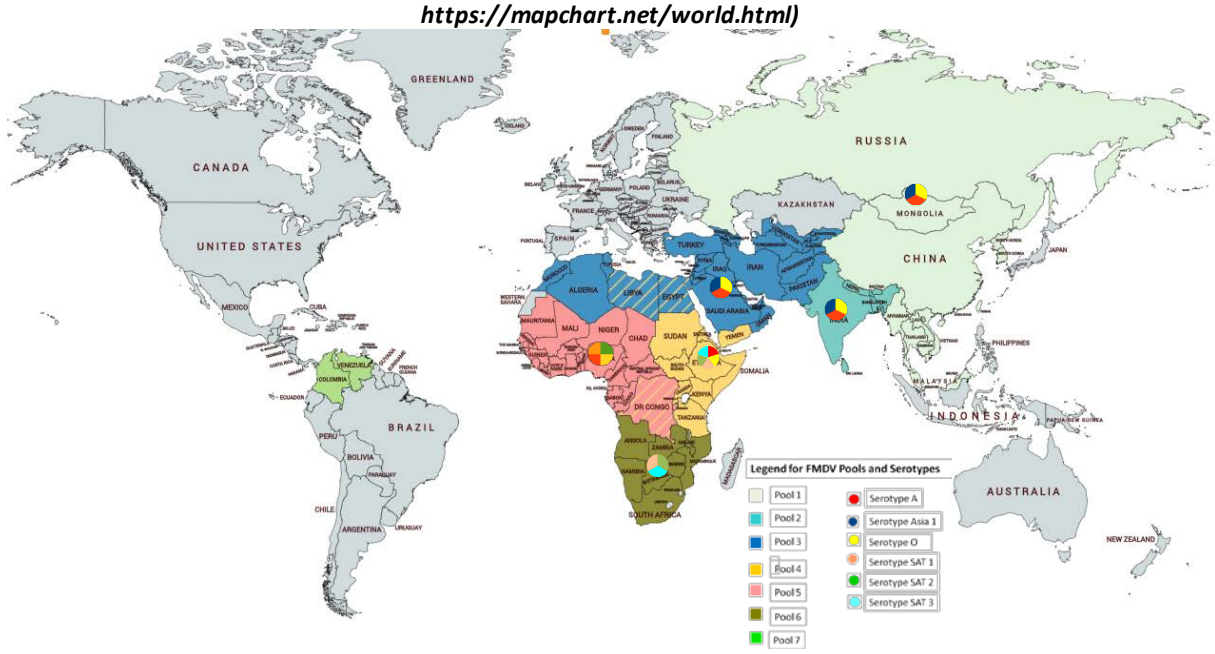
Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below are continuously circulating in parts of the pool area and would be detected if sufficient surveillance was in place (Table 1).*

Table 1: List of countries representing each virus pool for the period 2013 – 2017 (source EuFMD)

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

Egypt, Libya and **Democratic Republic of Congo** (highlighted in bold) are indicated as being in multiple pools, since they have evidence of FMDV originating from two or more pools. * ONLY IN NORTH ZAMBIA AS SPILL-OVER FROM POOL 4

MAP 1: Foot-and-mouth disease (FMD) virus pools: world distribution by serotype in 2013-2017 (source EuFMD, https://mapchart.net/world.html)



II. HEADLINE NEWS

POOL 1- SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA

China [1] **–** Four independent FMD events involving cattle respectively occurred at Anhui, Shanxi, Hubei and Guizhou between May 19th and June 6th 2018 that were all caused by FMDV serotype O.

China (Hong Kong, SAR) [2] **–** None of the vaccine strains used in the vaccine matching strain differentiation (VMSD) tests obtained good matching results with the field isolates belonging to FMDV serotype O detected in pig samples collected during the first months of 2018.

Republic of Korea [2] – Some of the vaccine strains used in the VMSD tests produced good matching results with the FMDV field isolate detected in the pig sample collected on April 7th 2018 identified as A/ASIA/Sea-97.

POOL 2 - SOUTH ASIA

Bhutan [2] **–** A/ASIA/G-VII and O/ME-SA/Ind-2001e were the topotypes detected in the cattle samples collected between July 2017 and April 2018.

India [11] **-** The ICAR-Directorate of Foot and Mouth Disease, Mukteswar, India detected FMDV serotype O in the 14 cattle samples examined using antigen and/or RNA detection diagnostic methods.

Nepal [3] **–** FMDV O was detected for the reporting month in cattle samples collected in different locations of the country.

Sri Lanka [2] **–** O/ME-SA/Ind-2001d and O/ME-SA/Ind-2001e were the topotypes detected among the cattle samples collected between August 2017 and May 2018.

POOL 3 - WEST EURASIA & MIDDLE EAST

Afghanistan [4] **–** The Central Veterinary Research and Development Laboratory (CVDRL), Afghanistan reported the detection of FMDV A, Asia 1 and O, in samples tested during June 2018.

Algeria [1, 2] **–** A FMD outbreak due to FMDV O/EA-3 occurred on a cattle farm in Tizi Ouzou on June 20th 2018.

Iran [2] **-** Good matching results were obtained for some of the vaccines strains employed in the VMSD tests conducted on field viruses belonging to FMDV A, ASIA 1 and O detected in the bovine samples collected between January and February 2018.

Israel [2] – Vaccine strains employed in the VMSD tests obtained good matching results with the field isolates belonging to FMDV serotype O that were detected in the samples collected in the outbreaks that occurred in the country during April 2018.

Palestine [1] **–** A FMD outbreak occurred on June 17th 2018 at Jenin, West Bank in cattle for which virus serotying is pending.

Pakistan [5] **–** Only FMDV serotype O was detected in Punjab during June 2018.

POOL 4 - EASTERN AFRICA

Kenya [6] – The FMD National Reference Laboratory, Embakasi, Kenya detected FMDV O among the cattle samples collected from outbreaks.

POOL 5 - WEST/CENTRAL AFRICA

Ghana [7] **–** The ACCRA Veterinary Laboratory reported the detection of FMDV O.

Nigeria [8] - The FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria detected FMDV in cattle samples examined during June 2018.

POOL 6 - SOUTHERN AFRICA

Botswana [1] **-** A FMD outbreak due to FMDV serotype SAT 2, occurred on June 9th 2018 involving cattle in a crush of Ngamiland.

Malawi [1] **–** A FMD outbreak, for which serotyping is pending, occurred on June 6th 2018 in cattle in a village of Ntcheu, Central.

Mozambique [1] – Two FMD outbreaks with serotyping again pending were reported in cattle respectively, on April 24th 2018 at Tete and on May 17th 2018 at Nampula.

Zimbabwe [1] **–** A FMD outbreak occurred in cattle at Mashonaland Central that started on June 28th 2018 were the virus was not yet typed.

POOL 7 - SOUTH AMERICA [1, 14, 15]

No FMD notifications were notified for this pool during the reporting month.
FMD in Latin America was last detected in Colombia in July 2017 with outbreaks due to FMDV serotype O, while PANAFTOSA reported historical outbreaks due to serotype A occurring in Venezuela in 2013.

COUNTER

****** 167 MONTHS SINCE THE LAST SEROTYPE C OUTBREAK WAS REPORTED***

III. DETAILED POOL ANALYSIS

A. POOL 1 – *SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA*

China [1]

Four independent FMD events involving cattle, occurred between May 19th and June 6th 2018 respectively at Anhui, Shanxi, Hubei and Guizhou. The outbreaks were all caused by FMDV serotype O.

In all cases, the Lanzhou National Reference Laboratory for Foot and Mouth Disease (OIE Reference Laboratory) carried out the diagnosis using gene sequencing and reverse transcription - polymerase chain reaction (RT-PCR).

For none of the outbreaks was it possible to identify the source of infection.

The control measures that were in general adopted were movement control inside the country, surveillance within containment and/or protection zone, screening, quarantine, official destruction of animal products, official disposal of carcasses, by-products and waste, stamping out, disinfection, vaccination permitted (if a vaccine exists), while no treatment is being provided to the affected animals.

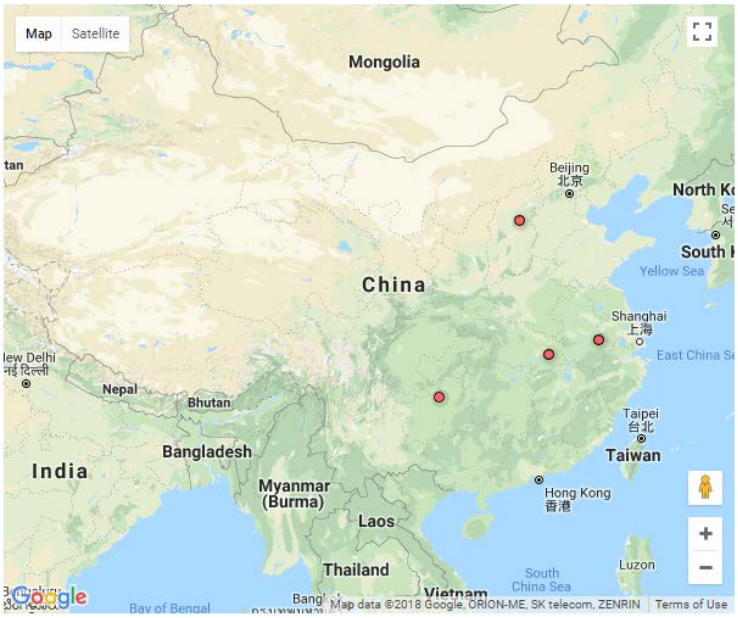
A summary of the animals involved and location of outbreaks are reported in Table 2 and Map 2.

