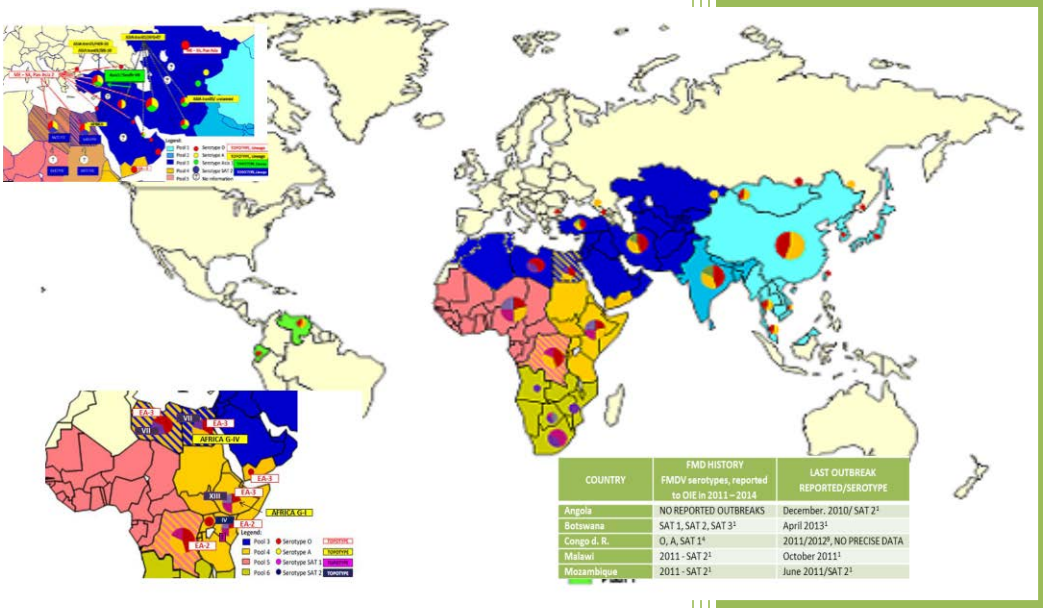
2016

Foot-and-Mouth Disease Situation
Monthly Report March 2016



COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2011 – 2014	LAST OUTBREAK REPORTED/SEROTYPE
Angola	NO REPORTED OUTBREAKS	December. 2010/ SAT 2[1]
Botswana	SAT 1, SAT 2, SAT 3[1]	April 2013[1]
Congo d. R.	O, A, SAT 1[4]	2011/2012[4], NO PRECISE DATA
Malawi	2011 - SAT 2[1]	October 2011[1]
Mozambique	2011 - SAT 2[1]	June 2011/SAT 2[1]

EuFMD

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

March 2016

Guest Editor
Dr. Donald King Head of WRLFMD,
The Pirbright Institute, UK

#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

The last twelve months have witnessed a number of important changes in the global circulation and distribution of certain FMD virus lineages. In previous reports, we have heard about the spread of the O/ME-SA/Ind-2001 lineage in the Gulf States and countries in North Africa. In 2015, this lineage was also detected in Laos, representing the first introduction of this FMDV lineage into Southeast Asia. This pattern has continued to develop during the first three months of 2016, and the latest situation is that new outbreaks due to the O/ME-SA/Ind2001 lineage have been detected in Vietnam - reported at the recent OIE Sub-Commission for Southeast Asia and China (SEACFMD) in March. Based on the movement of other endemic viruses in the region, we should now anticipate that this lineage may spread more widely, and could even move northwards into East Asia (China and other countries in the neighbourhood). In North Africa, at the western-most extent of this lineage, there is an emphasis on the selection and use of appropriate vaccines to control FMD outbreaks. Together with colleagues from other European OIE FMD Reference Laboratories and EuFMD, I recently attended an OIE meeting in Tunis (Tunisia) to consider the design and implementation of a vaccine bank for the Maghreb Region. Recent samples collected from Nepal (described later in this report) demonstrate how dominant this lineage is in the region, although a single sample represents the first example of a new O/ME-SA/PanAsia-2 sub-lineage, which we have called KAT-15.

In the Middle East, the spread of another new FMD virus lineage (A/ASIA/G-VII) continues to raise concerns. This lineage has also recently emerged from the Indian sub-continent and closely related viruses have caused outbreaks in Saudi Arabia, Iran, Armenia and Turkey. Recent data provided by colleagues at the Şap Institute, (Turkey) dramatically shows how quickly this virus lineage has spread: from the index case in September 2016 (occuring in Ipekyolu-Van in the east of the country), to the situation in January/February 2016 when outbreaks have occured in the west of Anatolia. There are now clearly threats to the FMD-free (with vaccination) zone of Turkish Thrace, which has been free of FMD since 2010. In response to these cases, a tailored serotype A vaccine has been manufactured in Turkey, and over 15 million doses have been administered.

The changing situation due to these two lineages (O/ME-SA/Ind-2001 and A/ASIA/G-VII) highlight threats posed via the trade of livestock and increased movement of people from the Indian sub-continent. In addition to these events, the WRLFMD (together with the Kimron Veterinary Institute in Israel) has also recently characterised new outbreaks belonging to the exotic O/ME-SA/Panasia lineage in the Middle East. These cases occurred in cattle and pigs in Israel and sheep in Nablus, Palestine sharing closest relationships to each other, and to FMD viruses from Southeast and East Asia. These unexpected results further reinforce the unpredictable nature of the epidemiology of FMDV, have raised questions about the movement and exchange of farm workers between the Middle East and Southeast/East Asia.

Within Europe, I look forward to catching up with many of you at the FMD NRL workshop in Ascot (UK) in May, where many of these topics will be discussed!

Don King (Pirbright, April 2016)

I. GENERAL OVERVIEW

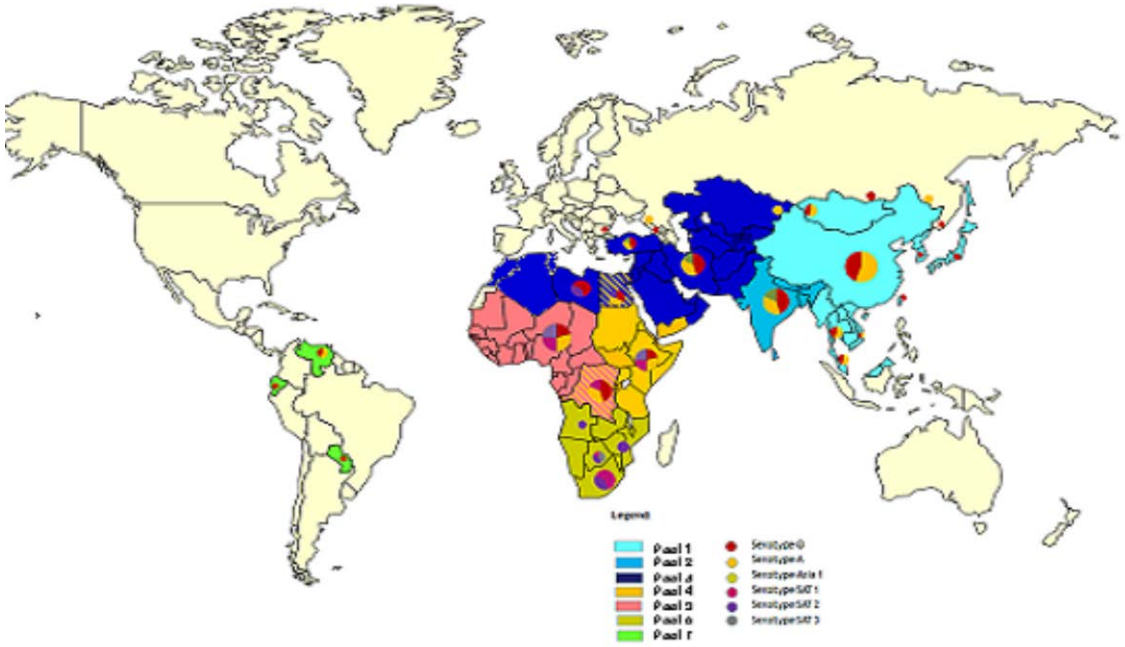
Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below 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 2011 – 2015

