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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

March 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.

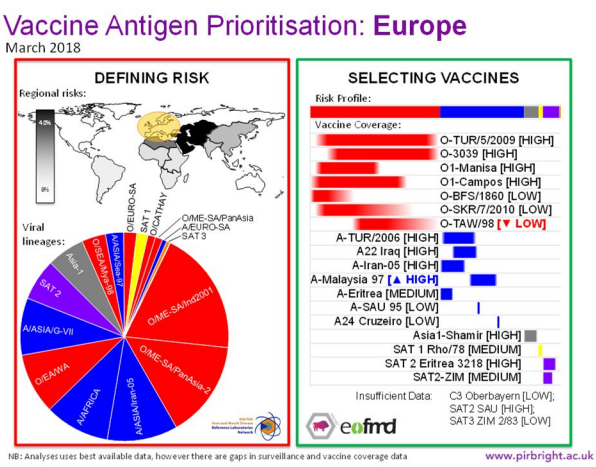
Contents

Guest Editor's comments:

I am very happy to write this short editorial to review the "headline" events for the first three months of 2018. The WRLFMD continues to receive samples from a wide-range of countries where FMD is endemic, or where new incursions of the disease cause problems. In the past three months, we have received new sample submissions from Hong Kong SAR, Israel, Kenya, Mongolia, Nepal, Palestine, South Korea and Swaziland. Data from these samples provide insights into the global distribution of FMD and support the work of the OIE/FAO Reference Laboratory Network for FMD (http://www.foot-and-mouth.org/).

Testing of samples previously submitted from the Punjab, Pakistan provide unexpected evidence for the emergence of a new antigenic variant within the O/ME-SA/PanAsia-2^{ANT-10} lineage not neutralised at all with reference sera for three front-line vaccines (O-Manisa, O-3039 and O-TUR-5-09). The distribution of this new lineage (http://www.wrlfmd.org/fmd_genotyping/2017/WRLFMD-2017-00021-Pakistan-O-approved.pdf represented by two isolates PAK/10/2016 and PAK/4/2017) will clearly require monitoring over the coming months. Elsewhere, sequence data for samples from Nepal highlight the gaps in surveillance for serotype O (O/ME-SA/Ind-2001) and serotype Asia-1 across the Indian sub-continent, and in this context raise important questions about the sources of exotic FMD viruses that have caused recent high-profile field outbreaks in North Africa, Southeast and East Asia and the Middle East. Samples from Kenya were characterised as serotype O and SAT 1, which were genetically distinct from previous FMD viruses detected in the region. The occurrence of novel FMDV genotypes in East and Southern Africa has also been revealed by analyses of sequence data (shared with SSARRL, Botswana) for SAT 3 FMD viruses recovered from Mozambique, and by full genome analyses that have been recently completed by Pirbright (see Lasecka-Dykes et al., 2018: http://www.mdpi.com/1999-4915/10/4/192). In terms of new incursions, FMD outbreaks due to the A/ASIA/Sea-97 lineage in South Korea have probably raised the greatest concerns and have occurred over the same period that outbreaks due to serotypes O and A have been reported in China. Detailed reports for these and other samples tested at the WRLFMD can be retrieved from http://www.wrlfmd.org/.

In addition to the regular updates for recent samples and test results, the WRLFMD quarterly report (http://www.wrlfmd.org/ref_labs/ref_lab_reports/OIE-FAO%20FMD%20Ref%20Lab%20Report%20Jan-Mar%202018.pdf) describes outputs from a new tool (called PRAGMATIST) that can be used to facilitate a more transparent prioritisation of FMDV vaccine antigens held by vaccine banks. This tool (generated in collaboration with EuFMD), accommodates the latest epidemiological data collected from the OIE/FAO FMD Laboratory Network regarding FMDV lineages that are present in different parts of the world (source regions), as well as available *in vitro, in vivo* and field data to score the ability of vaccines to protect against these FMDV lineages. The figure (left) highlights the importance of these *source regions* for **Europe** (using data collected at a previous EU-RL Workshop; please contact WRLFMD/EuFMD for assistance to tailor these outputs to other geographical regions), and the relative coverage against these risks provided by different commercial vaccines. Over time, we hope to expand the data to include more vaccines; but in the meantime, please let me know if you have any feedback to improve the way that these data is presented, or any specific comments relating to the relative distribution of viral lineages that are present in the endemic pools (shown in the new table in the quarterly report).



Don King (Pirbright, April 2018)

I. GENERAL OVERVIEW

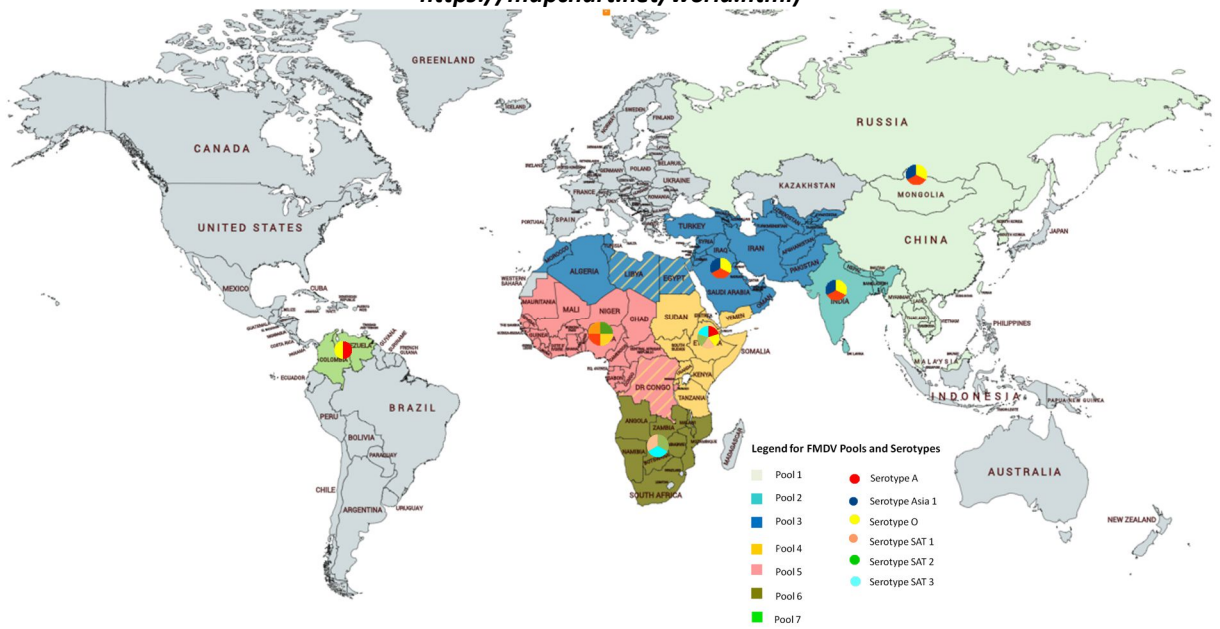
Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below 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] **–** A FMD outbreak caused by serotype O was reported on February 24th 2018 on a sheep farm at Henan.