Table 2: summary of the animals involved in the FMD outbreaks that occurred respectively occurred at Anhui, Shanxi, Hubei and Guizhou between May 19th and June 6th 2018. (Source – WAHIS)

Location	Date of start of outbreak	Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Suncun Town, Fanchang, Wuhu, Anhui	20/05/2018	Cattle	63	16	11	52	0	25.40%	17.46%	68.75%	100.00%
Xinfu District, Xinzhou, Shanxi	27/05/2018		60	2	0	60	0	3.33%	0.00%	0.00%	100.00%
Jiuzihe Town, Luotian, Huanggang, Hubei	19/05/2018		36	13	3	33	0	36.11%	8.33%	23.08%	100.00%
Xiazi Town, Xinpuxinqu District, Zunyi, Guizhou	05/06/2018		82	15	0	82	0	18.29%	0.00%	0.00%	100.00%

*Removed from the susceptible population through death, destruction and/or slaughter

Map 2: location of the FMD outbreaks that occurred that respectively occurred at Anhui, Shanxi, Hubei and Guizhou between May 19th and June 6th 2018 (Source – WAHIS, Google Fusion Maps)



China (Hong Kong, SAR) [2]

None of the vaccine strains represented by O 3039, O Manisa and O TUR 5/09 used in the VMSD tests produced good matching results with field isolates O/HKN/4/2018 and O/HKN/5/2018, both genotyped as FMDV O CATHAY. The isolates were detected in pig samples collected in Yuen Long, New Territories during the first months of 2018. FMDV O CATHAY is the only genotype reported to circulate in the country since 2011.

Mongolia [2]

Following the outbreak due to FMDV serotype O which occurred in March 2018, the country carried out a vaccination programme as reported in Table 3, keeping also in force the following control measures, movement control inside the country, screening, quarantine, zoning, stamping out and disinfection. No treatment is being administered to the affected animals.

Table 3: vaccination programme carried out in Mongolia following the last notified FMD outbreak of March 2018.

Administrative division	Species	N° Vaccinated	Vaccine Type Details
Dornod	Cattle	166,526	Not provided
	Goats	290,011	
	Sheep	478,584	
Khentii	Cattle	177,056	
	Goats	483,809	
	Sheep	764,176	
Sukhbaatar	Cattle	206,012	
	Goats	973,009	
	Sheep	1,523,375	
Total vaccinated		5,062,558	

Republic of Korea [2]

Good matching results were obtained with the following vaccine strains A IRN/2005, A/GVII, A22 IRQ/24/64 and A24 CRUZ (2) but not with A MAY 97 and A24 CRUZ (1) when examined in the VSMD test with the FMDV field isolate A/SKR/5/2018, belonging to topotype A/ASIA/Sea-97, detected in a pig sample collected on April 7th 2018 at Gyeonggi-Do.

Russian Federation [9]

The Regional Reference Laboratory for FMD (ARRIAH, Russia) reported only the serological control of 4,822 sera for post vaccination monitoring purposes while also providing materials to the Federal Service for Veterinary and Phytosanitary Surveillance of the Ministry of Agriculture of the Russian Federation and advice to the veterinary services of the Russian Federation Subjects.

SEAFMD [10]

FMD outbreaks were reported in Cambodia and Thailand for June 2018 and on-going outbreaks in the different reporting countries are as those listed in Table 4.

The FMD events notified in Cambodia were only on clinical basis while those that occurred in Thailand were reported as due to FMD serotype O (2 outbreaks) and the remaining were either not typed (1 outbreak) or not sampled (3 outbreaks).

Distribution of the circulating serotypes in the single countries is represented in Maps 3 and 4.

Table 4: FMD outbreaks ongoing and reported between January and June 2018 in the countries of the Southeast Asia Region for (Source – SEAFMD Campaign)

Countries with reported outbreaks	N° of prior outbreaks	jan-18	feb-18	mar-18	apr-18	May-18	Jun-18	Total N° of outbreaks
Cambodia	114	8	3	6	3	14	5	**153**
Laos	8	0	0	12	14	22	0	**56**
Malaysia	54	0	1	1	2	2	0	**60**
Myanmar	3	0	0	0	0	3	0	**6**
Thailand	236	13	7	5	3	3	6	**273**
Viet Nam	15	9	0	0	0	0	0	**24**
Total N° of outbreaks	**430**	**30**	**11**	**24**	**22**	**44**	**11**	**572**

Map 3: location of the ongoing FMD outbreaks reported during June 2018 due to serotype A in the countries reported in Table 4. (Source – SEAFMD Campaign)

Map 4: location of the ongoing FMD outbreaks reported during June 2018 due to serotype O in the countries reported in Table 4. (Source – SEAFMD Campaign)

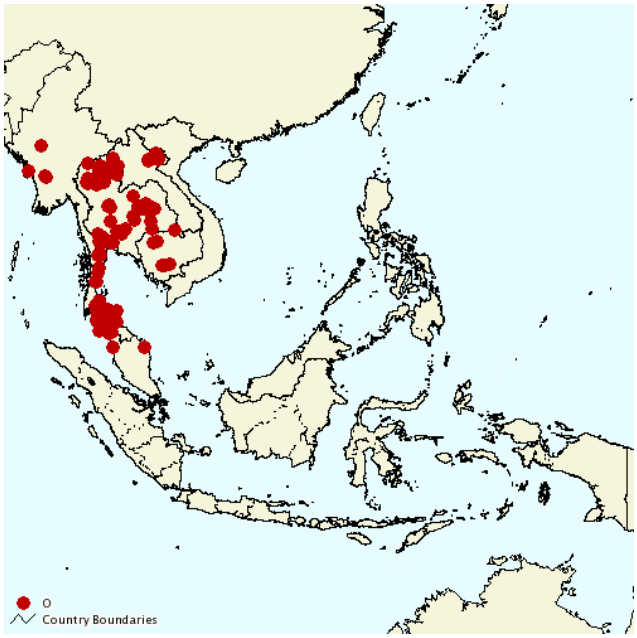


Table 5: Summary of the history of FMD Pool 1 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2013 -2017 see Map 5 below. (Source – Wahis, EuFMD Global Monthly Report)

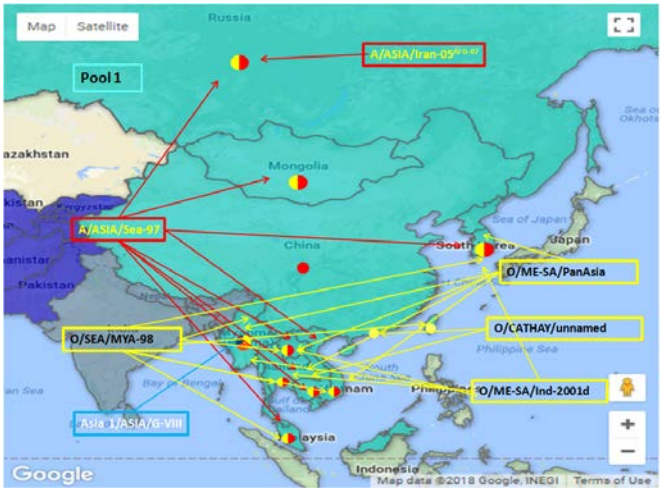
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2016 **(1st semester 2016)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Cambodia	PENDING/2013-2016 O, A/2016, NOT SAMPLED, (ASIA /2016)	Dec 2016/ A & O	**See text**
China	Data up to 1st semester 2015 2013 & 2015/A,	June 2018/O, May 2017/A	**See text**

	2012-2013/O, 2012 -2014/NOT TYPED		
China, Hong Kong, SAR	O	Mar 2018/O	**See text**
Democratic People's Republic of Korea	O/2016 2012-2013/DISEASE ABSENT 2014 & 2015/ NO DATA REPORTED	May 2014/not confirmed, July 2014/O	Follow-up needed
Lao People's Democratic Republic	Data up to 1st semester 2015) A, O/2015 2012/DISEASE PRESENT WITH QUANTITATIVE DATA BUT WITH AN UNKNOWN NUMBER OF OUTBREAKS	Jan 2017/O Mar 2015/A,	**See text**
Malaysia	A/2016, 2012 –2016/O, 2013 & 2015/NOT TYPED	August 2016/A & O	**See text**
Mongolia	Disease Absent /2016**, 2014 & 2015/O, 2013/A & NOT TYPED	March 2018/O, Sept 2016/A	**See text**
Myanmar	2012-2016/O, 2015/A & NOT TYPED	May 2018/O, April 2017/Asia 1, July 2016/ not typed, Oct 2015/A	**See text**
Republic of Korea	Data up to 1st semester 2015 2014 -2015/O, 2012-2013/DISEASE ABSENT	April 2018/A, Feb 2017/O	**See text**
Russian Federation	2013 – 2016**/A, 2012, 2014 & 2015/O	Feb 2018/O, Oct 2016/Asia 1, Jan 2016/ A	**See text**
Taiwan Province of China	2016/NO DISEASE PRESENT A/2015, 2012-2013/O	Jun 2015/A	Follow-up needed
Thailand	O, A NOT SAMPLED & NOT TYPED	Feb 2017 /A, Jan 2017/O June – July 2016/not typed	**See text**
Viet Nam	O, NOT SAMPLED, NOT TYPED 2013-2016/A	November 2017/A, Jan 2018/O and not typed	**See text**

Map 5: FMD distribution between 2013 – 2017 by serotype and topotype in South East Asia – red boxes and circles refer to serotype A genotypes, yellow to serotype O genotypes and white script refers to new introduction of viral lineage in pool or country of the pool during 2017.
(Source – Google Fusion Maps, WRLFMD).

