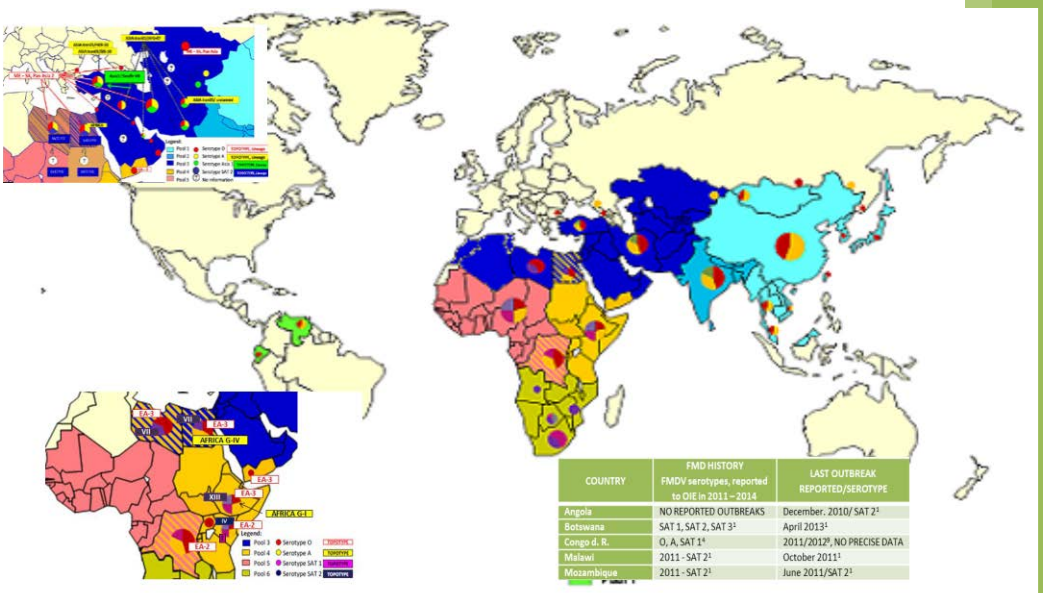
2016

Foot-and-Mouth Disease Situation
Monthly Report October 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

October2016

Guest Editor
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#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

It is an honour to be invited to be guest editor of the EU-FMD disease situation monthly report. During my experiences with FMD I have directly seen the disease affect farms in India, South America and Africa, and been in contact with colleagues working on its epidemiology and economic impact in South-East Asia. There continues to be a debate of whether this disease has a significant impact on smallholder farmers, versus the serious implications of the disease on trade and the wider aspects of managing complex food systems that have investments in slaughter plants, chilling and processing facilities, not to mention the consumers affected by disruptions in supply of beef and milk. It must not be forgotten that the presence of FMD in livestock food systems has: a negative impact on livestock productivity through loss of production and increases costs of treatment; it impedes investment in food systems; and limits opportunities for businesses and for employment. The skills developed in managing FMD and ultimately freeing livestock from the pathogen generate a stock of expertise and knowledge that can be applied across the animal health system. The complexity of FMD and its control lends itself to educating disease management specialists in the best possible manner. Investments in FMD therefore generate an environment where there are significant financial, economic and social benefits to producers and consumers, which will play a vital role in the challenges of food production, and to meeting the recently established sustainable development goals.

Therefore, the monthly report is encouraging in the presentation of the details available on FMD globally. The break in reports of FMD outbreaks in South America indicate that elimination of the virus could be close; the information on the virus types in Asia provide a view of the linkage across livestock populations affected; and the information on matching vaccine strains with circulating virus in China demonstrate how far technology has advanced in control programmes.

As an economist it would be good to link the detailed biological surveillance information with data on livestock trade routes and price differentials. The latter provide useful information on the likelihood of animals and animal products being moved from one region to another, giving disease management specialists a tool in predicting risks of FMD entry and spread. Information on the economic impact of FMD, linking this to the losses in production and the costs of control programmes, would be helpful in indicating how important this disease is on the productivity of the livestock systems at farm level. And finally it would be good to see how engaged the private sector are in managing FMD with their ideas on what can be achieved in the livestock sector if the disease is under better control. Recent work in Tanzania and Zimbabwe indicate there is enthusiasm to export cattle products from these countries recognizing that this needs improvements of FMD control.

I encourage you all to continue to invest your time and skill in managing FMD in order to generate benefits to farmers, business people and consumers across the world. And that this process can be helped with a good understanding of the economic and social setting of the people in the livestock sector in order to understand livestock and livestock product movements and the decision making of people living and working in the livestock sector on disease prevention, control and surveillance activities. Please contact me if you have a need for support in these areas and be aware that we will be holding the first meeting of the International Society for Economics and Social Science of Animal Health in March 2017 (full details http://www.isessah.com/inaugural-meeting/)

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I. GENERAL OVERVIEW

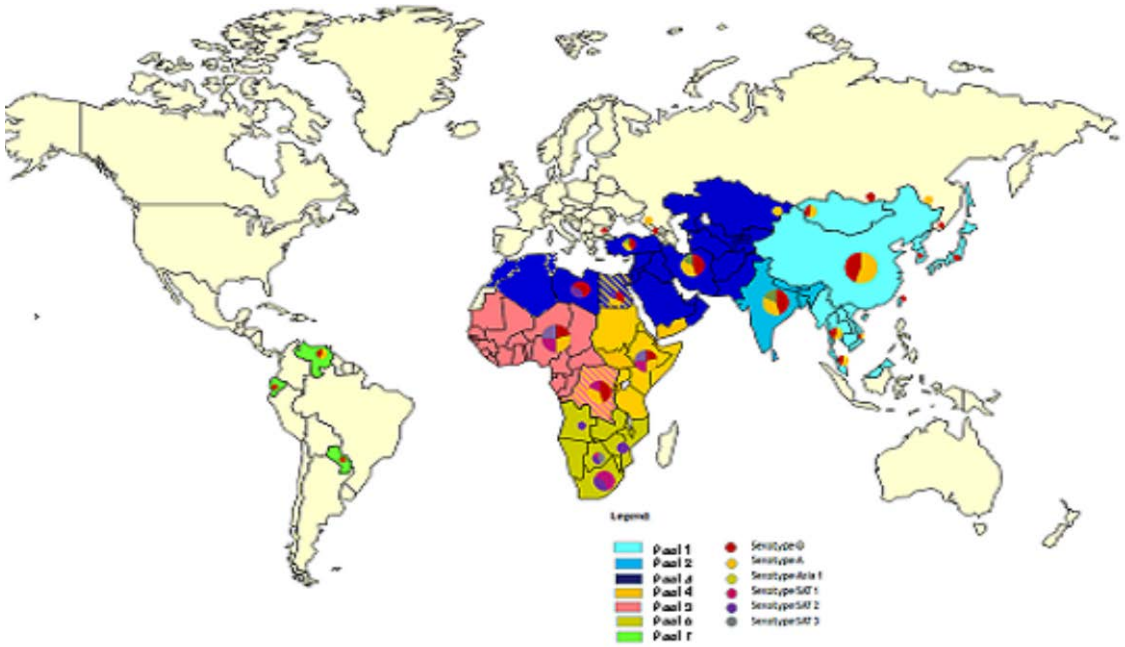
Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below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

China (Hong Kong, SAR) [1]
VMSD tests conducted on two field isolates belonging to FMDV serotype O, collected in the country during 2016, obtained good matching results with only one of the five vaccine strains employed.
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 4th Quarterly WRLFMD Report (October-December 2016).