Mongolia [1, 2 & 3] **-** Further to the seven FMD outbreaks notified during January 2018, another 15 outbreaks still caused by serotype O occurred between January and March 2018 in different parts of the country involving cattle and small ruminant farms.
Genotyping was carried out for FMDV field isolates belonging to serotype A and O detected in the country between 2015 and 2017.

Republic of Korea [1] - A FMD outbreak caused by serotype A occurred on March 26th 2018 in a large pig herd at Gyeonggi-Do.

Russian Federation [1, 3] **–** A new FMD outbreak due to serotype O was notified on a mixed animal species farm with clinical cases just in cattle on February 10th 2018 in Zabajkal`Skij Kray, further to the four outbreaks reported during the first week of February 2018.

SEAFMD [4] – FMD outbreaks were reported during February and March 2018 in Malaysia and Thailand.

POOL 2 - SOUTH ASIA

India [5] – FMDV O is the serotype which continues to be exclusively detected since May 2015 in the samples examined by the Indian Council of Agricultural Research - Directorate of Foot and Mouth Disease (ICAR-PDFMD).

Nepal [2, 6] **–** During the reporting month, the National Foot and Mouth Disease and TADS Laboratory reported the detection of FMDV serotype O.

Different vaccine strains with good matching results were identified in the vaccine matching strain differentiation (VMSD) tests conducted on field viruses detected during 2017 and respectively genotyped as FMDV Asia 1/Asia and O/ME-SA/Ind2001d.

POOL 3 - WEST EURASIA & MIDDLE EAST

Afghanistan [7] **–** The Central Veterinary Research and Development Laboratory **(**CVDRL) reported for March 2018 outbreaks due to FMDV serotypes A, ASIA 1 and O.

Israel [1] – A FMD outbreak caused by serotype O occurred on April 4th 2018 in a free ranging cattle farm at Hazafon.

Pakistan [8] – Eighty-six FMD outbreaks due to serotypes A, Asia 1 and O and untyped were reported in the two provinces of the country that are conducting surveillance activities.

POOL 4 - EASTERN AFRICA

Ethiopia [2, 9] – The National Animal Health Diagnostic and Investigation Center (NAHDIC), Ethiopia reported for March 2018 the detection of FMDV serotypes O and SAT 2 in cattle samples collected from outbreaks.
FMDV serotypes A, O and SAT 2 were detected by the WRLFMD in the bovine samples forwarded by NAHDIC which had collected them between June 2017 and February 2018.

Kenya [10] – The FMD National Reference Laboratory, Embakasi, Kenya detected FMDV serotypes O during the reporting month in the cattle samples collected from outbreaks.

POOL 5 - WEST/CENTRAL AFRICA

Cameroon [11] **–**The Laboratoire National Vétérinaire (LANAVET) - Garoua, Cameroon reported FMDV in the samples tested during reporting month.

Nigeria [12] - The FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria reported the presence of FMDV SAT 2 in the samples examined during March 2018.

POOL 6 - SOUTHERN AFRICA

Zambia [1] **–** Two FMD outbreaks for which serotyping is pending were reported in cattle at Central Province in March and April 2018.

POOL 7 - SOUTH AMERICA [2, 13, 14]

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

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

III. DETAILED POOL ANALYSIS

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

China [1]

FMDV serotype O was responsible for the outbreak notified on February 24th 2018 on a sheep farm at Henan.
The diagnosis was confirmed on March 2nd 2018 by the Lanzhou National Reference Laboratory For Foot And Mouth Disease (OIE Reference Laboratory) using reverse transcription - polymerase chain reaction (RT-PCR) and virus sequencing.
The animals presented clinical forms of the infection as reported in the summary table of the animals involved in the outbreak (Table 2). Location of the outbreak is reported in Map 2.
The source of the outbreak is unknown and the set of the control measures adopted are as follows: movement control inside the country, surveillance within containment and/or protection zone screening, quarantine, stamping out, zoning, disinfection, vaccine permitted if a suitable one is available, while no treatment is being administered to the affected animals.

Table 2: summary of the animals involved in the FMD outbreak that occurred on February 24th 2018 on a sheep backyard farm at Henan (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*
Sheep	1,200	12	0	1,200	0	1.00%	0.00%	0.00%	100.00%

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

Map 2: location of the FMD outbreak that occurred on February 24th 2018 on a sheep farm at Henan (Source – WAHIS)

Mongolia [1, 2 & 3]

Fifteen FMD outbreaks due to serotype O were notified between January and March 2018 of which six were reported as already resolved.
The new series of outbreaks affected the Eastern area of the country and involved the provinces Govi-Sumber, Umnugovi, Sukhbaatar, Dundgovi, Dornogovi, Dornod, Khentii. Clinical cases were reported in all the species involved, which were cattle, sheep and goats.
A summary of the animals present on the outbreaks and location of the latter are respectively reported in Table 3 and Map 3.

The source of the outbreaks was not identified while the sanitary control measures adopted were as following: movement control inside the country, surveillance within containment and/or protection zone screening, quarantine, stamping out, zoning, disinfection, while no treatment is being administered to the affected animals. Vaccination in response to the outbreaks was carried out as reported in Table 4. No details were provided for the type of vaccines used.

Table 3: summary of the animals involved in the FMD outbreaks that occurred between January and March 2018 in ruminants at Govi-Sumber, Umnugovi, Sukhbaatar, Dundgovi, Dornogovi, Dornod, Khentii (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	/	821	0	821	0	**	**	0.00%	**
Goats	/	462	0	462	0	**	**	0.00%	**
Sheep	/	417	0	417	0	**	**	0.00%	**
Totals	/	**1,700**	**0**	**1,700**	**0**	**	**	**0.00%**	**

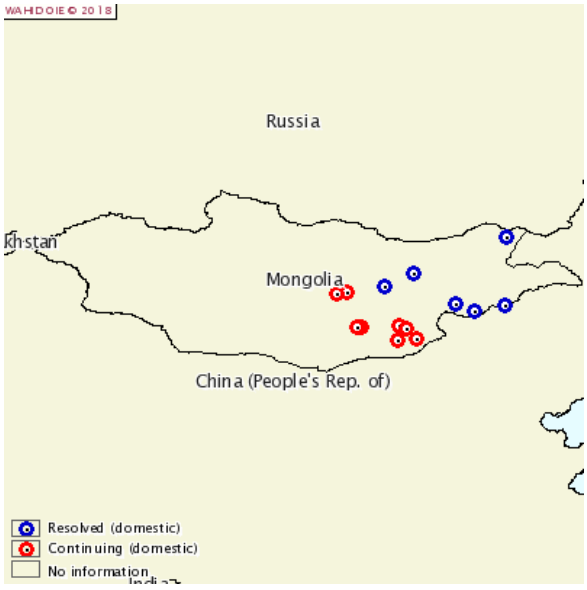
*Removed from the susceptible population through death, destruction and/or slaughter

**Not calculated because of missing information

Table 4: summary of the vaccination operations conducted in some of the FMD affected provinces in Mongolia. Source – WAHIS)

Administrative division	Species	Total Vaccinated
Dornod	Cattle	166,526
	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 animals vaccinated		**5,062,558**

Map 3: location of the FMD outbreak that occurred between January and March 2018 in ruminants at Govi-Sumber, Umnugovi, Sukhbaatar, Dundgovi, Dornogovi, Dornod, Khentii (Source – WAHIS))



The genotyping results reported by the WRLFMD of field isolates belonging to serotype A and O detected in the country between 2015 and 2017 are reported in Table 5, while the locations of their isolation are represented in Map 4.

