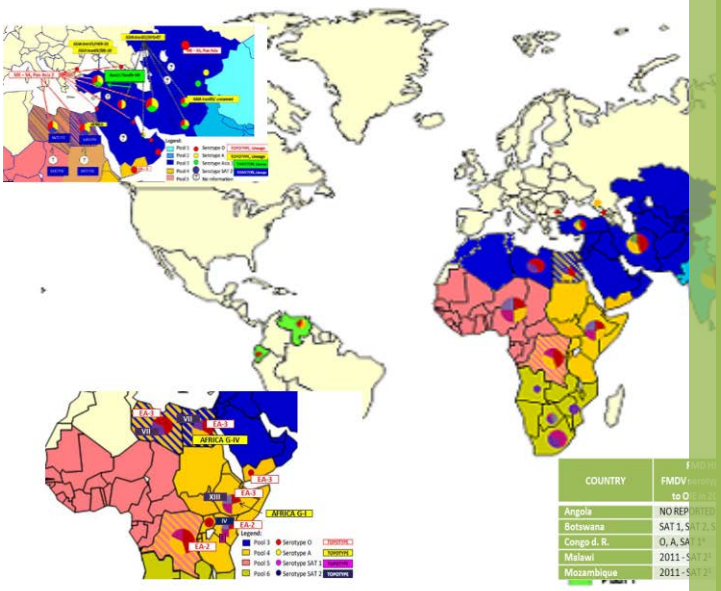
2016

Foot-and-Mouth Disease Situation
Monthly Report August 2016



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

EuFMD

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

August 2016

Dr Theo Knight-Jones
States Veterinary Officer, States of Jersey, Channel Islands

#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

Regular readers of these periodic global FMD reports quickly become aware of some of the ongoing challenges for FMD control, particularly the ongoing emergence of new field strains and the search for suitably matched vaccines. In theory, infectious disease control can be reduced to very simple concepts: to reduce transmission to a level where infections will tend to die out in a population by either preventing animals from being exposed to the pathogen and/or by immunising animals so that even if they are exposed to the agent, onward transmission will be sufficiently reduced. Sometimes rapid application of a simple control strategy is highly effective, however, the real world has a habit of being far more complex and hard to control.

A recent ProMED post discussing human meningococcal disease, that is meningitis or septicaemia caused by *Neisseria meningitidis* (www.promedmail.org/post/4513543), reflected on how following successful mass vaccination against specific serotypes, a rapid fall in disease incidence has been followed by re-emergence of the disease due to other meningococcal serogroups not covered by the vaccine. Similar serotype replacement epidemiology has also been observed for the childhood pneumococcal vaccine [http://%28www.promedmail.org/post/20070425.1348](www.promedmail.org/post/20070425.1348).

The effect of widespread but specific immunity, from both vaccination and natural infection, on the epidemiology of FMD is poorly understood. Endemic regions often experience successive epidemics caused by different FMD strains and serotypes, sometimes with an underlying periodicity. For pneumococcal and meningococcal disease, serotype replacement has been addressed by adding more serotypes to vaccines, current pneumococcal vaccines contain 7 to 23 serotypes. Sadly, the extent to which we can just add more virus strains to an FMD vaccine is in practice limited. Furthermore, the explanation for successive FMD epidemics observed in endemic countries is unlikely to be simple; complexities include the variable rates of virus strain mutation, variable length and strength of immunity to different strains, variable levels of cross-immunity, inter-play between typically short-lived vaccine immunity and natural immunity and multiple host species to name but a few... However, one simple concept remains which is highly relevant. New FMD strains do emerge, sometimes suddenly and unexpectedly. Given that we cannot continually vaccinate all susceptible hosts against all strains, the ability to rapidly produce and administer a matched, mass produced vaccine is crucial. This is true for both FMD-free countries and endemic countries.

The phrase "prevention is better than cure" is often used with reference to vaccination, however, if feasible, prevention of pathogen exposure is better still. However, countries with porous borders with FMD endemic neighbours face a high risk of exposure to new virus strains for which a matched vaccine will be needed. That said, the recent outbreak in Mauritius reminds us that incursions do occur even in low risk islands. These issues are of particular interest to me, having recently moved to Jersey, an island not much bigger than a typical FMD protection zone, where mass culling would quickly turn into depopulation. As for many other settings, the ability to rapidly immunise is likely to be critical. This in turn requires preparedness and a rapid response. As it happens, Jersey has an important role in the development of methods for predicting long distance FMD virus transmission to aid preparedness. The last epidemic in Jersey was in 1981 and was anticipated using meteorological models after outbreaks occurred affecting pigs in nearby Northern France. On that instance a rapid cull of only seven animals prevented further spread, even within the same farm! (Donaldson et al., 1982). By modern standards controlling an outbreak in a fully susceptible population with such a small but "precise" cull and biosecurity measures seems extraordinary. In the UK 2001 FMD outbreak by the time the outbreak was detected virus was already present in at least 57 premises distributed across the country (Gibbens et al., 2002). Farming in the UK in 2001 is clearly markedly different from Jersey in 1981, however, the contrast in impact is a stark reminder of the damage limitation that can be achieved with preparedness and a rapid response.

References

Donaldson AI, Gloster J, Harvey LD, Deans DH. Use of prediction models to forecast and analyse airborne spread during the foot-and-mouth disease outbreaks in Brittany, Jersey and the Isle of Wight in 1981. Vet Rec. 1982 110(3):53-7.

Gibbens JC, Wilesmith JW. Temporal and geographical distribution of cases of foot-and-mouth disease during the early weeks of the 2001 epidemic in Great Britain. Vet Rec. 2002 151: 407-12