Malaysia [1] **–** FMDVs detected in bovine samples collected between 2014-2016, forwarded by the Regional Veterinary Laboratory, Koto, Malaysia, were genotyped by the WRLFMD as A/ASIA/Sea-97 and O/SEA/MYA-98.

Myanmar [2] – Two new FMD outbreaks respectively occurred in different provinces of the country during August 2016.

SEACFMD [2] **–**FMD events in the Region are reported as ongoing in Cambodia, Malaysia, Mynamar, Thailand and Vietnam.

Russian Federation [3, 12] **-** A FMD outbreak due to serotype Asia 1, confirmed by Regional Reference Laboratory for FMD (ARRIAH, Russia) was reported on a mixed species farm, with cattle, small ruminants and pigs present, in Vyshmanovo, Sobinsky, Vladimirskaya Oblast, where cases were reported in only in the first species. No information on the source of infection was provided.

Thailand [2] **–** Ninety-one new FMD outbreaks occurred during August and September 2016 in twenty-three different provinces of the country.

POOL 2 - SOUTH ASIA

India [4] – The Indian Council of Agricultural Research - Project Directorate on Foot and Mouth Disease (ICAR-PDFMD), Mukteswar, India detected FMDV serotype O in bovine samples during October 2016.

Nepal [1,5] – Circulation of FMDV serotype O continues in the country during October 2016.
VMSD tests conducted on two field isolates belonging to FMDV serotype O, collected in the country during 2016, obtained good matching results with the three vaccine strains employed.

POOL 3 - WEST EURASIA & MIDDLE EAST

Afghanistan [1] – FMDV serotypes A, Asia 1 and O were detected by WRLFMD in bovine and ovine samples collected during 2016. Genotyping results of the field isolates are reported below.

Armenia [3] – The country reported on the 31st of October 2016 that the FMD outbreak, which occurred in December 2015 was resolved.

Egypt [1] – VMSD tests conducted on four field isolates collected in the country during 2015- 2016, belonging to FMDV serotypes A, O and SAT 2, obtained good matching results with at least one of the relative vaccine strains employed.

Pakistan [6] - The Progressive Control of Foot and Mouth Disease Project reported 55 FMD outbreaks occurring in Pakistan during October 2016 caused by FMDV serotypes A, Asia 1 and O, even if more than 45 % of the events are in the process of being typed

POOL 4 - EASTERN AFRICA

Ethiopia [7]- The National Animal Health Diagnostic and Investigation Center (NAHDIC) detected FMDV serotypes A and O in bovine samples.

Kenya [8] - The National FMD Reference Laboratory Embakasi, Kenya also detected FMDV serotypes A and SAT 1 in bovine samples.

Mauritius [1, 3] – No FMD outbreaks were reported in the country during October 2016.
First results of the VMSD tests for the FMDV responsible for the outbreak, which occurred in July 2016, are available. These were conducted on two field isolates belonging to FMDV serotype O collected at the beginning of the FMD event that obtained good matching results with the vaccine strains employed in the test.

POOL 5 - WEST/CENTRAL AFRICA

Nigeria [9] - Phylogenetic analysis of the virus isolates from ruminant samples collected during 2013-2015 revealed the presence of different viral lineages of FMDV serotypes A, O and SAT 2.

Senegal [9, 10] – The Laboratoire National de l'Elevage et de Recherches Vétérinaires (ISRA/LNERV), Senegal reported the detection of FMDV serotypes SAT 1 and SAT 2 using an FMD antigen ELISA.
A seroepdiemiological survey conducted to verify the circulation of FMDV serotypes A, O and SAT2, on samples collected during 2014-2015 confirmed the presence of all three serotypes, with a different distribution of each within the various regions of the country.

POOL 6 - SOUTHERN AFRICA

Botswana [1]- VMSD tests conducted on three field isolates collected in the country during 2015, belonging to FMDV serotypes SAT 1 and SAT 2 obtained good matching results with all of the relative vaccine strains employed.

Mozambique [1, 3] – VMSD tests conducted on one field isolate collected in the country during 2015, belonging to FMDV serotype SAT 2 obtained good matching results with the vaccine strains employed.

Two FMD outbreaks, for which serotyping were not carried out, occurred on the 30th of September 2016 in cattle of the villages of Gaza and Maputo.

Zambia [5] – A FMD outbreak, for which serotyping is still pending, occurred on the 8th of October 2016, in cattle of a village of Mbala, Northern Zambia.

Zimbabwe [1, 3] - VMSD tests conducted on one field isolate collected in the country during 2015, belonging to FMDV serotype SAT 2 obtained good matching results with the vaccine strains employed.
Thirteen FMD outbreaks occurred between the 8th of September and the 25th of October 2016 involving cattle in different villages of Matabeleland North and Midlands.

POOL 7 - SOUTH AMERICA

Latin America [3] – No FMD outbreaks were reported for this Region during October 2016.

COUNTER
****** 58 MONTHS SINCE THE LAST OUTBREAK IN SOUTH AMERICA WAS REPORTED***
****** 146 MONTHS SINCE THE LAST SEROTYPE C OUTBREAK WAS REPORTED***

III. DETAILED POOL ANALYSIS

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

China (Hong Kong, SAR) [1]
VMSD tests conducted on two field isolates, O/HKN/3 and 5/2016, belonging to viral lineage O/CATHAY/unnamed, gave good matching results only for the second isolate with O Russia 2000, even if sequence identity between the two is 99.8%.
No matching results were obtained with other vaccine strains used in the test i.e. O3039, O Manisa, O Skr W and O Tur 5/09 MSD. VMSD tests conducted on previous field viruses isolated in pigs during 2015 had given poor matching results with all the above-mentioned vaccine strains.
The field isolates used in the present VMSD tests were those responsible for the outbreak, which occurred in Sheung Shui, New Territories on the 6th of August 2016 in pigs owned by a private meat trader.

Malaysia [1]
Genotypes A/ASIA/Sea-97 and O/SEA/MYA-98 were identified by the WRLFMD in bovine samples collected between 2014-2016, forwarded by the Regional Veterinary Laboratory, Koto, Malaysia. A summary of the genotyping results is presented in Table 2. The country of origin of most closely related viruses not belonging to Malaysia denotes a virus circulation across borders of neighbouring countries.
The viral lineages identified continuously circulate in the country since at least 2005 for O/SEA/MYA-98 and 2011 for A/ASIA/Sea-97. Only viral lineages belonging to serotype O different to the present were occasionally detected, represented by 0/ME-SA/PanAsia-2 during 2005 and 2006 and 0/ME-SA/PanAsia in 2009.

Table 2: summary of the genotyping results of FMDV positive samples collected in different areas of Malaysia between September 2014 and August 2016.