Conjectured circulating FMD viral lineages in Pool 1 [2, 14]:

- Serotype O: O/SEA/Mya-98, O/CATHAY, O/ME-SA/PanAsia, O/ME-SA/Ind-2001d (new detection in Myanmar and Thailand during 2016)
- Serotype A: A/ASIA/Sea-97 and Iran-05^{SIS10} sublineage, only in the Russian Federation
- Serotype Asia-1 – reappearance of this serotype in 2016 in Russia and in 2017 in Myanmar – previous detection in the region was in 2006 in Vietnam and in China (People's Rep. of).



B. POOL 2 – South Asia

Bhutan [2]

A/ASIA/G-VII and O/ME-SA/Ind-2001e were detected in the cattle samples collected between July 2017 and April 2018. A summary of the results is represented in Table 6 and location of sample collection in Map 6.

Table 6: sequencing results of the FMDV serotypes A and O detected in the bovine samples collected in Bhutan between July 2017 and April 2018. (Source – WRLFMD)

Sample Identification	Location origin of sample	Date of collection	Genotype	Most Closely Related Viruses not belonging to the country - Seq id %	Host species
BHU/26/2017	Chazhi	22/09/2017	**A/ASIA/G-VII**	NEP/13/2017 (>97.6)	cattle
BHU/27/2017					
BHU/28/2017					
BHU/24/2017	Bangtaygang	19/07/2017	**O/ME-SA/Ind-2001e**	NEP/22/2017 (99.1)	cattle
BHU/25/2017				/	/
BHU/2/2018	Malbashy	20/04/2018		UAE/1/2015 (98.9)	gazelle
BHU/3/2018					

Map 6: location of the genotyped FMDV samples collected in in Bhutan between July 2017 and April 2018. (Source – WRLFMD, Google Fusion Maps)

India [11]

The ICAR-Directorate of Foot and Mouth Disease, Mukteswar, India detected FMDV serotype O in the 14 cattle samples examined using antigen and/or RNA detection diagnostic methods.

Serological testing was conducted on 169 samples collected during epidemiological studies. All diagnostic kits used are those developed by ICAR-PDFMD.

The laboratory conducts field investigations of FMD outbreaks and provides expert advice to the Government and to the National and Local authorities. The institution has on-going research studies and collaborations with international organisations.

Nepal [3]

FMDV O was detected by the National Laboratory of Foot and Mouth Disease and TADS Laboratory for the reporting month in cattle samples collected in the following locations of the country: Kavre, Chitwan, Ghorkha, Okhaldunga, Sindhupalchowk and Kathamndu districts. Location of the outbreaks is represented in Map 7.

Map 7: location of the outbreaks detected in Nepal during June 2018. (Source – National Laboratory: of Foot and Mouth Disease and TADS Laboratory, Nepal and Google Fusion Maps)

Sri Lanka [2]

O/ME-SA/Ind-2001d and O/ME-SA/Ind-2001e were the topotypes detected among the cattle samples collected between August 2017 and May 2018.

A summary of the genotyping results and location of where the samples were collected are respectively represented in Table 7 and Map 8.

Map 8: location of the bovine samples collected in Sri Lanka between August 2017 and May 2018. (Source – WRLFMD, Google Fusion Maps)

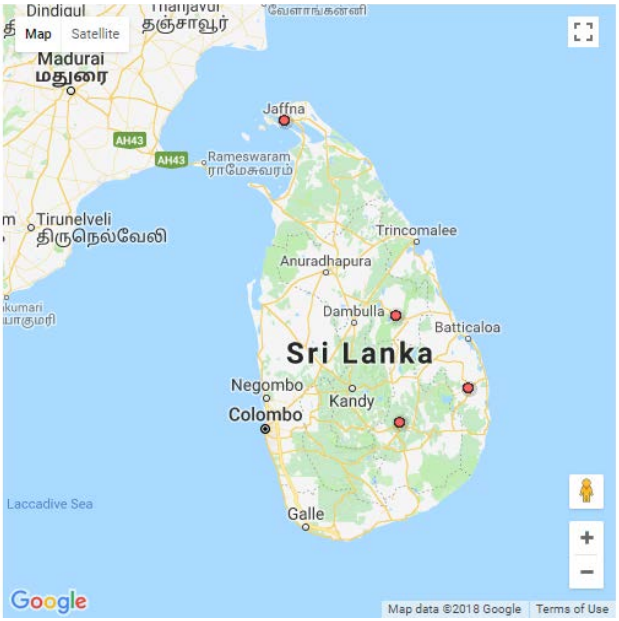


Table 7: sequencing results of the FMDV serotypes O detected in the bovine samples collected in Sri Lanka between August 2017 and May 2018. (Source – WRLFMD)

Sample Identification	Location origin of sample	Date of collection	Genotype	Most Closely Related Viruses not belonging to the country - Seq id %	Host species
SRL/5/2017	Tellipalai, Jaffna, Northern	28/11/2017	**O/ME-SA/Ind-2001e**	BAN/GKa-236(pig)/2015 (>98.1)	porcine
SRL/1/2018	Sankanai, Jaffna, Northern	09/01/2018		BAN/GKa-236(pig)/2015 (>98.1)	porcine
SRL/2/2018	Thuppitiya, Badulla, Uva	06/02/2018	**O/ME-SA/Ind-2001d**	/	
SRL/4/2018	Ridimaliyadda, Badulla, Uva	15/02/2018			
SRL/5/2018	Kanchankudi, Ampara, Eastern	14/03/2018			
SRL/6/2018	Kanchankudi, Ampara, Eastern	14/03/2018			
SRL/7/2018	Ampara, Eastern	28/03/2018			
SRL/9/2018	Aluth oya, Polonnaruwa, North Central	16/04/2018			
SRL/11/2018	Polonnaruwa, Polonnaruwa, North Central	23/04/2018			

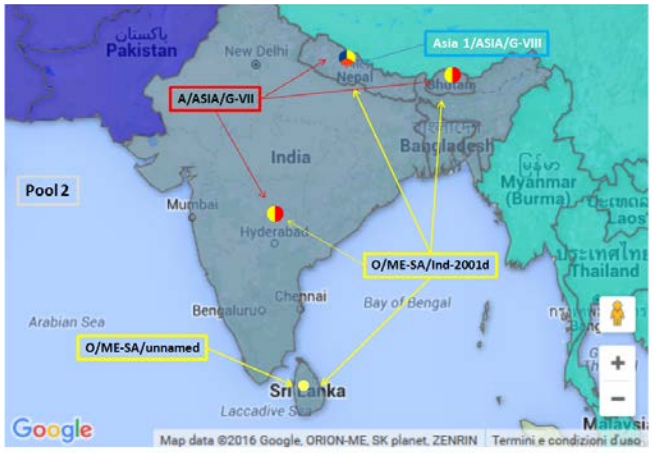
Table 8: Summary of the history of FMD Pool 2 between 2012– 2018. For geographic distribution of circulating FMDVs between 2013 -2017, see Map 9 below. (Source – WAHIS, EuFMD Global Monthly Report)

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2016 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Bangladesh	NO DATA AVAILABLE/2016, DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	Dec 2016/A, ASIA 1 and O	Follow-up needed
Bhutan	2013-2016/O, NOT TYPED or NOT REPORTED 2013 & 2014/NOT SAMPLED	Apr 2018/O, Sep 2017/A	**See text**
India	NO DATA AVAILABLE/2016, O, A, NOT SAMPLED 2012-2014/Asia 1 2013/NOT TYPED	April 2018/O, Apr 2015/A Asia 1	**See text**
Mauritius	DISEASE ABSENT	Sep 2016/0	Follow-up needed
Nepal	O, 2012-2103/Asia 1	June 2018/O, Mar 2018/Asia 1, April 2017/A	**See text**
Sri Lanka	2015 -16/NO DATA REPORTED, 2012 – 2014/O	May 2018/O	Follow-up needed

Map 9: FMD distribution between 2013 – 2017 by serotype and topotype in South Asia - red boxes and circles refer to serotype A genotypes, yellow to serotype O genotypes and white script refers to new introduction of viral lineage in pool or country of the pool during 2017.
(Source – Google Fusion Maps, WRLFMD)

Conjectured circulating FMDV lineages in Pool 2 [2, 14]:

- O/ME-SA/Ind-2001d predominates (the O/ME-SA/Ind-2011 lineage that emerged during 2011 has not been detected during 2012-17), outbreaks of this serotype detected also in Mauritius during 2016 (**not reported in Map**)
- A/ASIA/G-VII (genotype 18)
- Asia-1 (lineage C subdivided into Eastern and Western clusters) – not reported in map – reappearance in 2017 in Nepal.