POOL	REGION/COUNTRIES – colour pools as in Map	SEROTYPES
1	**SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA** Cambodia, China (People's Rep. of), China (Hong Kong, SAR), China (Taiwan Province), Korea (DPR), Korea (Rep. of), Laos PDR, Malaysia, Mongolia, Myanmar, Russian Federation, Thailand, Viet Nam	**O, A and Asia 1**
2	**SOUTH ASIA** Bangladesh, Bhutan, India, Nepal, Sri Lanka	**O, A and Asia 1**
3	**WEST EURASIA & MIDDLE EAST** Afghanistan, Algeria, Armenia, Azerbaijan, Bahrain, Bulgaria, **Egypt**, Georgia, Iran, 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	**O, A and Asia 1**
4	**EASTERN AFRICA** Burundi, Comoros, **Congo D. R.**, Djibouti, **Egypt**, Eritrea, Ethiopia, Kenya, **Libya**, Rwanda, Somalia, Sudan, South Sudan, Tanzania, Uganda, Yemen	**O, A, SAT 1, SAT 2 and SAT 3**
5	**WEST/CENTRAL AFRICA** Benin, Burkina Faso, Cameroon, Cape Verde, Central Afr. Rep., Chad, **Congo D. R.**, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea Biss., 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** Ecuador, Paraguay, Venezuela	**O and A**

Egypt, Libya and **Congo D. R.** (highlighted in bold) are indicated as being in multiple pools, since they have evidence of FMDV originating from 2 or more pools in the past four years. * ONLY IN NORTH ZAMBIA AS SPILL-OVER FROM POOL 4

MAP 1:Foot-and-mouth disease (FMD) virus pools: world distribution by serotype in 2011-2015



II. HEADLINE NEWS

POOL 1- SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA

China (People's Rep. Of) [1] **–** A new FMD outbreak caused by serotype O was reported in pigs on the 2nd of March 2016 in Sichuan, China (People's Rep. Of).

Korea (Rep. of) [1, 2] – Following to the reoccurrence of FMD in the country in January 2016, 16 new FMD outbreaks due to serotype O were reported in different pig holdings between the 24th of February and the 24th of March 2016, all of them located in Chngcheongnam-Do, Korea (Rep. of).
Vaccine strains were identified by the VMSD tests conducted by WRLFMD using recent field isolate O/SKR/7/2016
Details of the results of the cell culture/ELISA serotyping, genotyping of VP1 and vaccine matching strain differentiation (VMSD) tests carried out by the WRLFMD on FMDV field strains, which are cited in this report are available in the 1st Quarterly WRLFMD Report (January - March, 2016).

POOL 2 - SOUTH ASIA

India [3]**–** The Indian Council of Agricultural Research - Project Directorate on Foot and Mouth Disease (ICAR-PDFMD), Mukteswar, India detected FMDV serotype O among the 28 clinical samples tested.

Nepal [2, 4] **–** The National Foot and Mouth Disease (FMD) and TADS Laboratory, Nepal reported the detection of FMDV serotype O in samples tested during March 2016.
In addition, FMDV O was again the only serotype detected by the WRLFMD from among the 28 samples collected during 2014 and 2015 in Nepal that contained two genotypes represented by – predominantly - O/ME-SA/Ind2000d and by 0/ME-SA/PanAsia-2^{KAT-15} (see editorial).

POOL 3 - WEST EURASIA & MIDDLE EAST

Israel [2]**-** FMDV O was the serotype detected by the WRLFMD from among the 10 samples collected during the most recent outbreaks in 2015. All the isolates were genotyped as O/ME-SA/PanAsia (see editorial).

Pakistan [2], [5]- The Progressive Control of Foot and Mouth Disease Project reported 158 FMD outbreaks during March 2016 caused by FMDV serotypes A, Asia 1 and O. Multiple serotype FMD events were again detected within these outbreaks.
FMDV serotypes A, Asia 1 and O were also confirmed by the WRLFMD in the samples collected in Pakistan between April and December 2015.
Details of the genotypes identified within the various serotypes are described further on.

Palestinian Autonomous Territories [2]– FMDV O was also for this country the only serotype detected by the WRLFMD from among the six samples collected during November and December 2015 in Palestinian Autonomous Territories that was genotyped as O/ME-SA/PanAsia (see editorial).

POOL 4 - EASTERN AFRICA

Ethiopia [2] - FMDV serotypes A, O and SAT 2 were detected in the 16 samples examined by the WRLFMD, collected in Ethiopia between December 2014 and January 2016.

Kenya [6] –FMDV serotype A was detected in the samples examined by the National FMD Reference Laboratory, Embakasi, Kenya.

POOL 5 - WEST/CENTRAL AFRICA

No FMD outbreaks were reported within this pool for March 2016.

POOL 6 - SOUTHERN AFRICA

Malawi [1]- FMDV responsible for outbreaks that occurred between the August 2015 and January 2016 in various parts of the country was serotyped as SAT 1.

Mozambique [2] – Two vaccine strains likely to confer protection were identified by the WRLFMD in the VMSD tests using field isolate SAT2/MOZ/1/2015.

Namibia [2] – From the VMSD tests conducted by the WRLFMD, a vaccine strain likely to confer protection was identified only for field strain SAT1/NMB/1/2015, while none were identified among those included in the tests for isolates belonging to FMDV serotype SAT 2.

Zambia [2]- Further cases of FMD within outbreaks caused by FMDV serotype SAT 3 are still being reported in some cattle herds in Shangombo District of Western Province where the events were first reported in October 2015.

Zimbabwe [2]– Vaccine strains likely to confer protection were identified by the VMSD tests conducted by the WRLFMD, using field strains belonging to FMDV serotype SAT 1 and SAT 2 that were collected in the country during 2015.

POOL 7 - SOUTH AMERICA

Latin America [1] – No FMD events were reported for this Region for March 2016

COUNTER

****** 51 MONTHS SINCE THE LAST OUTBREAK IN SOUTH AMERICA WAS REPORTED***
****** 139 MONTHS SINCE THE LAST SEROTYPE C OUTBREAK WAS REPORTED***

III. DETAILED POOL ANALYSIS

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

China (People's Rep. Of) [1]

A FMD outbreak caused by serotype O was reported in pigs at an abattoir in Sichuan China (People's Rep. Of) on the 2nd of March 2016. Information on the origin of the animals, which were involved in the outbreak, is unavailable. The National/OIE Reference Laboratory, Lanzhou Veterinary Research Institute diagnosed the event on the 10th of March 2016, using reverse transcription - polymerase chain reaction (RT-PCR) and virus isolation. A summary of the animals involved and location of the outbreak are presented in Map 2 and Table 2.

Control measures adopted within this event are as following: movement control inside the country, screening disinfection, stamping out and zoning. Vaccination and treatment of affected animals will not be provided.

Table 2: summary of the animals involved in the FMD outbreak that occurred during March 2016 in Sichuan China (People's Rep. Of).

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Swine	91	8	0	91	0	8.79%	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 in March 2016 in Sichuan China (People's Rep. Of).

Korea (Rep. of) [1, 2]

Following the reoccurrence of FMD in January 2016 in this country, 16 new FMD outbreaks due to serotype O were reported in different pig holdings between the 24th of February and the 14th of March 2016 all located in Chungcheongnam-Do, Korea (Rep. of), in the western part of the country.

Summary of the animals involved in the outbreak and location of these are provided Table 3 and Map 3.

FMD is being immediately diagnosed by the Animal and Plant Quarantine Agency (National laboratory) as the outbreaks are progressively identified. The laboratory is detecting FMDV serotype O in all cases.

Source of outbreaks remains unknown even if an epidemiological survey is currently ongoing. The sanitary measures which are being adopted are the same as for those for the previous outbreaks and are represented by: movement control inside the country, screening, vaccination in response to the outbreaks, disinfection, quarantine, stamping out, control of wildlife reservoirs and zoning. No treatment is being administered to the affected animals. Of note, as reported in Table 3, is that not all animals involved in the outbreaks were destroyed as referred for the previous outbreaks that occurred in the country since January 2016.

