MARCH

2017

MONTHLY REPORT
FOOT-AND-MOUTH DISEASE SITUATION

Food and Agriculture Organization of the United Nations

European Commission

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

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

March 2017

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

I am pleased to be asked to write a few words to attempt to summarise the latest global situation for FMD; however, I am conscious that events are changing on an almost weekly basis, such that this synopsis will almost certainly be out of date almost as soon as this issue of the EUFMD Month Report goes to press!

At the end of 2016, we highlighted the re-emergence of South Asia (endemic Pool 2) as a major source of infection for international spread (particuarly for the O/ME-SA/Ind-2001d lineage that had caused caused unexpected outbreaks of FMD in North Africa, The Middle East, the Indian Ocean, Southeast Asia). This lineage appears now to be established in southeast Asia (endemic Pool 1; Laos, Myanmar, Thailand and Vietnam). Further to the sporadic FMD cases that were reported in Russia at the end of 2016, during the past three months there have been new reports of field outbreaks due to this rapidly spreading genotype in the Republic of Korea (in February 2017) and in Xinjiang Province in the western part of China (reported at the SEACFMD Meeting in Siem Reap, Cambodia). The challenges of FMD control in Republic of Korea has been further complicated by the almost simultaneous detection of a second FMD serotype (from the A/ASIA/Sea-97 lineage) in another part of the country during February 2017. The porous nature of the borders in southeast and East Asia was highlighted at the recent SEACFMD meeting by a presentation (by Dr Li Huachun, from the Yunnan Animal Science and Veterinary Institute) that provided evidence of extensive animal movements into Yunnan Provice in China from Thailand and Myanmar. These new incursions remind us about how easily FMD can cross international boundaries, and further demonstrate how outbreaks in East Asian countries are intimately linked to endemic FMD circulation in mainland Southeast Asian countries.

In the Middle East, there have been reports of new FMD outbreaks due to the exotic O/EA-3 topotype in Israel and Palestine (in and close to the Gaza Strip) – described in more detail in this report. However, the greatest concerns have been associated with the reports to the OIE on 31/3/2017 of new FMD outbreaks in Algeria. Local diagnosis by the Central Veterinary Laboratory has been supplemented by rapid testing and sequencing of representative specimens by the OIE/FAO Reference Laboratory at IZSLER, Brescia, Italy. The sequence data shows that the FMD virus causing these outbreaks belongs to the A/AFRICA/G-IV lineage, which is yet another new (and unexpected) incursion into the European neighbourhood. Although recent outbreaks due to this lineage have also occurred in Egypt (in 2016), the genetic analyse demonstrates closest genetic relationship to viruses collected in Nigeria (in 2015) and Cameroon (in 2013). While there are still gaps in our surveillance in west and central Africa and it is difficult to pinpoint the precise origin, these results suggest that this new incursion is due to viruses from West Africa (rather than from elsewhere in North Africa). These are the first reports of FMDV serotype A in Algeria since 1977, and represent the first "trans-Sahara" transmission of FMDV since 1999, when the West African O-Maghreb strain caused FMD outbreaks in Algeria (and Neighbouring countries). These recent events were reviewed at the EuFMD General session in Rome last week, and will provide a topic for discussion at the NRL Workshop of representatives from EU National Reference Laboratories (in Horsley, UK) at the beginning of May.

These dynamic virus movements reinforce the importance of work to collect, test and characterise samples from representative field cases of FMD, as well as the initiatives of the OIE/FAO FMD Laboratory Network to share and disseminate these data to the FMD community.

Looking forward to quieter times!

Don King
Pirbright, April 2017

I. GENERAL OVERVIEW

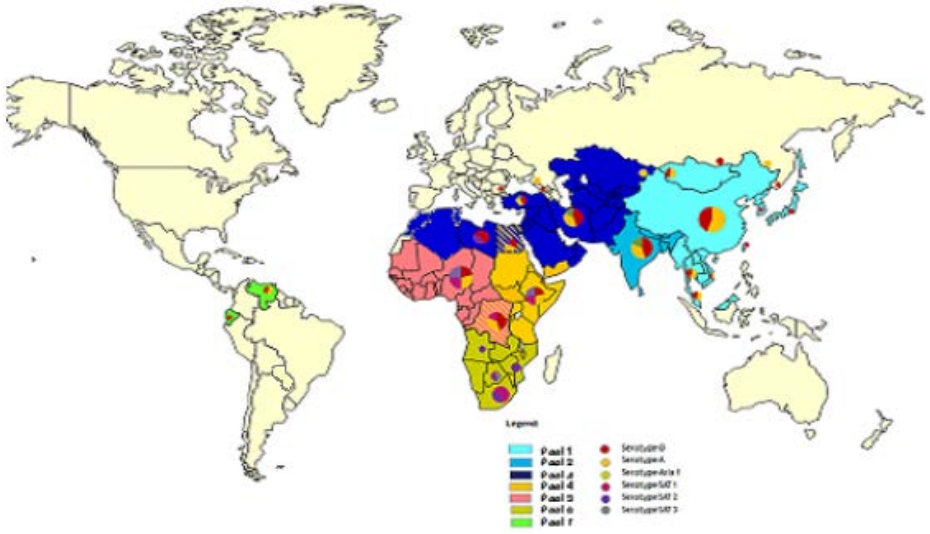
Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below 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 – 2016

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 not detected since 2006)**
2	**SOUTH ASIA** Bangladesh, Bhutan, India, Mauritius, Nepal, Sri Lanka	**O, A and Asia 1**
3	**WEST EURASIA & MIDDLE EAST** Afghanistan, Algeria, Armenia, Azerbaijan, Bahrain, Bulgaria, **Egypt**, Georgia, Iran, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, **Libya**, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan	**O, A and Asia 1**
4	**EASTERN AFRICA** Burundi, Comoros, **Congo D. R.**, Djibouti, **Egypt**, Eritrea, Ethiopia, Kenya, **Libya**, Rwanda, Somalia, Sudan, South Sudan, Tanzania, Uganda, Yemen	**O, A, SAT 1, SAT 2 and SAT 3**
5	**WEST/CENTRAL AFRICA** Benin, Burkina Faso, Cameroon, Cape Verde, Central Afr. Rep., Chad, **Congo D. R.**, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea Biss., Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome Principe, Senegal, Sierra Leone, Togo	**O, A, SAT 1 and SAT 2**
6	**SOUTHERN AFRICA** Angola, Botswana, **Congo D. R.,** Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe	**{O, A}*, SAT 1, SAT 2 and SAT 3**
7	**SOUTH AMERICA** Ecuador, Paraguay, Venezuela	**O and A**

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

MAP 1: Foot-and-mouth disease (FMD) virus pools: world distribution by serotype in 2011-2016



II. HEADLINE NEWS

POOL 1- SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA

China (People's Rep. of) [1, 2, 3] – Further to the outbreaks reported in Xinjiang, in January and February 2017, another FMD event still caused by serotype O was observed on the 23rd of March 2017 on a pig farm in Guangdong which, is on the other side of the country to where the previous outbreaks occurred.

FMDV VP1 sequences submitted by the Dr. Yamin Li of the Lanzhou Veterinary Research Institute, China were genotyped by the WRLFMD as O/ME-SA/Ind-2001d.