C. POOL 3 – West Eurasia & Middle East

Afghanistan [4]

The Central Veterinary Research and Development Laboratory (CVDRL), Afghanistan reported the detection of FMDV A (N° 1 sample) Asia 1 (N° 3 samples) and O (N° 18 samples) among the 48 samples tested during June 2018. Last genotypes reported to circulate relative to the serotypes detected for the reporting month were, A/ASIA /Iran-05^{SIS-13}, Asia 1/ASIA/Sindh-08 and O/ME-SA/PanAsiaAnt-10.

Algeria [1, 2]

A FMD outbreak occurred on a cattle farm in Tizi Ouzou on June 20th 2018. Previous FMD outbreaks in the country were last reported in July 2017 caused by FMDV serotype A.
Primary diagnosis was carried out on cattle samples, on June 22nd 2018 by the Central Veterinary Laboratory, Algeria (National laboratory) using real-time PCR and typing ELISA. The samples forwarded to the WRLFMD were positive for O/EA-3.
The source of the outbreak is not known and the control measures put in place are: surveillance outside containment and/or protection zone, official destruction of animal products, official disposal of carcasses, by-products and waste, disinfection, vaccination permitted (if a vaccine exists), and no treatment of affected animals. A movement control of animals will be applied.
A summary of the animals involved and location of the outbreak are reported in Table 9 and Map 10.

Table 9: summary of the animals involved in the FMD outbreak that occurred on a cattle farm in Tizi Ouzou on June 20th 2018. (Source – WAHIS)

Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Species	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	13	12	0	13	0	Cattle	92.31%	0.00%	0.00%	100.00%

*Removed from the susceptible population through death, destruction and/or slaughter

Map 10: location of the FMD that occurred on a cattle farm in Tizi Ouzou on June 20th 2018. (Source – WAHIS, Google Fusion Maps)

Iran [2]

Good matching results were obtained for some of the vaccines strains employed in the VMSD tests conducted on field viruses belonging to FMDV A, ASIA 1 and O detected in the bovine samples collected during January and February 2018 and respectively belonging to the following topotypes: A/ASIA/Iran-05^{SIS-13}, Asia 1/ASIA/Sindh-08 and O/ME-SA/PanAsia -2.

Summary of the VMSD test results is as follows:

- For field isolates A/IRN/10/10/2018 and A/IRN/23/2018 good matching results were obtained with vaccine strains A IRN/2005 and A22 IRQ/24/64 but not with A/GVII for both and A/TUR/20/2006 for the former isolate.
- For field isolates ASIA 1/IRN/19/2018 and ASIA 1/IRN/7/2018 good matching results were obtained with Asia 1 Shamir.
- For field isolates O/IRN/1/2018 and o/IRN/12/2018 good matching results were obtained with O 3039, O Manisa and O Tur 5/09.

Israel [2]

Vaccine strains O 3039, O Manisa and O TUR 5/09 employed in the VMSD tests obtained in general good matching results with the field isolates 0/ISR/2/2018 and 0/ISR/4/2018 belonging to O/ME-SA/PanAsia-2^{Qom-15} detected in the samples collected in the outbreaks that occurred in the country during April 2018.

Palestine [1]

A FMD outbreak due to FMDV serotype O, occurred on June 17th 2018 at Sielet Aldaher, Jenin, West Bank in cattle. While, the Central Veterinary Lab confirmed FMD diagnosis using real-time PCR, virus serotying is pending.

Outbreak origin is being investigated as straw from a new source was newly introduced on the farm.

Control measures adopted are movement control inside the country, vaccination in response to the outbreak with 1,450 cattle and 700 sheep vaccinated, surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, screening, traceability, quarantine, control of wildlife reservoirs, zoning and disinfection while no treatment is being provided to the affected animals.

A summary of the animals involved and location of the outbreak are reported in Table 10 and Map 11.

Table 10: summary of the animals involved in the FMD outbreak that occurred on a cattle farm on June 17th 2018 at Sielet Aldaher, Jenin, West Bank. (Source – WAHIS)

Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	62	8	0	0	0	12.90%	0.00%	0.00%	0.00%

*Removed from the susceptible population through death, destruction and/or slaughter

Map 11: location of the FMD that occurred on a cattle farm on June 17th 2018 at Sielet Aldaher, Jenin, West Bank.. (Source – WAHIS, Google Fusion Maps)

Pakistan [5]

The FMD control project in Pakistan is currently operating only in Punjab and information relative to other areas of the country is provided on a voluntarily basis.

For the reporting month, 5 FMD outbreaks due to serotype O were detected in different districts of Punjub. A summary of the distribution of the outbreaks relative to locations and serotypes are represented in Table 11 and Map 12.

Punjub is also continuing its emergency and preventive vaccinations campaigns with the respective administration of 50 and 301,498 doses. A summary of the doses administered in the different districts of Punjub is reported in Table 12.

Table 11: summary of the FMD outbreaks reported during June 2018 in Punjab, Pakistan. (Source – Progressive Control of Foot and Mouth Disease in Pakistan, *Dr. Muhammad Afzal*, Project Coordinator)

Province	District	Number Outbreaks	N° of Outbreaks and FMD serotypes	
			O	Un-Typed
Azad Kashmir	Neelum	04	02	02
Punjab	Rawalpindi	01	01	--
Total		**05**	**03**	**02**

Map 12: location of the FMD outbreaks reported in Punjab, Pakistan during June 2018. (Source – Google Fusion Maps, Progressive Control of Foot and Mouth Disease in Pakistan, *Dr. Muhammad Afzal*, Project Coordinator)

Table 12: summary of the preventive vaccination activities conducted in the province of Punjab, Pakistan during June 2018. (Source – Progressive Control of Foot and Mouth Disease in Pakistan, *Dr. Muhammad Afzal*, Project Coordinator)

District	No. of Households	Animals Vaccinated (6 Monthly Dose)		
		Cattles	Buffaloes	Total
Bahawalnagar	**1,861**	**10,255**	**15,455**	**25,710**
Bahawalpur	**12,745**	**119,607**	**49,024**	**168,631**
Cholistan	**2,805**	**103,098**	**4,059**	**107,157**
Punjab	**17,411**	**232,960**	**68,538**	**301,498**

Table 13: Summary of the history of FMD Pool 3 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2012 -2016, see Map 13 below. (Source – Wahis, EuFMD Global Monthly Report)

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2016 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Afghanistan	2013-2016**/O, A, Asia 1, NOT TYPED 2012/SEROTYPE NOT REPORTED	June 2018/A, Asia 1 & O	**See Text**
Algeria	Data available up to 1st semester 2015 2014 -2015/O	June2018/O Apr 2017/A	**See Text**
Armenia	2015 -2016**/A , 2012-2014/DISEASE ABSENT	Dec 2015/A	Follow –up needed
Azerbaijan	DISEASE ABSENT	2007/0	Follow –up needed
Bahrain	DISEASE ABSENT/2016, 2012, 2014 &2015 /O	Mar 2015/O	Follow –up needed
Egypt	2012, 2014, 2016**/SAT 2 2012 – 2016**/O, A	April 2017/O, Nov 2016/A May-Jun 2016/Sat 2, Aug 2016/typing pending	Follow –up needed

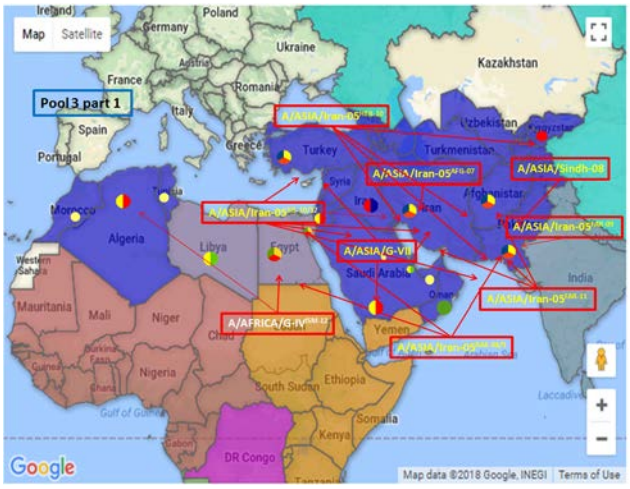
Georgia	DISEASE ABSENT	2001/ASIA 1	Follow –up needed
Iran (Islamic Republic of)	2012-2016/A, Asia 1 & O	Feb 2018/A, Asia 1& O,	**See text**
Iraq	2015-16/O, 2012-2016/A 2015/ SEROTYPE NOT REPORTED, 2012-13	Dec 2013/A, ASIA 1	Follow –up needed
Israel	2012-2015**/O	April 2018/O, June2017/A	**See text**
Jordan	DISEASE ABSENT	Mar 2017/O, 2006/A	Follow –up needed
Kazakhstan	2014-2016**/ DISEASE ABSENT, 2012/O,2012 –2013/A	Jun 2013/ A & Aug 2012/O	Follow –up needed
Kuwait	O/2016 2013 – 2014/ DISEASE ABSENT, 2012/O	April 2016/O	Follow –up needed
Kyrgyzstan	2015 -16/ DISEASE ABSENT, 2012-2014/O, A	Aug 2014/not typed & Apr 2013 /O, A,	Follow –up needed
Lebanon	DISEASE ABSENT/2016**, 2015/ NO DATA REPORTED	2010/not typed	Follow –up needed
Libya	NO DATA REPORTED	Oct 2013/O	Follow –up needed
Morocco	2012-14,2016**/DISEASE ABSENT, O/2015	Oct 2015/O	Follow –up needed
Oman	2016/ NO DATA REPORTED, 2012-2015/O	May 2015/SAT 2	Follow –up needed
Pakistan	2012 & 2015-16/ NO DATA REPORTED 2013-2014/A, ASIA 1 & O	June 2018/O May 2018/ A & Asia 1	**See text**
Palestine	O, 2012-2013/SAT 2	June 2018/Untyped, Dec 2017/O, Mar 2013/Sat 2	**See text**
Qatar	NO DATA AVAILABLE/2016 2012-2015/O	Dec 2013/O	Follow –up needed
Saudi Arabia	2012-2014, 2016**/O A/2015	Oct 2016/A & April 2016/O	Follow –up needed
Syrian Arab Republic	DISEASE ABSENT**	2002/ A & O	Follow –up needed
Tajikistan	2016/ NO DATA REPORTED 2014-2015**/DISEASE ABSENT 2012- 2013/NOT TYPED	Nov 2012/ not typed & Nov 2011/Asia 1,	Follow –up needed
Tunisia	2015-16**/ DISEASE ABSENT, 2014/O	April 2017/A, Oct 2014/O	Follow –up needed
Turkey	A & O, NOT TYPED Asia 1/2012-15	Oct 2015/ A May, 2014-2015/ Asia 1 and O	Follow –up needed
Turkmenistan	2013-2016**/DISEASE ABSENT, 2012/NO DATA REPORTED	Not available	Follow –up needed
United Arab Emirates	O/2016 2012, 2015/DISEASE ABSENT 2013-2014/O	Sep 2016/O	Follow –up needed
Uzbekistan	2012,2013 & 2015/NO DATA REPORTED 2014/DISEASE ABSENT	Not available	Follow –up needed