Sample Identification	Origin	Date of collection	Genotype	Most Closely Related Viruses not belonging to the country (Seq id %)	Host species
MAY/15/2014	Kelantan	27/08/2014	A/ASIA/Sea-97	TAI/12/2014 (98,4)	Cattle
MAY/10/2014	Kelantan	01/07/2014	O/SEA/MYA-98	TAI/11/2014 (99,5)	Cattle
MAY/14/2014	Terengganu	25/08/2014		TAI/19/2014 (99.5)	
MAY/17/2014	Perak	22/09/2014		TAI/20/2014 (99.5)	
MAY/18/2014	Johor	12/11/2014			
MAY/1/2015	Terengganu	26/03/2015		TAI/3/2009 (95,7)	
MAY/2/2015	Sembilan	16/04/2015		TAI/7/2008 (94,5)	Water buffalo
MAY/4/2015	Melaka	22/07/2015			
MAY/4/2016	Melaka	14/03/2016			
MAY/5/2016	Melaka	15/03/2016			
MAY/7/2016	Perak	02/06/2016		TAI/10/2014 (98.3)	Cattle
MAY/9/2016	Melaka	27/06/2016		TAI/28/2015 (99.4)	
MAY/10/2016	Melaka	08/08/2016			

Myanmar [2]

Two new FMD outbreaks due to serotype O occurred in the provinces of Irrawaddy and Sagaing during August 2016, which add to the other three ongoing outbreaks of the country. Distribution and location of outbreaks is reported in Table 3 and Map 1.

Field isolates of the country, genotyped between 2009 and 2015, belonged to the following viral lineages A/ASIA/Sea-97 and O/SEA/MYA-98, the same as those reported for Malaysia, indicate their circulation over a wide area of this Region. Further to these viral lineages, is the important detection of O/ME-SA/Ind-2001d in a field isolate collected in the country 2016, confirming the eastward spread of this viral lineage that was first observed in the area in 2015.

Table 3: Distribution of ongoing FMD outbreaks during October 2016 in the provinces of Myanmar.

Provinces with FMD outbreaks	N° of outbreaks
IRRAWADDY*	**1**
MANDALAY	**1**
SAGAING*	**1**
BAGO	**2**
Total	**5**

*****provinces with new FMD outbreaks which occurred in August 2016

Map 1: location of ongoing FMD outbreaks in the provinces of Myanmar during October 2016.

SEACFMD [2]

Latest updates from SEACFMD report new FMD outbreaks in Myanmar and Thailand during August September 2016 as described in other parts of the present report. FMD ongoing outbreaks in the Region are currently occurring in Cambodia, Malaysia, Myanmar, Thailand and Vietnam. Distribution of these events among the different countries is reported in Table 4.

Genotypes detected by the WRLFMD in the above countries with ongoing outbreaks during 2015 and 2016 were A/ASIA/SEA-97 in Cambodia Myanmar, Thailand and Vietnam, O/ME-SA/PanAsia in Cambodia and Thailand, O/SEA/Mya-98 in Myanmar, Thailand and Vietnam and O/ME-SA/Ind-2001d in Myanmar.

Table 4: Distribution of FMD outbreaks among the SEACFMD countries reported during October 2016.

SEAFCMD countries reporting ongoing FMD outbreaks	N° of outbreaks
Cambodia	134
Malaysia	48
Myanmar	5
Thailand	116
Viet Nam	22
Total	325

Russian Federation [3, 12]

A FMD outbreak due to serotype Asia 1 occurred on the 16th of October 2016 on a mixed species farm of cattle, goat, sheep and pigs in Vyshmanovo, Sobinsky, Vladimirskaya Oblast. Clincal cases were observed only in cattle. The FGBI-ARRIAH, OIE Reference Laboratory, rapidly confirmed the diagnosis on the 19th of October 2016 examining bovine samples using reverse transcription - polymerase chain reaction (RT-PCR), antigen (Ag) detection ELISA and complement fixation test.

Summary of animals involved and location of outbreak is respectively reported in Table 5 and Map 2.

No information on the source of infection was provided. Control measures applied following the outbreak were movement control inside the country, disinfection, quarantine, surveillance outside containment and/or protection

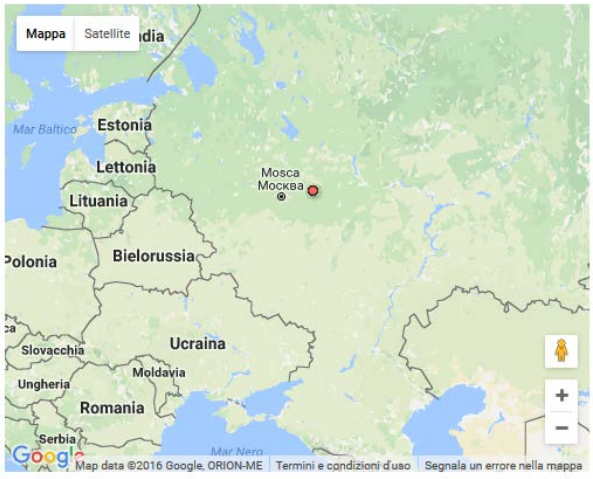
zone, official destruction of animal products, surveillance within containment and/or protection zone, zoning and emergency vaccination which is being carried out within a zone around the outbreak area where 17,666 cattle and 1,332 small ruminants were vaccinated.
Previous outbreak of FMDV serotype Asia 1 in the Russian Federation was reported to the OIE in 2006 in Amurskaya Oblast, which is on the other side of the country.

Table 5: summary of the animals involved in the FMD outbreak, that occurred on the 16th of October 2016 in Sobinsky, Russian Federation.

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	814	90	0	814	0	11.06%	0%	0%	100%
Sheep / goats	11	0	0	11	0	0.00%	0%	-	100%
Swine	54	0	0	54	0	0.00%	0%	-	100%
Totals	**879**	**90**	**0**	**879**	**0**	**10.23%**	**-**	**-**	**100%**

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

Map 2: location of FMD outbreak, which occurred on the 16th of October 2016 in Sobinsky, Russian Federation.



The FGBI-ARRIAH examined 18 samples in which FMDV serotype Asia 1 was detected. These isolates were subjected to genotyping. Work is under way to study the antigenic relationship between field isolates and their relative FMDV vaccine strains. Studies on the immunological properties of the FMDV Asia 1 field isolates are also ongoing. The laboratory personnel were involved in the epidemiological investigations of FMD outbreaks. The same laboratory examined 8,531 sera for post-vaccination monitoring.
The FGBI-ARRIAH provided 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. The same institution provided services and information for the 6th Meeting Cross Border Trade and TADs Risk Reduction, held between the 11th-13th October 2016.

Thailand [2]

During the months of August and September 2016, 91 new FMD outbreaks occurred in 23 of the total 29 provinces with ongoing FMD. These events are further to the 25 ongoing outbreaks. Location of outbreaks is represented in Map 3.
Last samples sent to the WRLFMD for analysis was during 2015 with the detection of the following viral lineages A/ASIA/Sea-97 and O/SEA/Mya-98.

Map 3: provinces in Thailand with new or ongoing FMD outbreaks.

Table 6: Summary of the history of FMD Pool 1, 2012 – 2016, for geographic distribution see Map 4 below.