Table 5: summary of the results of the lineages detected in the bovine samples collected in Mongolia between 2015 and December 2017. Source - WRLFMD

Sample Identification	Location origin of sample	Host species	Date of collection	Genotype	Most Closely Related Viruses not belonging to the country - Seq id %	Host species
MOG/7/2015	Khovd Bulgan	cattle	03/03/2015	**A/ASIA/Sea-97**	MYA/4/2015 (98.6%)	cattle
				O/SEA/Mya-98	MAY/2/2014 (99.4%)	cattle
MOG/13/2017	Sukhbaatar Erdenetsagaan		28/01/2017	**O/ME-SA/PanAsia**	/	
MOG/14/2017	Dundgovi Gurvansaihan		08/11/2017	**O/ME_SA/Ind-2001**	Zabaikalskiy/3/RUS/2016 (98.7%)	cattle

Map 4: location of the lineages detected in the bovine samples collected in Mongolia between 2015 and December 2017 (Source – WRLFMD and Google Fusion Maps)

Republic of Korea [1]

A FMD outbreak caused by serotype A took place in a large pig herd at Gyeonggi-Do on March 26th 2018. The Animal and Plant Quarantine Agency (OIE Reference Laboratory) using real-time reverse transcriptase/polymerase chain reaction (RRT-PCR) confirmed the diagnosis on March 27th 2018.

While an epidemiological investigation is on-going and control measures are already in place, the source of the outbreak is not yet established. Control measures applied are movement control inside the country, vaccination in response to the outbreak, surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, screening, traceability, quarantine, official destruction of animal products, official disposal of carcasses, by-products and waste, stamping out, control of wildlife reservoirs, zoning, disinfection and no treatment of affected animals.

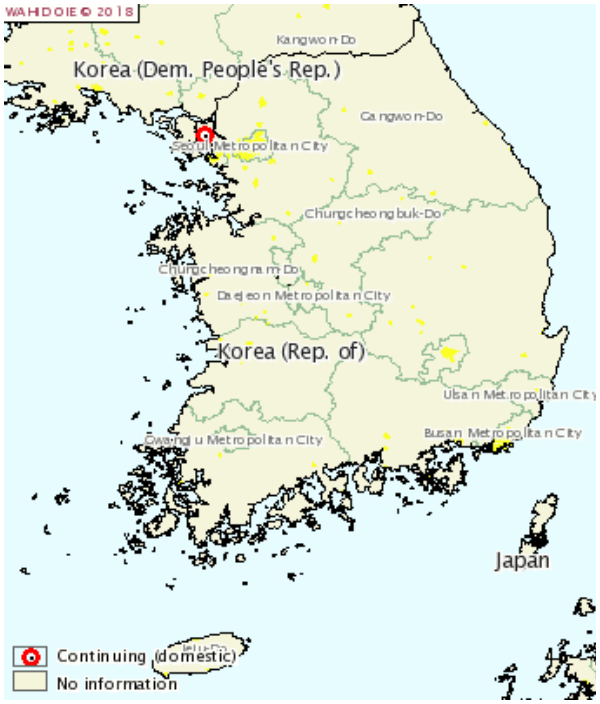
A summary of the animals involved and location of outbreak are respectively reported in Table 6 and Map 5.

Table 6: summary of the animals involved in the FMD outbreak that took place in a large pig herd at Gyeonggi-Do on March 26th 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*
Swine	1,059	14	1	1,058	0	1.32%	0.09%	7.14%	100.00%

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

Map 6: location of the FMD outbreak that took place in a large pig herd at Gyeonggi-Do on March 26th 2018 (Source – WAHIS)



Russian Federation [1, 3]

Further to the four outbreaks reported during the first week of February 2018, a new episode due to serotype O was notified on February 10th 2018 at Zabajkal`Skij Kray (Map 7) on a mixed animal species farm with clinical cases occurring just in cattle as shown in Table 6.

Laboratory diagnosis was confirmed on March 3rd 2018 by the All-Russian Research Institute for Animal Health (FGBI-ARRIAH) (OIE Reference Laboratory) using RT-PCR.

Source of outbreak is unknown while the control measures adopted are movement control inside the country, surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, quarantine, official destruction of animal products, zoning, disinfection, vaccination permitted if an appropriate vaccine exists and no treatment is being administered to affected animals.

Table 7: summary of the animals involved in the FMD outbreak that took place on February 10th 2018 at Zabajkal`Skij Kray (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	256	67	/	/	/	26.17%	**	**	**
Sheep / goats	377	**	/	/	/	**	**	**	**
Swine	7	**	/	/	/	**	**	**	**

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

**Not calculated because of missing information

Map 6: location of the FMD outbreak that took place on February 10th 2018 at Zabajkal`Skij Kray (Source – WAHIS)

SEAFMD [4]

FMD outbreaks were reported in the area during February and March 2018 in Malaysia and Thailand and on-going outbreaks in the different reporting countries are as those listed in Table 7.

Although FMDV Asia 1 is reported as still circulating in Viet Nam, further confirmation of this is required as last detection reports of the serotype in the country are those relative 2007.

Distribution of the serotypes in the single countries are represented in Maps 7, 8 and 9.