Map 13: FMD distribution between 2013 – 2017 by serotype and topotype for West Eurasia and Middle East– red boxes and circles refer to serotype A genotypes, yellow to serotype O genotypes, green to serotype SAT 2 genotypes and white script to new introduction of viral lineage in pool or country of the pool during 2017. (source – Google Fusion Maps, WRLFMD).

(Note: Kazakhstan is not included in map as declared by OIE as FMD free divided in zones with and without vaccination)

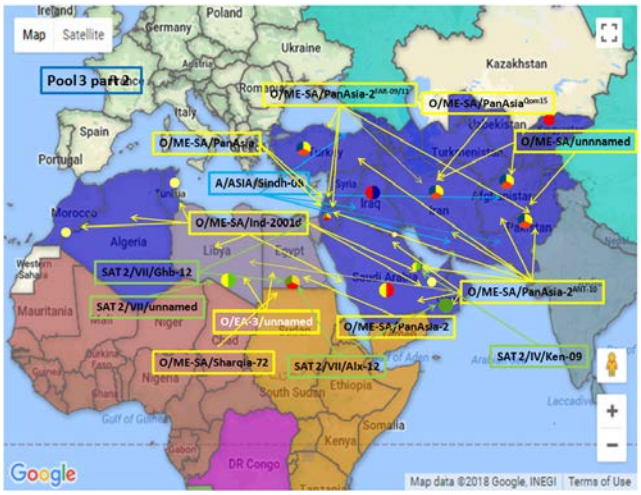
Conjectured circulating FMDV serotype A and Asia 1 lineages in Pool 3 [2, 14]:

- A/ASIA/Iran-05 (from AFG-07, HER 10, SIS-10-13, FAR 11 and BAR-08 sub-lineages)
- A/Asia/G-VII (recent incursion from South Asia)
- A/ASIA/Sea-97
- A/ASIA/Sindh-08
- A/AFRICA/G-IV
- Asia-1 (Sindh-08 lineage).



Conjectured circulating FMDV serotype O and SAT 2 lineages in Pool 3 **(cont'd)**

- O/ME-SA/PanAsia-2 (predominantly from ANT-10 and FAR-09 /11 sub-lineages)
- O/ME-SA/Ind-2001 (recent incursions per 2013/14 from the Indian sub-continent)
- New detection during 2016 of O/ME-SA/Sharqia-72 in Egypt and of O/ME-SA/PanAsia-2QOM-15 in Iran
- O/EA-3/unnamed in Egypt, Libya, Israel and Palestine
- SAT 2/IV/Ken-09
- SAT 2/VII/Alx-12 and Ghb-12 sublineages



D. POOL 4 – Eastern Africa

Kenya [6]

The FMD National Reference Laboratory, Embakasi, Kenya detected FMDV O in one of the 24 cattle samples examined for the reporting month.

An outbreak investigation is being carried out by the laboratory on a large scale due to the FMD events, which have lately occurred in the country and the Head of the Laboratory is revising the FMD control strategy for the country.

Table 14: Summary of the history of FMD Pool 4 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2013 -2017, see Map 14 below. (Source – WAHIS, EuFMD Global Monthly Report)

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2016 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Burundi	DISEASE PRESENT	Aug 2013 / not available	Typing required
Comoros	NO DATA AVAILABLE	2010	Follow –up needed
Democratic	2012 – 2016**/A, O, SAT 1	June 2017/not typed	Follow –up needed

Republic of Congo			
Djibouti	DISEASE ABSENT	Not available	Follow –up needed
Egypt	2012, 2014, 2016**/SAT 2 2012 – 2016**/O, A	May-Jun 2016/ O & Sat 2, March 2016/A, Aug 2016/typing pending	Follow –up needed
Eritrea	2014, 16/ DISEASE PRESENT 2015/ NO DATA REPORTED 2013/ DISEASE ABSENT, 2012/O	Nov 2016/not reported, Jan 2012/O	Follow –up needed
Ethiopia	O, 2015-16/SAT 1 2012 & 2105/SAT 2, 2012/A	April 2018/O & SAT 2 Feb 2018/SAT 1, Jan 2018/A	Follow –up needed
Kenya	2012 – 2016 /NOT TYPED, A, O, SAT1, SAT2	June 2018/O, May 2018/ SAT 1, Nov 2017/A & SAT 2	**See text**
Libya	NO DATA REPORTED	Oct 2013/ O, Sat 2/Apr 2012	Follow-up needed
Rwanda	2015-16/NO DATA AVAILABLE 2012-2013/A, O, SAT1, SAT 2	Nov 2012/not typed	Typing required
Somalia	2012-13, 2015-16/DISEASE PRESENT, 2014/PENDING	June 2016/not reported	Follow –up needed
Sudan	2015-16 -16/A, SAT 1 & NOT SAMPLED, 2012-2014/O & NOT TYPED 2013/SAT 2,	Dec 2016/ not sampled, Oct 2016/O, Dec 2013/A, Jan 2014/SAT 2	Follow –up needed
South Sudan	2015/DISEASE PRESENT 2014/A, O SAT 1, SAT 2, SAT 3 2012-2013 & 2016 NO DATA REPORTED	2011	Follow –up needed
United Republic of Tanzania	2012-2016/A, O, SAT 1, SAT 2	Oct 2016/SAT 1, Aug 2016/O & SAT 2, Jun 2016/ A	Follow –up needed
Uganda	2016/NO DATA REPORTED 2013-16/NOT TYPED or NOT SAMPLED, 2012, 2015/ SAT 1,2012, 2014-15/O	May 2017/O Nov 2014/SAT1, Jan 2015/A and SAT 3, July 2015/ SAT 2 and untyped	Follow –up needed
Yemen	2015-16/NO DATA REPORTED 2013 – 2014/ DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA, 2012/O	2009/O	Follow –up needed

Map 14: FMD distribution between 2013 – 2017, by serotype and topotype for East Africa - red boxes and circles refers to serotype A genotypes, yellow refers to serotype O genotypes, green refers to serotype SAT 2 genotypes and light blue refers to SAT 3 genotypes.
(source – Google Fusion Maps, WRLFMD).

East Africa is known to be endemic for FMD, but available data is at present limited.
Conjectured circulating FMDV lineages in Pool 4 [2, 14]:

- O (topotypes EA-2 (Tanzania, DR Congo & Uganda), EA-3 and EA-4 (Ethiopia)
- A/AFRICA (genotypes I (Kenya, Tanzania, D.R. Congo), VII (Ethiopia)
- SAT 1 (topotypes I (Kenya, Tanzania), IX (Ethiopia))
- SAT 2 (topotypes IV (Kenya, Tanzania), VII (Sudan, Egypt, Ethiopia), XII (Ethiopia, Sudan))
- SAT 3 (only detected in African buffalo in the south of the QENP, Uganda in 1970 & 1997 and recently in 2013)

E. POOL 5 – West / Central Africa

Cameroon [12]
The Laboratoire National Vétérinaire (LANAVET), Garoua Cameroon detected FMDV antibodies in 313 (69.6%) of the 450 cattle serum samples tested during June 2018.
The laboratory continues its collaborative research projects with the Ohio State University and Plum Island, USA.
The last viral lineages reported by the WRLFMD for the country was in 2014 with the detection of A/AFRICA/G-IV and SAT2/VII/Lib-12.