I. GENERAL OVERVIEW

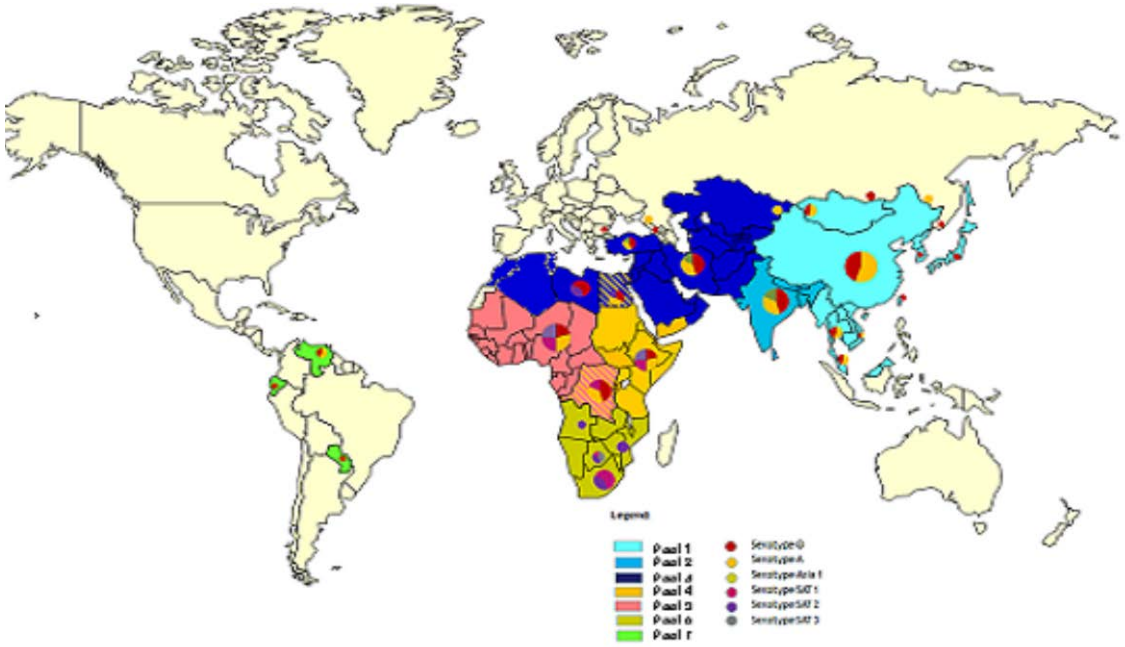
Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below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

Myanmar [1, 2] **–** FMDV VP1 sequences of field isolates collected in Myanmar, analysed by the WRLFMD, were genotyped as FMDV O/ ME-SA/ Ind-2001d. This detection denotes the further circulation of the strain in this Region, following its initial detection in 2015 in Laos and Vietnam.
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, will be available in the forthcoming issue of the 3rd Quarterly WRLFMD Report (July-September 2016).

Russian Federation [3]**-** The Russian Research Institute for Animal Health (FGBI-ARRIAH), Russia detected FMDV serotype A/ASIA/SEA-97 in samples collected in Mongolia.

SEACFMD [4] **–** While no new FMD events were reported in this Region for the current month, on-going FMD outbreaks are present in Cambodia, Malaysia, Myanmar, Thailand and Vietnam.

Thailand [1] **–** VMSD tests conducted on three field isolates, collected in Thailand during 2016, belonging to FMDV serotypes A and O, obtained good matching results with two of the three vaccine strains employed for each of the serotypes.

POOL 2 - SOUTH ASIA

India [5,] **–** During August 2016, the Indian Council of Agricultural Research - Project Directorate on Foot and Mouth Disease (ICAR-PDFMD), Mukteswar, India detected FMDV serotype O in samples collected from cattle.

Nepal [1, 6] –FMDV field isolates collected in Nepal during 2015 and 2016 from various susceptible domestic species were genotyped by the WRLFMD as FMDV O/ ME-SA/ Ind-2001d. The National Foot and Mouth Disease (FMD) and TADS Laboratory, Nepal continues to report the sole detection of FMDV serotype O up to end of August 2016.

POOL 3 - WEST EURASIA & MIDDLE EAST

Egypt [1] **–** FMDV serotypes A, O and SAT 2 were detected by the WRLFMD in samples collected in cattle and water buffaloes, between 2015 and 2016. Genotyping was also conducted on the field isolates. FMDV type O EA-3 remains dominant and until now FMDV O/ ME-SA/ Ind-2001d has not been found in Egypt.

Iran [1] **–** The WRLFMD conducted VMSD tests on field isolates collected in Iran during 2016 and belonging to FMDV serotype A, ASIA 1 and O. Only isolates belonging to FMDV serotypes A and O obtained good matching results with some the vaccine strains employed.

Pakistan [7] **-** The Progressive Control of Foot and Mouth Disease Project reported 76 FMD outbreaks occurring in Pakistan during August 2016, principally caused by FMDV serotypes O, and followed by serotypes A and Asia 1.

POOL 4 - EASTERN AFRICA

Ethiopia [8]**-** The Laboratory: National Animal Health Diagnostic and Investigation Center (NAHDIC) detected FMDV serotypes A and O in an outbreak occurring in cattle.

Kenya [9] **-** The National FMD Reference Laboratory Embakasi, Kenya detected FMDV serotype SAT 1 in the bovine samples examined during August 2016.

Mauritius [1, 10] **–** FMDV VP1 sequences of field isolates collected from the FMD outbreaks that occurred on the Islands of Rodrigues and Mauritius during July and August 2016 were analysed by the WRLFMD and genotyped as FMDV O/ME-SA/ Ind-2001d.

Sudan [1]**-**
VMSD tests were conducted by the WRLFMD on field isolates, collected in Sudan between 2012 and 2014, belonging to FMDV serotype A, O and SAT 2. Only field isolates belonging to FMDV serotypes O and SAT 2 obtained good matching results with some of the vaccine strains employed.

POOL 5 - WEST/CENTRAL AFRICA

Cameroon [11] **–** The Laboratoire National Vétérinaire (LANAVET) - Garoua, Cameroon detected FMDV in the samples collected from cattle.

Nigeria [12] - The National Veterinary Research Institute, Vom, Plateau State, Nigeria reported the isolation of FMDV virus.

POOL 6 - SOUTHERN AFRICA

RSA [13] **-** The ARC-Onderstepoort Veterinary Institute, Republic of South Africa reported the detection of FMDV serotype O.

Zimbabwe [14] **-** FMDV serotype SAT 2 was responsible for 12 outbreaks which occurred between the 4th and 24th of July 2016 involving cattle and goats.

POOL 7 - SOUTH AMERICA

Latin America [14] – No FMD events were reported for this Region during August 2016.

COUNTER

****** 56 MONTHS SINCE THE LAST OUTBREAK IN SOUTH AMERICA WAS REPORTED***
****** 144 MONTHS SINCE THE LAST SEROTYPE C OUTBREAK WAS REPORTED***

III. DETAILED POOL ANALYSIS

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

Myanmar [1, 2]

The OIE Sub-Regional Representation for South-East Asia, Bangkok provided two FMDV VP1 sequences of field isolates collected during 2016 in Myanmar to the WRLFMD for phylogenetic analysis. Species from which these field isolates were collected were not reported, as also their location origin was unknown. Both isolates were identified as FMDV O/ ME-SA/ Ind-2001d. Interesting to note is that the closest field viruses to these isolates, not pertaining to the country, were isolated in outbreaks respectively occurring in Nepal during 2015 and 2016 and in Mauritius in July –August 2016 with a sequence identity (seq id) between 99.06% for those from Nepal and 98.90% for those from Mauritius.

Russian Federation [3]

The FGBI-ARRIAH, Russia provided diagnostic services to Mongolia examining samples received from this country. The FMDV virus detected in the five samples received from Mongolia was genotyped as FMDV serotype A/ASIA/SEA-97. In view of the detection of this virus, studies were conducted on the immunobiological properties of FMDV serotypes A. The laboratory also carried out post-vaccination monitoring with the screening of 34,809 sera.
FGBI-ARRIAH provides constant support to the Federal Service for Veterinary and Phytosanitary Surveillance of the Ministry of Agriculture of the Russian Federation and to the Veterinary Services of the Russian Federation Subjects by respectively supplying materials and technical advice.

