



WRLFMD Quarterly Report

April-June 2014

Reference Laboratory Contract Report

Foot-and-Mouth Disease



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Summary of samples tested and reported FMD outbreaks

ASIA

Afghanistan

A batch of 21 samples, collected in 2013, was received to WRLFMD. Four samples were identified as **FMDV type O** (ME-SA/PanAsia-2^{ANT-10}), nine as **FMDV type A** (ASIA/Iran-05^{FAR-11}), four as FMDV-GD and five as NVD. One sample (AFG/4/2013) contained both FMDV O and A.

Iran

A batch of 31 samples, collected in 2013 and 2014, was received. **FMD type O** viruses was isolated from seven samples (five belonged to ME-SA/PanAsia-2^{FAR-09} and two belonged to an unnamed ME-SA lineage). **FMD type A** was isolated from 18 samples; all belonged to the ASIA toptotype, Iran-05 lineage (13 belonged to SIS-10 sub-lineage, two to the FAR-09 sub-lineage and three to the FAR-11 sub-lineage). A single **FMD Asia 1** virus was isolated and identified as belonging to the Sindh-08 lineage. Two samples were FMDV-GD and three NVD.

Mongolia

On 06/03/2014 **FMD type O** was reported in cattle and sheep in Khuliin dersen us, Eldev bag, Dalanjargalan soum, Dornogovi. No genotyping has been reported.

People's Republic of China

An outbreak of **FMD type O** was reported on 03/04/2014 cattle in Zhoutang village, Yingtan, Jiangxi. No genotyping has been reported.

Russian Federation

Between 17th and 28th May 2014 seven outbreaks of **FMD type O** were reported in pigs in various locations within Spassky, Primorskiy Krai. Genotyping of one virus isolate at FGI-ARRIAH showed it to belong to the SEA toptotype, Mya-98 lineage (see below).

Turkey

A batch of 33 samples was received from the SAP Institute in Ankara. **FMD type O** viruses were isolated from 10 samples and genotyped as ME-SA/PanAsia-2^{FAR-09}. **FMD type A** viruses were isolated from 15 samples and genotyped as ASIA/Iran-05^{SIS-10}. **FMD type Asia 1** viruses were isolated from two samples and genotyped as the Sindh-08 lineage.

AFRICA

Botswana

An outbreak of **FMD type SAT 1** was reported in cattle on 19/06/2014 at Mohembo, Shakawe, Ngamiland. Genotyping with VP1 sequences determined at the Botswana Vaccine Institute showed the virus to belong to toptotype III (WZ) but not to be closely related to other SAT 1 sequences held the WRLFMD database (see below). Contact with wildlife species was suspected as the origin of infection.

Egypt

A batch of 31 samples was received. **FMD type O** viruses were isolated from 11 samples and genotyped as EA-3 toptotype. **FMD type A** viruses were isolated from two samples and genotyped as ASIA/Iran-05^{BAR-08}. **FMD type SAT 2** were isolated from three samples and genotyped as toptotype VII. Twelve samples were FMDV-GD and three were NVD.

Ethiopia

A batch of 60 samples was received. **FMD type O** was isolated from 33 samples (two collected in 2003/2004 and the remainder collected between 2012 and 2013) and genotyped as EA-3 (n= 27) or EA-4

(n=6). **FMD type A** was isolated from two old samples (collected in 2000/2001) and genotyped as AFRICA/G-VII. **FMD type SAT 2** was isolated from two samples collected in 2009/2010 and genotyped as topotype XIII. Six samples were FMDV-GD and seven were NVD.

Nigeria

A batch of 42 samples were received from Nigeria (collected from cattle between 2011 and 2014). Seven **FMD type O** viruses belonged to the WEST AFRICA (WA) topotype and three to the EAST AFRICA 3 (EA-3) topotype. Nine **FMD type A** viruses belonged to the AFRICA topotype, G-IV lineage and 13 **type SAT 2** viruses belonged to the VII topotype. Two of these viruses (NIG/8/2011 and NIG/10/2011) contained both type O (EA-3) and type SAT 2. FMDV genome was detected in a further eight samples and four were NVD.

Tunisia

Between 25th April and 23rd June 2014, 98 outbreaks of **FMD type O** were reported in cattle, sheep and goats in 18 of the 24 governorates. VP1 sequencing of two virus isolates at the Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna (IZSLER) showed them to belong to the ME-SA topotype, Ind-2001d lineage and to be most closely related to recent viruses from Libya (see below) as well as other related outbreaks in the Middle East.