Map 7: location of the ongoing FMD outbreaks occurring during March 2018 due to serotype A in the countries reported in Table 5. (Source – SEAFMD Campaign)

Map 8: location of the ongoing FMD outbreaks last reported in 2007 in Vietnam due to serotype Asia 1. (Source – SEAFMD Campaign)

Map 9: location of the ongoing FMD outbreaks occurring during March 2018 due to serotype O in the countries reported in Table 6. (Source – SEAFMD Campaign)

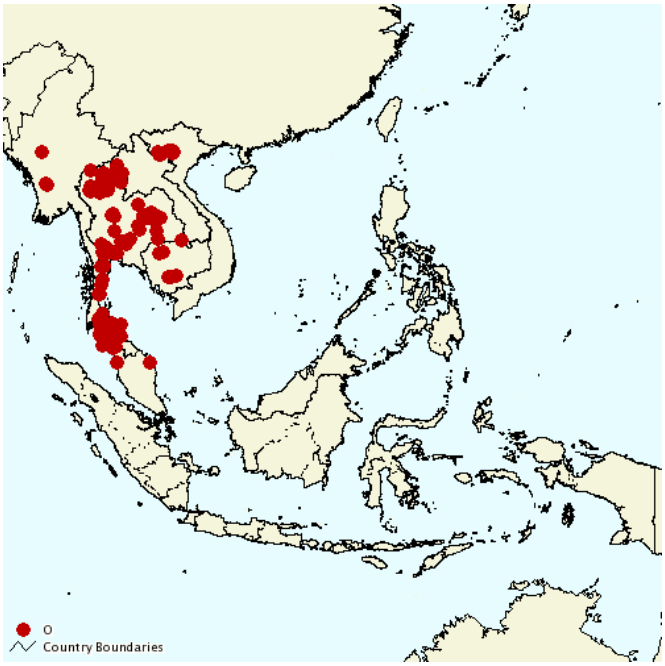


Table 7: number of FMD outbreaks in the reporting countries of the Southeast Asia Region for the present year (Source – SEAFMD Campaign)

Country	Ongoing prior outbreaks	jan-18	feb-18	mar-18	Total per country
Cambodia	114	0	0	0	**114**
Laos	8	0	0	0	**8**
Malaysia	54	0	1	1	**56**
Myanmar	3	0	0	0	**3**
Thailand	236	13	7	0	**256**
Viet Nam	15	9	0	0	**24**
Total per month	**430**	**22**	**8**	**1**	**461**

Table 8: Summary of the history of FMD Pool 1 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2013 -2017 see Map 10 below. (Source – Wahis, EuFMD Global Monthly Report)

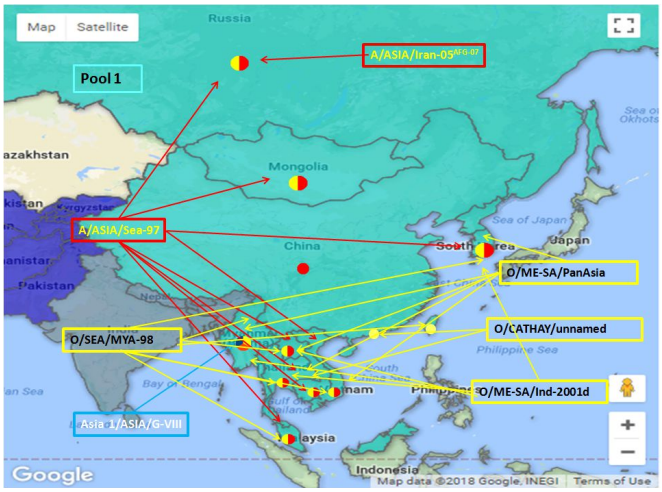
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2016 **(1st semester 2016)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Cambodia	PENDING/2013-2016 O, A/2016, NOT SAMPLED, (ASIA /2016)	Dec 2016/ A & O	**See text**
China	Data up to 1st semester 2015 2013 & 2015/A, 2012-2013/O, 2012 -2014/NOT TYPED	Feb 2018/O, May 2017/A	**See text**
China, Hong Kong, SAR	O	Sep 2017/O	Follow-up needed
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	March2018/O, Sept 2016/A	**See text**
Myanmar	2012-2016/O, 2015/A & NOT TYPED	Dec 2017/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	Mar 2018/A, Feb 2017/O	Follow-up needed

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 2016/A, Oct 2016/O and not typed	**See text**

Map 10: 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 [1, 13]:

- 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

India [5]

FMDV O continues to be the serotype that is exclusively detected since May 2015 even in the samples examined this month by ICAR-PDFMD. The virus was detected using antigen and/or RNA detection. Five FMDV serotype O isolates were submitted to genotyping and four other isolates belonging to the same serotype were subjected to vaccine matching tests. Serological testing was conducted on 1,861 samples collected within epidemiological studies. All diagnostic kits used are those developed by ICAR-PDFMD.
The laboratory continues to conduct field investigations of FMD outbreaks and to provide 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 [2, 6]

During the reporting month, the National Foot and Mouth Disease and TADS Laboratory reported the detection of FMDV serotype O but further details of animal species involved and location of outbreaks are not provided.
The vaccine strains, which had good matching results with the FMD field viruses detected during 2017, were as following:

- Asia 1 Shamir for isolates ASIA 1/NEP/42 and 45/2017, identified as genotype Asia 1/Asia,
- 3039 and O TUR 5/09, but not O Manisa, for isolates O/NEP/33and 35/2017 identified as O/ME-SA/Ind2001d.

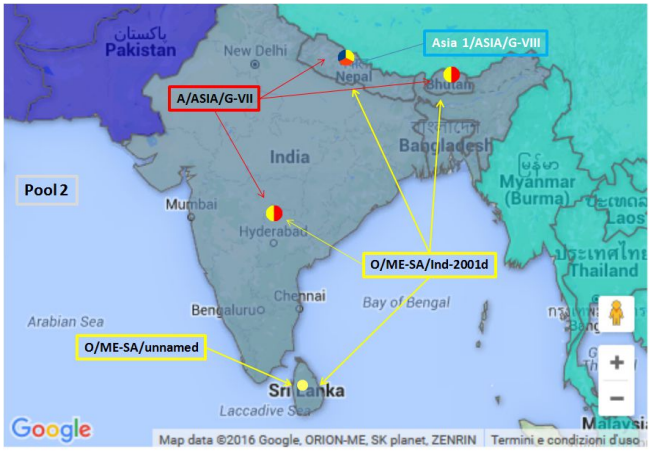
Table 9: Summary of the history of FMD Pool 2 between 2012– 2018. For geographic distribution of circulating FMDVs between 2013 -2017, see Map 11 below. (Source – WAHIS, EuFMD Global Monthly Report)

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	Sep 2017/untyped, July 2017/O, April 2017/A	Follow-up needed
India	NO DATA AVAILABLE/2016, O, A, NOT SAMPLED 2012-2014/Asia 1 2013/NOT TYPED	Mar 2018/O, Apr 2015/A Asia 1	**See text**
Mauritius	DISEASE ABSENT	Sep 2016/0	Follow-up needed
Nepal	O, 2012-2103/Asia 1	Mar 2018/O & Asia 1, April 2017/A	**See text**
Sri Lanka	2015 -16/NO DATA REPORTED, 2012 – 2014/O	Sep 2017/O	Follow-up needed

Map 11: 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 [1, 13]:

- 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 – <u>West Eurasia & Middle East</u>

Afghanistan [7]

FMDV serotypes A, ASIA 1 and O were detected by the CVDRL during March 2018.
The same laboratory provided expert advice to Government services national/local authorities and is conducting collaborating activities with the EU, FAO and OIE.