Two vaccine strains likely to confer protection, represented by O 3039 and O/TUR/5/2009 were identified in the VMSD tests conducted by WRLFMD using field isolate, O/SKR/7/2016, detected during the first outbreaks that occurred in January 2016. On the other hand, O Manisa vaccine strain obtained in the same test an r_1 value that indicated that it was unlikely to confer protection.

Table 3: summary of the animals involved in the FMD outbreak that occurred between 24th of February and 14th of March 2016 in Chungcheongnam-Do, Korea (Rep. of).

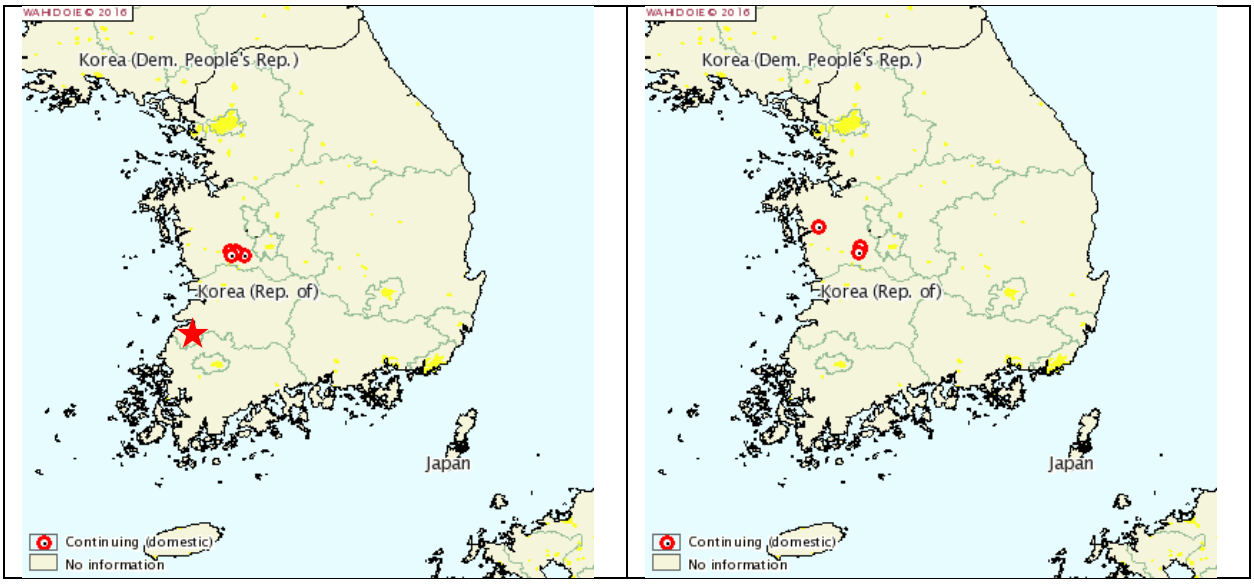
Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Swine	22,909	111	0	15,229	0	0.48%	0.00%	0.00%	66.48%

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

Map 3: Location of the FMD outbreaks that occurred between 24th of February and 14th of March 2016 in Chungcheongnam-Do, Korea (Rep. of).

Map on the left represents the outbreaks reported between the 24th of February and the 14th of March while map on the right represents the outbreaks reported between the 17th and 24th March.

★ Indicates the location of the first FMD outbreaks that occurred in January 2016 in Jeollabuk-Do, Korea (Rep. of).



Russian Federation [7]

The Regional Reference Laboratory for FMD (FGBI-ARRIAH, Russia) examined 2,460 sera for post vaccination monitoring purposes. Other activities being conducted by the laboratory are studies on the immunobiological properties of the FMDV serotypes A and O, the provision of 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.

SEACFMD [8]

Within the countries belonging to the Organization, no new FMD events were reported during March 2016 while the list of countries with the relative number of on-going FMD outbreaks is reported in Table 4. The number of ongoing reported outbreaks within this area remains stable since the beginning of 2016.
Location of these outbreaks is currently not available as the website is undergoing reconstruction.

Table 4: Distribution of reported FMD outbreaks within the SEACFMD countries on-going during March 2016.

SEACFMD countries with on-going FMD outbreaks	Number of events
Cambodia	**119**
Myanmar	**3**
Malaysia	**46**
Thailand	**14**
Viet Nam	**22**
Total	**204**

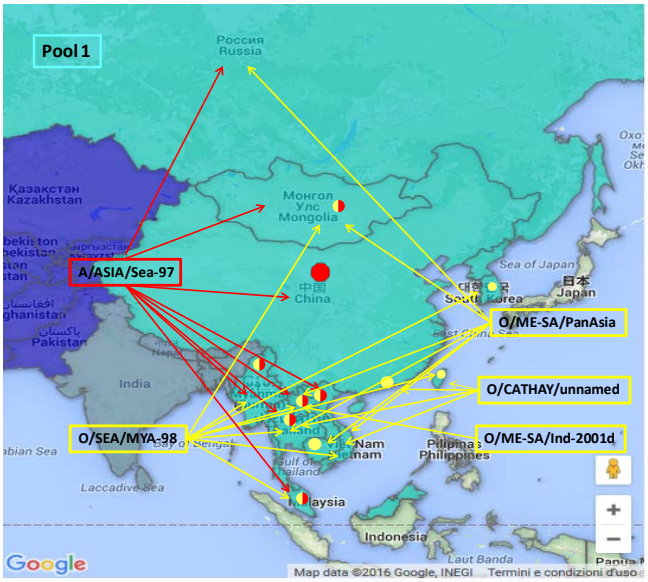
Table 5: Summary of the history of FMD Pool 1, 2012 – 2016, for geographic distribution see Map 4 below.

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2014	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Cambodia	O, 2013-2014/NOT SAMPLED	Sep 2015/O and A, Aug 2014/ not typed, June 2014/not typed	See text
China (People's Rep. of)	2012-2013/O, 2013/A,	Mar 2016/O, May 2015/A	Typing required
China (Hong Kong, Sar)	O	Dec 2015/O	Follow-up needed
China (Taiwan Province)	2012-2013/O,	Jun 2015/A	Typing required
Korea (DPR)	2012-2013/DISEASE ABSENT	May 2014/not confirmed, July 2014/O	Follow-up needed
Korea (Rep. of)	2012-2013/DISEASE ABSENT	March 2016/O	See text
Laos PDR	2012/DISEASE PRESENT WITH QUANTITATIVE DATA BUT WITH AN UNKNOWN NUMBER OF OUTBREAKS	Mar 2015/A, June 2015/O	Follow-up needed
Malaysia	2012 –2013/O 2013/NOT TYPED	Sep2015/O	See text
Mongolia	2013/A	Sept 2013/A, May 2015/O, Oct 2015/O	Follow-up needed
Myanmar	2012-2013/O	Oct 2015/A and O, July 2014/ not typed	See text
Russian Federation	2012/O, 2013/A	Jan 2016/ A and Dec 2015/O	See text
Thailand	O, A and NOT TYPED	Sep 2015 /A, Feb 2015/O, Sept 2014/not typed	See text
Vietnam	O, NOT SAMPLED 2013- 2014/A,	Jan 2015/O, Feb 2016/A and not typed	See text

Map 4: FMD distribution by serotype and topotype in South East Asia, 2012 – 2015.

Conjectured circulating FMD viral lineages in Pool 1 per 2015 [2, 15]:

- Serotype O: O/SEA/Mya-98, O/ME-SA/PanAsia, O/CATHAY, O/ME-SA/Ind-2001d
- Serotype A: A/ASIA/Sea-97
- Serotype Asia-1 has not been detected in the region since 2005 (Myanmar) and 2006 (China (People's Rep. of) and Vietnam)



B. POOL 2 – South Asia

India [2]

The ICAR-PDFMD, Mukteswar, India reported that during March 2016 FMDV serotype O was detected using antigen and/or RNA detection methods from among the 28 clinical samples, of which 24 were collected from cattle and 4 from buffaloes.