Ghana [7]
For the reporting month, the ACCRA Veterinary Laboratory reported the detection of FMDV O in pig samples.
The most recent viral lineages reported by the WRLFMD for the country was in 2016 with the detection of O/WA, O/EA-3 and SAT1/X.

Nigeria [8]
The FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria detected FMDV in five cattle samples examined during June 2018.
The samples were collected at a cattle market of Jos South and Bokkos LGA of Plateau (Map 15).
The most recent viral lineages reported by the WRLFMD for the country was in 2016 with the detection of O/WA, O/EA-3 and SAT1/X.

Map 15: location of where the FMDV positive bovine samples were collected during June 2018. (Source – NVRI, Nigeria, Google Fusion Maps)

Table 15: Summary of the history of FMD Pool 5 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2012 -2016, see Map 16 below. (Source – WAHIS, EuFMD Global Monthly Report)

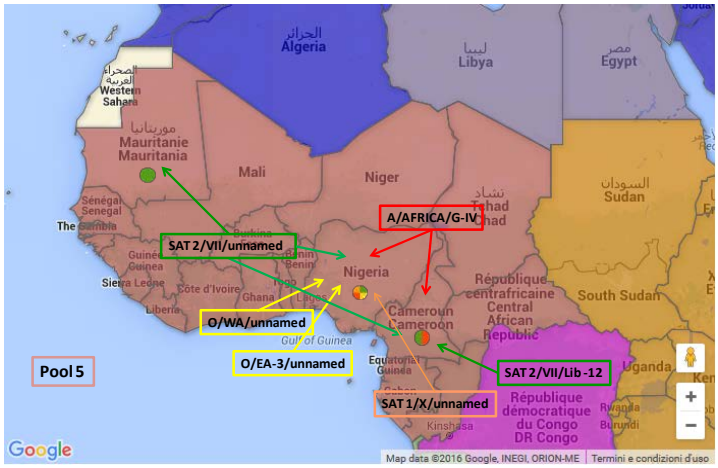
Country	**FMD history FMDV serotypes, reported to OIE in 2012 – 2016 **(1st semester)**	**Last outbreak reported/serotype** #see pg. 1	**Comment** (Genotyping would be useful for this region)
Benin	2016/NO DATA REPORTED A, O, SAT 1, SAT 2/2012-2015	Jun 2014/O, A, SAT 1, SAT 2	Follow –up needed
Burkina Faso	DISEASE PRESENT	Dec 2016/ not available	Follow –up needed
Cameroon	2016/NO DATA REPORTED DISEASE PRESENT	April 2018/untyped, Nov 2014/O, SAT 2, May 2014/SAT 1, Apr 2014/ A	**See text**
Cabo Verde	DISEASE ABSENT	Not available	Follow –up needed
Central African Republic	DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	Not available	Follow –up needed
Chad	2016/DISEASE PRESENT 2014-15/ DISEASE ABSENT 2012 – 2013/ DISEASE PRESENT	Aug 2016/Not reported	Follow –up needed
Democratic Republic of the Congo	2012 – 2016/A, O, SAT 1	Dec 2016/A, O & Sat 1	Typing required
Congo	NO DATA AVAILABLE	Jun 2013/not typed	Typing required
Côte d'Ivoire	2013-16/ not sampled or not reported, 2012/A,	Jul 2016/not reported	Follow –up needed
Equatorial Guinea	2014 – 2016/ NO DATA AVAILABLE 2012 – 2013/DISEASE SUSPECTED	Not available	Follow –up needed
Gabon	2012, 2014-16/DISEASE ABSENT 2013/NO DATA AVAILABLE	Not available	Follow –up needed
Gambia	NO DATA AVAILABLE	2012/O	Follow –up needed
Ghana	2016/NO DATA AVAILABLE	June 2017/O,	**See text**

	2012 – 2015/DISEASE PRESENT	Dec 2016/ SAT 2 2014/not available	
Guinea-Bissau	2015-16**/DISEASE SUSPECTED 2014/ DISEASE PRESENT 2012-2013/DISEASE ABSENT	Oct 2016/O Dec 2016/SAT1 & SAT 2	Follow –up needed
Guinea	2012-2013, 2015-16**/ DISEASE ABSENT 2014/ DISEASE PRESENT	2014/not available	Follow –up needed
Liberia	NO DATA AVAILABLE	Not available	Follow –up needed
Mali	2013, 2016/DISEASE PRESENT 2015/A, SAT 1 2014-2015/SAT 2 2012/ NO DATA AVAILABLE	Oct 2016/not reported	Follow –up needed
Mauritania	2016/DISEASE SUSPECTED, 2014-2015**/SAT 2, 2012-2013/NO REPORTED OUTBREAKS	Dec 2014/SAT 2	Follow –up needed
Niger	2016**/DISEASE PRESENT BUT WITH NO QUALITATIVE DATA, 2015/O 2012 – 2014/NOT SAMPLED	2014/not sampled, May 2015/O	Follow –up needed
Nigeria	2015-16/DISEASE PRESENT 2012-2014/O	June2018/untyped Mar 2018/ SAT 2 Feb Sept 2016/ O & SAT 1 Nov 2015/A	**See text**
Sao Tome Principe	2013-16/NO DATA AVAILABLE 2012/DISEASE ABSENT	Not available	Follow –up needed
Senegal	2015-16/DISEASE PRESENT 2012, 2014/NOT SAMPLED 2013/NO DATA AVAILABLE	Feb 2015/ A and O, 2014/ SAT 2	Follow –up needed
Sierra Leone	DISEASE ABSENT**	Oct 1958	Follow –up needed
Togo	O, SAT 1	2012/O	Follow –up needed

Map 16: FMD distribution between 2013 – 2017 by serotype and topotypes for West Africa. Red boxes and circles refer to serotype A genotypes, yellow refers to serotype O genotypes, orange boxes to serotype SAT 1 genotypes, green refers to serotype SAT 2serotypes and white script in map refers to new introduction of viral lineage in pool or country of the pool during 2017. (Source – Google Fusion Maps, WRLFMD).

Conjectured circulating FMDV lineages in Pool 5 [2, 14]:

- Serotype O (topotypes WA, EA-3 (Nigeria))
- Serotype A (topotypes AFRICA IV & VI)
- Serotype SAT 1 - detection of a new viral lineage, SAT 1/X/unnamed in Nigeria
- Serotype SAT 2 (topotype VII/Lib-12 (Mauritania), and unnamed genotypes)



F. POOL 6 – Southern Africa

Botswana [1]

A FMD outbreak due to FMDV serotype SAT 2, occurred on June 9th 2018 involving cattle in a crush of Ngamiland. Diagnosis was carried out on June 25th 2018 by the Botswana Vaccine Institute (OIE Reference Laboratory) using virus isolation. Laboratory results indicate infection with the FMDV SAT 2, Topotype III.

Disease suspect was due to the observation of FMD related signs in cattle represented by lameness, drooling and dullness, together with salivation, swollen gums, necrosis/lesions in the interdigital space and coronary band, ulcers on the dorsal aspect of the tongue, dental pad with fibrin deposits.

Surveillance is on-going in the outbreak zone 2d. Biosecurity check points have been put in place to control the spread of the disease, coupled with cloven hoofed animal movement restrictions. Ring vaccination to 1382 cattle, both primary and booster, was done with a trivalent vaccine containingg FMDV SAT 1, SAT 2 and SAT 3 antigens.

Other control measures applied are surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, disinfection with no treatment of affected animals.

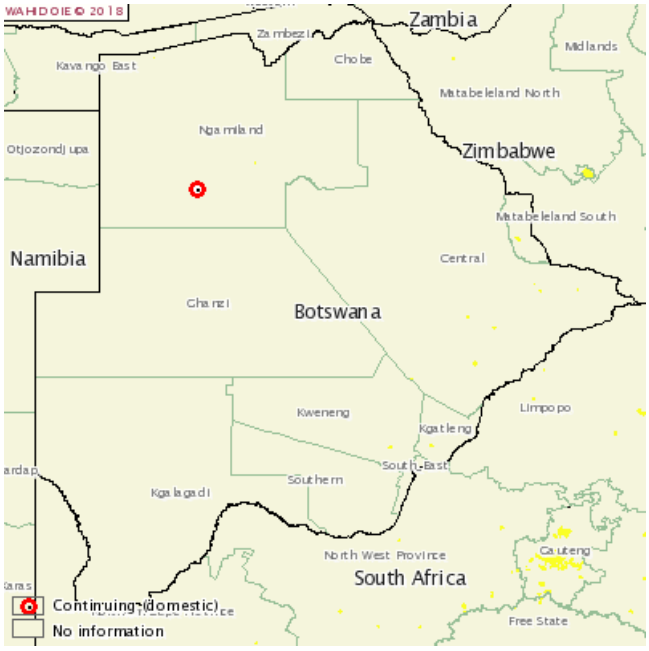
A summary of the animals involved and location of the outbreak are reported in Table 16 and Map 17.