Korea (Rep. of) [2] - Isolates collected from the two outbreaks that occurred during February 2017 and repectively genotyped as A/ASIA/SEA-97 and O/ME-SA/Ind2001d were subjected to VMSD tests. Vaccine strains with good matching results were detected for each viral lineage.

Mongolia [1] – Further to the outbreaks reported on the 24th and 29th of January 2017, on three multispecies ruminant farms situated in Sukhbaatar and Dornod, twelve other outbreaks, still due to FMDV serotype O involving cattle sheep and goats occurred, between the 2nd of February and the 3rd of April 2017, in the same localities of the previous events and also in Khentii and Dornogovi.

POOL 2 - SOUTH ASIA

Bhutan [4] – FMD outbreaks were reported in cattle in March 2017 in Samtse, while during the same month the disease was also suspected in pig farm in Dagana.

India [5] – The Indian Council of Agricultural Research - Project Directorate on Foot and Mouth Disease (ICAR-PDFMD), Mukteswar, India reported for the current month the detection of FMDV serotype O in clinical samples of cattle and buffaloes.

Nepal [2, 6] – the National Foot and Mouth Disease and TADS Laboratory reported the circulation FMDV serotype O. FMDV isolates detected in nineteen samples, collected from cattle between January 2016 and 2017, were genotyped as O/ME-SA/Ind2001d.

POOL 3 - WEST EURASIA & MIDDLE EAST

Algeria [1, 2, 7] – Three FMD outbreaks were reported on the 24th of March and 2nd of April on three cattle farms respectively in Relizane, Medea and Bordj Bou Arreridj.
The virus detected in these outbreaks by the Algerian National Laboratory was sequenced by Dr. Emiliana Brocchi of the Istituto Zooprofilattico Sperimentale della Lombardia ed Emilia Romagna (IZSLER), Brescia, Italy (OIE/FAO FMD Reference Laboratory). The sequences were shared with the WRLFMD for confirmation to demonstrate that FMDV A/AFRICA/G-IV is the viral lineage responsible of these outbreaks.

Israel [2] – The virus that caused the FMD clinical outbreak on the 4th of February 2017, at a dairy farm in the Kibutz Nir Yizhak, Beer-Sheva, Hadarom was genotyped as O/EA-3.

Jordan [1] – Four FMD outbreaks due to serotype O were observed between the 21st of February and 9th of March 2017, involving sheep, goats and cattle farms, respectively located in Hamman, Al Balqa and Irib, Jordan.

Pakistan [8] - The Progressive Control of Foot and Mouth Disease Project reported 153 FMD outbreaks occurring in the country during March 2017. FMDV serotypes A, ASIA 1 and O were responsible for the outbreaks. No further reporting will be submitted for this Project which has been completed during this month.

Palestinian Auton. Territories [2] – FMDV field isolates from the outbreaks that respectively occurred on the 2nd and 5th of February 2017 in two cattle farms in Rafah and Jabalia, in the Gaza Strip were sequenced as O/EA-3 by the WRLFMD.

Saudi Arabia [2] – FMDV serotypes A and O were detected in the 25 samples collected in the country between October and December 2016, from cattle and sheep. The viral lineages identified for these serotypes were respectively A/ASIA/G-VII and O/ME-SA/PanAsia 2^{ANT-10}.

POOL 4 - EASTERN AFRICA

Ethiopia [9] – The National Animal Health Diagnostic and Investigation Center (NAHDIC) detected FMDV serotypes A, O and SAT 1 in the bovine, tissue and probang samples collected from a recent outbreaks.

Kenya [10] - The National FMD Reference Laboratory Embakasi, Kenya reported for the current month, the detection of FMDV O and SAT 1 in bovine samples.

POOL 5 - WEST/CENTRAL AFRICA

No FMD outbreaks were reported during March 2017 for this Pool.

POOL 6 - SOUTHERN AFRICA

Republic of South Africa [1, 11] – the serotype responsible of the FMD outbreak that occurred on the 1st of March 2017 at a cattle farm in Mpumalanga was identified as FMDV SAT 2.

Zimbabwe [1] – FMD outbreaks caused by serotype SAT 2 continue to occur further to those reported in January 2017 respectively in the villages of Matabeleland North and Midlands.

POOL 7 - SOUTH AMERICA

Latin America [1, 12] – No new FMD outbreaks were reported for this Region during January 2017. During the OIE/FAO FMD Laboratory Meeting held in November 2016, PANAFTOSA reported sequence data for historical FMD outbreaks that occurred in Venezuela in 2013. These now represent the most recent confirmed FMD cases in South America.

The 44th Meeting of the South American Commission for the Control of Foot-and-Mouth Disease (COSALFA) was held in March 2017, Reun, Brazil to analyze the strategies for the final stage of the Hemispheric Program Eradication of Foot-and-Mouth Disease (PHEFA).

COUNTER

****** 39 MONTHS SINCE THE LAST OUTBREAK IN SOUTH AMERICA WAS REPORTED***

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

III. DETAILED POOL ANALYSIS

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

China (People's Rep. of) [1, 2, 3]

In addition to the FMD outbreaks that occurred in small and large ruminants in Rinbung, Tibet and in Xinjiang, respectively in January and February 2017, the disease was again reported on the 23rd of March 2017, in a pig farm at Guangdong, which is on the other side of the country to where the previous outbreaks occurred.

The Lanzhou National Foot and Mouth Disease Reference Laboratory (OIE Reference Laboratory) confirmed the diagnosis on the 30th of March using reverse transcription - polymerase chain reaction (RT-PCR). Summary of the animals involved and location of outbreak are reported in Table 2 and Map 2.

The source of the outbreak is unknown and the control measures adopted are disinfection, movement control inside the country, quarantine, zoning, surveillance within containment and/or protection, stamping out, official disposal of carcasses, by-products and waste, zoning and vaccination in response to the outbreak, quarantine.

Table 2: summary of the animals involved in the FMD outbreak of the 25th March 2017, in Guangdong China (People's Rep. of).

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Swine	73	37	0	73	0	50.68%	0.00%	0.00%	100.00%

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

Map 2: location of the FMD outbreak of the 25th March 2017 in Guangdong China (People's Rep. of)

The two FMDV VP1 sequences obtained by the Lanzhou Veterinary Research Institute, China from the viruses detected in the field samples collected in XinJiang, for which species and location from where the samples were collected is not reported, were genotyped by the WRLFMD as O/ME-SA/Ind-2001d. The virus not pertaining to the country that is most closely related to these field isolates is Zabaikalskiy/3/RUS/2016 with a sequence identity (seq. id.) between 99.4 and 99.7%.

Korea (Rep. of) [2]

Field isolates, A/SKR//2017 and O/SKR/ 1 and 2/2017, responsible of the outbreaks that occurred in cattle in Korea (Rep. of) during February 2017 and which were respectively genotyped as A/ASIA/SEA-97 and O/ME-SA/Ind2001d were subjected to VMSD tests:

- good matching results were obtained with vaccine strains A IRN/2005 and A22 IRQ/24/64 but not for A/MAY/97, A/TUR/20/2006 and A24/Cruzeiro for A/ASIA/SEA-97,
- good matching results were obtained with vaccine strains O 3039, O 5911, O Campos 04, O Manisa, O SKR and O/TUR/5/09 for O/ME-SA/Ind2001d.