SEACFMD [4]

While no new FMD events were reported for the current month in this Region, on-going FMD outbreaks are present in Cambodia, Malaysia, Myanmar, Thailand and Vietnam. A summary of the number of the outbreaks is reported in Table 2. Compared to the previous month, the number of event is nearly constant as those registered during July 2016 were 269.

Table 2: Distribution of FMD outbreaks among the SEACFMD countries reported during August 2016.

SEACFMD countries	N° of FMD outbreaks
Cambodia	134
Myanmar	3
Malaysia	48
Thailand	53
Viet Nam	22
Total	**260**

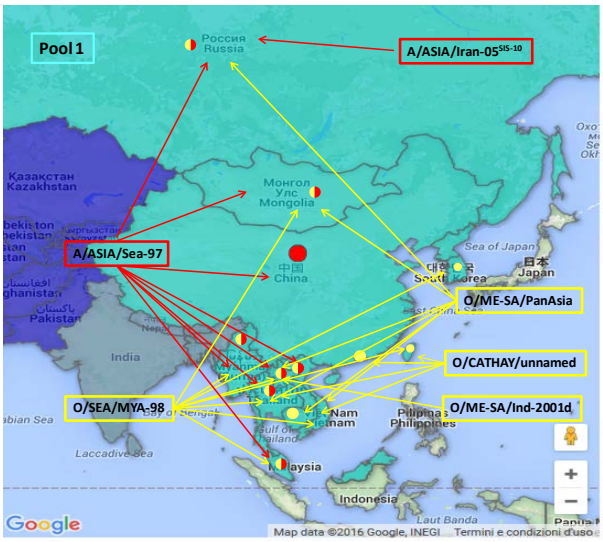
Table 3: Summary of the history of FMD Pool 1, 2012 – 2016, for geographic distribution see Map 2 below.

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Cambodia	O, 2013-2015/NOT SAMPLED	July 2016/ not typed or not sampled, Sep 2015/O and A, Aug 2014/ not typed, June 2014/not typed	See text Typing required
China (People's Rep. of)	2012-2013/O, 2013 & 2015/A 2012 - 2014/NOT TYPED**	May2016/O, May 2015/A	Typing required
China (Hong Kong, Sar)	O**	Dec 2015/O	Follow-up needed
China (Taiwan Province)	2012-2013/O, A/2015**	Jun 2015/A	Typing required
Korea (DPR)	2012-2013/DISEASE ABSENT 2014 & 2015/ NO DATA REPORTED	May 2014/not confirmed, July 2014/O	Follow-up needed
Korea (Rep. of)	2012-2013/DISEASE ABSENT 2014/O, 2015/ NO DATA REPORTED	Mar 2016/O	Follow-up needed
Laos PDR	2012/DISEASE PRESENT WITH QUANTITATIVE DATA BUT WITH AN UNKNOWN NUMBER OF OUTBREAKS 2015/ NO DATA REPORTED	Mar 2016/O Mar 2015/A,	Follow-up needed
Malaysia	2012 –2015/O 2013 & 2015/NOT TYPED	June-July/A & O	See text Follow-up needed
Mongolia	2013/A & NOT TYPED, 2014 & 2015**/O	July 2016/O, Sept 2013/A,	Follow-up needed
Myanmar	2012-2014/O, 2015/A & NOT TYPED	July 2016/ not typed, Oct 2015/A and O,	See text
Russian Federation	2012, 2014 & 2015/O, 2013 - 2015/A	Jan 2016/ A and Dec 2015/O	See text
Thailand	O, A NOT SAMPLED & NOT TYPED	June – July 2016/not typed, Mar 2016 /A & O	See text
Vietnam	O, NOT SAMPLED, NOT TYPED 2013, 2014 & 2015/A,	Mar 2016/O, Feb 2016/A and not typed	See text

Map 2: FMD distribution by serotype and topotype in South East Asia, 2012 – 2015.

Conjectured circulating FMD viral lineages in Pool 1 per 2015 [14, 18]:

- Serotype O: O/SEA/Mya-98, O/ME-SA/PanAsia, O/CATHAY, O/ME-SA/Ind-2001d
- Serotype A: A/ASIA/Sea-97 and Iran-05^{SIS10} sublineages
- 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 [5]

During August 2016, the ICAR-PDFMD, Mukteswar, India reported the detection of FMDV serotype O among the three bovine samples examined using FMDV antigen and/or RNA detection. Four field isolates were subjected to vaccine matching tests. The laboratory also tested 3,304 serum samples for epidemiological studies. The laboratory tests were carried out using diagnostic kits developed at ICAR-PDFMD.

ICAR-PDFMD was involved in the field investigation of FMD outbreaks and in providing expert advice to the Government and to the National and Local authorities. The institution is continuing its research studies and collaborations with international organisations.

Nepal [1, 6]

The TADS Laboratory in Nepal reported FMD outbreaks that continue to be due to serotype O even during August 2016. Serological analyses for FMD were also carried out. The laboratory personnel was again involved in outbreak investigations and in the provision of expert advice to the Government and to the National and Local authorities. The laboratory has forwarded an additional shipment of FMDV isolates to the WRLFMD for further investigation.

In a previous consignment to the WRLFMD, FMDV O/ME-SA/Ind-2001d was confirmed as being the only FMDV strain present in 15 of the 22 samples collected in Nepal between December 2015 and June 2016 from various susceptible domestic species, represented by cattle, buffaloes, goats and pigs. The summary of the genotyping results is reported in Table 4 and location of collection of samples is represented in Map 3. As can be noted from Table 4, the most closely related FMDV strains are not pertaining to the country confirm the long distance circulation and or direct introduction of this virus in regions that are far apart.

Table 4: summary of the genotyping results of FMDV positive samples collected from different areas of Nepal between December 2015 and June 2016.

Sample Identification	Origin	Date of collection	Host species	Most closely related field viruses not belonging to the country (Seq id %)	Host species
NEP/28/2015	Bhaktapur	01/12/2015	Cattle	UAE/4/2016 (99.2)	Cattle
NEP/29/2015	Sunsari	09/12/2015		/	/
NEP/3/2016	Gorkha	10/01/2016	Water buffalo		
NEP/4/2016	Gorkha	10/01/2016			
NEP/5/2016	Jhapa	30/01/2016	Cattle	UAE/4/2016 (99.1 - 99.2)	Cattle
NEP/6/2016	Kaski	01/02/2016			
NEP/7/2016	Lalitpur	12/02/2016		SAU/7/2016 (98.9)	
NEP/8/2016	Lalitpur	12/02/2016		/	/
NEP/9/2016	Dolakha	12/02/2016	Pig		
NEP/10/2016	Nuwakot	10/03/2016	Goat	UAE/4/2016 (98.9)	Cattle
NEP/11/2016	Nuwakot	10/03/2016			
NEP/12/2016	Kathmandu	15/03/2016	Cattle	SAU/10/2016 (99.1)	
NEP/13/2016	Kathmandu	15/03/2016			
NEP/14/2016	Chitwam	29/03/2016	Water buffalo	SAU/7/2016 (98.9 - 99,1)	
NEP/17/2016	Ramechhap	09/06/2016	Cattle		

Map 3: location of FMD samples collected in Naples between December 2015 and June 2016 that were submitted to the WRLFMD.