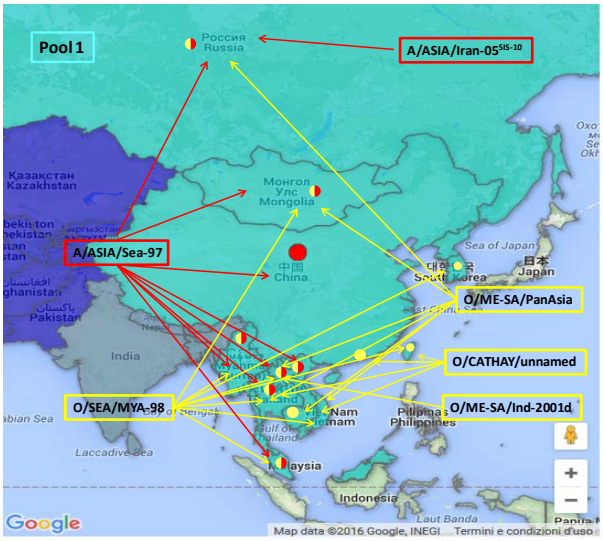
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE between 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Cambodia	O, 2013-2015/NOT SAMPLED	July 2016/ not typed or not sampled, Sep 2015/O and A, Aug 2014/ not typed, June 2014/not typed	See text Typing required
China (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**	Aug 2015/O	See text
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	Mar 2016/O Mar 2015/A,	Follow-up needed

	2015/ NO DATA REPORTED		
Malaysia	2012 –2015/O 2013 & 2015/NOT TYPED	August 2016/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	Aug 2016/O, July 2016/ not typed, Oct 2015/A	See text
Russian Federation	2012, 2014 & 2015/O, 2013 - 2015/A	Oct 2016/Asia 1, Jan 2016/ A and Dec 2015/O	See text
Thailand	O, A NOT SAMPLED & NOT TYPED	Sep 2016 /A, Aug 2016/O June – July 2016/not typed	See text
Vietnam	O, NOT SAMPLED, NOT TYPED 2013, 2014 & 2015/A,	Mar 2016/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 [1, 16]:

- 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 [3]

The ICAR-PDFMD, Mukteswar, India detected during October 2016 FMDV serotype O in three bovine samples that were tested using FMDV antigen and/or RNA detection. Four field isolates belonging to FMDV serotype O were

genotyped while five field isolates belonging to the same serotype were subjected to vaccine matching tests. Further to these activities, 7,713 serum samples collected within epidemiological studies were tested for FMDV antibodies. Personnel of ICAR-PDFMD were 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 [4]

VMSD tests conducted on two field isolates, O/NEP/11 and 17/2016, isolated respectively in a goat and bovine sample, belonging to viral lineage O/ME-SA/Ind-2001d, gave good matching results with all of the vaccine strains used represented by O 3039, O Manisa and O Tur 5/09 MSD.

The TADS Laboratory in Nepal reported for October 2016, FMD outbreaks due to serotype O. Serological analyses for FMD were also carried out. The laboratory personnel were involved in outbreak investigations and in the provision of expert advice to the Government and to the National and Local authorities.

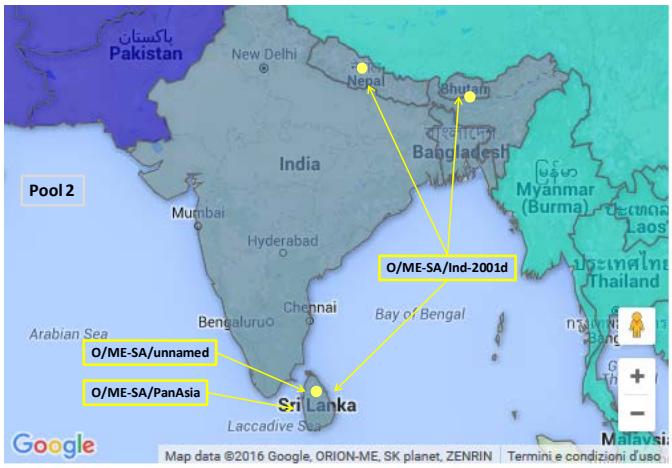
Table 7: Summary of the history of FMD Pool 2, 2012 – 2016, for geographic distribution see Map 5 below.

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	Oct 2016/O, Apr 2015/A Apr 2015/Asia 1	See text Genotyping required
Nepal	O, 2012-2103/Asia 1	OCT 2016/O	See text
Sri Lanka	2012 – 2014/O, 2015/NO DATA REPORTED	Sept 2014/O	Follow-up needed

Map 5: FMD distribution by serotype and topotype in South Asia, 2012 – 2015 (EuFMD).

Conjectured circulating FMDV lineages in Pool 2 per 2015 [1, 16]:

- 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

Afghanistan [1]

The WRLFMD conducted the phylogenetic analysis of the VP1 of the viruses detected by the Central Veterinary Diagnostic and Research Laboratory (CVDRL) in Kabul, Afghanistan in the 27 samples (25 from cattle and two from sheep) collected between May and July 2016. Viral lineages identified were A/ASIA/Iran-05^{Far-11}, Asia 1/ASIA/Sindh-08 and O/ME-SA/PanAsia-$^{2Ant-10}$. The present serotypes were first detected in the country between 2010 and 2014.
A summary of the genotyping results of the FMDVs detected is presented in Table 8. As can be noted from the Table the field isolates are divided into four groups. Location of sampling is represented in Map 6.
Even in this case, as already observed for Malaysia, the country of origin with most closely related viruses not belonging to Afghanistan confirm the circulation of FMDVs over a wide area of the Region.
FMDV serotypes prevalently detected in the country by the WRLFMD since 2010 are A, Asia 1 and O, with the circulation for the latter serotype of O/ME-SA/PanAsia-2^{ANT-10}. Latest VMSD test for field isolates of the same genotype collected in the country in 2014 obtained borderline to good matching results with vaccine strains tested that were O 3039, O Manisa and O/TUR/5/2009.

Map 6: location of FMD samples collected in Afghanistan during 2016 and submitted for phylogentic analysis to the WRLFMD.

Table 8: summary of the genotyping results of FMDV positive samples collected in different Provinces of Afghanistan during 2016.

Sample Identification	Origin	Date of collection	Genotype	Most Closely Related Viruses not belonging to the country (Seq id %)	Host species
AFG/4/2016	Ghazni, Centre	01/05/2016	O/ME-SA/PanAsia-2^{Ant-10}	PAK/18/2014 (97.8)	Water buffalo
AFG/11/2016	Badakhshan, North	23/05/2016		PAK/42/2015 (99.5)	Cattle
AFG/12/2016	Kabul, East	24/05/2016		PAK/58/2012 (97.8)	
AFG/15/2016	Paktika, East	29/05/2016		PAK/42/2015 (99.4)	
AFG/16/2016	Faryab, North	01/06/2016		PAK/12/2014 (98.1)	
AFG/17/2016	Herat, West	08/06/2016		PAK/58/2012 (97.6)	
AFG/18/2016	Herat, West	08/06/2016		PAK/58/2012 (97.6)	
AFG/19/2016	Badakhshan, North	08/06/2016		PAK/42/2015 (99,7)	
AFG/20/2016	Jozjan, North-West	11/06/2016		PAK/12/2014 (98.1)	
AFG/25/2016	Baghlan, North	20/07/2016		PAK/42/2015 (99.1)	
AFG/5/2016	Kundoz, North	04/05/2016	A/ASIA/Iran-05^{Far-11}	PAK/41/2014 (98.3)	
AFG/6/2016	Faryab, North-west	08/05/2016	Asia1/ASIA/Sind-08	PAK/26/2014 (98.9 - 99.7)	
AFG/10/2016	Kundoz, North	17/05/2016			
AFG/21/2016	Takhar,	19/06/2016			