Zimbabwe

During April 2014, three outbreaks of **FMD SAT 1** were reported in cattle in Rutenga, Mwenezi, Masvingo. All three outbreaks occurred in adjoining farms close to a wildlife conservancy with wild buffaloes. There was evidence of fence breakages on the conservancy perimeter fence which may have resulted in mixing of cattle and buffaloes. Infection is likely to have spread from Alko ranch to Fauna and Kayalami through cattle to cattle contact. No genotyping has been reported.

SOUTH AMERICA

No new outbreaks of FMD were reported in the region.

Uncharacterised FMD viruses

A number of outbreaks have occurred where samples have not been sent to the WRLFMD. It is probable that the countries involved have performed their own genetic characterisation; however, through the OIE/FAO laboratory network we would also like to encourage the submission of samples (or complete VP1 sequences) to the WRLFMD.

An up-to-date list and reports of FMD viruses characterised by sequencing can be found at the following website: http://www.wrlfmd.org/fmd_genotyping/2014.htm.

Results from samples received at WRLFMD (status of samples being tested) are shown in Table 1 and a complete list of clinical sample diagnostics made by the WRLFMD between April and June 2014 is shown in Annex 1 Table A. A record of all samples received to IAH-Pirbright (April to June 2014) is shown in Annex 1 Table B.

Table 1: Status of sequencing of samples received by the WRLFMD from April to June 2014.

WRLFMD Batch No.	Date received	Country	Serotype	No. of samples	No. of sequences	Sequencing status
WRLFMD/2014/00004	10/02/2014	Afghanistan	O	4	4	Completed*
WRLFMD/2014/00004	10/02/2014	Afghanistan	A	9	9	Completed*
WRLFMD/2014/00006	05/02/2014	Iran	O	7	7	Completed*
WRLFMD/2014/00006	05/02/2014	Iran	A	18	18	Completed*
WRLFMD/2014/00006	05/02/2014	Iran	Asia 1	1	1	Completed*
WRLFMD/2014/00012	21/03/2014	Turkey	O	10	10	Completed*
WRLFMD/2014/00012	21/03/2014	Turkey	A	15	15	Completed*
WRLFMD/2014/00012	21/03/2014	Turkey	Asia 1	2	2	Completed*
WRLFMD/2014/00013	27/02/2014	Ethiopia	O	33	33	Completed*
WRLFMD/2014/00013	27/02/2014	Ethiopia	A	2	2	Completed*
WRLFMD/2014/00013	27/02/2014	Ethiopia	SAT 2	2	2	Completed*
WRLFMD/2014/00016	11/04/2014	Nigeria	O	10	10	Completed
WRLFMD/2014/00016	11/04/2014	Nigeria	A	9	9	Completed
WRLFMD/2014/00016	11/04/2014	Nigeria	SAT 2	13	13	Completed
WRLFMD/2014/00017	23/04/2014	Egypt	O	11	11	Completed
WRLFMD/2014/00017	23/04/2014	Egypt	A	2	2	Completed
WRLFMD/2014/00017	23/04/2014	Egypt	SAT 2	3	3	Completed
WRLFMD/2014/00019	07/05/2014	Cameroon	Pending			Pending
WRLFMD/2014/00020	28/05/2014	Hong Kong SAR	O	1		Pending
WRLFMD/2014/00021	22/05/2014	Pakistan	Pending			Pending
WRLFMD/2014/00022	19/06/2014	Thailand	Pending			Pending
WRLFMD/2014/00023	19/06/2014	Laos	Pending			Pending
WRLFMD/2014/00024	19/06/2014	Cambodia	Pending			Pending
				152	151	

*, received during the first quarter of 2014

Detailed Analysis:

ASIA

Afghanistan

WRLFMD/2014/00004

Date received: 10/02/2014

No. of samples: 21

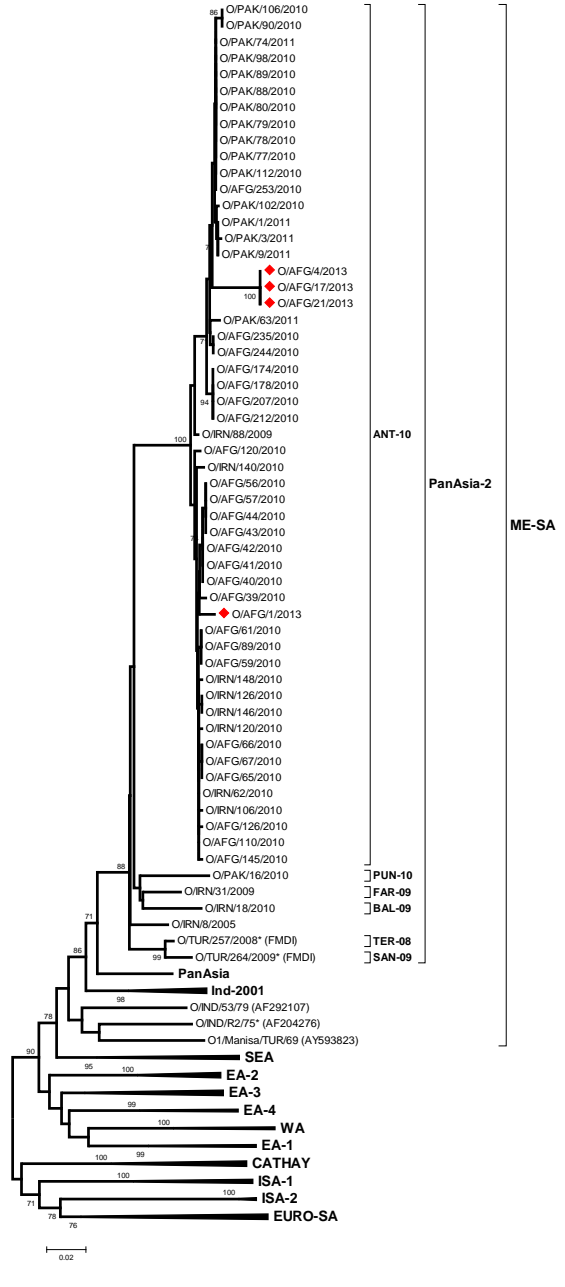
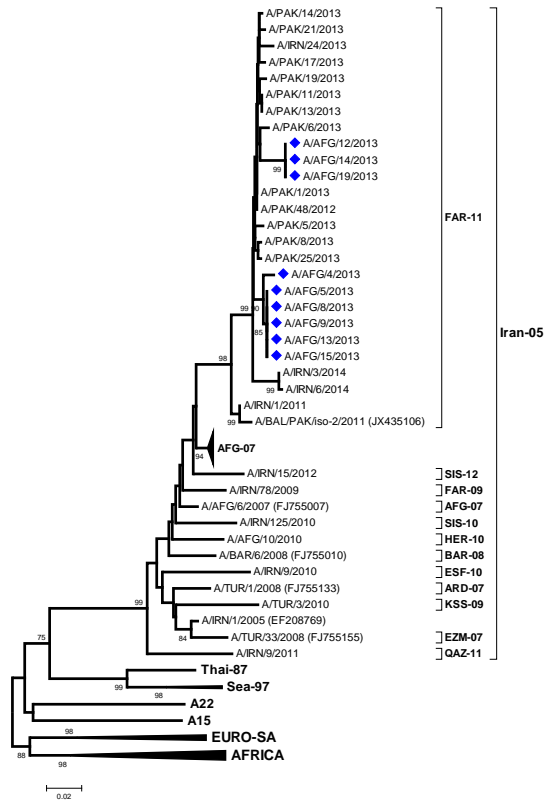
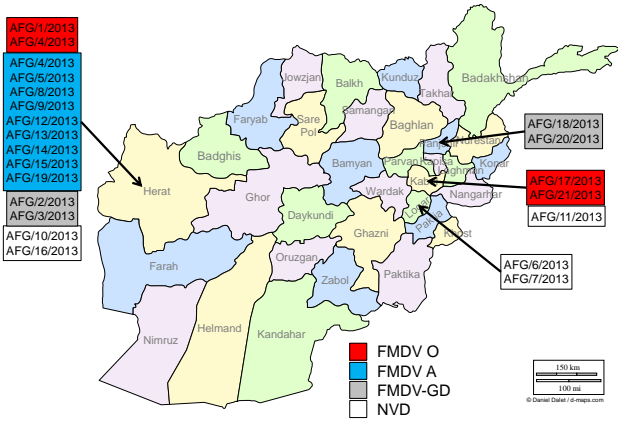
O (ME-SA/PanAsia-2^{ANT-10}): 4*