Israel [1]

FMDV serotype O was responsible for the outbreak that occurred on April 4th 2018 in a free ranging cattle farm at Hazafon.

The Kimron Veterinary Institute, Foot and mouth disease Laboratory (National laboratory) confirmed the diagnosis on April 4th 2018 using a ELISA, RT-PCR and cell culture isolation.

The affected herd contains four different groups of which only one was involved. The affected group contains 80 dams, 30 calves and eight bulls. All the bulls, two calves and 40 dams presented clinical signs which in this case were limited to mouth lesions, with no fever and mortality.

While an epidemiological investigation is on-going, the source of the outbreak is not yet determined. The control measures in place for containing the outbreak are movement control inside the country, vaccination in response to the outbreak, surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, quarantine, zoning, and no treatment of affected animals.

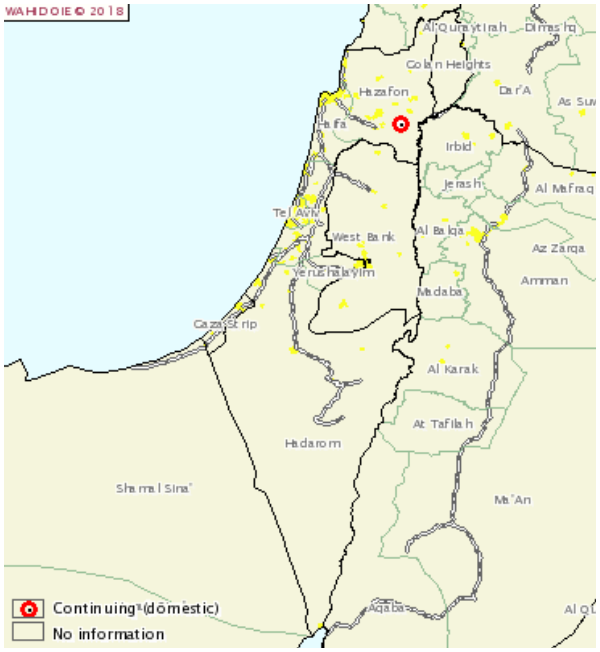
Summary of the animals involved in the outbreak and location of this are presented in Table 10 and Map 12.

Table 10: summary of the animals involved in the FMD outbreak that occurred on April 4th 2018 in a free ranging cattle farm at Hazafon. (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	218	50	0	0	0	22.94%	0.00%	0.00%	0.00%

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

Map 12: location of the FMD outbreak that occurred on April 4th 2018 in a free ranging cattle farm at Hazafon. (Source – WAHIS)



Pakistan [8]

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

Eighty-six FMD outbreaks due to serotypes A, Asia 1 and O and untyped (n=17) were reported during March 2018 in the two provinces of the country conducting surveillance activities.

A summary of the distribution of the outbreaks relative to locations and serotypes are represented in Table 11 and Map 13.

Emergency and preventive vaccinations were also carried out in Punjab with 76,425 doses administered in the first case while a summary of the activities carried out in the second case are represented in Table 12.

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

Province	District	Number Outbreaks	Number of Outbreaks due to FMD Virus Serotype(s)				
			'O'	'A'	'Asia-1'	'Mixed'	Un-Typed
Azad Kashmir	Mirpur	4	3	--	--	--	1
Punjab	Sargodha	7	--	2	--	--	5
	Faisalabad	8	3	2	--	--	3
	Mianwali	1	--	1	--	--	--
	Chakwal	17	10	6	--	--	1
	Gujrat	3	2	1	--	--	--
	Gujranwala	5	2	3	--	--	--
	Hafizabad	3	--	1	--	--	2
	Jhang	11	3	6	--	--	2
	Lahore	4	1	2	--	--	1
	T.T. Singh	4	--	4	--	--	--
	Rawalpindi	16	10	3	1	--	2
	Jhelum	3	1	2	--	--	--
Total		86	35	33	1	--	17

Map 13: location of the FMD outbreaks reported in Pakistan during March 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 March 2018. (Source – Progressive Control of Foot and Mouth Disease in Pakistan, *Dr. Muhammad Afzal*, Project Coordinator)

Districts of Punjab	No. of Households	Animals Vaccinated (6 Monthly Dose)		
		Cattles	Buffaloes	Total
Okara	87,735	387,674	541,947	929,621
Sahiwal	73,692	311,256	482,367	793,623
Vehari	36,754	209,862	180,923	390,785
Pakpattan	55,096	232,248	300,594	532,842
Sheikhupura	46,679	268,562	373,055	641,617
Rahim Yar Khan	1,431	9,817	7,248	17,065
Total doses	**301,387**	**1,419,419**	**1,886,134**	**3,305,553**

Table 13: Summary of the history of FMD Pool 3 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2012 -2016, see Map 14 below. (Source – Wahis, EuFMD Global Monthly Report)

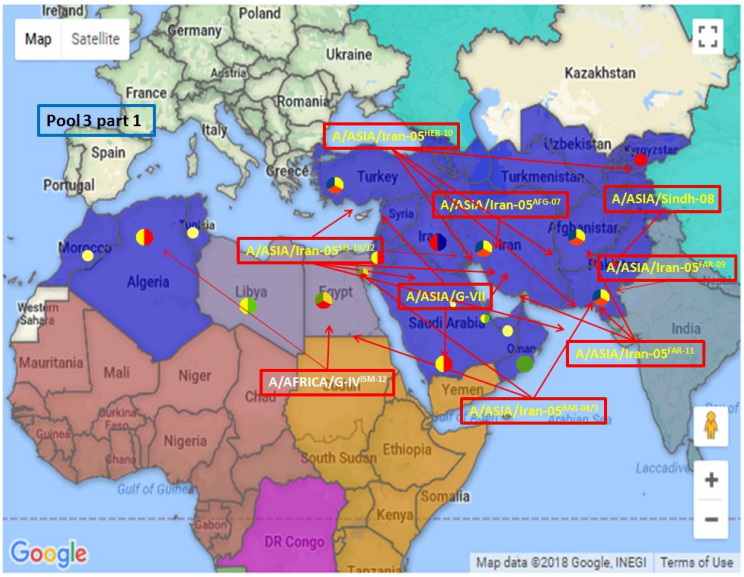
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2016 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Afghanistan	2013-2016**/O, A, Asia 1, NOT TYPED 2012/SEROTYPE NOT REPORTED	Mar 2018/A, Asia 1 & O,	**See Text**
Algeria	Data available up to 1st semester 2015 2014 -2015/O	Apr 2017/A, Apr 2015/O	Follow –up needed
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 2017/A & O, 2013/Asia 1	Follow –up needed
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	Mar 2018/ A, Asia 1 & O	**See text**
Palestine	O, 2012-2013/SAT 2	Dec 2017/O, untyped Mar 2013/Sat 2	Follow –up needed
Qatar	NO DATA AVAILABLE/2016 2012-2015/O	Dec 2013/O	Follow –up needed
Saudi Arabia	2012-2014, 2016**/O	Oct 2016/A & April 2016/O	Follow –up needed