Egypt [1]

The VMSD tests conducted on the following field isolates collected in the country during 2015 and 2016 obtained the following results with the relative vaccine strains used:

- field isolate A/EGY/3/2016, belonging to genotype A/AFRICA/G-IV, obtained good matching result with A/Eri 98 but not with A Iran 2005, ATUR 20/06 and A22IRQ,

-field isolates O/EGY 3 and 18/2016 belonging to genotype O/EA-3/unnamed, obtained good matching results with 0 Manisa only for the latter isolate, while none of the two field viruses obtained good matching results with O 3039 and O Tur 5/09,

-field isolate Sat 2/EGY/5/2015, belonging to genotype SAT 2 /VII/Alx-12 obtained good matching results with field isolates, belonging to FMDV serotypes A, O and SAT 2, obtained good matching results which were better with SAT 2 ERI then with SAT 2 ZIM.

Kyrgyzstan[9]

In 2013, in the Chui region disease cases were observed among vaccinated animals from which FMDV was isolated. The phylogenetic analysis of the field isolates detected the following viral lineages FMDV A/Iran-05 and FMDV O/PanAsia 2.

Pakistan [6]

The Progressive Control of Foot and Mouth Disease Project reported 55 FMD outbreaks occurring in Pakistan during October 2016. As represented in Table 9, these were principally caused by FMDV serotype by O (16.4 %), followed by Asia 1 (10.9%) and A (1.8%), however more than 60% of the outbreaks were either untyped or in the process of being serotyped. Location of districts with reported FMD outbreaks is presented in Map 7.

Ring vaccination and vaccination on cost sharing basis, involving a contribution from the farmers, with the administration of 40,240 vaccine doses during October 2016. A summary of the number of interventions carried out in the different provinces is presented in Table 10.

Map 7: Location of the Districts where FMD outbreaks occurred in Pakistan during October 2016.

Table 9: FMD outbreaks with relative serotypes that occurred during October 2016 in the different areas of Pakistan.

N° Outbreaks and location		N° of Outbreaks due to FMDVs Serotype(s)				
Province	**District**	**'O'**	**'A'**	**'Asia-1'**	**Un-Typed**	**Not Yet Typed**
Sindh (28)	Karachi (16)	--	--	--	--	16
	Thatta (8)	--	--	--	--	8
	Matiari (3)	2	--	--	1	--
	Umerkot (1)	--	--	--	--	1
Khyber Pakhtunkhwa (3)	Swabi (1)	--	--	--	1	--
	Malakand (2)	--	--	2	--	--
Azad Kashmir (6)	Bhimber (4)	--	--	1	3	--
	Mirpur (2)	1	--	--	1	--
Punjab (18)	Chakwal (2)	--	--	--	2	--
	Khanewal (1)	--	--	1	--	--
	Lahore (3)	1	--	1	1	--
	Gujranwala (3)	2	1	--	--	--
	Sheikhupura (1)	--	--	--	1	--
	TT Singh (4)	3	--	--	2	--
	Faisalabad (3)	--	--	1	2	--
Totals	**55**	**9 (16.4)**	**1 (1.8)**	**6 (10.9)**	**14 (25.5)**	**25 (45.5)**

Table 10: Vaccination activities carried out during October 2016 in the various Provinces of Pakistan.

	N° of doses		
Province	**Ring Vaccination**	**Cost sharing basis**	
Sindh	4,975	24,215	
Balochistan	--	125	
Khyber Pakhtunkhwa	300	675	
Punjab	200	9,250	
Azad Kashmi	100	200	
Gilgit	200	--	
Total	**5,775**	**34,465**	**40,240**

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

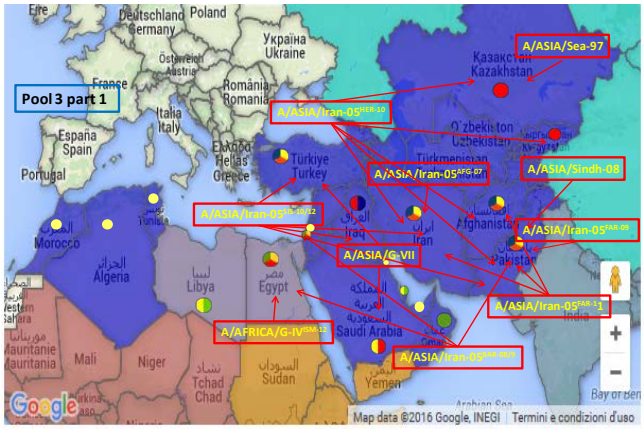
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Afghanistan	2013-2015**/O, A, Asia 1, NOT TYPED 2012/SEROTYPE NOT REPORTED	May 2016/A, Jun 2016/Asia 1, Jul 2016/O	See text
Algeria	2014 -2015**/O	Apr 2015/O	Follow –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, May-Jun 2016/ O & Sat 2	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	Follow –up needed
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	See text 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 2015/ NO DATA REPORTED	May 2015/SAT 2	Follow –up needed
Pakistan	2012 & 2015/ NO DATA REPORTED 2013-2014/A, ASIA 1 & O	Oct 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 8: FMD distribution by serotype and topotype for West Eurasia and Middle East, 2012 – 2015 (EuFMD).

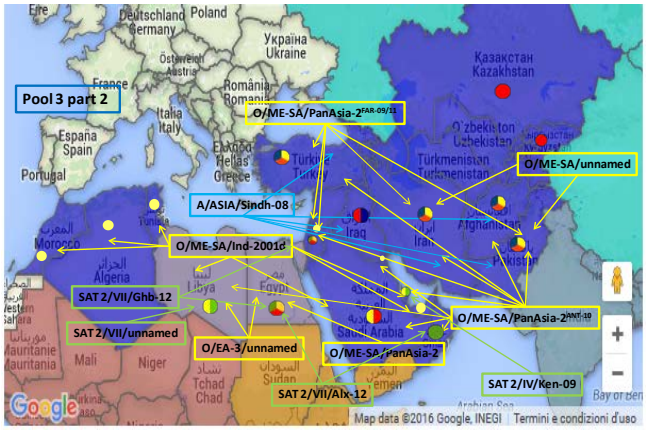
Conjectured circulating FMDV lineages in Pool 3 per 2015 [1, 16]:

- 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 [7]

The NAHDIC detected FMDV serotypes A and O in the eight bovine samples examined using FMD Antigen detection ELISA. Most recent viral lineages detected for the detected serotypes are relative to samples collected during 2015 and these are respectively A/AFRICA/G-VII and O/EA -3/unnamed and O/EA-4/unnamed. VMSD tests conducted on these serotypes did not give good matching results with the vaccines strains employed represented by A22 IRQ, A IRN 05 and A/TUR/20/2006 for serotype A, while for serotype O, good vaccine matching results were obtained for O 3039 and 0/TUR/5/2009, but not with O Manisa.