A (ASIA/Iran-05^{FAR-11}): 9*

FMDV-GD: 4

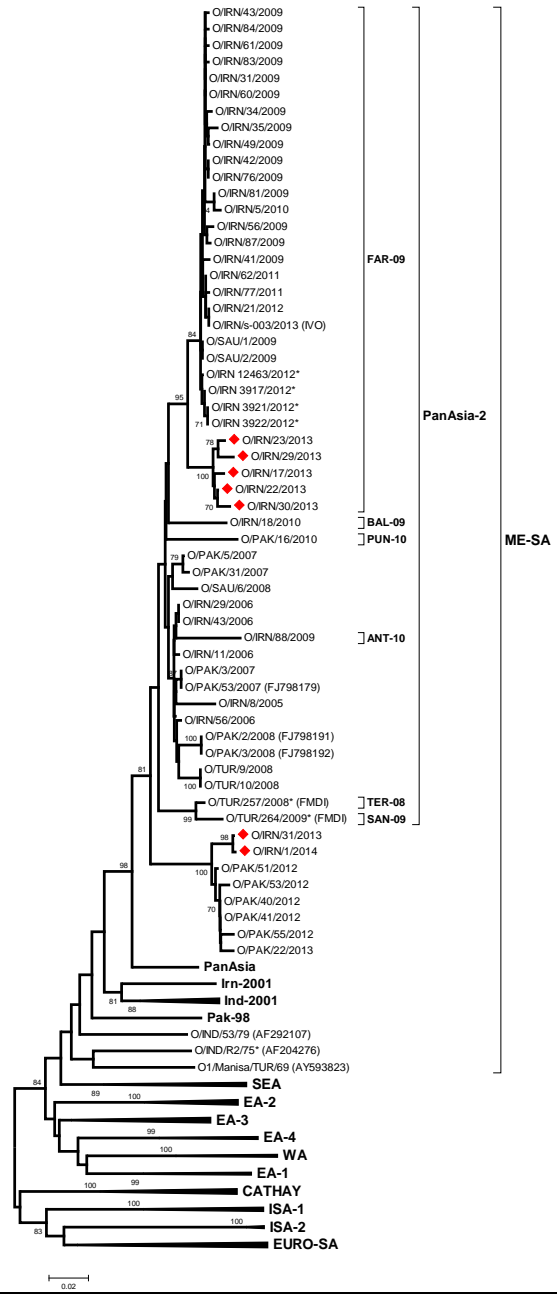
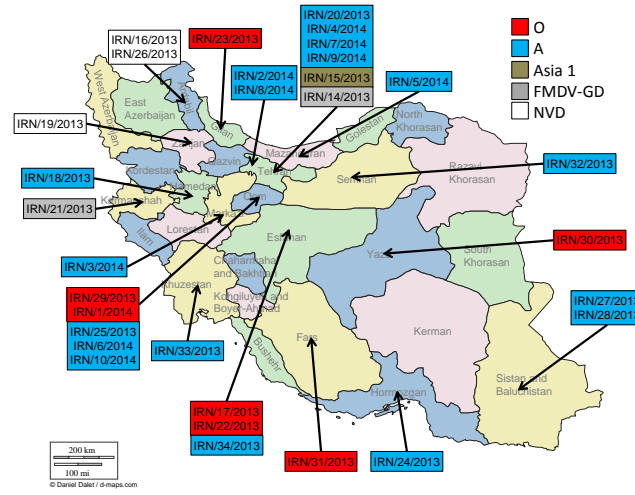
NVD: 5

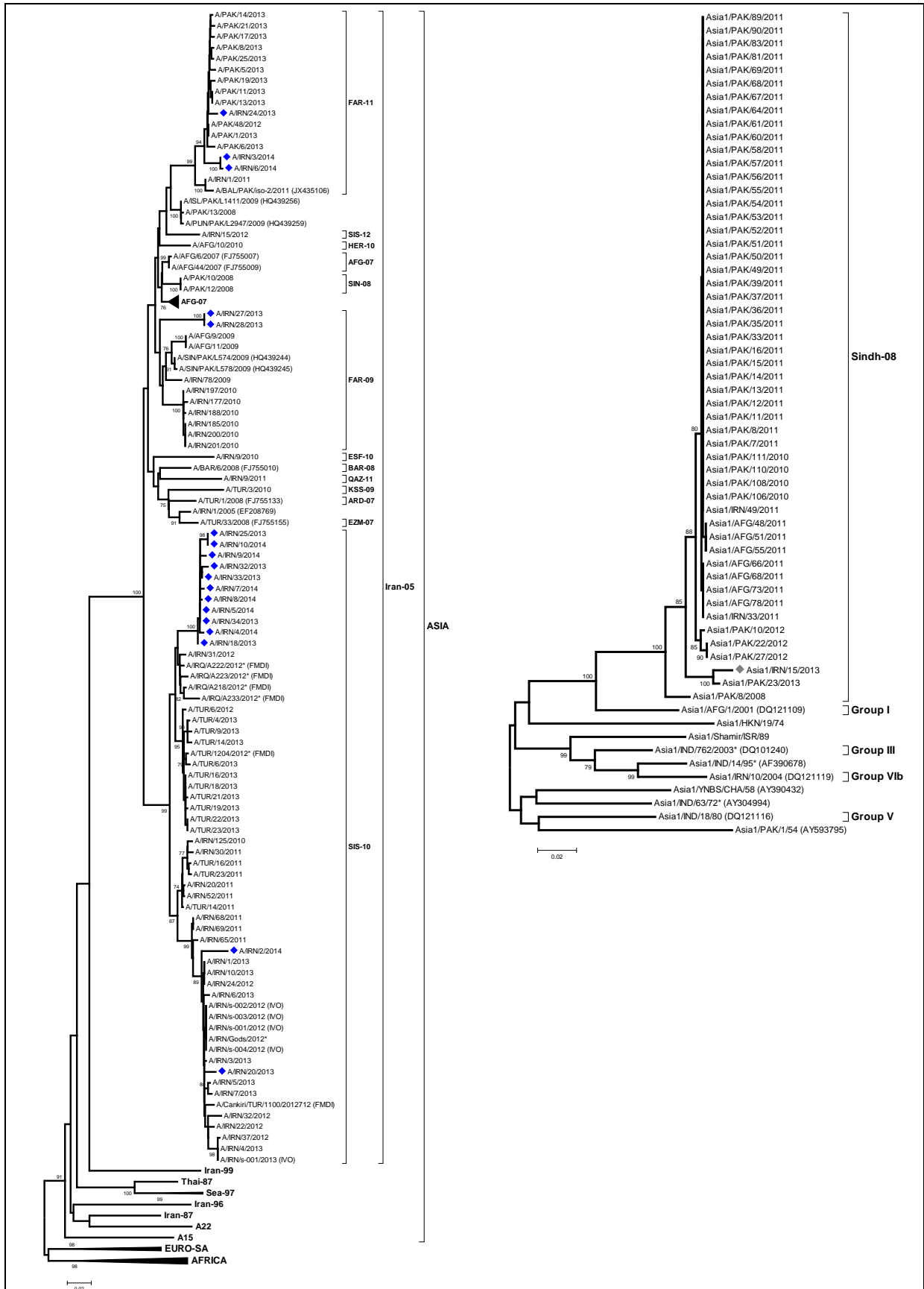
*, one sample (AFG/4/2013) contained both FMDV O and A.