Table 16: summary of the cattle involved in the FMD outbreak that occurred on June 9th 2018 involving cattle in a crush of Ngamiland. (Source – WAHIS)

Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	373	5	0	0	0	1.34%	0.00%	0.00%	0.00%

*Removed from the susceptible population through death, destruction and/or slaughter

Map 17: location of the FMD that occurred on June 9th 2018 involving cattle in a crush of Ngamiland. (Source – Google Fusion Maps, WAHIS-OIE)



Malawi [1]

A FMD outbreak, for which even in this case serotyping is pending, occurred on June 6th 2018 involving cattle in a village of Ntcheu, Central. Diagnosis is in process by the Central Veterinary Laboratory using 3ABC ELISA.

The source of the outbreak is unknown while an investigation is on-going to establish the extent of spread.

The outbreak was observed in a naive population with common grazing area with animals from Mozambique. First cases were observed in draught oxen which converge at a market point carrying farmers' produce.

Control measures adopted are movement control inside the country, surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, quarantine, disinfection, process to inactivate the pathogenic agent in products or by-products, vaccination permitted (if a vaccine exists) with no treatment of affected animals.

A summary of the animals involved and location of the outbreak are reported in Table 17and Map 18.

Map 18: location of the FMD that occurred on June 6th 2018 involving cattle in a village of Ntcheu, Central. (Source – Google Fusion Maps, WAHIS-OIE)

Table 17: summary of the cattle involved in the FMD outbreak that occurred on June 6th 2018 involving cattle in a village of Ntcheu, Central. (Source – WAHIS)

Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	6451	28	0	0	0	0.43%	0.00%	0.00%	0.00%

*Removed from the susceptible population through death, destruction and/or slaughter

Mozambique [1]

Two FMD outbreaks with serotyping pending were reported in cattle respectively on April 24th 2018 at Tete and on May 17th 2018 at Nampula.

Laboratory confirmation is ongoing and is being carried out by the Veterinary Research Institute - DCA which is using an antibody detection ELISA

The animals involved presented ulcerative lesions on mouth and gums, together with wounds present in interdigital space. Animals of all ages are affected.

Source of outbreaks was attributed to animals in transit or from contact with infected animals at grazing/watering points or though fomites (humans, vehicles, feed, etc.).

Control measures adopted are Movement control inside the country, Surveillance within and outside containment and/or protection zone, Quarantine, Vaccination permitted if a suitable vaccine is available. Affected animals are not receiving treatment.

A summary of the animals involved and location of the outbreak are reported in Table 18 and Map 19.

Table 18: summary of the cattle involved in the FMD outbreaks reported in cattle respectively on April 24th 2018 at Tete and on May 17th 2018 at Nampula on May 17th 2018 at Nampula. Central. (Source – WAHIS)

Location	Date of start of outbreak	Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Kambulatsitsi, Kambulatsitsi, Moatize, Tete	24/04/2018	Cattle	290	48	8	0	0	16.55%	2.76%	16.67%	2.76%
Namachepa, Namachepa, Mogovolas, Nampula	17/05/2018	Cattle	1600	17	8	0	0	1.06%	0.50%	47.06%	0.50%

*Removed from the susceptible population through death, destruction and/or slaughter

Map 19: location of the FMD outbreaks reported in cattle respectively on April 24th 2018 at Tete and on May 17th 2018 at Nampula on May 17th 2018 at Nampula. (Source – Google Fusion Maps, WAHIS-OIE)

South Africa [12]

The ARC Onderstepoort Veterinary Institute examined and 3,273 serum samples using liquid-phase blocking ELISA for the detection of FMDV serotypes SAT 1, SAT 2 and SAT 3 and 25 sera using FMD NSP ELISA.

Zimbabwe [1]

A FMD outbreak occurred in cattle at Bopoma, Mary Mount, Rushinga, Mashonaland Central that started on June 28th 2018 were the virus was not yet typed. Laboratory diagnosis is being conducted by the Central Veterinary Laboratory uisng liquid-phase blocking ELISA and non structural protein ELISA and by the Botswana Vaccine Institute (Regional Reference Laboratory) which Is using virus isolation.

The disease was observed older in cattle along the border with Mozambique where four villages dipping at Bopoma dip tank were affected. The district has been placed under quarantine with roadblocks manned by police and veterinary personnel being put in place. Inspections are currently on-going to determine the spread of infection.

Source of outbreak is due to the Illegal movement of animals.

Other control measures adopted were movement control inside the country surveillance outside containment and/or protection zone surveillance within containment and/or protection zone screening

traceability quarantine zoning vaccination in case a suitable vaccine is available.

A summary of the animals involved and location of the outbreak are reported in Table 19 and Map 20.

Map 20: location of the FMD outbreak s reported in cattle at Bopoma, Mary Mount, Rushinga, Mashonaland Central that started on June 28th 2018. (Source – Google Fusion Maps, WAHIS-OIE)

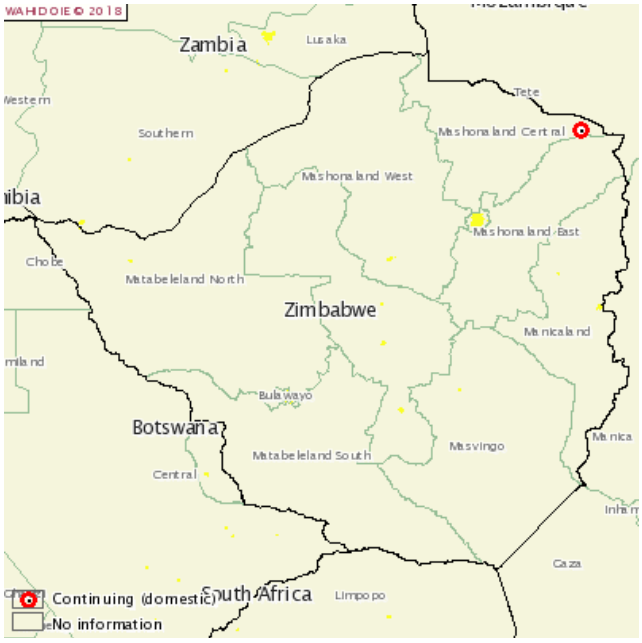


Table 19: summary of the cattle involved in the FMD outbreak reported in cattle at Bopoma, Mary Mount, Rushinga, Mashonaland Central that started on June 28th 2018. (Source – WAHIS)

Species	Susceptible	Cases	Deaths	Killed and disposed of	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	2126	30	5	0	0	1.41%	0.24%	16.67%	0.24%

*Removed from the susceptible population through death, destruction and/or slaughter

Table 20: Summary of the history of FMD Pool 6, 2013 – 2018, for geographic distribution see Map 21 below. (Source – WAHIS, EuFMD Global Monthly Report)

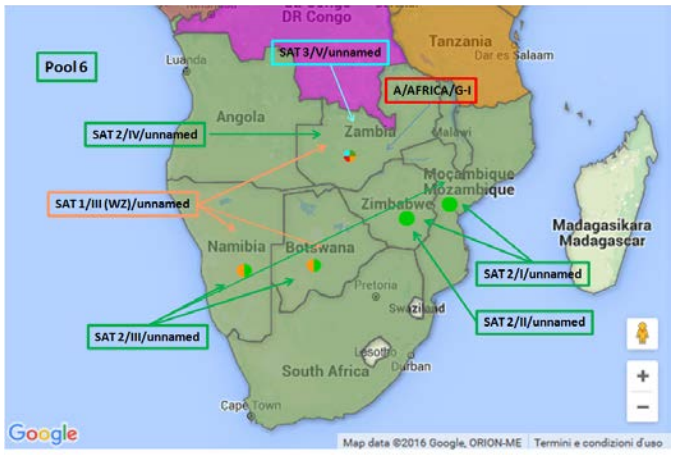
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2016	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment

	**(1st semester)		
Angola	2015-2016**/ DISEASE PRESENT 2013-2014/DISEASE ABSENT 2012/DISEASE SUSPECTED BUT NOT CONFIRMED	April 2016/SAT 2, July 2015/ SAT 2	Follow –up needed
Botswana	2012-2016**/SAT 2 2014-2015/SAT 1	June2018/SAT 2, June 2015/SAT 1	**See text**
Democratic Republic of the Congo	2012 – 2016/A, O, SAT 1	Dec 2016/A, O & Sat 1	Follow –up needed
Malawi	2012/NO OUTBREAKS REPORTED 2013-2015/ NO DATA AVAILABLE	June 2018/Untyped, June 2016/SAT 1	**See text**
Mozambique	2016**/ NO DATA AVAILABLE 2012 -2015/DISEASE ABSENT	June 2018/ Typing pending, Oct 2017/SAT 2, May 2015/ SAT 1	**See text**
Namibia	2014-2016**/SAT 22012-2014/SAT 1	Sep 2017/SAT 2, Aug 2017/typing pending, May 2015/SAT 1	Follow –up needed
South Africa	2015-16**/SAT 3 2012-2015/SAT 2 2013/SAT 1	May 2018/SAT 2, Oct 2017/SAT 1, Dec 2015/SAT 3	**See text**
Zambia	2016/SAT 3 & NOT TYPEC 2013-2014/ NO DATA AVAILABLE 2012/SAT 1, SAT 2	April 2018/ A &O, May 2017/SAT 3, Mar 2017/SAT 2, Jan 2013/SAT 1	Follow –up needed
Zimbabwe	2012-2016/SAT 2 2014-15SAT 1 2013/SAT 3	June 2018/typing pending, April 2018/ SAT 1, May 2017/SAT 2, Jun 2013/SAT 3	**See text**

Map 21: FMD distribution by serotype and topotype for Southern Africa, 2013 – 2017 - red refers to serotype A, orange refers to SAT 1, green refers to serotype SAT 2. (source – Google Fusion Maps, WRLFMD).