	A/2015		
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 14. 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)

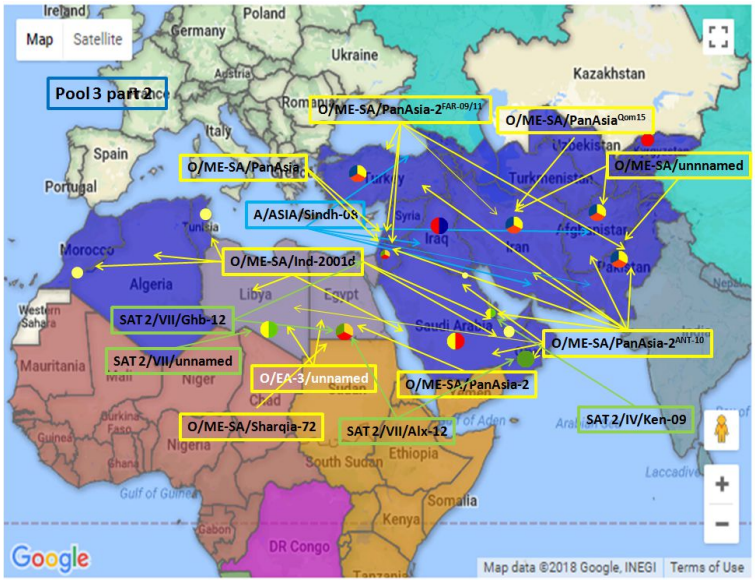
Conjectured circulating FMDV serotype A and Asia 1 lineages in Pool 3 [1, 13]:

- 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

Ethiopia [2, 9] –

FMDV serotypes O and SAT 2 were detected during March 2018 by the NAHDIC in the eight swab and tissue samples collected by the regional veterinary laboratories from cattle in different outbreaks using antigen ELISA.

The laboratory staff was involved in the field investigations of FMD outbreaks and in providing advice to the local community for the containment of these outbreaks.

Of the 28 bovine samples collected in the country between June 2017 and February 2018, FMDV serotype A (n=7 – 25%), O (n=1111-39.3%) and SAT 2 (n=1-3.6%) were detected by antigen ELISA. The remaining 9 samples were either virus negative (n=2-7.1%) or only PCR positive (n=7 – 25%)

Kenya [10]

During the reporting month, the FMD National Reference Laboratory, Embakasi, Kenya detected FMDV serotype O using antigen ELISA in the cattle samples collected from two outbreaks that occurred at Kericho and at Narok.

Although, clinical cases were observed on the respective farms, with the first farm reporting two affected animals of the eight present and the second farm, seven affected animals of the 30 present, deaths were not registered. The location of the two outbreaks from which the samples were collected are represented in Map 15.

The laboratory staff was involved in the field in the investigation of FMD outbreaks in Narok in collaboration with the International Livestock Research Institute (ILRI) with whom it has on-going collaborations, and in providing advice to the local community for the containment of FMD.

The Reference Laboratory was also involved in the training of field staff on good sampling procedures for FMDV and in studies of FMD circulating viruses.

Map 15: location of the FMD outbreaks reported in Keny during March 2018. (Source – Google Fusion Maps, FMD National Reference Laboratory, Embakasi, Kenya, *Dr.Eunice Chepkwony*)

Table 14: Summary of the history of FMD Pool 4 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2013 -2017, see Map 16 below. (Source – WAHIS, EuFMD Global Monthly Report)

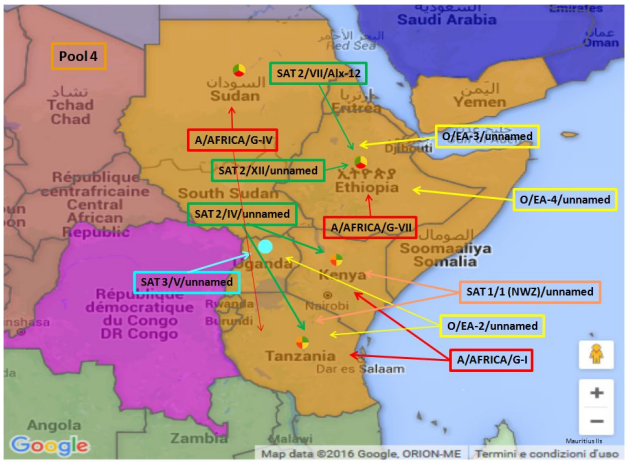
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2016 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Burundi	DISEASE PRESENT	Aug 2013 / not available	Typing required
Comoros	NO DATA AVAILABLE	2010	Follow –up needed
Democratic Republic of Congo	2012 – 2016**/A, O, SAT 1	May 2017/not typed	Follow –up needed
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	Mar 2018/O & SAT 2 Feb 2018/SAT 1, Jan 2018/A	**See text**
Kenya	2012 – 2016 /NOT TYPED, A, O, SAT1, SAT2	Mar 2018/O, Feb 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	2011	Follow –up needed

	2014/A, O SAT 1, SAT 2, SAT 3 2012-2013 & 2016 NO DATA REPORTED		
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 16: 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 [1, 13]:

- 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 [11]

FMDV was detected during March 2018 in seven of the 92 samples tested by LANAVET - Garoua, Cameroon using RT-PCR. It also conducted the serological examination of 20 sera collected from small ruminants using non-structural protein (NSP) ELISA with seven (35%) samples reacting positive.
The laboratory continues its collaborative research projects with the Ohio State University and Plum Island, USA.

Nigeria [12]

The FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria detected the presence of FMDV SAT 2 in 11 of the 19 samples examined during March 2018.
The laboratory staff was involved in the field in the investigation of FMD outbreaks and in providing advice to the local farmers.

Ongoing collaborations which the laboratory is conducting are an OIE twinning project with CODA-CERVA, Belgium and the FASTRack project with ANSES, France.

Ghana [15], Senegal [16]

The ACCRA Veterinary Laboratory, Ghana, The National Veterinary Research Institute Vom, Nigeria and the Laboratoire National de l'Elevage et de Recherches Vétérinaires of Senegal did not report FMD outbreaks in their respective countries for February 2018. The latter laboratory examined FMDV suspect samples, which resulted negative. The laboratory also has an on-going collaboration with ANSES, France for the examination of samples and technology transfer.