Table5: Summary of the history of FMD Pool 2, 2012 – 2016, for geographic distribution see Map 4 below.

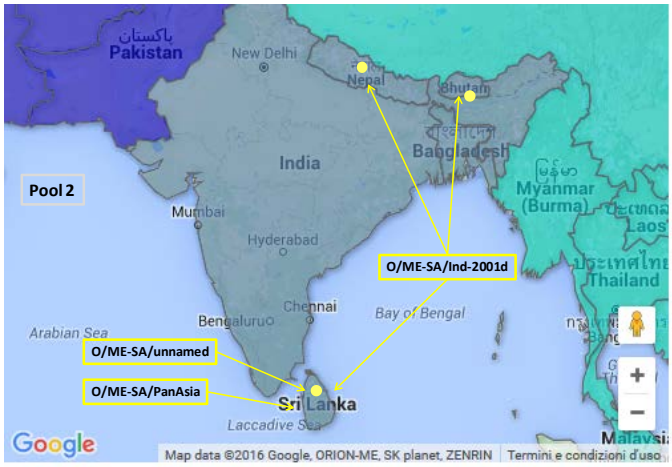
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Bangladesh	DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	Not available	Follow –up needed
Bhutan	NOT TYPED, 2013 & 2014/NOT SAMPLED 2013-2015/O	Not available	Follow –up needed

India	O, A, NOT SAMPLED 2012-2014/Asia 1 2013/NOT TYPED	Aug 2016/O, Apr 2015/A Apr 2015/Asia 1	See text
Nepal	O, 2012-2103/Asia 1	Aug 2016/O	See text
Sri Lanka	2012 – 2014/O, 2015/NO DATA REPORTED	Sept 2014/O	Follow-up needed

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

Conjectured circulating FMDV lineages in Pool 2 per 2015 [14, 18]:

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

Egypt [1]

FMDV serotypes A, O and SAT 2 were detected by the WRLFMD among the 32 samples collected in Egypt between 2015 and 2016 from cattle and water buffaloes,. The summary of the genotyping results is reported in Table 6 and location of collection of samples in represented in Map 5.

As previously indicated for Nepal, even in this case as can be seen from Table 6, FMDV circulating strains in Egypt have a high sequence homology with those detected in countries that are either neighbouring or at some distance from it, thus reconfirming the wide circulation that serotypes of FMDV are capable of. FMDV type O EA-3 remains predominant and until now FMDV O/ ME-SA/ Ind-2001d has not been found in Egypt. At a lower level FMDV A/Africa/G-IV continues to circulate.

Table 6: summary of the genotyping results of FMDV positive samples collected in different areas of Egypt between December and June 2016.

Sample Identification	Origin	Date of collection	Host species	Genotype	Most closely related field viruses not belonging to the country (Seq id %)	Host species
EGY/8/2015	Elrahmania	21/09/2015	Cattle	**A/AFRICA/G-IV**	ETH/19/2015 (97.6)	Cattle
EGY/3/2016	Sendeoin	11/01/2016				
EGY/3/2015	Elsaro	27/05/2015				
EGY/9/2015	Gizera El	21/09/2015				
EGY/10/2015	Dashtot	07/10/2015				
EGY/11/2015	Shandora	05/11/2015	Water buffalo			
EGY/13/2015	Damleg	03/12/2015	Cattle			
EGY/14/2015	Seif Eldin	29/12/2015				
EGY/4/2016	Baroot	19/01/2016				
EGY/5/2016	Aden					
EGY/7/2016	Abobaker	20/02/2016	Water buffalo	**O/EA-3**	/	/
EGY/8/2016	Mobarak	22/02/2016	Cattle			
EGY/9/2016	Sentres	24/02/2016				
EGY/10/2016	Elkrea	07/03/2016				
EGY/11/2016	Elkrea					
EGY/12/2016	Elkrea					
EGY/14/2016	Elrab	10/03/2016				
EGY/16/2016	Baghor	14/03/2016				
EGY/17/2016	Abdel Khale	24/03/2016				
EGY/18/2016	Bayad Elarab	27/03/2016				
EGY/5/2015	Elmahmodia	26/07/2015		**SAT 2/VII/Alx-12**	SUD/3/2013 (95.8)	Cattle

Map 5: location of FMD samples collected in Egypt between September 2015 and July 2016 submitted for identification to the WRLFMD.

Iran [1]

The WRLFMD conducted VMSD tests the on the field isolates collected in the country during 2016 pertaining to serotypes A, Asia 1 and O with the following results:

vaccine strains A Iran 2005 and A22 IRQ but not with A TUR 20/06 obtained good matching results only for field isolate A/IRN/6/2016, genotyped as A/ASIA/Iran -03^{SIS-10} but not for A/IRN/8/2016, genotyped as A/ASIA/G-VII;
Asia 1/IRN/26/2016, genotyped as ASIA 1/ASIA/Sindh-08 did not match with the vaccine strain Asia 1 Shamir; O/IRN/25/2016, genotyped as O/ME-SA/PanAsia-2 ^{QOM} matched with O 3039 and O/TUR/5/2009 but not with O Manisa.

Pakistan [7]

The Progressive Control of Foot and Mouth Disease Project detected 76 FMD outbreaks during August 2016 caused prevalently by FMDV serotype by O (23.68%), followed by A (13.16%) and Asia 1 (10.53%). A summary of the number of outbreaks caused by the various serotypes in relation to the districts where the outbreaks are occurring is reported in Table 7. Location of districts with FMD outbreaks is presented in Map 6.
Ring vaccination and vaccination on cost sharing basis that involves a contribution from the farmers, were carried out in the Pakistan during August 2016 with the administration of 76,675 doses. A brief description of the interventions and locations in which they were carried out is presented in Table 8.
The PCFMD carried out capacity building of field staff by training 169 persons belonging to different professional profiles involved in the control of FMD in the following locations: Bahawalpur, Multan, Sahiwal and Lahore.

Table 7: FMD outbreaks with relative serotypes that occurred during August 2016 in the different Districts of Pakistan.