The laboratory personnel were also involved in the investigation of outbreaks and in the provision of advice to field veterinarians and framers on the type of vaccine to employ.

Twenty-two veterinary professionals from different the regional veterinary laboratories attended a training course on FMD outbreak investigation and epidemiology organized in conjunction with the WRLFMD that was held between the 3rd - 7th October 2016.

Detection of FMDV in 263 samples (tissues, swabs and oro-pharyngeal fluids) collected between 2013-2016 confirmed the presences of serotypes A, O, SAT1, and SAT2. Phylogenetic analysis showed that some of the FMDV

O isolates were closely related to Yemen isolates of 2006/08/09; some FMDV SAT2 isolates were also related to isolate of Oman of the same year: FMDV A isolate in Ethiopia during 2015 was more closely related to FMD serotype A of Sudan isolate in 2011. VMSD tests showed that the FMDV isolates of O/ETH/3/2015 and O/ETH/1/2016 were antigenically matched with O 3039 and O/TUR/5/2009 and unlikely matched with O Manisa; the FMDV SAT2 isolates were more antigenically matched with SAT ERI than with SAT2 ZIM; FMDV A isolate had poor antigenic matching with relative vaccine strain.

Kenya [8]

The National FMD Reference Laboratory Embakasi, Kenya reported the detection of FMDV serotypes A and SAT 1 respectively in the two bovine samples examined. Samples last forwarded by the country to the WRLFMD for genotyping was in 2013. The genotypes detected in relation to the serotypes reported this month were A/AFRICA/G-1 and SAT 2/IV/unnamed from samples respectively collected in 2013 and 2012.

Mauritius [1]

The first VMSD results are available for FMDV responsible for the epidemic, which occurred in the country between July –September 2016.

The VSDM test for the two field isolates O/MUR/6/and 7/2016, belonging to viral lineage O/ME-SA/Ind – 2001d, collected at the beginning of the FMD outbreak, gave good matching results with all of the vaccine strains employed represented by O 3039, O Manisa and O Tur/09 MSD.

Tanzania[9]

The VP1 characterization of 356 FMDV isolates obtained from outbreaks in various parts of Tanzania between 2008 and 2013 gave the following results. The VP1 sequence data revealed that topotypes of FMDV serotype A clustered into the Africa G1 topotype, those of serotype O into the East Africa 2 (EA-2) topotype, those of SAT1 into the NWZ topotype and the SAT2 isolates into I topotype. No topotype was found to be peculiar to Tanzania. The Authors report that geographical, epidemiological, ecological and animal movement patterns shared with neighbouring countries could influence the genetic features of these strains.

Uganda[9]

A cross sectional study was conducted in 25 representative districts selected within the Northern, Western Central and Eastern regions of the country to study the distribution FMDVs. A total of 1300 oral-pharyngeal fluid samples were collected from these areas between 2014-2015. FMDV serotype O was isolated from the Northern and Eastern regions while SAT 2 was isolated from the Western region in samples collected in 2014. FMDV SAT 1, circulating in the Western region, and O were detected in samples collected in 2015.

Table 12: Summary of the history of FMD Pool 4, 2012 – 2016, for geographic distribution see Map 9 below.

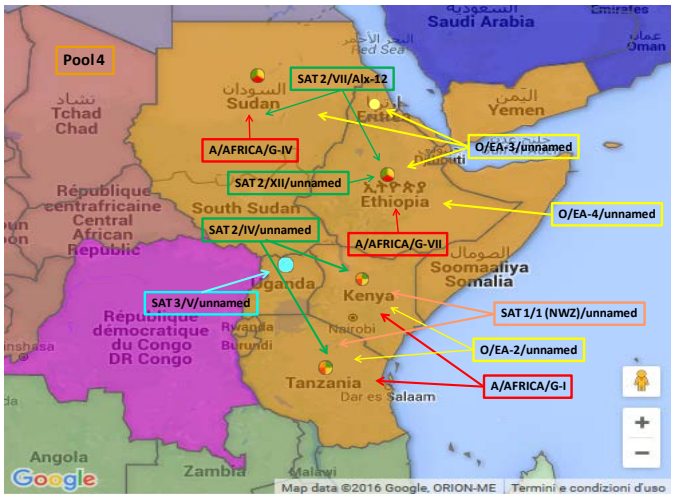
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Burundi	DISEASE PRESENT	Aug 2013 / not available	Typing required
Comoros	NO DATA AVAILABLE	2010	Follow –up needed
Congo d. R.	NO DATA AVAILABLE	Jun 2013/not typed	Typing required
Djibouti	DISEASE ABSENT**	Not available	Follow –up needed
Egypt	2012, 2014/SAT 2 2012 – 2015**/O, A	March 2016/A, May-Jun 2016/ O & Sat 2	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,	Oct 2016/ A & O, May 2016/SAT 2,	See text

	2015**/SAT 1	Jun 2014/ SAT 1	
Kenya	A, O, SAT1, SAT2, 2012 – 2015 /NOT TYPED	Oct 2016/ A & SAT 1,Sep 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	Sep 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	Follow –up needed
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	See text 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	See text Follow –up needed
Yemen	2012/O, 2013 – 2014/ DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA 2015/NO DATA REPORTED	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, 16]:

- 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 – West / Central Africa

Cameroon [12]

As diagnostic reagents are still out of stock, the Laboratory:Laboratoire National Vétérinaire (LANAVET), Garoua carried out only the serological testing of 90 bovine serum samples collected of which 52 (57.8%) reacted as positive in the 3ABC non structural protein ELISA.
LANAVET has ongoing collaborative activities with the Ohio State University and Plum Island Laboratory, USA.
Last genotypes identified in the country were represented by A/AFRICA/G-IV and SAT 2/VII/Lib-12 in samples collected in 2013 for which VMSD tests are not available.

Nigeria [9, 13]
The National Veterinary Research Institute Vom, Nigeria has forwarded 25 FMDV positive samples to the WRLFMD for further analysis.
The laboratory was involved in providing support on the control of FMD to local farmers. The laboratory is continuing with the OIE twinning programme with CODA CERVA, Belgium.
The most recent genotypes isolated in the country are those from samples collected between 2011 and 2014 and are represented by A/AFRICA/G-IV, O/EA-3/unnamed and SAT 2/VII/unnamed.
The VMSD tests conducted for each relative circulating serotype gave good matching results with the following vaccine strains: A ERI/98 and A TUR/06, O 3039 and O TUR/5/09, and SAT 2 ERI and SAT 2 ZIM.
A study was conducted in 2013-2015 in Nigeria on the circulation of FMDV in clinically affected cattle and in-contact sheep. The phylogenetic study of the isolated viruses detected the presence of the following viral lineages: O topotypes, East Africa-3 (EA-3) and West Africa (WA), Africa genotype (G-IV) of serotype A and FMDV SAT2 topotype VII strains.