Sixteen FMDV isolates belonging to serotype O were genotyped while 12 isolates were subjected to vaccine matching exercises. The number of serum samples tested for FMDV antibodies within related epidemiological studies was 17,626. The indigenous diagnostic kits developed at ICAR-DFMD, Mukteswar were used for the laboratory diagnosis. The laboratory staff provided expert advice to the Government, to the National and Local authorities. ICAR-PDFMD is has on-going research studies and collaborations with international organisations.

Nepal [2, 4]

The National FMD and TADS Laboratory in Budhanilkantha, Kathmandu Nepal, reported the detection of FMDV serotype O during March 2016. The laboratory also carried out FMD serological studies.

Laboratory personnel were involved in outbreak investigations and in the provision of expert advice to the Government and to the National and Local authorities.

The FMD and TADS Laboratory forwarded samples to the WRLFMD collected in Nepal during outbreaks occurring between April 2014 and December 2015 and FMDV O was the only serotype detected from among the 28 samples examined. The specimens were collected from the following species: cattle, 24 samples, pigs, 3 samples and buffalo, 1 sample. Of the total batch, 16 reacted positive and were those collected between February and December 2015, with 15 from cattle and the remaining from a pig.

The genotypes identified among the field samples were two: the first was 0/ME-SA/Ind2000d while the second is a new sublineage with the proposed designation of 0/ME-SA/PanAsia-2^{KAT-15} (derived from Katmandu). A summary of the genotyping details are reported in Table 6and location of the sample collected is represented in Map 5.

Table 6: summary of the genotyping results of FMDV positive samples collected in different areas of Nepal during 2015.

Strain	Date of collection	Location	Species	Genotype detected	Most Closely Related Viruses not belonging to the country	Seq id** (%)	Most Closely Related Reference Viruses - seq id %
NEP/1/2015	18/02/2015	Kathmandu	Cattle	O/ME-SA/PanAsia-2^{KAT-15}	O/AFG/12/2010	92.16	O/IRN/18/2010 - O/ME (SA/PanAsia-2^{BAL-09}) - 91.54
NEP/3/2015	23/02/2015	Bhaktapur		O/ME-SA/Ind2000d	O/IND127/2013 (KM264359)	96.71	O/BHU/3/2009 (KM921814) - (O/ME-SA/Ind2000d) 93.11 to 95.46
NEP/4/2015	26/03/2015	Kaski,			O/BHU/3/2009 (KM921814)	95.46	
NEP/9/2015	01/11/2015	Bhaktapur			O/UAE/1/2015	98.43	
NEP/10/2015	01/11/2015					98.44	
NEP/11/2015	01/11/2015					98.44	
NEP/12/2015	01/11/2015					98.28	
NEP/14/2015	03/11/2015	Kavre			O/NEP/15/2015*	100.00	
NEP/15/2015	03/11/2015				O/NEP/14/2015*	100.00	
NEP/17/2015	01/12/2015	Kathmandu			O/UAE/1/2015	99.06	
NEP/18/2015	01/12/2015		Pig		O/NEP/14/2015	99.22	
NEP/19/2015	02/12/2015	Bhaktapur	Cattle		O/UAE/1/2015	99.06	
NEP/21/2015	06/12/2015	Kathmandu			O/NEP/23/2015*	100.00	
NEP/23/2015	09/12/2015				O/NEP/21/2015*	100.00	
NEP/24/2015	11/12/2015	Sunsari,				99.69	
NEP/25/2015	14/12/2015	Lalitpur				99.53	

*the ten most closely related field viruses are all from the same country

**Sequence identity (%)

Map 5: Location of the areas from where the FMDV positive samples were collected in 2015, in Napel.

Table 7: Summary of the history of FMD Pool 2, 2012 – 2016, for geographic distribution see Map 6 below.

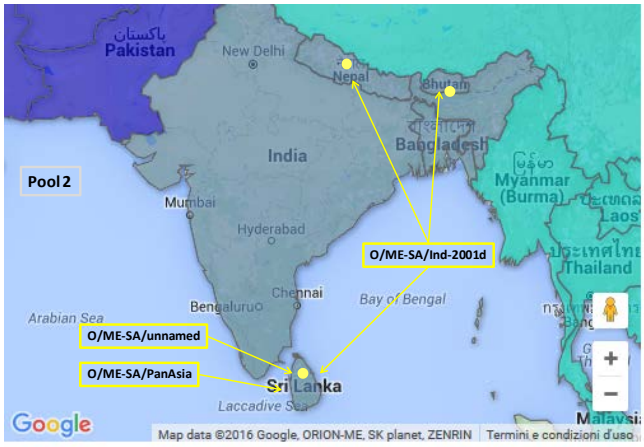
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2014	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Bangladesh	DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	Not available	Follow –up needed
Bhutan	NOT TYPED, 2013/NOT SAMPLED 2013-2014/O	Not available	Follow –up needed
India	O, A, NOT SAMPLED 2012-2013/Asia 1 2013/NOT TYPED	March 2016/O, Apr 2015/A April 2015/Asia 1,	See text
Nepal	O, 2012-2103/Asia 1	MArch 2016/O	See text

Sri Lanka	2012 – 2013/O	Sept 2014/O	Follow-up needed

Map 6: FMD distribution by serotype and topotype in South Asia, 2012 – 2015 (EuFMD).

Conjectured circulating FMDV lineages in Pool 2 per 2015 [2, 15]:

- O/ME-SA/Ind-2001 predominates (the O/ME-SA/Ind-2011 lineage that emerged during 2011 has not been recognized during 2012-15)
- O/ME-SA/PanAsia-2 (last detected in 2014 in Sri Lanka)
- A/ASIA/G-VII (genotype 18)?
- Asia-1 (lineage C subdivided into Eastern and Western clusters)?



C. POOL 3 – West Eurasia & Middle East

Israel [2]

Samples collected from pigs and cattle during the FMD outbreaks that respectively occurred in November and December 2015 in HafZafon, Israel were examined by the WRLFMD and FMDV serotype O was detected in all of them.

Heart tissues and fluid represented the samples from pigs (seven samples) and epithelial tissue from cattle (three samples). Genotyping of the field isolates identified all of them as O/ME-SA/PanAsia.

The present batch of field samples had a high sequence identity (seq id) between 99.53and 100%, confirming the close epidemiological links between these two events. In addition, the most closely related virus not pertaining to the country was O/PAT/1/2015, which had a seq id equal to one of the present field isolates, i.e. equal to 99.53% indicating an epidemiological correlation between the events that have recently occurred subsequently in Israel and the Palestinian Autonomous Territories. Most closely related reference virus is represented by O/UKG/35/2001 (AJ539141).

Pakistan [2, 5]

The Progressive Control of Foot and Mouth Disease Project TCP/PAK/3503 reported 158 FMD outbreaks during March 2016 caused by FMDV serotypes A, Asia 1 and O.

A summary of the distribution of the outbreaks relative to the serotypes involved and the provinces where they were detected is reported in Table 8. The Project also reported the vaccination that was carried out during March 2016, which was focused mainly on ring vaccination and on animals within a cost-sharing scheme in which livestock holders participate for the purchase of the vaccine (Table 9).

Table 8: FMD outbreaks that occurred during March 2016 in the various Provinces of Pakistan.

Province	Number Outbreaks	Number of Outbreaksper Serotype(s)					Not Yet Typed
		'O'	'A'	'Asia-1'	'Mixed'	ELISA Negative	
Sindh	80	2	9	3	4	6	57
Azad Kashmir	2	1	-	-	-	1	0
Khyber Pakhtunkhwa	9	6	0	3	0	0	0
Punjab	20	7	4	6	0	3	0
Islamabad Capital Territory	6	-	2	4	0	0	0
Gilgit Baltistan	6	3	1	-	0	2	0
Total	**123**	**19**	**16**	**16**	**4**	**12**	**57**

Table 9: Vaccination activity carried out during March 2016 in the various Provinces of Pakistan.