Number Outbreaks		Number of Outbreaks (% of total) due to FMD Virus Serotype(s)						
Province	**District**	**O**	**A**	**Asia-1**	**Mixed serotypes**	**Un-Typed**	**Not yet typed**	
Sindh (48)	Karachi (48)	12	9	0	1	1	25	
Khyber Pakhtunkhwa (8)	Malakand (2)	2	-	-	-	-	-	
	Peshawar (2)	-	-	1	-	1	-	
	Buner (2)	-		1	-	1	-	
Azad Kashmir (8)	Mirpur (8)	2	-	3	-	3	-	
Punjab (10)	Jhelum (4)	1	-	-	-	3	-	
	Sargodha (2)	1	-	1	-	-	-	
	Sheikhupura (3)	-		1	-	2	-	
	Kasur (1)	-	-	-	-	1	-	
Islamabad Capital Territory (4)	Islamabad (4)	-	1	1	-	2	-	
76		**18 (23.68)**	**10 (13.16)**	**8 (10.53)**	**1 (1.28)**	**14 (17.95)**	**25 (32.05)**	**Totals**

Map 6: Location of the districts where FMD outbreaks occurred in Pakistan during August 2016.

Table 8: Vaccination activities carried out during August 2016 in the various Provinces of Pakistan.

Province	Ring Vaccination	Cost sharing basis	
Sindh	--	40.000	
Baluchistan	--	4.000	
Khyber Pakhtunkhwa	200	--	
Punjab	100	31.275	
Azad Kashmir	500	--	
Islamabad Capital Territory	600	--	
Totals	**1.400**	**75.275**	**76.675**

Table 9: Summary of the history of FMD Pool 3, 2012 – 2016, for geographic distribution see Map 7 below.

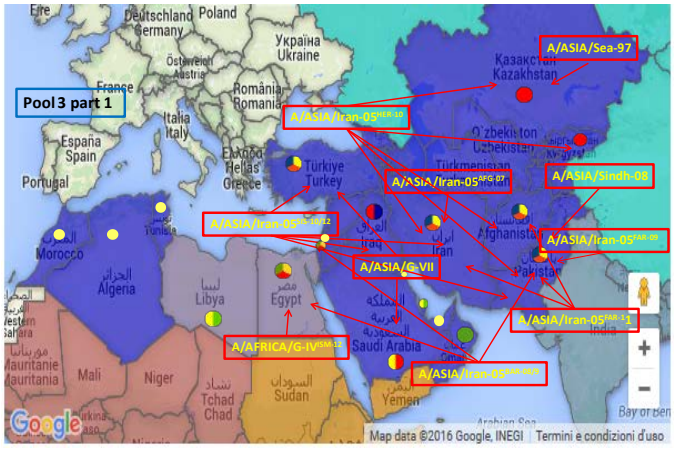
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Afghanistan	2013-2015**/O, A, Asia 1, NOT TYPED 2012/SEROTYPE NOT REPORTED	2014/A, Asia 1, O	Follow –up needed
Algeria	2014 -2015**/O	Apr 2015/O	Follow –up needed
Armenia	2012-2014/DISEASE ABSENT 2015/A	Dec 2015/A	Follow –up needed
Azerbaijan	DISEASE ABSENT**	2007/0	Follow –up needed
Bahrain	2012, 2014 &2015 /O	Oct 2014/O	Follow –up needed
Egypt	2012, 2014/SAT 2 2012 – 2015**/O, A	March 2016/A & Sat 2, April 2016/ O	See text
Georgia	DISEASE ABSENT	2001/ASIA 1	Follow –up needed
Iran	2012-2014/A, Asia 1 & O 2015**/SEROTYPE NOT REPORTED	July 2016/A & O, 2013/Asia 1	See text
Iraq	2012-2013/O, 2012-2014/A 2015/ SEROTYPE NOT REPORTED	Dec 2013/A, O	Follow –up needed
Israel	2012-2015**/O	December 2015/O	Follow –up needed
Jordan	DISEASE ABSENT**	2006/A	Follow –up needed
Kazakhstan	2012/O 2012 –2013/A 2014-2015**/ DISEASE ABSENT	Aug 2012/O, Jun 2013/ A	Follow –up needed
Kuwait	2012/O 2013 – 2014/ DISEASE ABSENT	Jan-Feb 2016/O	Follow –up needed
Kyrgyzstan	2012-2014/O, A 2015/ NO DATA REPORTED	Apr 2013 /O, A, Aug 2014/not typed	Follow –up needed
Lebanon	DISEASE ABSENT 2015/ NO DATA REPORTED	2010/not typed	Follow –up needed
Libya	NO DATA REPORTED	Oct 2013/O	Follow –up needed
Morocco	DISEASE ABSENT**	Oct 2015/O	
Oman	2012-2014/O	May 2015/SAT 2	Follow –up needed

	2015/ NO DATA REPORTED		
Pakistan	2012 & 2015/ NO DATA REPORTED 2013-2014/A, ASIA 1 & O	Aug 2016/A, Asia 1 and O	See text
Palestine	O, 2012-2013/SAT 2	Dec 2015/O Mar 2013/Sat 2	Follow –up needed
Qatar	2012-2015/O	Dec 2013/O	Follow –up needed
Saudi Arabia	2012-2014/O 2015/ NO DATA REPORTED	April 2016/O, April 2015/A	Follow –up needed
Syrian Arab Republic	DISEASE ABSENT**	2002/ A & O	Follow –up needed
Tajikistan	2012- 2013/NOT TYPED 2014-2015**/DISEASE ABSENT	Nov 2011/Asia 1, Nov 2012/ NOT TYPED	Follow –up needed
Tunisia	2014/O 2015/ DISEASE ABSENT	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	2012/NO DATA REPORTED 2013-2015/DISEASE ABSENT	Not available	Follow –up needed
United Arab Emirates	2012, 2015/DISEASE ABSENT 2013-2014/O	Feb 2016/O	Follow –up needed
Uzbekistan	2012,2013 & 2015/NO DATA REPORTED 2014/DISEASE ABSENT	Not available	Follow –up needed

Map 7: FMD distribution by serotype and topotype for West Eurasia and Middle East, 2012 – 2015 (EuFMD).

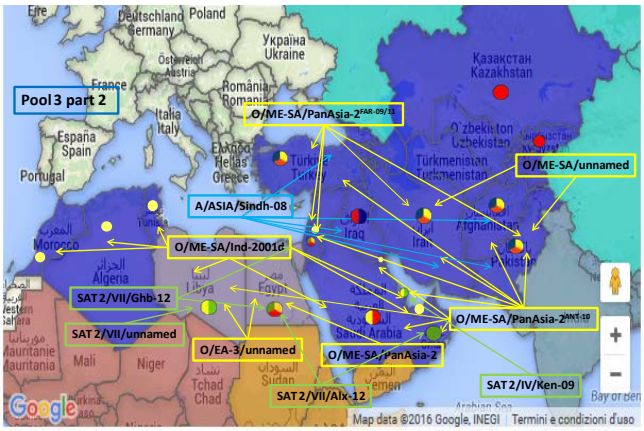
Conjectured circulating FMDV lineages in Pool 3 per 2015 [14, 18]:

- 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 [8]

The National Animal Health Diagnostic and Investigation Center (NAHDIC) detected FMDV serotypes A and O employing FMD antigen detection ELISA in twelve tissue samples collected during an outbreak occurring in cattle.
A total of 886 serum samples collected from sheep and goats were tested for exportation purposes using ELISA with 51 sera resulting positive (5.76%) for antibodies against non-structural proteins of FMDV.
NAHDIC is continuing with the National surveillance programme which is being conducted on trade sensitive animal diseases represented by FMD, rift valley fever, peste des petits ruminants and contagious bovine pleuropneumonia.
In collaboration with WRLFMD, the laboratory is organizing a training course on outbreak investigation for regional veterinary laboratory professionals to be held in October 2016.