Mongolia [1]

Further to the notification of outbreaks at the end of January 2017, in Sukhbaatar and Dornod, FMD, due to serotype O, FMD reoccurred between the 2nd of February and the 3rd of April 2017, on twelve new holdings where large and small ruminants were present. Khentii and Dornogovi are the new localities involved in addition to those of the previous events.

Summary of the animals involved and location of outbreaks are reported in Table 3 and Map 3. The number of cases reported is very high for FMD.

The source of the outbreaks is still unknown and the control measures adopted in the area are the following: movement control inside the country, screening, vaccination in response to the outbreak (for details see February Report), quarantine, disinfection, stamping out and zoning.

Table 3: summary of the animals involved in the FMD outbreaks that occurred between the 2nd of February and the 3rd of April 2017, in Mongolia.

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Species	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	/	2322	0	2322	0	Cattle	**	**	0.00%	**
Goats	/	38	0	38	0	Goats	**	**	0.00%	**
Sheep	/	321	0	321	0	Sheep	**	**	0.00%	**
Totals	**/**	**2681**	**0**	**2681**	**0**	**0**	**	**	**0.00%**	**

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

**Not calculated because of missing information

Map 3: location of the FMD outbreaks, which occurred between the 24th and 29th of January 2017, in Sukhbaata, Dornod, Khentii and Dornogovi, Mongolia.

Russian Federation [13]

The Russian Federation Regional Reference Laboratory for FMD, Russia has examined 1,265 cattle serum blood samples collected in Korea (Rep. of) for the presence of FMDV antibodies for monitoring post-vaccination immunity investigations being conducted in the latter country. This activity was carried out within a collaborative study between the two countries.

The FGBI-ARRIAH constantly provides 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.

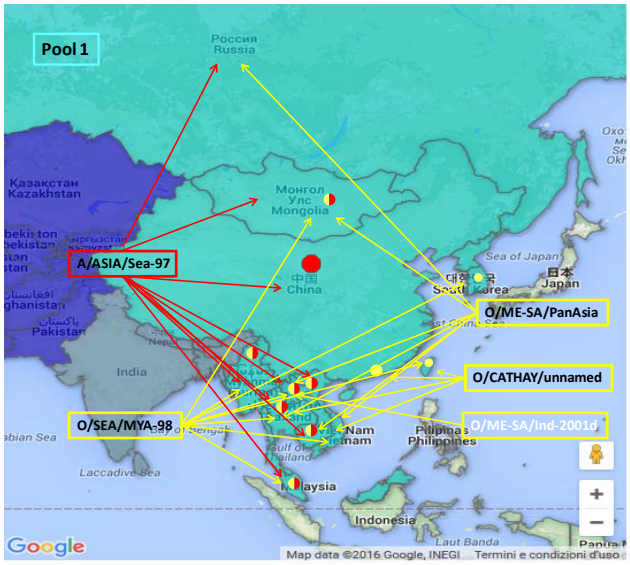
Table 4: Summary of the history of FMD Pool 1, 2012 – 2016, for geographic distribution see Map 4 below.

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	Follow-up needed
China (People's Rep. of)	2012-2013/O, 2013 & 2015/A 2012 - 2014/NOT TYPED**	March 2017/O, May 2015/A	See text Follow-up needed
China (Hong Kong, SAR)	O**	Aug 2016/O	Follow-up needed
China (Taiwan Province)	2012-2013/O, A/2015**	Jun 2015/A	Follow-up needed
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	Feb 2017/O & A	See text 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	August 2016/A & O	Follow-up needed
Mongolia	2013/A & NOT TYPED, 2014 & 2015**/O	April 2017/O, Sept 2013/A,	See text Follow-up needed
Myanmar	2012-2014/O, 2015/A & NOT TYPED	Aug 2016/O, July 2016/ not typed, Oct 2015/A	Follow-up needed
Russian Federation	2012, 2014 & 2015/O, 2013 - 2015/A	Dec 2016/O, Oct 2016/Asia 1, Jan 2016/ A	See text
Thailand	O, A NOT SAMPLED & NOT TYPED	Sep 2016 /A, Aug 2016/O June – July 2016/not typed	Follow-up needed
Vietnam	O, NOT SAMPLED, NOT TYPED 2013, 2014 & 2015/A,	November 2016/A, Aug 2016/O and not typed	Follow-up needed

Map 4: FMD distribution by serotype and topotype in South East Asia, 2012 – 2016 – white script in map refers to new introduction of viral lineage in pool or country of the pool during 2016.

Conjectured circulating FMD viral lineages in Pool 1 per 2016 [2, 17]:

- Serotype O: O/SEA/Mya-98, O/ME-SA/PanAsia, O/CATHAY, O/ME-SA/Ind-2001d (new detection in Myanmar and Thailand during 2016)
- Serotype A: A/ASIA/Sea-97 and Iran-05^{SIS10} sublineage
- Serotype Asia-1 has not been detected in the region since 2006 (Vietnam) and 2006 (China (People's Rep. of) and Vietnam)



B. POOL 2 – South Asia

Bhutan [4]

Suspicion of clinical FMD, for which control measures were adopted, was reported on the 8th of March 2017 in cattle in the villages of Dangragoan and Devithan. Another suspect outbreak was reported on the 14th of February 2017 on a private pig farm at Dagana Dzongkhag, where 28 pigs were presenting severe foot lesions. The Livestock extension centre is conducting epidemiological investigations while laboratory testing will be carried out at National Centre for Animal Health (NCAH). There are about 1100 pigs at risk in the village involved. Investigations are being conducted to identify the infection source. Even in this case control measures, represented by isolation and treatment of affected animals, were adopted.

India [3]

The ICAR-PDFMD, Mukteswar, India reports since May 2015 the sole detection of FMDV serotype O among the clinical samples examined using FMDV antigen and/or RNA detection: samples were collected from 20 cattle and five buffaloes; ten field isolates were genotyped for serotype O. Further to this, four field viruses belonging to serotype O and another set of five samples belonging to serotype A were subjected to vaccine matching exercise. Within ongoing epidemiological studies, 7, 455 serum samples were tested for FMDV antibodies. The FMD diagnostic kits used for these analyses were developed at ICAR-DFMD, Mukteswar.

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

Nepal [2, 6]

FMDV O was also reported by National Foot and Mouth Disease and TADS Laboratory as the only serotype circulating in the country.

Bovine FMDV positive samples, collected between November 2016 and January 2017, were forwarded by the above laboratory and were genotyped as O/ME-SA/ind-2001d. These set of viruses are all closely related to other isolates previously detected in the country during 2016 and 2015. Location of the isolates is shown in Map 5.

Map 5: location of the areas in Nepal from where the set of FMDV genotyped samples were collected between November 2016 and January 2017.