Province	N° of animals within a ring vaccination	N° of animals vaccinated on cost sharing basis	
Sindh	3,200	8,229	
Baluchistan	-	550	
Khyber Pakhtunkhwa	900	-	
Punjab	1,275	3,329	
Azad Kashmir	75	11,850	
Gilgit	600	-	
Islamabad Capital Territory	400	325	
Total	**6,450**	**24,283**	**30,733**

FMDV A, Asia 1 and O were confirmed as the serotypes present in the samples examined by the WRLFMD, in the 12 buffalo and 23 cattle samples, collected in Pakistan between April and December 2015.
Summary of the genotyping results are reported in Table 10 and location of areas where the samples were collected is represented in Map 7.

Table 10: summary of the genotyping results of FMDV positive samples collected in different areas of Pakistan during 2015.

Strain	Date of collection	Location	Species	Genotype detected	Most Closely Related Viruses not belonging to the country	Seq id** (%)	Most Closely Related Reference Viruses - seq id %
PAK/22/2015	03/04/2015	Lahore	Water Buffalo	**O/ME-SA/Pak-98**	O/YEM/4/80	91.24	O1/Manisa/TUR/69 (AY593823)- 89.98
PAK/30/2015	29/08/2015	Sindh	Water Buffalo	**O/ME-SA/PanAsia-2^{BAL-09}**	O/IRN/6/2015	99.06	O/IRN/18/2010 -94.99 to 95.15
PAK/32/2015	01/09/2015		Cattle			99.06	
PAK/34/2015	16/09/2015					98.90	
PAK/42/2015	05/10/2015			**O/ME-SA/PanAsia-2^{ANT-10}**	O/AFG/23/2013	98.75	O/IRN/88/2009 - 93.90 to 94.52
PAK/44/2015	09/10/2015	Lahore				98.44	
PAK/45/2015	14/10/2015	Punjab					
PAK/49/2015	21/10/2015		Water Buffalo		O/AFG/1/2014	97.34	
PAK/51/2015	28/10/2015				O/AFG/23/2013	98.28	
PAK/52/2015	01/11/2015	AJK	Cattle			98.44	
PAK/25/2015	05/06/2015	Lahore	Cattle	**A/ASIA/Iran-05^{FAR-11}**	A/PAK/10/2015*	99.84	A/IRN/1/2011 -93.58 to 96.09
PAK/31/2015	31/08/2015	Sindh	Water Buffalo		A/PAK/35/2015*	99.84	
PAK/35/2015	16/09/2015		Cattle		A/PAK/31/2015*	99.84	
PAK/36/2015	19/09/2015				A/PAK/41/2014*	98.59	
PAK/46/2015	16/10/2015	Punjab	Water Buffalo		A/PAK/31/2015*	99.22	
PAK/50/2015	21/10/2015	AJK			A/PAK/55/2015*	100.00	
PAK/53/2015	03/11/2015	Punjab	Cattle		A/IRN/27/2013	97.65	
PAK/55/2015	12/11/2015	AJK			A/PAK/50/2015*	100.00	
PAK/56/2015	04/11/2015	Lahore			A/PAK/31/2015*	99.22	
PAK/27/2015	15/07/2015	Lahore	Water Buffalo	**ASIA-1/ASIA/Sindh-08**	Asia1/TUR/37/2014	99.84	Asia1/PAK/8/2008 -93.21 to 95.58
PAK/28/2015	01/08/2015		Cattle		Asia1/AFG/40/2011	98.74	
PAK/29/2015	27/08/2015		Water Buffalo		Asia1/PAK/33/2015*	99.37	
PAK/33/2015	05/09/2015	Sindh	Water Buffalo		Asia1/PAK/37/2015*	99.84	
PAK/37/2015	22/09/2015		Cattle		Asia1/PAK/38/2015*	100.00	
PAK/38/2015	23/09/2015				Asia1/PAK/37/2015*	100.00	
PAK/43/2015	08/08/2015	Islamabad			Asia1/PAK/1/2015*	99.84	
PAK/48/2015	19/10/2015	Punjab			Asia1/PAK/35/2014*	98.58	
PAK/54/2015	06/11/2015		Water Buffalo		Asia1/PAK/35/2014*	98.26	

*the ten most closely related field viruses are all from the same country

**Sequence identity (%)

Map 7: Location of the areas from where the FMDV positive samples were collected in 2015, in Pakistan.

Palestinian Autonomous Territories [2]

FMDV O was detected by the WRLFMD in all of the six samples that were collected from the outbreaks that occurred in November and December 2015. The samples consisted of four sheep heart tissues and two cell cultures/mice passages inoculated with sheep samples that. All the isolates were genotyped as O/ME-SA/Pan-Asia and had a seq. id of 100% with the most closely related virus not pertaining to the country represented by O/ISR/10/2015 with a seq id of 99.37 which is the virus mentioned in the paragraph relative to Israel confirming the epidemiological link between the outbreaks of the two neighbouring countries. As also for Israel most closely related reference virus is represented by O/UKG/35/2001 (AJ539141).

Table 11: Summary of the history of FMD Pool 3, 2012 – 2016, for geographic distribution see Map 8 below.

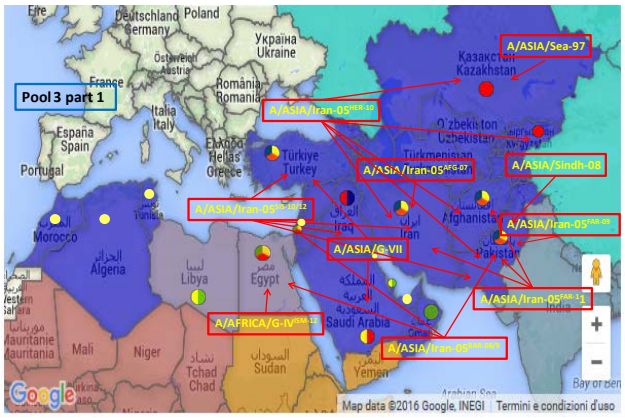
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2014	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Afghanistan	2013/O, A, Asia 1, NOT TYPED 2012/SEROTYPE NOT REPORTED	2014/A, Asia 1, O	Follow –up needed
Algeria	2014/O	Apr 2015/O	Follow –up needed
Armenia	2012-2014/DISEASE ABSENT	Dec 2015/A	Follow –up needed
Azerbaijan	DISEASE ABSENT	2007/O	Follow –up needed
Bahrain	2012 /O	Oct 2014/O	Follow –up needed
Egypt	2012, 2014/SAT 2 2012 - 2014/O, A	April 2014/Sat 2, Jan-April 2015/A & O	Follow –up needed
Georgia	DISEASE ABSENT	2001/ASIA 1	Follow –up needed
Iran	O, A, 2012-2013/Asia 1	Dec 2015/A Jun Apr 2014/O, 2013/Asia 1	See text
Iraq	2012-2013/O, A	Dec 2013/A, O	Follow –up needed
Israel	2012-2013/O	December 2015/O	See text
Jordan	DISEASE ABSENT	2006/A	Follow –up needed
Kazakhstan	2012/O 2012 –2013/A	Aug 2012/O, Jun 2013/ A	Follow –up needed
Kuwait	2012/O 2013 – 2014/ DISEASE ABSENT	Jan-Feb 2016/O	Follow –up needed

Kyrgyzstan	2012-2013/O, A	Apr 2013 /O, A, Aug 2014/not typed	Typing required
Lebanon	DISEASE ABSENT	2010/not typed	Follow –up needed
Libya	NO DATA AVAILABLE	Oct 2013/O	Follow –up needed
Morocco	No outbreaks reported for that period	Oct 2015/O	
Oman	2012-2013/O	May 2015/SAT 2	Follow –up needed
Pakistan	DISEASE LIMITED TO ONE OR MORE ZONES	Feb 2016/A, Asia 1 and O	See text
Palestine	O, 2012-2013 - SAT 2	Dec 2015/O Mar 2013/Sat 2	See text
Qatar	2012-2013/O	Dec 2013/O	Follow –up needed
Saudi Arabia	2013/O	Mar 2014/O, Dec 2015/A	Follow –up needed
Syrian Arab Republic	DISEASE ABSENT	2002/ A & O	Follow –up needed
Tajikistan	2012/NOT TYPED 2013/DISEASE ABSENT	Nov 2011/Asia 1, Nov 2012/ NOT TYPED	Follow –up needed
Tunisia	2014/O	Oct 2014/O	Follow –up needed
Turkey	Asia 1, A, O, NOT TYPED	Oct 2015/ A May 2014-2015/ Asia 1 and O	Follow –up needed
Turkmenistan	NO DATA AVAILABLE	Not available	Follow –up needed
United Arab Emirates	2012/DISEASE ABSENT 2013-2014/O	Jan 2016/O	Follow –up needed
Uzbekistan	NO DATA AVAILABLE	Not available	Follow –up needed

Map 8: FMD distribution by serotype and topotype for West Eurasia and Middle East, 2012 – 2015 (EuFMD).