Swaziland and Lesotho are free from FMD without vaccination. There is a zone in both Botswana and Namibia, which has been FMD free without vaccination, since 2010 and 1997 respectively.
Conjectured circulating FMDV lineages in pool 6 [2, 14]:

- Serotype SAT 1 (topotypes I, II and III) – new detection of SAT 1/III (WZ)/unnamed in Botswana during 2016
- Serotype SAT 2 (topotypes I, II, III and IV) - new detection of SAT 2/III/unnamed in Namibia
- Serotype SAT 3 (?) (topotypes I, II and III) – new detection of SAT 3/V/unnamed in Zambia during 2016



G. POOL 7 – South America

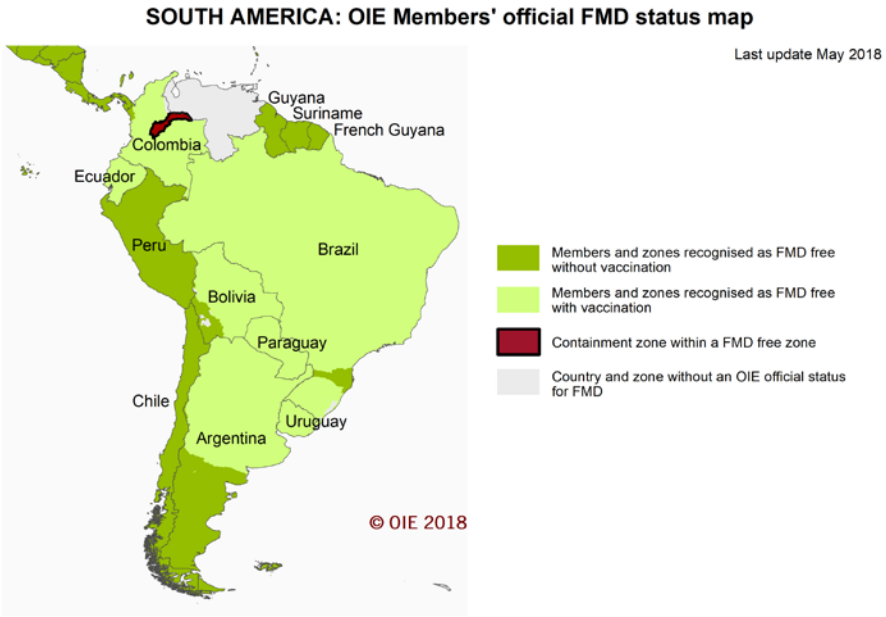
Rest of Latin America [1, 14, 15]

The OIE FMD status of the countries in South America as reported in December 2017 is presented in Map 22.
Most South American countries are FMD free with vaccination (Uruguay) or without vaccination (Chile, Guyana) or with free zones with vaccination (Argentina, Bolivia, Brazil, Peru and continental Ecuador) or without vaccination (Argentina, Bolivia, Brazil, Colombia, Peru) as described by the OIE maps (see: http://www.oie.int/en/animal-health-in-the-world/official-disease-status/fmd/en-fmd-carte/).
Small areas of the continent may still be considered as endemic but clinical cases are rare (Map 22). In fact, before the outbreak which occurred in Columbia, PANAFTOSA reported data for historical FMD outbreaks that occurred in Venezuela in 2013 caused by serotype A during the OIE/FAO FMD Laboratory Meeting held in November 2016. The FMD history relative to the Region for 2012 –2017 is reported in Table 21.

Table 21: Summary of the history of FMD Pool 16 between 2012 – 2018, for geographic distribution see Map 22 below. (Source – WAHIS, EuFMD Global Monthly Report)

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 2016**(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Colombia	DISEASE ABSENT	July 2017/O	Follow –up needed
Venezuela (Bolivarian Republic of)	DISEASE ABSENT**	2011/O, 2013/A	National situation needs verification

Map 22: FMD status for South America [1] (Source – OIE)



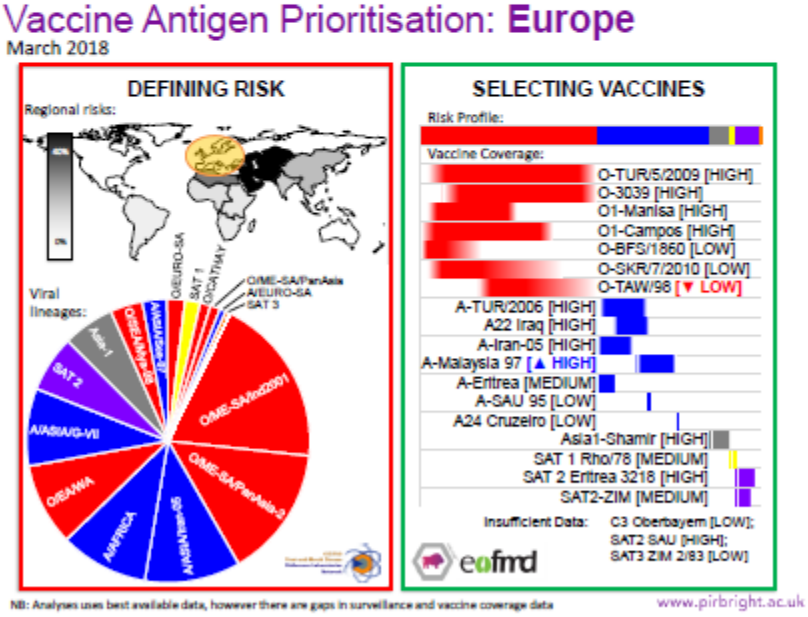
IV. OTHER NEWS:

[2]The 2nd WRLFMD Quarterly Report for the period April–June 2018 contains a new format for recommendations of FMDV vaccines to be included in antigen banks for Europe. The discussion of Table 22 is available within the report.

Table 22: Recommendations from WRLFMD® on FMD virus strains to be included in FMDV antigen banks (for Europe).

This report showcases a new format for 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. These analyses accommodate the latest epidemiological data collected by the OIE/FAO FMD Laboratory Network regarding FMDV lineages that are present in different *source regions* (see Table below), as well as available *in vitro, in vivo* and field data to score the ability of vaccines to protect against these FMDV lineages.

Lineage	West Eurasia	East Asia	North Africa	India and Southern Asia	East Africa	West and Central Africa	Southern Africa	South America
O/ME-SA/PanAsia-2	35	-	-	-	-	-	-	-
O/ME-SA/PanAsia	-	10	-	-	-	-	-	-
O/SEA/Mya-98	-	33	-	-	-	-	-	-
O/ME-SA/Ind2001	6	20	35	80	-	-	-	-
O/EA or O/WA	3	-	20	-	45	37	-	-
O/EURO-SA	-	-	-	-	-	-	-	74
O/CATHAY	-	10.5	-	-	-	-	-	-
A/ASIA/Sea-97	-	25	-	-	-	-	-	-
A/ASIA/Iran-05	25.5	-	-	-	-	-	-	-
A/ASIA/G-VII	17.5	-	-	16	-	-	-	-
A/AFRICA	-	-	35	-	24	25	-	-
A/EURO-SA	-	-	-	-	-	-	-	26
Asia-1	12.5	1.5	-	4	-	-	-	-
SAT 1	-	-	-	-	10	10	27	-
SAT 2	0.5	-	10	-	20	28	57	-
SAT 3	-	-	-	-	1		16	-
C	-	-	-	-	-	-	-	-



The table defines the relative distribution of FMDV lineages in each of the eight *source regions*, while the figure highlights the importance of these *source regions* for **Europe** (using data collected at the EU-RL Workshop); please contact WRLFMD/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.

V. REFERENCES - Superscripts

1. WAHID Interface – OIE World Animal Health Information Database http://web.oie.int/wahis/public.php?page=home
2. World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD), www.wrlfmd.org.
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4. Central Veterinary Research and Development Laboratory (CVDRL), Aghanistan - *Dr.Ghulam,* Head of Laboratory
5. Progressive Control of Foot and Mouth Disease in Pakistan - *Dr. Muhammad Afzal*, Project Coordinator.
6. National FMD Reference Laboratory, Embakasi, Kenya – Dr. *Eunice Chepkwony Miss. Hellen Mutua.*
7. ACCRA VETERINARY LABORATORY, Ghana – Dr. Joseph Adongo Awuni
8. FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria - *Dr. Ularamu Hussaini.*
9. Regional Reference Laboratory for FMD (ARRIAH, Russia) - *Dr. S. Fomina*.
10. South East Asia FMD (SEAFMD) Campaign - http://www.arahis.oie.int/reports.php?site=seafmd
11. Project Directorate on Foot and Mouth Disease (PD-FMD), Indian Council of Agricultural Research, Mukteswar, India - *Dr. S. Saravanan*.
12. Laboratoire National Vétérinaire (LANAVET) - Garoua, Cameroon - *Dr. Simon Dickmu Jumbo*.
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15. 44a Reunión Ordinaria de la Comisión Sudamericana para la Lucha contra la Fiebre Aftosa - 6 – 8 March 2017, Rio de Janeiro, Brasil