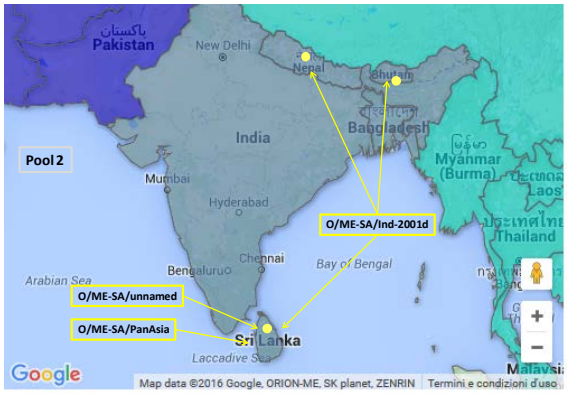
Table 5: Summary of the history of FMD Pool 2, 2012 – 2016, for geographic distribution see Map 6 below.

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

Map 6: FMD distribution by serotype and topotype in South Asia, 2012 – 2016 (EuFMD).

Conjectured circulating FMDV lineages in Pool 2 per 2016 [2, 17]:

- O/ME-SA/Ind-2001d predominates (the O/ME-SA/Ind-2011 lineage that emerged during 2011 has not been recognized during 2012-15)
- Outbreaks of O/ME-SA/Ind-2001d detected in Mauritius during 2016 (**not reported in Map**)
- 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

Algeria [1, 2, 7]

Three FMD outbreaks were reported on the 24th of March and 2nd of April on three cattle farms respectively in Relizane, Medea and Bordj Bou Arreridj that are situated in the Northern part of the country facing the Mediterranean. Fattening bulls involved in the outbreaks presented lameness, stomatitis, lingual lesions and salivation.

The diagnosis was confirmed on the 4th of April 2017 by the Laboratoire Central Vétérinaire (National laboratory) using real-time reverse transcriptase/polymerase chain reaction (RRT-PCR) and typing ELISA indicating that FMDV serotype A was responsible for these outbreaks. Samples sent to IZSLER were sequenced and forwarded to the WRLFMD for genetic analysis. The five sequences investigated belong to A/AFRICA/G-IV. All the sequences from the Algerian outbreaks are relatively closely related (seq id 98.9 and 100%), while the closest field virus not pertaining to the country is NIG/01/15 isolated from cattle in Nigeria with a seq id between 97.3 and 98.4%. Although the two countries are linked by this lineage, the great distance between them leaves open the question of the possible introduction of FMDV in Algeria.

Egypt is the other country of Pool 3 where the same lineage was isolated in 2016. However, in this case the most closely related virus, not pertaining to the country, was an isolate detected in Ethiopia in 2015.

This information indicates that the two variants of the same viral lineage are following independent spreading pathways.

The present outbreaks are the first evidence of the circulation of FMDV serotype A in the country since 1977, as the previous outbreaks were due to FMDV serotype O, with latest lineage represented by O/Me-SA/Ind2001d.

A summary of the animals involved and location of the outbreak are presented in Table 6 and Map 7.

The Sanitary measures that were put in place by the country are movement control inside the country, disinfection, stamping out and vaccination if the appropriate vaccine exists.

Table 6: summary of the animals involved in the FMD outbreaks that occurred between the 24th of March and the 2nd of April 2017, in Algeria.

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Species	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	28	12	0	0	28		42.86%	0.00%	0.00%	100.00%

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

Map 7: location of the the FMD outbreaks that occurred between the 24th of March and the 2nd of April 2017, in Relizane, Medea And Bordj Bou Arreridj Algeria.

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Israel [2]

The virus detected in the eight bovine samples collected during the FMD clinical outbreak that occurred on the 4th of February 2017, on a dairy farm in the Kibutz Nir Yizhak, at Beer-Sheva, Hadarom was genotyped as O/EA-3 with a 100% seq id to those isolated in the outbreaks that occurred simultaneously in Palestinian Auton. Territories.

Jordan [1]

Four FMD outbreaks occurred between the 21st of February and 9th of March 2017, involving sheep, goats and cattle farms which are respectively located in Hamman, Al Balqa and Irib, Jordan. The diagnosis was confirmed on the 28th of February by the Animal Wealth Laboratories (National laboratory) using antigen (Ag) detection ELISA. The Veterinary College Research Laboratory, Jordan University of Science and Technology confirmed the results using in addition, the PCR test. The latter laboratory is also carrying out sequencing of the FMDV serotype O detected, results of which are still pending.

Details of the animals involved and location of the outbreaks are presented in Table 7 and Map 8.

The affected species presented fever, lameness in the small ruminants, lesions in the mouth of the cattle, drop in milk production and neonatal deaths in sheep and goat after ingestion of milk. The outbreak at Al Balqa occurred after the introduction of a new cow that was purchased at a livestock market.

All the outbreaks were reported as resolved on the 9th of April.

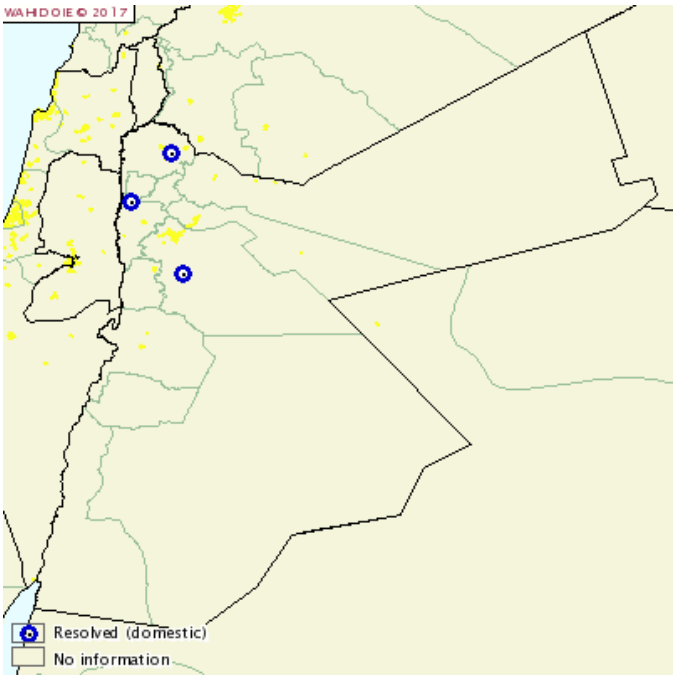
Control measures put in place are vaccination in response to the outbreaks, disinfection, quarantine, surveillance outside containment and/or protection zone, official disposal of carcasses, by-products and waste, surveillance within containment and/or protection zone and treatment of affected animals with antibiotics.

Table 7: summary of the animals involved in the FMD outbreaks that occurred between the 21st of February and 9th of March 2017, in Jordan.

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Sheep	1900	300	150	0	0	15.79%	7.89%	50.00%	7.89%
Goats	150	13	3	0	0	8.67%	2.00%	23.08%	2.00%
Cattle	35	3	0	0	0	8.57%	0.00%	0.00%	0.00%
Cattle	20	15	0	0	0	75.00%	0.00%	0.00%	0.00%
Totals	**2105**	**331**	**153**	**0**	**0**	**16.67%**	**7.27%**	**46.22%**	**7.27%**

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

Map 8: location of the FMD outbreaks that occurred between the 21st of February and 9th of March 2017, in Hamman, Al Balqa and Irib, Jordan



Pakistan [8]

The Progressive Control of Foot and Mouth Disease Project reported that 153 FMD outbreaks occurred in the country during March 2017. The distribution among the provinces of the country of the FMDV serotypes (A, ASIA 1 and O) responsible for these events is represented in and Table 8 and Map 9. The present Project has been completed in all its phases and therefore here will be no further reporting.