Iran

WRLFMD/2014/00006
 Date received: 05/02/2014
 No. of samples: 31
 O (ME-SA/PanAsia-2^{FAR-09}): 5
 O (ME-SA/unnamed): 2
 A (ASIA/Iran-05^{SIS-10}): 13
 A (ASIA/Iran-05^{FAR-09}): 2
 A (ASIA/Iran-05^{FAR-11}): 3
 Asia 1 (Sindh-08): 1
 FMDV-GD: 2
 NVD: 3





Russian Federation

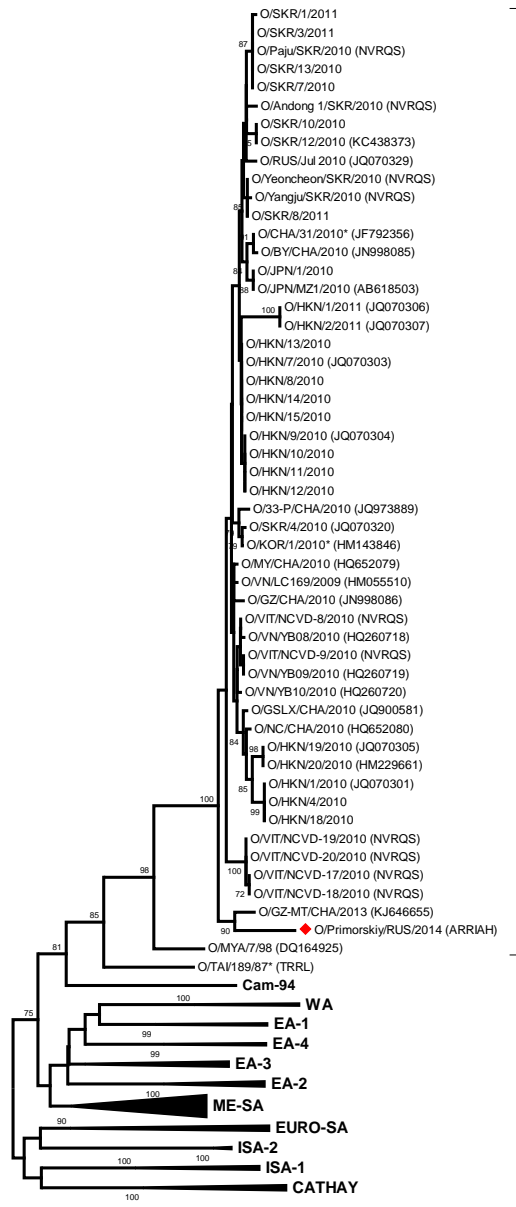
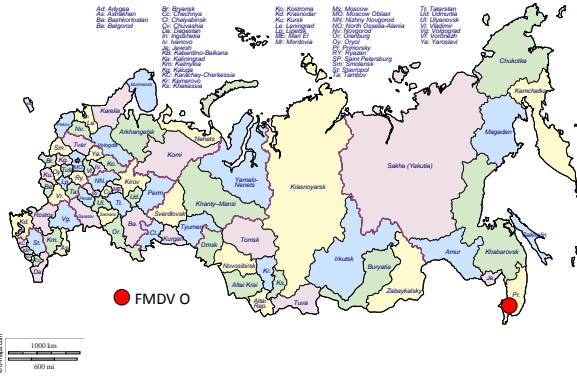
WRLMEG/2014/00013

Date received: 10/06/2014

No. of sequences: 1

O (SEA/Mya-98): 1

VP1 sequence received from: FGI-ARRIAH.