Senegal [9, 10]
The Laboratoire National de l'Elevage et de Recherches Vétérinaires (ISRA/LNERV), Senegal reported the detection of FMDV serotypes SAT 1 and SAT 2 using an FMD antigen ELISA. Serological analysis conducted on serum samples detected antibodies against FMD serotypes A and O.
A seroepdiemiological survey conducted to verify the circulation of FMDV serotypes A, O and SAT2, on samples collected during 2014-2015 confirmed the presence of all three serotypes, with a their different distribution of each within the various regions of the country. These results are of high importance as epidemiological data relative are essential for the country when adopting a FMD control programme as proposed in the West.Africa Road Map meeting held in September 2016 in Togo.

Ghana[14]
No FMD outbreaks and activities were referred by the ACCRA Veterinary Laboratory, Ghana for October 2016. The country's FMD epidemiological status requires investigation as information relative to this is scarce.

Table 13: Summary of the history of FMD Pool 5, 2012 – 2016, for geographic distribution see Map.10 below.

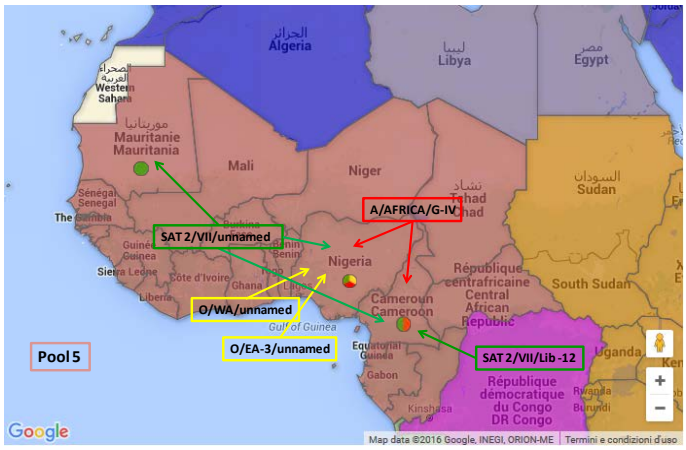
Country	FMD history FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	Last outbreak reported/serotype #see pg. 1	Comment (Genotyping would be useful for this region)
Benin	A, O, SAT 1, SAT 2	Jun 2014/O, A, SAT 1, SAT 2	Follow –up needed
Burkina Faso	DISEASE PRESENT SEROTYPES NOT REPORTED	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	Sept 2016/ O & SAT 1 Nov 2015/A, Sept 2014/ 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 10: FMD distribution by serotype and topotypes for West Africa, 2012 – 2015(EuFMD)

Conjectured circulating FMDV lineages in Pool 5 per 2015 [1, 16]

- 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

Botswana [1]

The VMSD test results obtained relative to the three field isolates collected in the country during 2015 are as follows:
- both FMDV field isolates SAT 1/5 and 8/2015, belonging to viral lineage SAT 1/III (WZ)/unnamed, obtained good with vaccine strain SAT 1/RHO
- FMDV isolate SAT 2/BOT/3/2015, belonging to genotype SAT 2/III/unnamed obtained good matching results with SAT 2 ERI and SAT 2 ZIM.

Mozambique [1]

Good matching results were obtained with vaccine strains SAT 2 ERI and SAT 2 ZIM in the VMSD tests conducted on the field isolate SAT 2/MOZ/3/2015 belonging genotype SAT 2/I/unnamed.
Two FMD outbreaks occurred on the 30th of September 2016 in cattle of the village of Gaza and Maputo for which serotyping was not carried out. FMD diagnosis was confirmed on the 14th of October 2016 by the Central National Veterinary Laboratory using the 3ABC ELISA. A population of 3,582 cattle of different ages were clinically examined in the affected and surrounding areas with 25 animals showing clinical signs and lesions referable to FMD while five reacted positive to non-structural protein (NSP) ELISA test. The diseased animals showed vesicular lesions in the gums, tongue and feet and presented lameness. The affected cattle were not vaccinated against FMD.
Although source of outbreaks is unknown, these are occurring in an area, which is affected by a severe drought inducing cattle to concentrate together in areas where water and pastures are available. Summary of animals involved and location of outbreaks are reported in Table 14 and Map 11
Control measures in place are movement control inside the country, disinfection, traceability, quarantine, surveillance within containment and/or protection area and vaccination in response to outbreaks.

Table 14: summary of the animals involved in the FMD outbreaks that occurred in October 2016 in Mozambique.

Location	Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Gaza	Cattle	4,491	31	0	0	0	0.69%	0%	0%	0%
Maputo		12,520	30	0	0	0	0.24%	0%	0%	0%
Totals		**17,011**	**61**	**0**	**0**	**0**	**0.36%**	**0%**	**0%**	**0%**

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

Map 11: Location of the FMD outbreaks in that occurred in October 2016 in Mozambique (map on the right refers to outbreak in Maputo, while that on the left to the outbreak in Gaza)

RSA [14]

The ARC- Onderstepoort Veterinary Institute, Republic of South Africa examined during October 2016 3,297 samples using liquid-phase blocking ELISA for the detection of FMDV serotypes O and SAT 1, SAT 2 and SAT 3 and 205 samples using FMD NSP ELISA. The ARC-Onderstepoort Veterinary Institute is continuing its collaboration with international organisations on research projects.

Zambia [5]

A FMD outbreak, for which serotyping is still pending, occurred on the 8th of October 2016, in cattle of a village of Mbala, Northern Zambia. FMD diagnosis, which is being carried out by the Central Veterinary Laboratory using the 3ABC, Elisa is still pending. Summary of animals involved and location of outbreaks are reported in Table 15 and Map 12.

Although cattle were vaccinated against FMD in Mbala district in November 2015, the affected animals are from three villages in Kaka Vet Camp within Mbala district: Ntembo, Maembe and Mpanga which had refused to have their animals immunized. Eighteen cattle presented healed lesions in their interdigital spaces, on the tongue and lips, referable to FMD. Source of outbreaks was attributed to the illegal movement of animals and contact with susceptible cattle at water points or pastures.

Control measures in place are movement control inside the country, quarantine, surveillance within and outside containment and/or protection area and vaccination in response to outbreaks if available.

Table 15: summary of the animals involved in the FMD outbreak that occurred in October in Mbala, Northern Zambia

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	5,948	18	0	0	0	0.30%	0.00%	0.00%	0.00%

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

Map 12: Location of the FMD outbreaks in October in Mbala, Northern Zambia

Zimbabwe [1, 3]

Good matching results were obtained with vaccine strains SAT 2 ERI and SAT 2 ZIM in the VMSD tests conducted on field isolate SAT 2/ZIM/25/2015 belonging genotype SAT 2/II/unnamed.

Thirteen FMD outbreaks occurred between the 8th of September and the 25th of October 2016 involving cattle in different villages of Matabeleland North and Midlands. FMDV serotype responsible for the outbreak is reported as SAT 2, even if a laboratory confirmation is not reported. Summary of animals involved and location of outbreaks are reported in Table 16 and Map 13.

Source of infection is due to the illegal movement of animals and their contact with other cattle within communal areas. Vaccination has not yet been carried out due to lack of resources. However, the three infected districts of Gokwe South, Nkayi and Hwange are under quarantine and roadblocks with veterinary checkpoints that were placed on the major leads outbound from the infected areas.

Control measures adopted are movement control inside the country, traceability, quarantine, surveillance within and outside containment and/or protection area and vaccination if available.