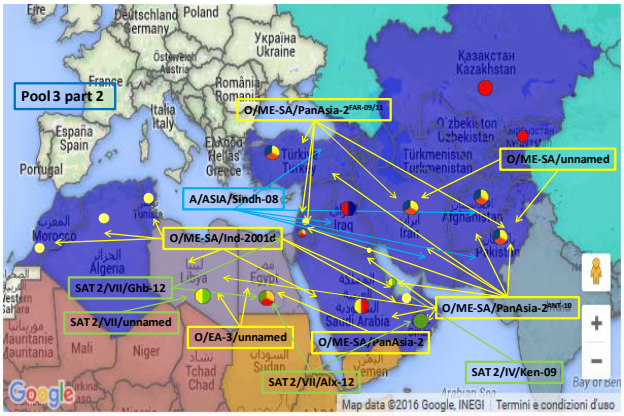
Conjectured circulating FMDV lineages in Pool 3 per 2015 [2, 15]:

- A/ASIA/Iran-05 (from AFG-07, HER 10, SIS-10/12, SIS-, FAR-09/11 and BAR-08 sub-lineages)
- A/Asia/G-VII (recent incursion from South Asia)[1]
- A/ASIA/Sea-97
- A/ASIA/Sindh-08
- A/AFRICA/G-IV
- Asia-1 (Sindh-08 lineage).



Conjectured circulating FMDV 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 incursion per 2013/14 from the Indian sub-continent)
- SAT 2/IV/Ken-09
- SAT 2/VII/Alx-12 and Ghb-12 sublineages



D. POOL 4 – Eastern Africa

Ethiopia [2]

Sixteen body fluids and epithelium samples collected from 15 cattle and one goat, in Ethiopia between December 2014 and January 2016 were examined by the WRLFMD, using PCR and cell culture/ELISA. FMDV serotypes identified were A, O and SAT 2, with the latter being the most prevalent, in six samples including the goat sample, while A and O were detected only once.

Kenya [6]

FMDV serotype A was detected in eight of the samples examined by the National FMD Reference Laboratory, Embakasi, Kenya. The laboratory has ongoing collaborations with EuFMD, which has provided serological diagnostic kits

Table 12: Summary of the history of FMD Pool 4, 2012 – 2015, for geographic distribution see Map 9 below.

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 - 2014	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Burundi	NO DATA AVAILABLE	Aug 2013 / not available	Typing required
Comoros	NO DATA AVAILABLE	2010	Follow –up needed
Congo d. R.	NO DATA AVAILABLE	Jun 2013/not typed	Typing required
Djibouti	DISEASE ABSENT	Not available	Follow –up needed
Egypt	2012, 2014/SAT 2 2012 - 2014/O, A	April 2014/Sat 2, May 2014/A, Oct 2014/O	Follow –up needed
Eritrea	2012/O	Jan 2012/O	Follow –up needed
Ethiopia	O,2012/A, SAT 2	Jan 2016/ O & SAT 2, Jun 2014/A and SAT 1	See text
Kenya	O, SAT1, SAT2, 2012 – 2013/A, 2012/NOT TYPED	March2016/ A, Oct 2015/SAT1 and SAT 2, Apr 2015/O	See text
Libya	NO DATA AVAILABLE	Oct 2013/ O, Sat 2/Apr 2012	Follow-up needed
Rwanda	2012-2013/A, O, SAT1, SAT 2	Nov 2012/not typed	Typing required
Somalia	2012/NOT SAMPLED 2013 – 2014/ NO DATA AVAILABLE	2011	Follow –up needed
Sudan	O, 2013/SAT 2,	2013/O, SAT2	Follow –up needed

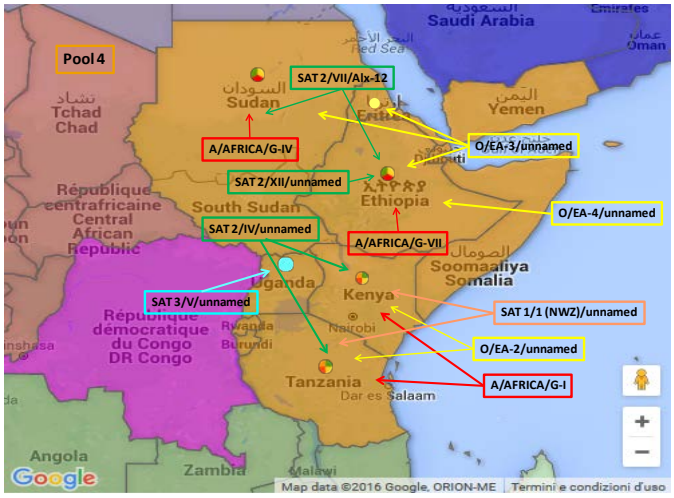
	2013-2014/NOT TYPED		
South Sudan	NO DATA AVAILABLE	2011	Follow –up needed
Tanzania	2012/O 2012-2013/A, SAT 1, SAT 2	May 2015/O Apr2013/ A, SAT 1, SAT2	Follow –up needed
Uganda	2012/O, SAT 1 2012-2013/NOT TYPED	May 2014/O Nov 2014/SAT1, Jan 2015/A, and SAT 3, July 2015/ SAT 2 and untyped	Follow –up needed
Yemen	2012/O, 2013 – 2014/ DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	2009/O	Follow –up needed

Map 9: FMD distribution by serotype and topotype for East Africa. 2011 – 2015 (EUFMD)

East Africa is known to be endemic for FMD, but currently available data are limited.

Conjectured circulating FMDV lineages in Pool 4 per 2015 2[1,15]:

- O (topotypes EA-2 (Kenya, Tanzania, EA-3 (Ethiopia, Eritrea, Kenya & Sudan) and EA-4 (Ethiopia).
- A/AFRICA (genotypes I (Kenya, Tanzania), IV (Sudan) and VII (Ethiopia))
- A/ASIA/Iran-05 BAR-08 sub-lineage (Egypt)
- SAT 1 (topotypes I (Kenya, Tanzania))
- SAT 2 (topotypes IV (Kenya, Tanzania), VII (Sudan, Ethiopia), XII (Ethiopia))
- SAT 3 (only detected in African buffalo in the south of the QENP, Uganda in 1970 & 1997 and recently in 2013)



E. POOL 5 – <u>West / Central Africa</u>

No reports of FMD outbreaks are available for this pool for March 2016 as also no FMD related activities were carried out by ACCRA Veterinary Laboratory, Ghana and the FMD Research Centre of the Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria[, 9, 10].

Cameroon [11]

During March 2016, the Laboratoire National Vétérinaire tested 60 cattle serum samples using non-structural protein (NSP) ELISA with 45 reacting positively for FMD antibodies. Other diagnostic activities continue to be on a hold due to the lack of reagents.

The laboratory personnel were also involved in the investigations of outbreaks and collaborative partnerships with the Ohio State University and Plum Island Laboratory, USA are continuing.

Senegal [12]

The Laboratoire National de l'Elevage et de Recherches Vétérinaires (LNERV), Senegal has examined 1,735 sera of which 27% resulted positive ,employing the kits provided by EuFMD/FAO. FMDV serotypes A, O, and SAT2 were

serologically identified even if 22% of the positive sera were not serotyped. The latter samples are in the process of confirmation.

Table 13: Summary of the history of FMD Pool 5, 2012 – 2015, for geographic distribution see Map 10 below.