Kenya [9]

The National FMD Reference Laboratory Embakasi, Kenya detected FMDV serotype SAT 1 in six of the seven bovine samples examined during August 2016 using FMD antigen ELISA for serotype confirmation.
The NRL was also involved in carrying out vaccine potency assays and post vaccination monitoring of vaccines produced by Kenya Veterinary Vaccines Production Institute.

Mauritius [1, 10]

The FMDV VP1 sequences provided by Dr. Labib Bakkali Kassimi, of ANSES, Laboratoire National et OIE de référence pour la fièvre aphteuse, Maisons-Alfort, France of field isolates collected from the FMD outbreaks that occurred on the Islands of Rodrigues and Mauritius during July and August 2016 were analysed by the WRLFMD and genotyped as FMDV O/ ME-SA/ Ind-2001d. A summary of the samples exampled and relative genotyping results is presented in Table 10. Thehe FMDV strain causing the aforementioned outbreaks has a high sequence identity with that detected in a distant country not even pertaining to the virus pool.

Table 10: summary of the genotyping results of FMDV positive samples collected on the Islands of Rodrigues and Mauritius between July and August 2016.

Sample Identification	Origin	Date of collection	Host species	Most closely related field viruses not belonging to the country (Seq id %)	Host species
F1/ROD/2016	Rodrigues Island, Mauritius	15/08/2016	Bovine	O/NEP/17/2015 (98.90 - 99,06)	Cattle
F2/ROD/2016					
F3/ROD/2016					
1A/MAUR/2016	valley des Pretre, Mauritius	09/08/2016	Unknown		
2B/MAUR/2016	Cite la Cure, Mauritius				
2C/MAUR/2016					
3A/MAUR/2016					
3B/MAUR/2016					
5A/MAUR/2016					

Sudan [1]

The results of the VMSD tests conducted by the WRLFMD on the field isolates collected in Sudan between 2012 and 2014 are as following: for isolates A/SUD /1 and 10/2013, genotyped as A/AFRICA /G-IV there were no vaccine strains matching with those used represented by A Iran 2005, A TUR 20/06 and A22 IRQ; for field isolates O/SUD/4/2013 and O/SUD/6/2012, genotyped as O/EA-3/unnamed, good matching results were obtained with O 3039 and O TUR 5/9 but not with O Manisa; for field isolates SAT 2/SUD/7 and SAT 2/SUD/9/2013, genotyped as SAT 2/VII/Alx-12, better matching results were obtained with SAT 2 ERI than with SAT 2 ZIM.

Table 11: Summary of the history of FMD Pool 4, 2012 – 2016, for geographic distribution see Map 8 below.

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(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
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 – 2015**/O, A	March 2016/A & Sat 2, April 2016/ O	Follow –up needed
Eritrea	2012/O, 2013/ DISEASE ABSENT 2014/ DISEASE PRESENT 2015/ NO DATA REPORTED	Jan 2012/O	Follow –up needed
Ethiopia	O**, 2012/A, 2012 & 2105/SAT 2, 2015**/SAT 1	Jan 2016/ O, May 2016/SAT 2, Jun 2014/A and SAT 1	See text
Kenya	A, O, SAT1, SAT2, 2012 – 2015 /NOT TYPED	July 2016/ A & SAT 1, June 2016/O , Oct 2015/ SAT 2,	See text
Libya	NO DATA REPORTED	Oct 2013/ O, Sat 2/Apr 2012	Follow-up needed

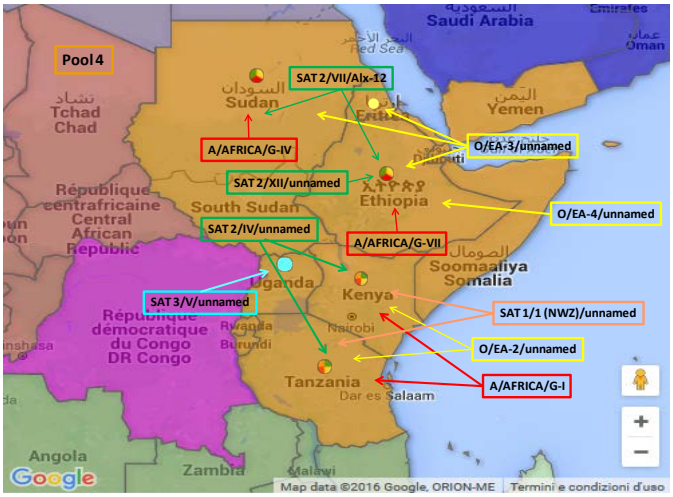
Mauritius	DISEASE ABSENT	Aug 2016/0	See text Follow-up needed
Rwanda	2012-2013/A, O, SAT1, SAT 2	Nov 2012/not typed	Typing required
Somalia	2012-2014/NOT SAMPLED 2013 – 2014/ NO DATA AVAILABLE	2011	Follow –up needed
Sudan	2013/SAT 2, 2012-2014/O & NOT TYPED 2015**/A & NOT SAMPLED	Dec 2013/ O & A, Jan 2014/SAT 2	See text
South Sudan	2014/A, O SAT 1, SAT 2, SAT 3, 2012-2013 & 2015/ NO DATA REPORTED	2011	Follow –up needed
Tanzania	2012-2015/A, O, SAT 1, SAT 2	May 2015/O Apr2013/ A, SAT 1, SAT2	Follow –up needed
Uganda	2012/ SAT 1,2012, 2014/O, 2013/NOT TYPED 2015/NO DATA REPORTED	May 2014/O Nov 2014/SAT1, Jan 2015/A and SAT 3, July 2015/ SAT 2 and untyped	Follow –up needed See text
Yemen	2012/O, 2013 – 2014/ DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA 2015/NO DATA REPORTED	2009/O	Follow –up needed

Map 8: 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 [14, 18]:

- 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 Egypt) 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>

Cameroon [11]

The LANAVET - Garoua, Cameroon detected FMDV using non serotype specific PCR in twelve epithelia samples collected from cattle. FMDV non-structural proteins (NSP) were detected in 57 of the 90 bovine serum samples (63.3%) tested using the 3ABC- NSP ELISA.