Vaccination in response to outbreak was also carried out within the project with the administration of 7,575 doses during March 2017. A summary of the number of interventions carried out in the different Provinces is presented in Table 9.

Table 8: Province and District distribution of FMD outbreaks with relative serotypes that occurred in Pakistan during March 2017.

Location of Outbreaks (N°)		Number of Outbreaks due to FMD Virus Serotype(s)				
Province	**District**	**'O'**	**'A'**	**'Asia-1'**	**'Mixed'**	**Un-Typed**
Sindh (23)	Karachi (5)	3	1	--	--	1
	Thatta (5)	5	--	--	--	--
	Nawab shah (1)	1	--	--	--	--
	Matiari (1)	--	--	--	--	1
	Larkana (11)	5	--	--	--	6
Federally Administered Tribal Areas (3)	Bajaur Agency (1)	1	--	--	--	--
	FR-Peshawar (1)	1	--	--	--	--
	FR-Bannu (1)	--	--	--	--	1
Khyber Pakhtunkhwa (14)	Swat (9)	7	--	--	2	--
	Peshawar (5)	1	--	--	--	4
Azad Kashmir (11)	Mirpur (9)	3	--	1	--	5
	Bhimber (2)	1	--	1	--	--
Punjab (89)	Faisalabad (12)	5	--	1	--	6
	Khanewal (13)	9	--	--	--	4
	Bhawalnagar (4)	3	--	--	--	1
	Chiniot (1)	1	--	--	--	--
	Sargodha (5)	5	--	--	--	1
	Gujrat (2)	2	--	--	--	--
	Lodhran (2)	2	--	--	--	--
	Rawalpindi (5)	1	1	--	--	3
	Sahiwal (1)	1	--	--	--	--
	Lahore (12)	7	2	1	--	2
	Sheikhupura (5)	5	--	--	--	--
	Vehari (11)	5	3	--	--	3
	Nankana (3)	--	--	--	--	3
	Gujranwala (5)	2	--	1	--	2
	Jhang (1)	1	--	--	--	--
	Kasur (2)	2	--	--	--	--
	Multan (5)	1	1	--	--	3
Islamabad Capital Territory (9)	Islamabad (9)	--	--	6	--	3
Balochistan (4)	Hub, Lasbella (4)	3	--	--	--	1
Totals (153)		80	8	11	2	52

Map 9: Location of the Districts where FMD outbreaks occurred in Pakistan during March 2017.

Table 9: Vaccination activities carried out during March 2017 in the various Provinces of Pakistan.

Province	Ring Vaccination
Sindh	2,000
Balochistan	550
Khyber Pakhtunkhwa	1,250
Punjab	2,375
Azad Kashmir	625
Islamabad Capital Territory	775
Total	**7,575**

Palestinian Auton. Territories [2]

The eight samples collected from the outbreaks that occurred during February 2017, on two cattle farms in Rafah and Jabalia, in the Gaza Strip were all sequenced as O/EA-3. As previously mentioned, seq id of these isolates was nearly complete with those responsible of the episodes that simultaneously occurred in Israel, varying from 99.7 to 100%.

Saudi Arabia [2]

Genotyping of the FMDVs serotypes, detected in eight of the 25 samples collected in the country from cattle and sheep, between October and December 2016 were respectively identified as A/ASIA/G-VI and O/ME-SA/PanAsia 2^{ANT-10}. A summary of the species, location and sequence homology of the field isolates is given in Table 10 and Map 10.

As can be noted from Table 10, the field isolates of viral belonging to O/ME-SA/PanAsia 2^{ANT-10} divide into two groups, respectively relating to location origin.

Table 10: summary of the genotyped field isolates collected in Saudi Arabia from cattle and sheep between October and December 2016.

Sample Identification	Location Origin	Species from which isolate was detected	Date of collection	Genotype	Most Closely Related Viruses not belonging to the country (Seq id %)	Host species
SAU/21/2016	Mekkah	cattle	19/10/2016	A/ASIA/G-VII	IRN/21/2015 (98.6 - 98.7)	cattle
SAU/22/2016						
SAU/24/2016						
SAU/37/2016	Kharj		29/12/2016		/	
SAU/40/2016						
SAU/41/2016						
SAU/42/2016						
SAU/27/2016	Durma	sheep	07/11/2016	O/ME-SA/PanAsia 2^{ANT-10}	BAR/1/2014 (97.8%)	cattle

Map 10: Location origin of genotyped samples collected in Saudi Arabia from cattle and sheep between October and December 2016.

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

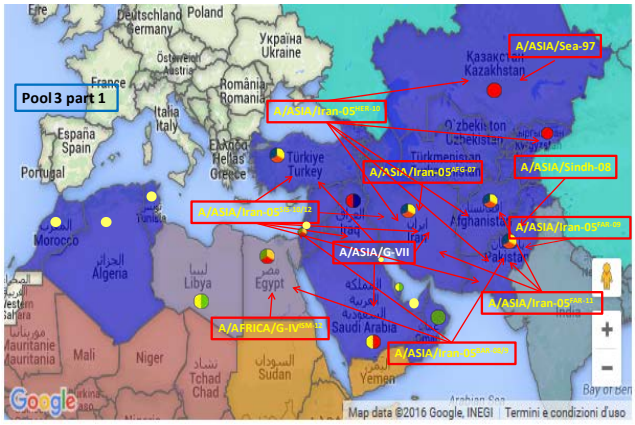
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE # see pg. 1	Comment
Afghanistan	2013-2015**/O, A, Asia 1, NOT TYPED 2012/SEROTYPE NOT REPORTED	Jul 2016/O, Jun 2016/Asia 1 & May 2016/A,	Follow –up needed
Algeria	2014 -2015**/O	Apr 2017/A, Apr 2015/O	See text
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	May-Jun 2016/ O & Sat 2, March 2016/A, Aug 2016/typing pending	Follow –up needed
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,	Dec 2013/A, O	Follow –up needed

	2012-2014/A 2015/ SEROTYPE NOT REPORTED		
Israel	2012-2015**/O	Feb 2017/O	See text Follow –up needed
Jordan	DISEASE ABSENT**	2006/A	Follow –up needed
Kazakhstan	2012/O,2012 –2013/A 2014-2015**/ DISEASE ABSENT	Jun 2013/ A & Aug 2012/O	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	Aug 2014/not typed & Apr 2013 /O, A,	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	March 2017/A, Asia 1 & O	See text
Palestine	O, 2012-2013/SAT 2	Feb 2017/O, Mar 2013/Sat 2	See text Follow –up needed
Qatar	2012-2015/O	Dec 2013/O	Follow –up needed
Saudi Arabia	2012-2014/O 2015/ NO DATA REPORTED	Oct 2016/A & April 2016/O	See text Follow –up needed
Syrian Arab Republic	DISEASE ABSENT**	2002/ A & O	Follow –up needed
Tajikistan	2012- 2013/NOT TYPED 2014-2015**/DISEASE ABSENT	Nov 2012/ not typed & Nov 2011/Asia 1,	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

Map 11: FMD distribution by serotype and topotype for West Eurasia and Middle East, 2012 – 2016 (EuFMD) - white script in map refers to new introduction of viral lineage in pool or country of the pool during 2016.