Mya-98

SEA

Turkey

WRLFMD/2014/00012

Date received: 21/03/2014

No. of samples: 33

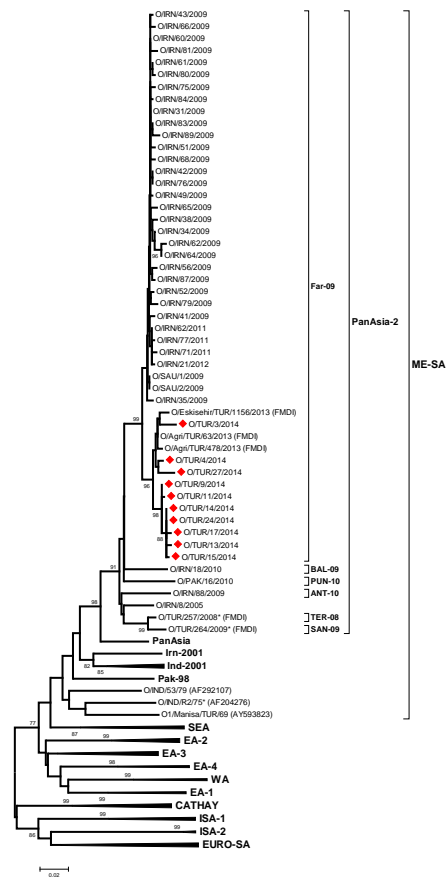
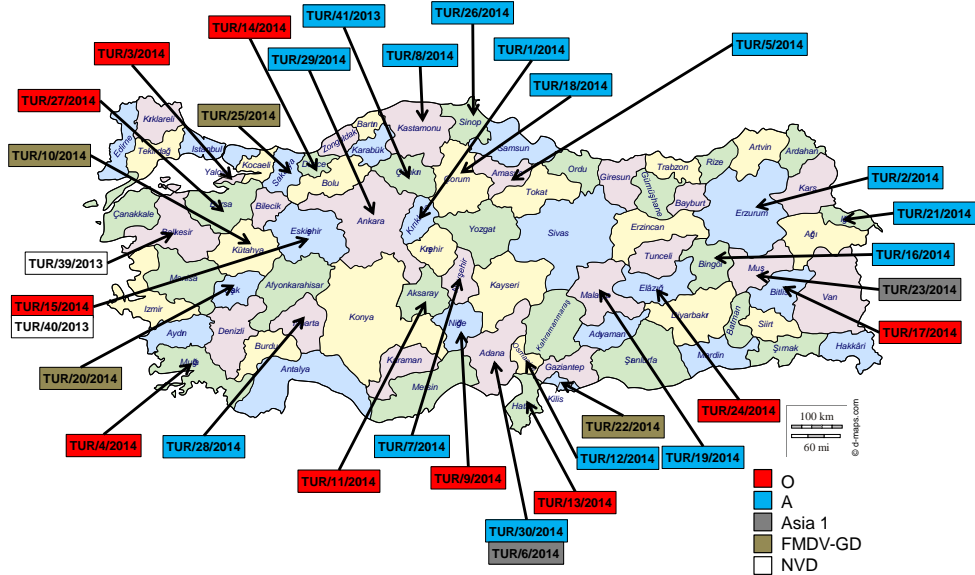
O (ME-SA/PanAsia-2^{FAR-09}): 10