LANAVET has ongoing collaborative activities with the Ohio State University and Plum Island Laboratory, USA.

Ghana [15]

No FMD outbreaks were reported for July 2016 by the ACCRA Veterinary Laboratory, Ghana and by the Laboratoire National de l'Elevage et de Recherches Vétérinaires. The laboratory has however has detected antibodies against FMDV serotype O, using SPCE ELISA in 11 of the 12 serum samples collected in three different outbreaks. The laboratory was also involved in providing information on the sample set to collect in the course of an FMD outbreak.

Nigeria [12]

The National Veterinary Research Institute, Vom, Plateau State, Nigeria reported the isolation of FMDV virus for which serotyping is still pending. Of the 37 serum samples collected from cattle, 35 were for positive when examined in the 3ABC NSP ELISA. The laboratory was also involved in providing advice on the control of FMD to local farmers. The laboratory is continuing its participation in the OIE twinning programme with CODA CERVA, Belgium.

Senegal [16]

The Laboratoire National de l'Elevage et de Recherches Vétérinaires (ISRA/LNERV), Senegal detected sera positive for FMDV NSP antibodies. The sera were collected within a surveillance study conducted during 2015 and 2016 and these will be further tested using serotype specific ELSIA for FMDV serotypes A, O and SAT 2.
The personnel also provided support in preparing the information relative to the FMD country situation that was to be presented by the Senegalese CVO during the first FMD roadmap meeting in Lomé, Togo held on the 7th and 8th September 2016. The laboratory has on-going collaborations within the Defence Threat Reduction Agency Cooperative Biological Engagement Programme (DETRA/CBEP).

Table 12: Summary of the history of FMD Pool 5, 2012 – 2016, for geographic distribution see Map 9 below.

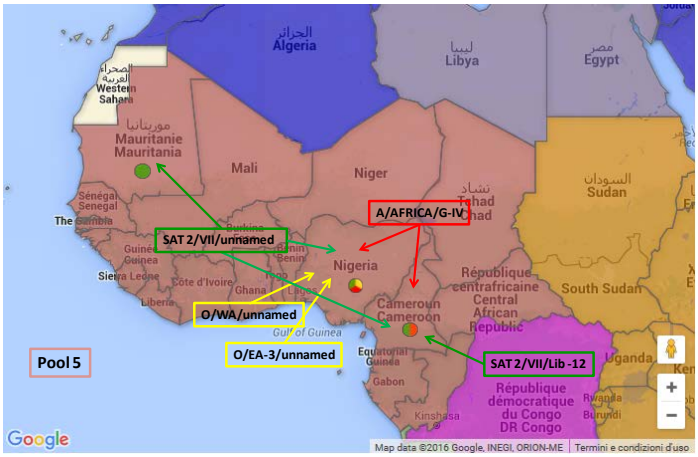
Country	FMD history FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	Last outbreak reported/serotype #see pg. 1	Comment (Genotyping would be useful for this region)
Benin	A, O, SAT 1, SAT 2	Jun 2014/O, A, SAT 1, SAT 2	Follow –up needed
Burkina Faso	DISEASE PRESENT SEROTYPES NOT REPORTED	2013/ not available	Follow –up needed
Cameroon	DISEASE PRESENT SEROTYPES NOT REPORTED	Apr 2014/ A, Nov 2014/O, SAT 2, May 2014/SAT 1, Jun 2014, Jan 2015 and July-Aug 2015/untyped, Apr & Aug 2016/serotyping pending	See text Typing required
Cape Verde	NO DATA AVAILABLE	Not available	Follow –up needed
Central Afr. Rep.	DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA	Not available	Follow –up needed
Chad	2012 – 2013/SEROTYPES NOT REPORTED	Not available	Follow –up needed
Congo D. R.	2012 – 2015/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, 2015/A, NOT SAMPLED 2013/ SEROTYPES NOT REPORTED	Jun 2013/not typed	Follow –up needed
Equatorial Guinea	2012 – 2013/DISEASE SUSPECTED 2014 – 2015/ NO DATA AVAILABLE	Not available	Follow –up needed
Gabon	NO DATA AVAILABLE	Not available	

Gambia	NO DATA AVAILABLE	2012/O	Follow –up needed
Ghana	2012 – 2015**/SEROTYPES NOT REPORTED	2014/not available	See text Follow –up needed
Guinea Biss.	2012-2013/DISEASE ABSENT 2014/ SEROTYPES NOT REPORTED 2015/ Disease suspected	No data available	Follow –up needed
Guinea	2012-2013, 2015/ DISEASE ABSENT 2014/ SEROTYPES NOT REPORTED	2014/not available	
Liberia	NO DATA AVAILABLE	Not available	Follow –up needed
Mali	2012/ NO DATA AVAILABLE 2013/ SEROTYPES NOT REPORTED 2014-2015/SAT 2 2015/A, SAT 1	2011/2012, no precise data	
Mauritania	2012-2013/NO REPORTED OUTBREAKS 2014-2015**/SAT 2	Dec 2014/SAT 2	Follow –up needed
Niger	2012 – 2014/NOT SAMPLED	2014/not sampled, May 2015/O	Follow –up needed
Nigeria	2014-2015/O	Aug 2016/typing pending Nov 2015/A and SAT 1, Sept 2014/0 and SAT 2	See text Genotyping required Follow –up needed
Sao Tome Principe	2012/DISEASE ABSENT, 2013/NO DATA AVAILABLE	Not available	Follow –up needed
Senegal	2013/NO DATA AVAILABLE 2012, 2014-2015**/ NOT SAMPLED	2014/ SAT 1 Feb 2015/ A and O	See text Follow –up needed
Sierra Leone	DISEASE ABSENT	Oct 1958	Follow –up needed
Togo	O, SAT 1	2012/O	Follow –up needed

Map 9: FMD distribution by serotype and topotypes for West Africa, 2012 – 2015(EuFMD)

Conjectured circulating FMDV lineages in Pool 5 per 2015 [14, 18]

- 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

RSA [13]

The ARC- Onderstepoort Veterinary Institute, Republic of South Africa reported the detection of FMDV serotype in 66 samples examined in PCR and in four samples using serotyping ELISA, sample origin was however not reported. Genotyping was also carried out on the positive samples. The laboratory also examined 5,352 samples using liquid-phase blocking ELISA for the detection of FMDV serotypes O and SAT 1, SAT 2 and SAT 3 and 483 samples using FMD NSP ELISA. The ARC-Onderstepoort Veterinary Institute is also collaborating with international organisations on research projects.