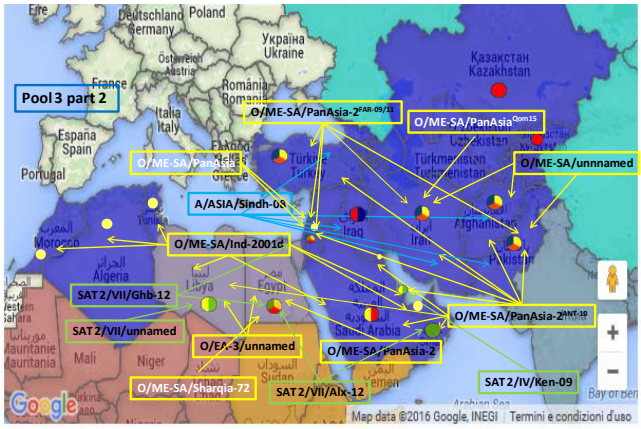
Conjectured circulating FMDV serotype A lineages in Pool 3 per 2016 [2, 17]:

- 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 - detected also in Iran in 2016)
- A/ASIA/Sea-97
- A/ASIA/Sindh-08
- A/AFRICA/G-IV
- Asia-1 (Sindh-08 lineage).



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

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



D. POOL 4 – Eastern Africa

Ethiopia [9]

The NAHDIC detected FMDV serotypes A, O and SAT 1 in the 13 of the 25 bovine, tissue (11) and probang (13) samples collected from FMD outbreaks using an antigen detection ELISA.

The laboratory has also shipped 23 samples collected over the past year to the WRLFMD,

The NAHDIC personnel were also involved in the outbreak investigation of these events supporting the field veterinarians and farmers for the choice of vaccine to employ.

Most recent viral lineages identified, belonging to 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 and SAT 1/IX/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. VMSD test results are unavailable for field isolates of the country belonging to FMDV serotype SAT 1 that was last reported in 2014.

Kenya [10]

The National FMD Reference Laboratory Embakasi, Kenya reported the detection of FMDV O (1) and SAT 1 (2) in the five bovine samples examined using antigen detection Elisa and Real time PCR.

Other FMD related actions carried out by the laboratory were vaccine potency tests, outbreak investigations and surveillance activities.

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-I and SAT 2/IV/unnamed from samples respectively collected in 2013 and 2012.

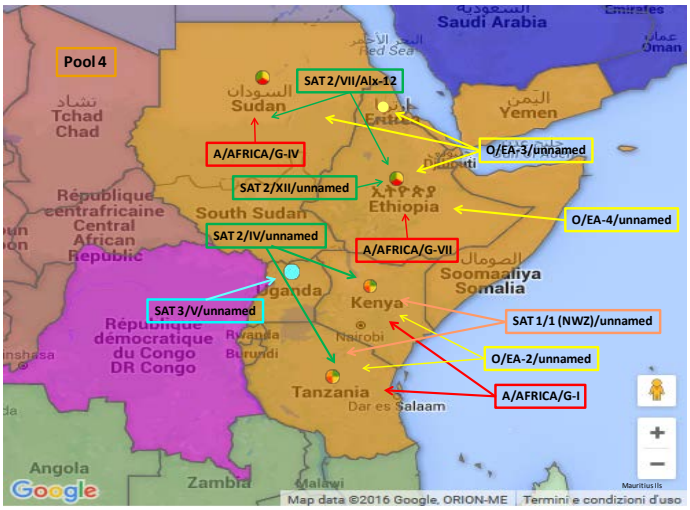
Table 12: Summary of the history of FMD Pool 4, 2012 – 2016, for geographic distribution see Map 12 below.

COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
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	May-Jun 2016/ O & Sat 2, March 2016/A, Aug 2016/typing pending	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	March 2017/ A, O & SAT 1 May 2016/SAT 2	See text
Kenya	A, O, SAT1, SAT2, 2012 – 2015 /NOT TYPED	Mar O & SAT 1, Jan 2016/ A, Oct 2015/ SAT 2	See text
Libya	NO DATA REPORTED	Oct 2013/ O, Sat 2/Apr 2012	Follow-up needed
Rwanda	2012-2013/A, O, SAT1, SAT 2	Nov 2012/not typed	Typing required
Somalia	2012-2014/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	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
Yemen	2012/O, 2013 – 2014/ DISEASE PRESENT BUT WITHOUT QUANTITATIVE DATA 2015/NO DATA REPORTED	2009/O	Follow –up needed

Map 12: FMD distribution by serotype and topotype for East Africa. 2011 – 2015 (EUFMD

East Africa is known to be endemic for FMD, but available data is at present limited.
Conjectured circulating FMDV lineages in Pool 4 per 2015 2 [2, 17]:

- 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 [13]

The Laboratoire National Vétérinaire (LANAVET), Garoua detected FMDV using RT- PCR in 142 (38.6%) out of the 368 environmental samples collected from soil and air.
Sheep sera samples (140) were tested using 3ABC non-structural protein antibodies (NSP) ELISA with 22 (15.71%) resulting positive for FMDV antibodies; 14 of these samples were positive for antibodies against serotype O. In addition, 52 bovine sera samples were also tested using the NSP ELISA with 41 resulting positive for FMDV antibodies.
LANAVET has an ongoing collaborative study with the Ohio State University and Plum Island Laboratory, USA.
Most recent 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.

Ghana [14], **Nigeria** [15] **and Senegal** [16]

No FMD outbreaks were reported during March 2017 respectively in the relative countries of the following laboratories: the National Veterinary Research Institute Vom, Nigeria, the ACCRA Veterinary Laboratory, Ghana and the Laboratoire National de l'Elevage et de Recherches Vétérinaires, Senegal, except for the collection of suspect samples by Nigeria.

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

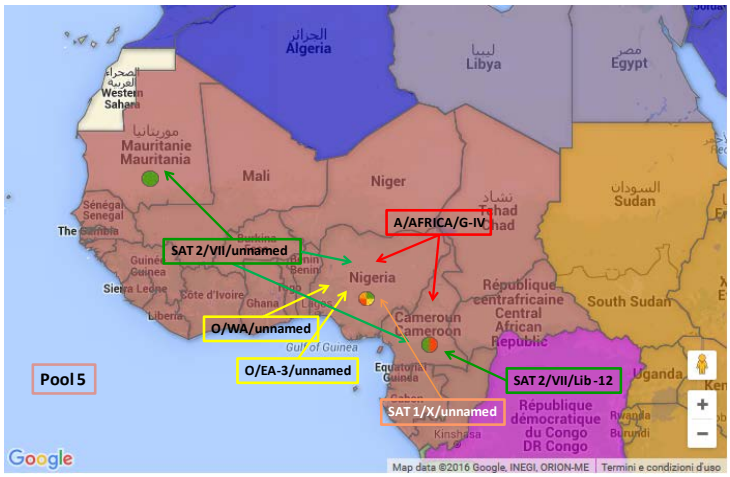
Country	FMD history FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	Last outbreak reported/serotype #see pg. 1	Comment (Genotyping would be useful for this region)
Benin	A, O, SAT 1, SAT 2	Jun 2014/O, A, SAT 1, SAT 2	Follow –up needed
Burkina Faso	DISEASE PRESENT SEROTYPES NOT REPORTED	2013/ not available	Follow –up needed
Cameroon	DISEASE PRESENT SEROTYPES NOT REPORTED	Apr -Dec 2016/serotyping pending, Jun 2014, Jan 2015 and July-Aug 2015/untyped, Nov 2014/O, SAT 2, May 2014/SAT 1, Apr 2014/ A	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	Dec 2016/ O & SAT 2 2014/not available	See text Follow –up needed
Guinea Biss.	2012-2013/DISEASE ABSENT 2014/ SEROTYPES NOT REPORTED 2015/ Disease suspected	Dec 2016/SAT1 &SAT 2	Follow –up needed
Guinea	2012-2013, 2015/ DISEASE ABSENT 2014/ SEROTYPES NOT REPORTED	2014/not available	Follow –up needed
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	Feb 2017/not typed Sept 2016/ O & SAT 1 Nov 2015/A, Sept 2014/ SAT 2	See text 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 2, 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 13: FMD distribution by serotype and topotypes for West Africa, 2012 – 2015 (EuFMD) - white script in map refers to new introduction of viral lineage in pool or country of the pool during 2016.