Table 15: Summary of the history of FMD Pool 5 between 2012 – 2018. For geographic distribution of circulating FMDVs between 2012 -2016, see Map 17 below. (Source – WAHIS, EuFMD Global Monthly Report)

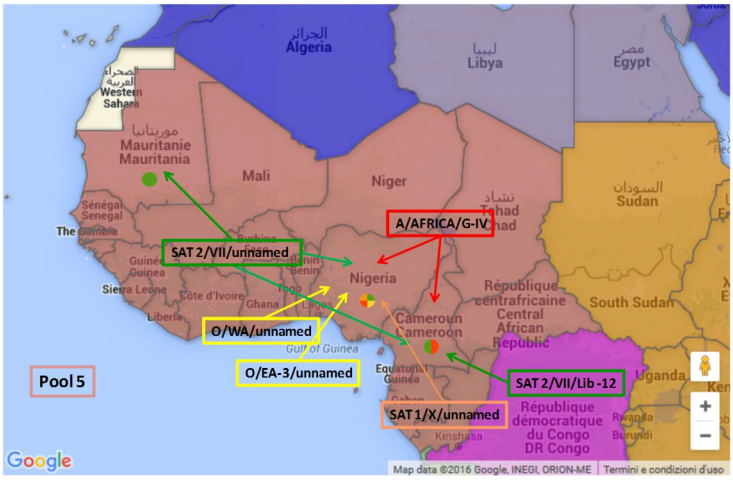
Country	FMD history FMDV serotypes, reported to OIE in 2012 – 2016 **(1st semester)	Last outbreak reported/serotype #see pg. 1	Comment (Genotyping would be useful for this region)
Benin	2016/NO DATA REPORTED A, O, SAT 1, SAT 2/2012-2015	Jun 2014/O, A, SAT 1, SAT 2	Follow –up needed
Burkina Faso	DISEASE PRESENT	Dec 2016/ not available	Follow –up needed
Cameroon	2016/NO DATA REPORTED DISEASE PRESENT	Mar 2018/untyped April 2017/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 2012 – 2015/DISEASE PRESENT	Feb 2017/O, Dec 2016/ SAT 2 2014/not available	**See text**

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	Mar 2018/ SAT 2 Feb 2017/not typed 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	**See text**
Sierra Leone	DISEASE ABSENT**	Oct 1958	Follow –up needed
Togo	O, SAT 1	2012/O	Follow –up needed

Map 17: 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 [13]:

- 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]

The FMD outbreaks due to serotype, SAT 2 which occurred up to October 2017, in Ngamiland following contact with wild infected animals, are resolved. Intensive surveillance, vaccinations and biosecurity measures that were implemented after the FMD outbreak at Namanyane crush in zone 2d controlled disease spread. This area is an FMD vaccination zone, and vaccination will continue indefinitely. During the outbreak period, 61,784 cattle were vaccinated.

This event is closed and no further updates will be reported.

Mozambique [1]

The FMD outbreaks due to SAT 2 that occurred last at Moamba district of Maputo province on October 13th, 2017 are now resolved. While in Gaza province there is no clinical cases of FMD observed since January 2017.

Sources of outbreaks were mostly due to the severe drought which hit the area, forcing animals to look for common grazing areas and main water bodies.

As in the previous case, intensive surveillance, vaccinations and biosecurity measures were capable of containing the spread of infection. Vaccination in response to the outbreaks were carried out in Gaza and Maputo with the respective vaccination of 6,530 and 14,510 cattle using Aftovax SAT 1 and SAT 2.

South Africa [17]

The Agriculture Research Council- Onderstepoort Veterinary Institute examined FMDV suspect samples that resulted PCR negative and 3,483 serum samples using liquid-phase blocking ELISA for the detection of FMDV serotypes SAT 1, SAT 2 and SAT 3 and 406 sera using FMD NSP ELISA.

Zambia

Two FMD outbreaks both at Central Province were respectively reported in cattle on March 23rd and April 3rd 2018. The affected units are commercially managed dairy cattle farms with animals of all ages presenting clinical signs.

The Botswana Vaccine Institute (OIE Reference Laboratory) is conducting the laboratory testing and serotyping results are pending.

Five farms were affected within Chisamba and Chibombo districts of Central Province and all of them were quarantined with movement restrictions were instituted in the area. The source of the outbreaks was not determined.

Other control measures in place are movement control inside the country, surveillance outside containment and/or protection zone, surveillance within containment and/or protection zone, screening, traceability, quarantine, ante and post-mortem inspections, vaccination permitted (if a vaccine exists), no treatment of affected animals.

Summary of the animals involved and location of outbreaks is reported in Table 16 and Map 18.

Table 16: summary of FMD outbreaks for which serotyping is pending that occurred on March 23rd and April 3rd 2018 at 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	11,000	113	0	0	0	1.03%	0.00%	0.00%	0.00%

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

Map 18: location of the FMD outbreaks for which serotyping is pending that occurred on March 23rd and April 3rd 2018 at Central (Source – WAHIS)

Zimbabwe [1]

No new outbreaks were reported further to the three FMD episodes which occurred on cattle farms during January 17th and 18th 2018 at Mashonaland East, with serotyping still pending,.

The source of outbreaks was reported as due to the introduction of new live animals, illegal movement of animals, contact with infected animal(s) at grazing/watering.

Movement restrictions remain in place in the affected farms and dip tank and a herd of 16 cattle, illegally moved to the farm, where the outbreak started, were destroyed under veterinary and police supervision. The destruction of illegally moved cattle was publicized to deter would-be offenders.

Following outbreaks at Maganga and Nyadema farms, 500 susceptible cattle on and around the farms at Mashonaland East were vaccinated.

Table 17: Summary of the history of FMD Pool 6, 2013 – 2018, for geographic distribution see Map 19 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
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

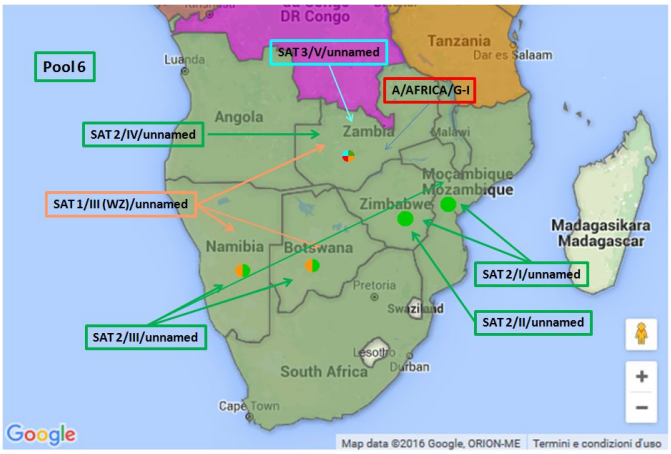
Botswana	2012-2016**/SAT 2 2014-2015/SAT 1	Sep 2017/SAT 2, June 2015/SAT 1	**See text**
Democratic Republic of the Congo	2012 – 2016/A, O, SAT 1	Dec 2016/A, O & Sat 1	Follow –up needed
Malawi	2012/NO OUTBREAKS REPORTED 2013-2015/ NO DATA AVAILABLE	June 2016/SAT 1, Oct 2011,	Follow –up needed
Mozambique	2016**/ NO DATA AVAILABLE 2012 -2015/DISEASE ABSENT	Dec 2017/ 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	Oct 2017/SAT 1, May 2017/SAT 2 Dec 2015/SAT 3,	**See text**
Zambia	2016/SAT 3 & NOT TYPEC 2013-2014/ NO DATA AVAILABLE 2012/SAT 1, SAT 2	Mar 2018/untyped, May 2017/SAT 3, Mar 2017/SAT 2, Jan 2013/SAT 1, Feb 2015/A,	**See text**
Zimbabwe	2012-2016/SAT 2 2014-15SAT 1 2013/SAT 3	Jan 2018/typing pending, May 2017/SAT 2, Aug 2015/ SAT 1, Jun 2013/SAT 3	**See text**