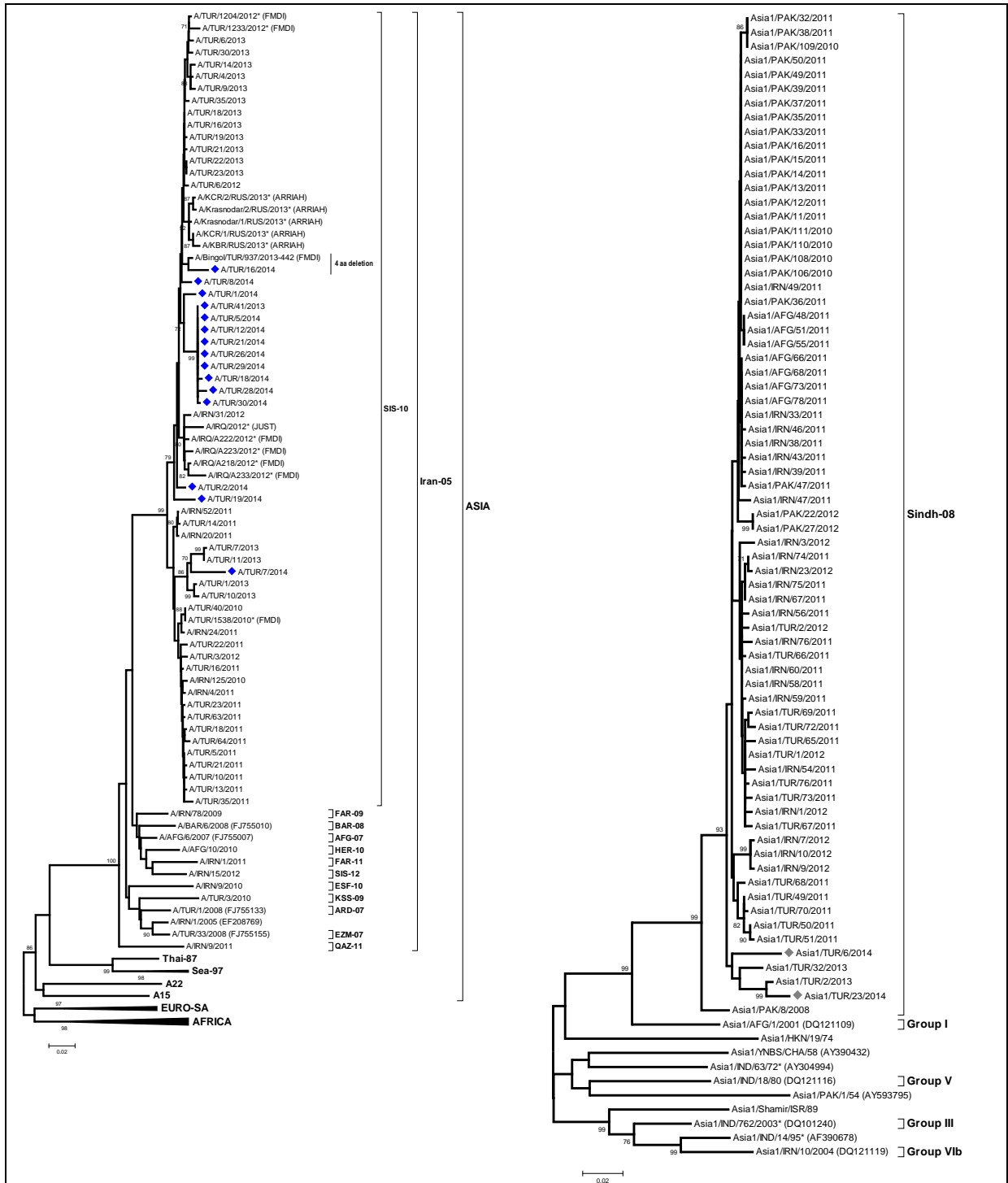
A (ASIA/Iran-05^{SIS-10}): 15

Asia 1 (Sindh-08): 2

FMDV-GD: 4

NVD: 2





AFRICA

Botswana

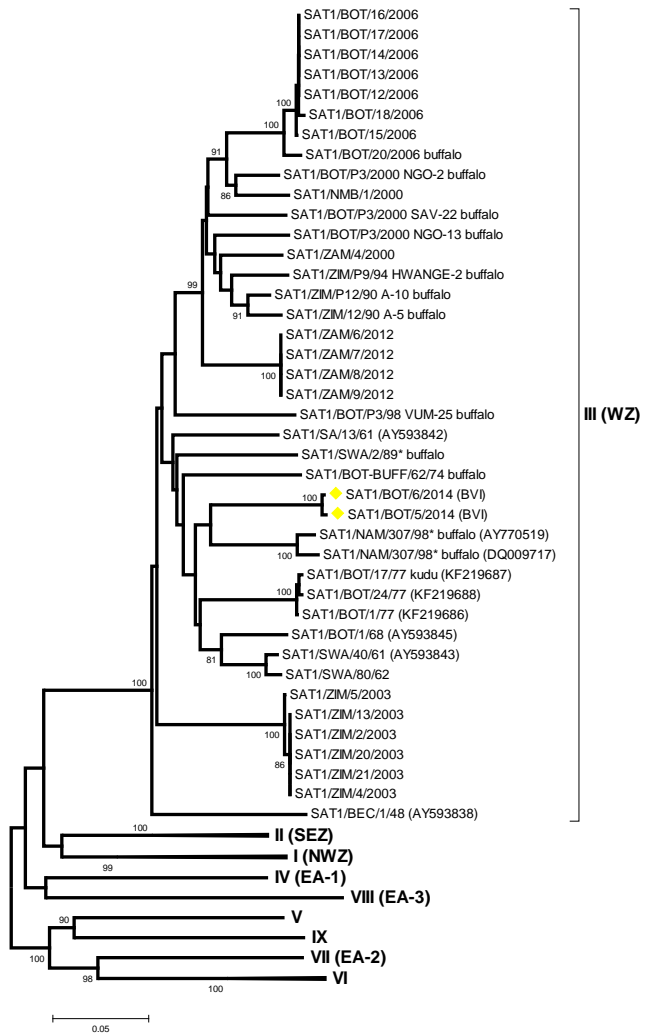
WRLMEG/2014/00016

Date received: 30/06/2014

No. of sequences: 2

SAT 1 (III): 2