Conjectured circulating FMDV lineages in Pool 5 per 2016 [2, 17]

- Serotype O (topotypes WA, EA-3 (Nigeria))
- Detection of a new viral lineage, SAT 1/X/unnamed in 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

Mozambique[1]

FMD outbreaks due to serotype SAT 2, that started in September 2016 in Maputo and Gaza provinces, are still ongoing. The area where the outbreaks are occurring is facing a severe drought, which is causing the uncontrolled movement of cattle that are coming in contact with possible wild infected animals at main watering points. For this, control measures are still in place represented by movement control inside the country, disinfection, traceability, quarantine, surveillance within containment and/or protection zone and vaccination employing Aftovax SAT 1 and SAT 2, in response to outbreaks with the immunization of 2,518 cattle in Gaza and 12,121 cattle in Maputo.

Republic of South Africa [12]

The ARC- Onderstepoort Veterinary Institute serotyped the virus responsible for the outbreak that occurred on the 1st of March 2017 on a cattle farm in Mpumalanga FMDV as SAT2, using virus isolation and typing ELISA. Twenty-one of the 82 samples examined were positive for FMDV. Sequencing PCRs were performed and the genotyping results will shortly be available.

The laboratory also examined 6,297 serum samples using liquid-phase blocking ELISA for the detection of FMDV serotypes SAT 1, SAT 2 and SAT 3 and 647 sera using FMD NSP ELISA. The ARC-Onderstepoort Veterinary Institute is continuing its collaboration with international organisations on research projects.

The FMD research group, led by Dr Francois Maree, is involved in an international research project funded by Ecology and Evolution of Infectious Diseases program of the National Science Foundation, together with researchers from the UK and USA, investigating the ecological and evolutionary mechanisms in FMDV persistence in buffalo. During the reporting period, sampling was performed on buffalo herds (n=64) in the Kruger National Park (KNP) and probang and tonsillar crypt samples (n=560) were subjected to virus isolations.

The laboratory also has collaborations with the WRLFMD, Oregon State University, SANParks and State Veterinary Services, KNP on the ecological and evolutionary mechanisms in foot-and-mouth disease virus persistence in buffalo.

Zimbabwe[1]

Six new outbreaks due to FMDV serotype 2 occurred between the 6th of January and the 22nd of March 2017, on cattle farms of Matabeleland North and Midlands.

The present outbreaks were due to the illegal movement of animals and the infection is continuing its spread in Gokwe South and Nkayi districts, within communal areas where cattle share the same grazing and watering points. Previously, vaccination campaigns were not carried out due to lack of resources to procure FMD vaccine however, they are currently being conducted with the immunization of 1000 heads, with a 28 day booster to follow. The three infected districts are still under quarantine measures to limit the spread of infection. In addition, veterinary check-

points/roadblocks were placed on major roads leading into and out of the infected districts and awareness campaigns are on-going in the area as are also weekly inspections in the infected and neighbouring areas.
Summary of the animals involved and location of outbreaks are presented in Table 14 and Map 14.
Control measures adopted are the following: movement control inside the country, traceability, quarantine, surveillance outside containment and/or protection zone, vaccination if available. Vaccination

Table 14: summary of the animals involved in the FMD outbreaks that occurred 6th of January and the 9th of March on cattle farms of Matabeleland North and Midlands, Zimbabwe.

Species	Susceptible	Cases	Deaths	Destroyed	Slaughtered	Apparent morbidity rate	Apparent mortality rate	Apparent case fatality rate	Proportion susceptible animals lost*
Cattle	11,424	194	32	0	0	1.70%	0.28%	16.49%	0.28%

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

Map 14: Location of the FMD outbreaks that occurred between January and March 2017 in Matabeleland North and Midlands, Zimbabwe.

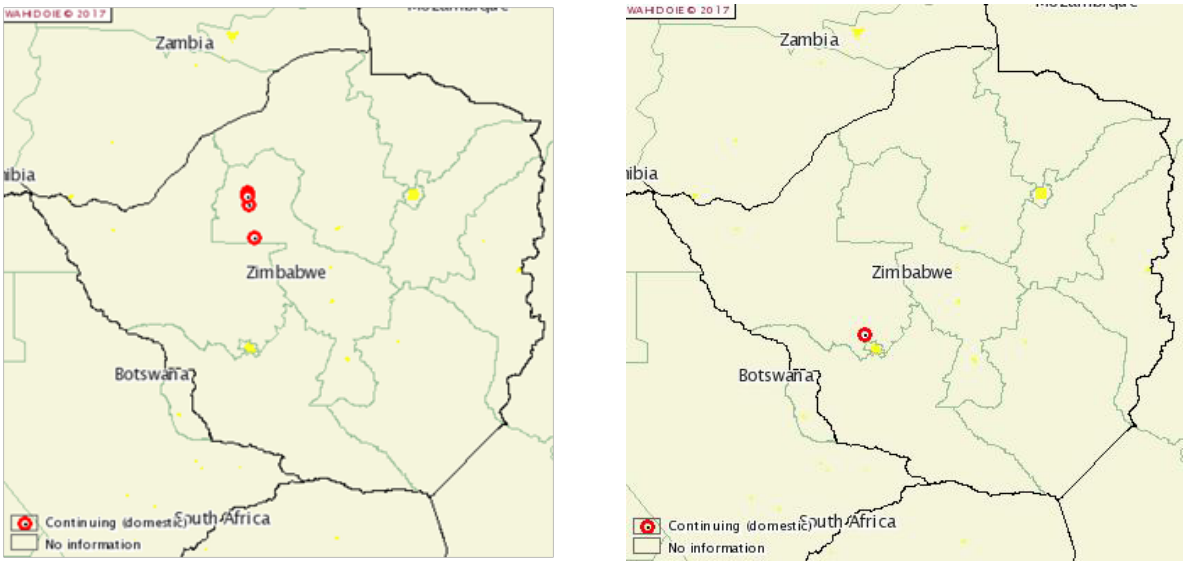


Table 15: Summary of the history of FMD Pool 6, 2012 – 2016, for geographic distribution see Map 15 below.