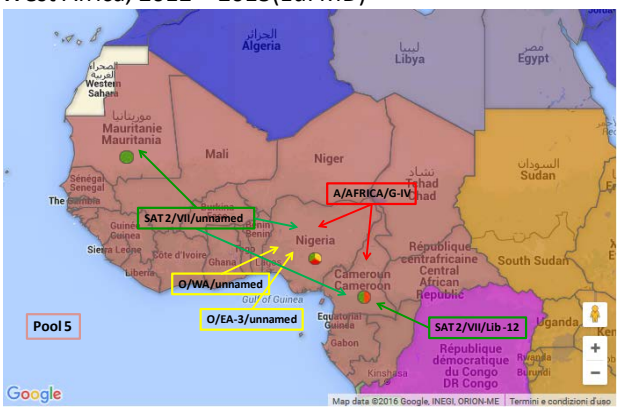
Country	FMD history FMDV serotypes, reported to OIE in 2012 – 2014	Last outbreak reported/serotype #see pg. 1	Comment (Genotyping would be useful for this region)
Benin	A, O, SAT 1, SAT 2	Jun 2014/O, A, SAT 1, SAT 2	Follow –up needed
Burkina Faso	SEROTYPES NOT REPORTED	2013/ not available	Follow –up needed
Cameroon	SEROTYPES NOT REPORTED	Apr 2014/ A, Nov 2014/O, SAT 2, May 2014/SAT 1, Jun 2014, Jan 2015 and July-Aug 2015/untyped	See text
Cape Verde	NO DATA AVAILABLE	Not available	Follow –up needed
Central Afr. Rep.	DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	Not available	Follow –up needed
			Follow –up needed
Chad	2012 – 2013/SEROTYPES NOT REPORTED	Not available	Follow –up needed
Congo D. R.	2012 – 2013/A, O, SAT 1	Jun 2013/not typed	Typing required
Congo R.	NO DATA AVAILABLE	Jun 2013/not typed	Typing required
Cote D'Ívoire	2012/A, NOT SAMPLED 2013/ SEROTYPES NOT REPORTED	Jun 2013/not typed	Follow –up needed
Equatorial Guinea	DISEASE SUSPECTED BUT NOT CONFIRMED	Not available	Follow –up needed
Gabon	NO DATA AVAILABLE	Not available	
Gambia	NO DATA AVAILABLE	2012/O	
Ghana	2012 – 2014/SEROTYPES NOT REPORTED	2014/not available	Follow –up needed
Guinea Biss.	DISEASE ABSENT	No data available	Follow –up needed
Guinea	2012-2013/ DISEASE ABSENT	2014/not available	
Liberia	NO DATA AVAILABLE	Not available	Follow –up needed
Mali	2012/DISEASE ABSENT 2013/ SEROTYPES NOT REPORTED	2011/2012, no precise data	
Mauritania	2012-2013/NO REPORTED OUTBREAKS	Dec 2014/SAT 2	Follow –up needed
Niger	2012 – 2014/NOT SAMPLED	2014/not sampled, May 2015/O	Follow –up needed
Nigeria	2012 – 2014/NOT SAMPLED	Nov 2015/A and SAT 1, Sept 2014/0 and SAT 2	Genotyping required Follow –up needed
Sao Tome Principe	2012/DISEASE ABSENT, 2013/NO DATA AVAILABLE	Not available	Follow –up needed
Senegal	2012, 2014/NO DATA AVAILABLE 2013/DISEASE ABSENT,	2014/ SAT 1 Feb 2015/ A and O	See text

Sierra Leone	DISEASE ABSENT	Oct 1958	Follow –up needed
Togo	O, SAT 1, 2013/NOT TYPED	2012/O	Follow –up needed

Map 10: FMD distribution by serotype and topotypes for West Africa, 2012 – 2015(EuFMD)

Conjectured circulating FMDV lineages in Pool 5 per 2015 [2, 15]

- Serotype O (topotypes WA, EA-3 (Nigeria))
- Serotype A (topotype AFRICA, genotypes IV)
- Serotype SAT 1 (?)
- Serotype SAT 2 (topotype VII/Lib-12 and unnamed genotypes)



F. POOL 6 – SOUTHERN AFRICA

Malawi [1]

FMDV, responsible for outbreaks that occurred between the August 2015 and January 2016, in various parts of the country was serotyped by the Botswana Vaccine Institute (OIE Reference Laboratory) as SAT 1 on the 22nd of March 2016, eight months after the events had started.

The origin of the outbreaks was attributed to contact with wild animals and the ongoing control measures are represented by movement control inside the country, screening, disinfection traceability quarantine, surveillance outside and within containment and/or protection zone surveillance within containment and/or protection zone, control of wildlife reservoirs. No treatment of affected animals is being carried out while vaccination in response to the outbreak has been administered to 9,965 cattle heads in Chikwawa that are around the outbreaks that have occurred which are nearby the Lengwe National Park, which has a high density population of buffalos. Other 21,229 cattle heads in Shire Valley were also vaccinated – this represented a targeted population that was around Bangula which is the focus of the outbreak. The present vaccination campaign covered the whole Magoti EPA (Expansion Planning Area), Ndalapa and Mwananjobvu dip tanks in Dolo EPA of Chikwawa District.

Mozambique [2]

Field strain SAT2/MOZ/1/2015 (SAT2/I/ unnamed) was used in the VMSD tests conducted by the WRLFMD in which both vaccine strains used, SAT 2 ERI and SAT 2 SIM were identified as likely confer protection.

Namibia [2]

From the VMSD tests conducted by the WRLFMD, vaccine strain SAT1/RHO, likely to confer protection was identified for field strain SAT1/NMB/1/2015 belonging to the genotype SAT 1/III /WZ)/unnamed.

For field isolates SAT 2/NMB/3 and 5/2015, both belonging to the genotype SAT 2/III/unnamed, none of the vaccines strains employed, i.e. SAT 2 ERI and SAT 2 ZIM obtained values of r_1 that indicated them as likely to confer protection. All field strains collected in this country since 2010 belong to the previously mentioned genotypes.

RSA[13]

The ARC-Onderstepoort Veterinary Institute, Republic of South Africa examined 2,877 samples using liquid-phase blocking ELISA for the detection of FMDV serotypes SAT 1, SAT 2 and SAT 3 and 20 samples using NSP ELISA. The laboratory is carrying out research studies and collaborations with international organisations.

Zambia [2]

Following the onset in October 2015 of outbreaks due to FMDV serotype SAT 3, due to contact with wild animals, further cases are still being reported in some cattle herds in Shangombo District of Western Province. From this

district, the disease spread to the neighbouring districts of Kalabo and Sikongo. A ring vaccination was carried out in January 2016 involving 109,211 cattle. The disease is no longer spreading and fewer cases are being reported. The FMDV serotype SAT 3 detected in cattle is suspected to have been contracted from wild African buffaloes that are present in the area. The spread from buffaloes to cattle may have been due to the drought that was experienced during the year. Buffalo samples to confirm this hypothesis are yet to be conducted. Other control measures still in place are the following: movement control inside the country, surveillance outside and within containment and/or protection zone, while no treatment is being carried out in affected animals.

Zimbabwe [2]

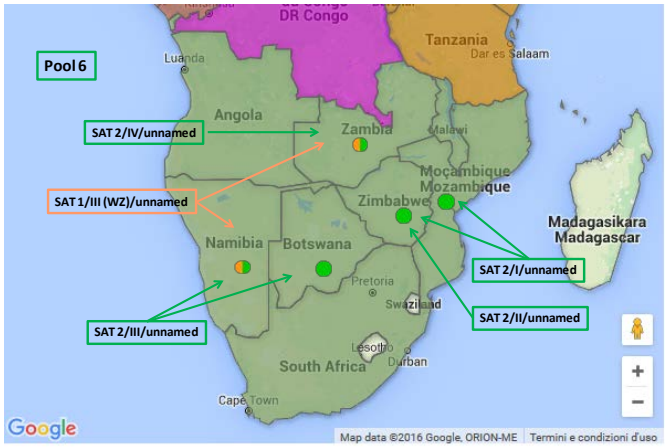
Field strains SAT 1/ZIM/10, 14/2015, genotyped as SAT 1/II/unnamed were used by the WRLFMD in VMSD tests in which the following vaccine strain SAT1/RHO obtained an $_{r1}$ value indicating it as likely to confer protection for field strain SAT 1/ZIM/10/2015.