Zimbabwe [14]

Another12 outbreaks of FMD due to serotype SAT 2? occurred in cattle and goats between the 4th and 24th of July 2016. The outbreaks involved villages situated in Matabeleland North and Midlands, Zimbabwe. Diagnosis was confirmed by the Central Veterinary Laboratory on the 3rd of August 2016 using antibody detection ELISA. The spread of FMD is due to lack of funds for vaccination. As the infected areas are currently under prolonged periods of quarantine this is resulting in illegal cattle movement since farmers need to move their cattle for various socio-economic reasons. To avoid this practice, roadblocks controlled by police and veterinary personnel are in place as well as farmer education campaigns. Weekly inspections of the infected area are currently on-going. The controls measures that were adopted are the following: Movement control inside the country, traceability, quarantine, surveillance outside containment and/or protection zone, vaccination permitted (if a vaccine exists). Treatment to affected animals is not being administered. A summary of the animals involved and location of outbreaks are respectively reported in Table 13 and Map 10.

Table 13: summary of the animals involved in the FMD outbreak that occurred in June 2016 in Matabeleland South, Zimbabwe.

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	17.787	559	0	0	0	3.14%	0%	0%	0%
Goats	2.388	24	0	0	0	1.01%	0%	0%	0%
Total	20.175	583	0	0	0	2,89%	0%	0%	0%

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

Map 10: Location of the FMD outbreaks which occurred in Matabeleland North and Midlands, Zimbabwe during July 2016

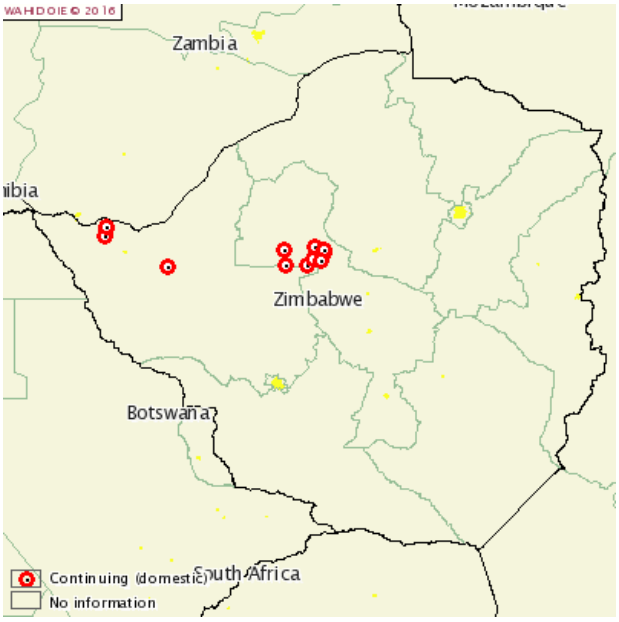
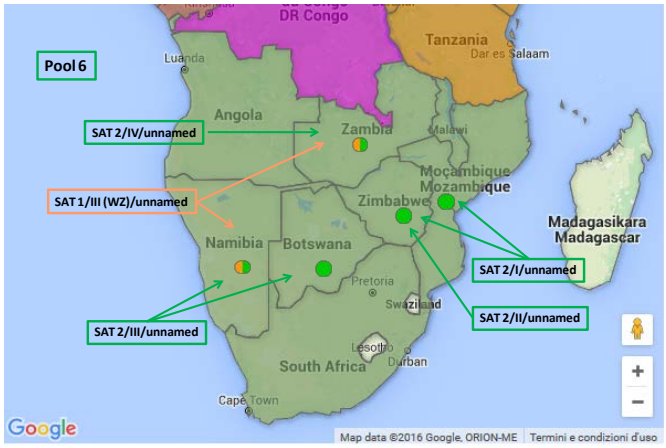


Table 14: Summary of the history of FMD Pool 6, 2012 – 2016, for geographic distribution see Map 11 below.

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

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 [14, 18]:

- 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

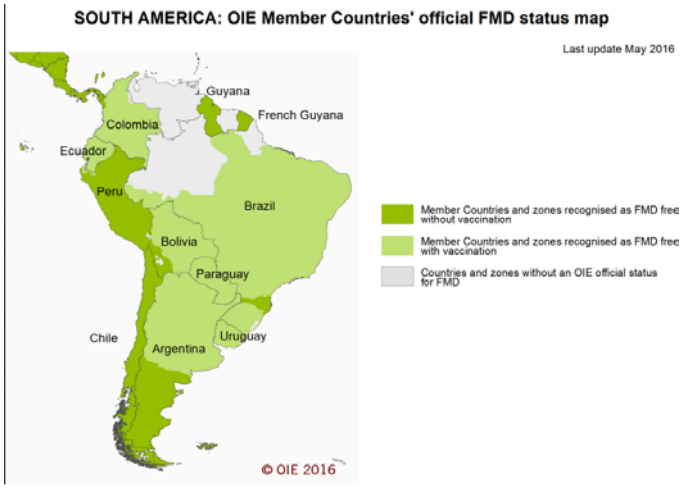
South America [14, 17]

The OIE FMD status of the countries in South America as reported in May 2016 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 2015**(1st semester)	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 [14].



IV. OTHER NEWS:

[2]The 2nd WRLFMD Quarterly Report for the period April – June 2016 published the following table (Table 16) that contains a list of recommended 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 circulating FMDV lineages and relate these to priority vaccines for use in Europe and other FMD-free settings.

Table 16: Recommendations from WRLFMD® on FMD virus strains to be included in IN FMDV antigen banks (for FMD-free countries) - June 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. World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD), www.wrlfmd.org.
2. Project Officer, OIE Sub-Regional Representation for South-East Asia, Bangkok, Thailand – *Dr Yu Qiu.*
3. Regional Reference Laboratory for FMD (ARRIAH, Russia) - *Dr. Svetlana Fomina*.
4. SEACFMD, 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 B. B. Dash) FAO.
6. National Foot and Mouth Disease and TADS Laboratory, Nepal - *Dr. Sharmila Chapagain*.
7. Progressive Control of Foot and Mouth Disease in Pakistan, - *Dr. Manzoor Hussain*, National Project Director and *Dr. Muhammad Afzal*, Project Coordinator.
8. National animal health diagnostic and investigation center (NAHDIC), Ethiopia - *Dr. Daniel Gizaw.*
9. National FMD Reference Laboratory, Embakasi, Kenya - *Dr. Abraham Sangula, Dr. Kenneth Ketter*.
10. ANSES, Laboratoire National et OIE de référence pour la fièvre aphteuse, Maisons-Alfort, France. – *Dr. Labib Bakkali Kassimi*
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. ARC -Onderstepoort Veterinary Institute, Republic of South Africa - *Dr LE Heat - Ms E Kirkbride*
14. WAHID Interface – OIE World Animal Health Information Database http://web.oie.int/wahis/public.php?page=home
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 Dr. Moustapha Lô
17. 43a Reunión Ordinaria de la Comisión Sudamericana para la Lucha contra la Fiebre Aftosa, Punta del Este, Uruguay, 7-8 April, 2016. http://www.panaftosa.org/cosalfa43/
18. OIE/FAO FMD Reference Laboratory Network, Annual Report 2015