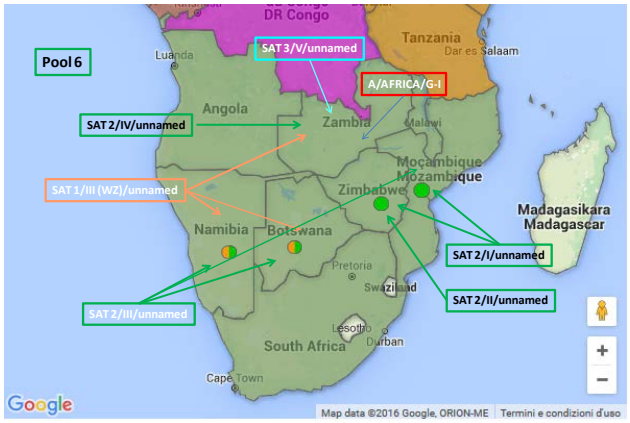
COUNTRY	FMD HISTORY FMDV serotypes, reported to OIE in 2012 – 2015 **(1st semester)	LAST OUTBREAK REPORTED/SEROTYPE #see pg. 1	Comment
Angola	2012/DISEASE SUSPECTED BUT NOT CONFIRMED 2013-2014/ DISEASE ABSENT 2015/ SEROTYPES NOT REPORTED	July 2015/ SAT 2 April 2016/typing pending	Follow –up needed
Botswana	2012-2015/SAT 2 2014-2015/SAT 1	Jun 2015/typing pending July 2015/SAT 2, June 2015/SAT 1	Follow –up needed
Congo D. R.	2012 – 2015/A, O, SAT 1	Jun 2013/not typed	Follow –up needed
Malawi	2012/NO REPORTED OUTBREAKS	Oct 2011,	Follow –up needed

	2013-2015/ NO DATA AVAILABLE	Sep 2015/SAT 1	
Mozambique	2012 -2013/DISEASE ABSENT, 2014/ SEROTYPES NOT REPORTED 2015/ NO DATA AVAILABLE	Dec 2016/SAT 2, Sep 2016/ Typing pending, May 2015/ SAT 1	See text 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	Feb 2017/SAT 2 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	Mar 2017/SAT 2, Aug 2015/ SAT 1, Jun 2013/SAT 3	See text Follow –up needed

Map 15: FMD distribution by serotype and topotype for Southern Africa, 2012 – 2015 (EuFMD)

Swaziland and Lesotho are free from FMD without vaccination. There is a zone in both Botswana and Namibia, which has been FMD free without vaccination, since 2010 and 1997 respectively.
Conjectured circulating FMDV lineages in pool 6 per 2015 [2, 17]:

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



G. POOL 7 – South America

South America [1, 12]

The OIE FMD status of the countries in South America as reported in May 2016 is presented in Map 16.
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 16). The FMD history between 2012 –2015 is reported in Table 16. In fact, during the OIE/FAO FMD Laboratory Meeting held in November 2016, PANAFTOSA reported data for historical FMD outbreaks that occurred in Venezuela in 2013, these now represent the most recent confirmed FMD cases in South America.

Map 16: FMD status for South America [1]

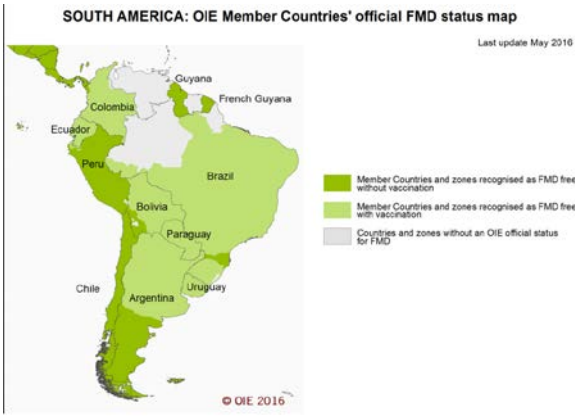


Table 16: Summary of the history of FMD Pool 16, 2012 – 2015, for geographic distribution see Map 16 below.

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 2013/ A	National situation needs verification

IV. OTHER NEWS:

[2]The 1st WRLFMD Quarterly Report for the period January – March 2017 published the table below (Table 17) 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 17: Recommendations from WRLFMD® on FMD virus strains to be included in FMDV antigen banks (for FMD-free countries).

Note: Virus strains are NOT listed in order of importance

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

March 2017:

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)* Asia 1 Shamir A Iran-05 *(or A TUR 06)* A22 Iraq A24 Cruzeiro O BFS or Campos SAT 2 Saudi Arabia *(or equivalent i.e. SAT 2 Eritrea)*
Medium Priority	A Eritrea-98‡ 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

Note: 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 vaccines supplied by international manufacturers for this viral lineage.

‡Antigenic-matching for the A/AFRICA/G-IV isolates collected from the recent field outbreaks in Algeria is currently underway. In the meantime, historical data generated for representative viruses from this lineage indicates that A-Eritrea-98 provides a closer antigenic match - in comparison to other serotype A vaccines such as A22, A-Iran-05 or A-Tur-06.

V. REFERENCES - Superscripts

1. WAHID Interface – OIE World Animal Health Information Database http://web.oie.int/wahis/public.php?page=home
2. World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD), www.wrlfmd.org.
3. Lanzhou Veterinary Research Institute, China (OIE/FAO Reference Laboroatory) - *Dr. Yamin Li*.
4. http://www.ncah.gov.bt/newsdetail.php?ID=309
5. Project Directorate on Foot and Mouth Disease (PD-FMD), Indian Council of Agricultural Research, Mukteswar, India - *Dr. S. Saravanan*.
6. National Foot and Mouth Disease and TADS Laboratory, Nepal - *Dr. Sharmila Chapagain*.
7. Istituto Zooprofilattico Sperimentale della Lombardia ed Emilia Romagna (IZSLER), Brescia, Italy (OIE/FAO FMD Reference Laboratory) – *Dr. Emiliana Brocchi.*

8. Progressive Control of Foot and Mouth Disease in Pakistan, - *Dr. Manzoor Hussain*, National Project Director and *Dr. Muhammad Afzal*, Project Coordinator.
9. National animal health diagnostic and investigation center (NAHDIC), Ethiopia - *Dr. Daniel Gizaw.*
10. National FMD Reference Laboratory, Embakasi, Kenya - *Dr. Abraham Sangula, Dr. Kenneth Ketter*.
11. ARC -Onderstepoort Veterinary Institute, Republic of South Africa - *Dr F. Maree, Dr L. E. Heath/Ms E. Kirkbride*.
12. 44a Reunión Ordinaria de la Comisión Sudamericana para la Lucha contra la Fiebre Aftosa - 6 – 8 March 2017, Rio de Janeiro, Brasil.
13. Laboratoire National Vétérinaire (LANAVET) - Garoua, Cameroon - *Dr. Simon Dickmu Jumbo*.
14. FMD Research Centre, Virology Research Department, National Veterinary Research Institute, Vom, Plateau State, Nigeria - *Dr. Ularamu Hussaini.*
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. OIE/FAO FMD Reference Laboratory Network, Annual Report 2015