VMSD tests were also carried out with the following field stains collected from the same country, SAT 2/ZIM/1, 5, 13, 20/2015, genotyped as SAT 2/II/unnamed with the following vaccine strains identified as likely to confer protection, SAT 2 ERI and SAT 2 ZIM for at least one of the previously mentioned field strains.

Table 14: Summary of the history of FMD Pool 6, 2012 – 2015, for geographic distribution see Map 11 below.

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2014	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Angola	2012/DISEASE SUSPECTED BUT NOT CONFIRMED 2013/DISEASE ABSENT 2014/NO DATA AVAILABLE	July 2015/ SAT 2	Follow –up needed
Botswana	2012-2014/SAT 2 2014/SAT 1	Jun 2015/typing pending July 2015/SAT 2, June 2015/SAT 1	Follow –up needed
Congo D. R.	2012 – 2013/A, O, SAT 1	Jun 2013/not typed	Follow –up needed
Malawi	2012 -2013/NO REPORTED OUTBREAKS	Oct 2011, Sep 2015/SAT 1	See text
Mozambique	2012 -2013/DISEASE ABSENT, 2014/NO DATA AVAILABLE	July 2015/SAT 2, May 2015/ SAT 1	Follow –up needed
Namibia	2012-2013/SAT 1	May 2015/SAT 1, Jun 2015/SAT 2, July/typing pending	See text
South Africa	2012/SAT 2 2013/SAT 1	Dec 2015/SAT 3, Nov 2014/ SAT 2, Aug 2013/SAT 1	See text Genotyping required
Zambia	2012/SAT 1, SAT 2	Jan 2013/SAT 1, SAT 2, Mar 2016/SAT 3	See text
Zimbabwe	2012-2013/SAT 2 2013/SAT 3 2014/SAT 1	Nov 2015/SAT 2, Aug 2015/ SAT 1, Jun 2013/SAT 3	See text

Map 11: FMD distribution by serotype and topotype for Southern Africa, 2012 – 2015 (EuFMD)



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 per 2015 [2, 15]:

- Serotype SAT 1 (topotypes I(?), I(?)I and III)
- Serotype SAT 2 (topotypes I, II, III and IV)
- Serotype SAT 3 (?) (topotypes I, II and III)

G. POOL 7 – South America

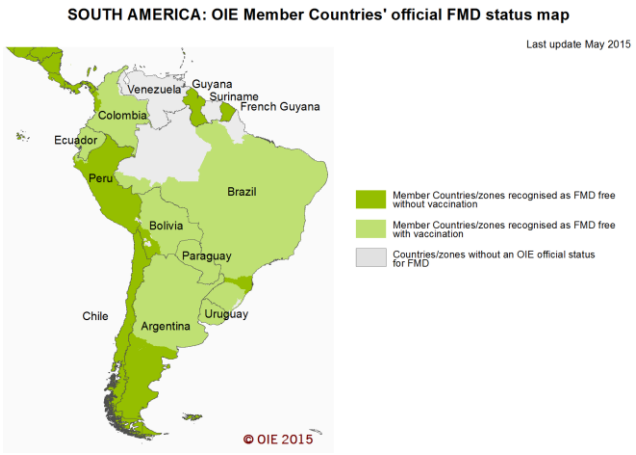
South America [1, 14]

The OIE FMD status of the countries in South America as reported in April 2015 is presented in Map 12.
Most South American countries are FMD free with vaccination (Uruguay) or without vaccination (Chile, Guyana) or with free zones with vaccination (Argentina, Bolivia, Brazil, Colombia, 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 12). The FMD history between 2012 –2014 is reported in Table 15.

Table 15: Summary of the history of FMD Pool 7, 2012 – 2015, for geographic distribution see Map 12 below

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 2014	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Paraguay	DISEASE ABSENT	Dec 2011/O	
Venezuela	DISEASE ABSENT	2011/O, A	National situation needs verification

Map 12: FMD status for South America [1].



IV. OTHER NEWS:

[1]**The 1st WRLFMD Quarterly Report for the period January– March 2016** published the following table (Table 16) that contains a list of FMDV strains for antigen banks of FMD-Free countries. The discussion of this table is within the report.

The WRLFMD is at present working to adopt a risk-based approach for identifying FMDV lineages and relate these to priority vaccines for use in Europe and other FMD-free settings.

Table 16 Recommendations by the WRLFMD® on FMD virus strains to be included in FMDV antigen banks (for FMD -free countries) – March 2016.

Note: Virus strains are NOT listed in order of importance

RECOMMENDATIONS FROM WRLFMD® ON FMD VIRUS STRAINS TO BE INCLUDED IN FMDV ANTIGEN BANKS (FOR FMD-FREE COUNTRIES) March 2016

Note: Virus strains are NOT listed in order of importance

High Priority	A/ASIA/G-VII(G-18)* O Manisa O PanAsia-2 *(or equivalent)* O BFS or Campos A24 Cruzeiro Asia 1 Shamir A Iran-05 *(or A TUR 06)* A22 Iraq SAT 2 Saudi Arabia *(or equivalent i.e. SAT 2 Eritrea)*
Medium Priority	A Eritrea SAT 2 Zimbabwe SAT 1 South Africa A Malaysia 97 (or Thai equivalent such as A/Sakolnakorn/97) A Argentina 2001 O Taiwan 97 *(pig-adapted strain or Philippine equivalent)*
Low Priority	A Iran '96 A Iran '99 A Iran 87 or A Saudi Arabia 23/86 *(or equivalent)* A15 Bangkok related strain A87 Argentina related strain C Noville SAT 2 Kenya SAT 1 Kenya SAT 3 Zimbabwe

NB: Discussions are currently underway to adopt a risk-based approach for different FMD viral lineages to identify priority vaccines for use in Europe and other FMD-free settings.

*Recent in-vitro data from WRLFMD for serotype A viruses from Saudi Arabia and Iran highlights an apparent gap in vaccine coverage. Work is urgently required to evaluate whether there is adequate in-vitro match with Indian vaccine strains (A/IND/40/2000), or whether in-vivo protection may be provided by high potency international 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. Project Directorate on Foot and Mouth Disease (PD-FMD), Indian Council of Agricultural Research, Mukteswar, India (Dr B. B. Dash) FAO
4. National Foot and Mouth Disease and TADS Laboratory, Nepal - Dr. Sharmila Chapagain
5. Progressive Control of Foot and Mouth Disease in Pakistan, - (*Dr. Manzoor Hussain*, National Project Director and *Dr. Muhammad Afzal*, Project Coordinator)
6. National FMD Reference Laboratory, Embakasi, Kenya - (*Dr. Abraham Sangula, Dr. Kenneth Ketter*)
7. Regional Reference Laboratory for FMD (ARRIAH, Russia) - (*Dr. Svetlana Fomina*)
8. SEACFMD, http://www.arahis.oie.int/reports.php?site=seafmd
9. ACCRA Veterinary Laboratory, Ghana - (*Dr. Joseph AdongoAwuni*)

10. FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria - (Dr.UlaramuHussaini)
11. Laboratoire National Vétérinaire (LANAVET) -Garoua, Cameroon - (Dr. Simon Dickmu Jumbo)
12. Laboratoire National de l'Elevage et de RecherchesVétérinaires (LNERV, Senegal) – (Dr ModouMoustapha)
13. ARC-Onderstepoort Veterinary Institute, Republic of South Africa - (Dr LE Heat - Ms E Kirkbride)
14. 42a Reunión Ordinaria de la Comisión Sudamericana para la Lucha contra la Fiebre Aftosa, Quito, Ecuador, 16-17 April, 2015. http: //ww2.panaftosa.org.br/cosalfa42/
15. OIE/FAO FMD Reference Laboratory Network, Annual Report 2014