Map 19: 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 [1, 13]:

- 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, 13, 14]

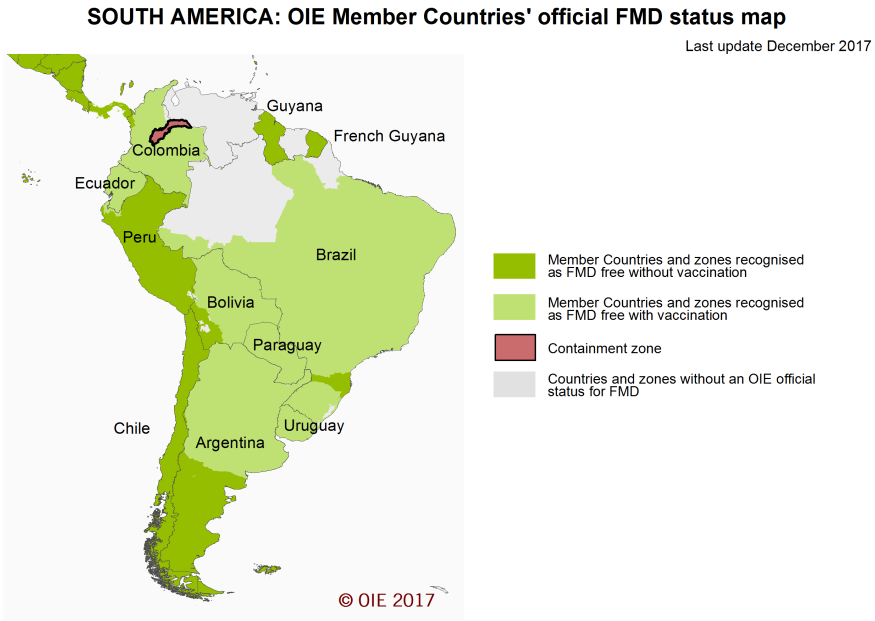
The OIE FMD status of the countries in South America as reported in December 2017 is presented in Map 20

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 20). 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 18.

Table 18: Summary of the history of FMD Pool 16 between 2012 – 2018, for geographic distribution see Map 20 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 20: FMD status for South America [1] (Source – OIE)



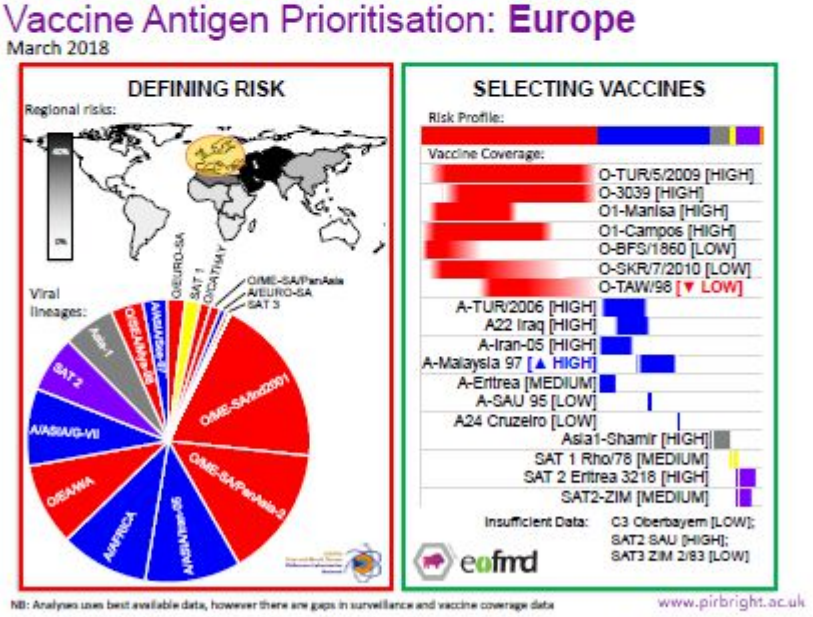
IV. OTHER NEWS:

[2]The 3rd WRLFMD Quarterly Report for the period January – March 2018 contains a new format for recommendations of FMDV vaccines to be included in antigen banks for Europe. The discussion of this table is within the report. (Table 19)

Table 19: 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.
3. Regional Reference Laboratory for FMD (ARRIAH, Russia) - *Dr. S. Fomina.*
4. South East Asia FMD (SEAFMD) Campaign - http://www.arahis.oie.int/reports.php?site=seafmd
5. Project Directorate on Foot and Mouth Disease (PD-FMD), Indian Council of Agricultural Research, Mukteswar, India - *Dr. S. Saravanan*.
6. National Foot and Mouth Disease and TADS Laboratory, Nepal - *Dr. Sharmila Chapagain*
7. Central Veterinary Research and Development Laboratory (CVDRL) *Dr.Ghulam* - Head of Laboratory
8. Progressive Control of Foot and Mouth Disease in Pakistan, - *Dr. Manzoor Hussain*, National Project Director and *Dr. Muhammad Afzal*, Project Coordinator.
9. National animal health diagnostic and investigation center (NAHDIC), Ethiopia - *Dr. Daniel Gizaw.*
10. National FMD Reference Laboratory, Embakasi, Kenya – Dr. *Eunice Chepkwony Miss. Hellen Mutua.*
11. Laboratoire National Vétérinaire (LANAVET) - Garoua, Cameroon - *Dr. Simon Dickmu Jumbo*.
12. FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria - *Dr. Ularamu Hussaini.*
13. OIE/FAO FMD Reference Laboratory Network, Annual Report 2016
14. 44a Reunión Ordinaria de la Comisión Sudamericana para la Lucha contra la Fiebre Aftosa - 6 – 8 March 2017, Rio de Janeiro, Brasil
15. ACCRA Veterinary Laboratory, Ghana - *Dr. Joseph Adongo Awuni.*
16. Laboratoire National de l'Elevage et de Recherches Vétérinaires (LNERV, Senegal) – *Miss Mariame Diop and*
17. ARC -Onderstepoort Veterinary Institute, Republic of South Africa - *Dr LE Heath/Ms E Kirkbride*