Table 16: summary of the animals involved in the FMD outbreaks that occurred between the 8th of September and the 25th of October 2016 in Matabeleland North and Midlands

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Species	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	24,026	914	0	0	0	Cattle	3.80%	0%	0%	0%

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

Map 13: Location of the FMD outbreaks that occurred between the 8th of September and the 25th of October 2016 in Matabeleland North and Midlands, in Zimbabwe.

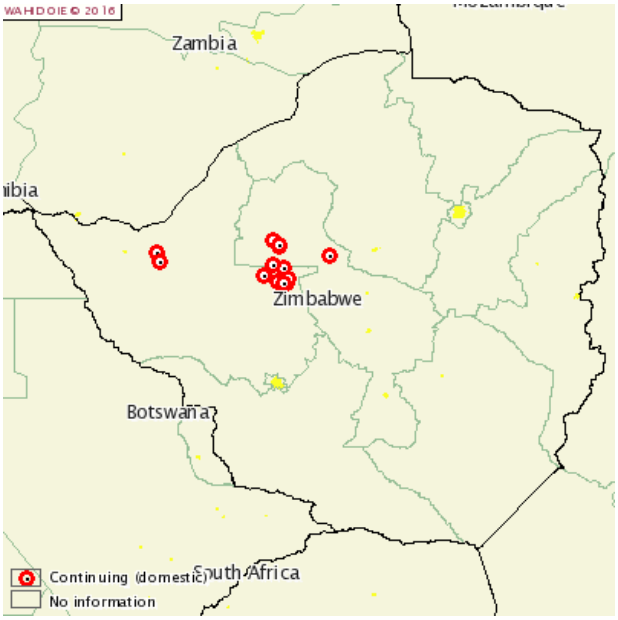
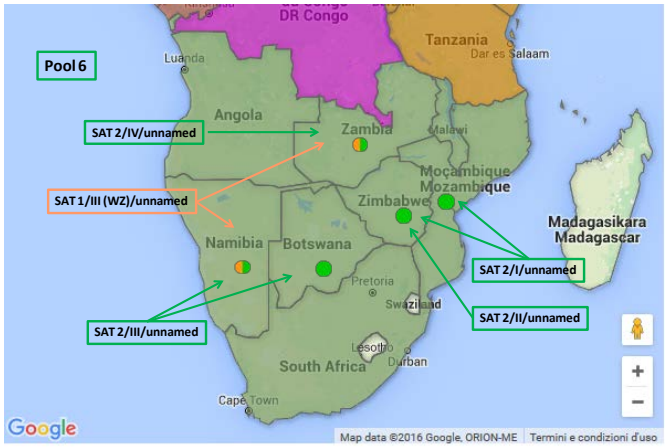


Table 17: Summary of the history of FMD Pool 6, 2012 – 2016, for geographic distribution see Map 14 below.

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 April 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	See text
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	Sep 2016/ Typing pending, July 2015/SAT 2, May 2015/ SAT 1	See text
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	See text
Zimbabwe	2012-2015**/SAT 2 2013/SAT 3 2014/SAT 1	Sep 2016/SAT 2, Aug 2015/ SAT 1, Jun 2013/SAT 3	See text

Map 14: 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 [1, 16]:

- 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 [3, 17] The OIE FMD status of the countries in South America as reported in May 2016 is presented in Map 15.

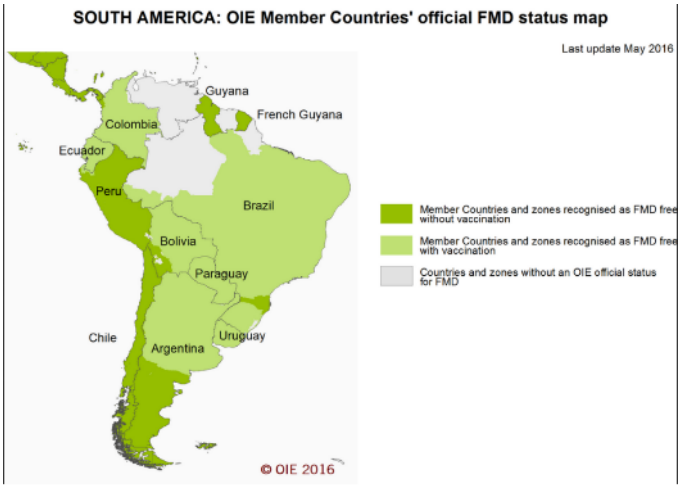
Most South American countries are FMD free with vaccination (Uruguay) or without vaccination (Chile, Guyana) or with free zones with vaccination (Argentina, Bolivia, Brazil, Colombia, Peru and continental Ecuador) or without vaccination (Argentina, Bolivia, Brazil, Colombia, Peru) as described by the 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 15). The FMD history between 2012 –2014 is reported in Table 18.

Table 18: Summary of the history of FMD Pool 7, 2012 – 2015, for geographic distribution see Map 15 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 15: FMD status for South America [3]



IV. OTHER NEWS:

The 2016 Open Session of the EuFMD was held in Cascais, Lisbon, on the 26-27 and 28 October 2016. The **OS'16** focused on innovation, innovative practice and the challenges and lessons learnt from the field relative to FMD. The meeting also had as objective of translating science into improved disease management. Proceedings of the meeting are available at the following link, http://www.opensessioneufmd.com/abstracts.

[1]The 3rd WRLFMD Quarterly Report for the period July – September 2016 published the table below (Table 19) 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 19: Recommendations from WRLFMD® on FMD virus strains to be included 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. SEACFMD, http://www.arahis.oie.int/reports.php?site=seafmd.
3. WAHID Interface – OIE World Animal Health Information Database http://web.oie.int/wahis/public.php?page=home
4. Project Directorate on Foot and Mouth Disease (PD-FMD), Indian Council of Agricultural Research, Mukteswar, India (Dr B. B. Dash) FAO.
5. National Foot and Mouth Disease and TADS Laboratory, Nepal - *Dr. Sharmila Chapagain*.
6. Progressive Control of Foot and Mouth Disease in Pakistan, - *Dr. Manzoor Hussain*, National Project Director and *Dr. Muhammad Afzal*, Project Coordinator.
7. National animal health diagnostic and investigation center (NAHDIC), Ethiopia - *Dr. Daniel Gizaw.*
8. National FMD Reference Laboratory, Embakasi, Kenya - *Dr. Abraham Sangula, Dr. Kenneth Ketter*.
9. http://www.opensessioneufmd.com/abstracts
10. Laboratoire National de l'Elevage et de Recherches Vétérinaires (LNERV, Senegal) – Miss Mariame Diop and Dr. Moustapha Lô
11. Regional Reference Laboratory for FMD (ARRIAH, Russia) - *Dr. Svetlana Fomina*.

12. Laboratoire National Vétérinaire (LANAVET) -Garoua, Cameroon - *Dr. Simon Dickmu Jumbo.*
13. FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria - *Dr. Ularamu Hussaini*
14. ACCRA Veterinary Laboratory, Ghana - *Dr. Joseph Adongo Awuni*
15. ARC -Onderstepoort Veterinary Institute, Republic of South Africa - *Dr LE Heat - Ms E Kirkbride*
16. OIE/FAO FMD Reference Laboratory Network, Annual Report 2014
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/