VP1 sequences received from: Botswana Vaccine Institute.



Egypt

WRLFMD/2014/00017

Date received: 23/04/2014

No. of samples: 31

O (EA-3): 11

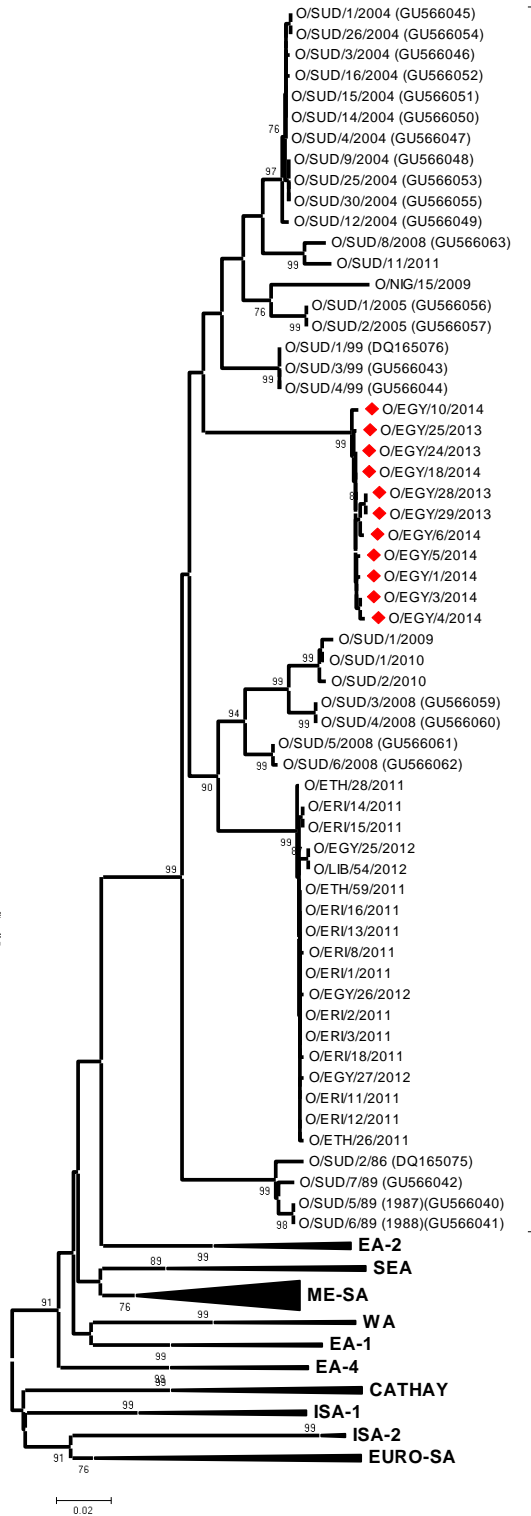
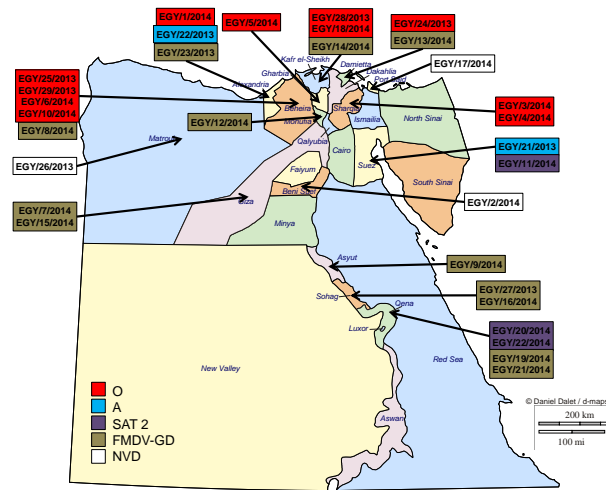
A (ASIA/Iran-05^{BAR-08}): 2

SAT 2 (VII): 3

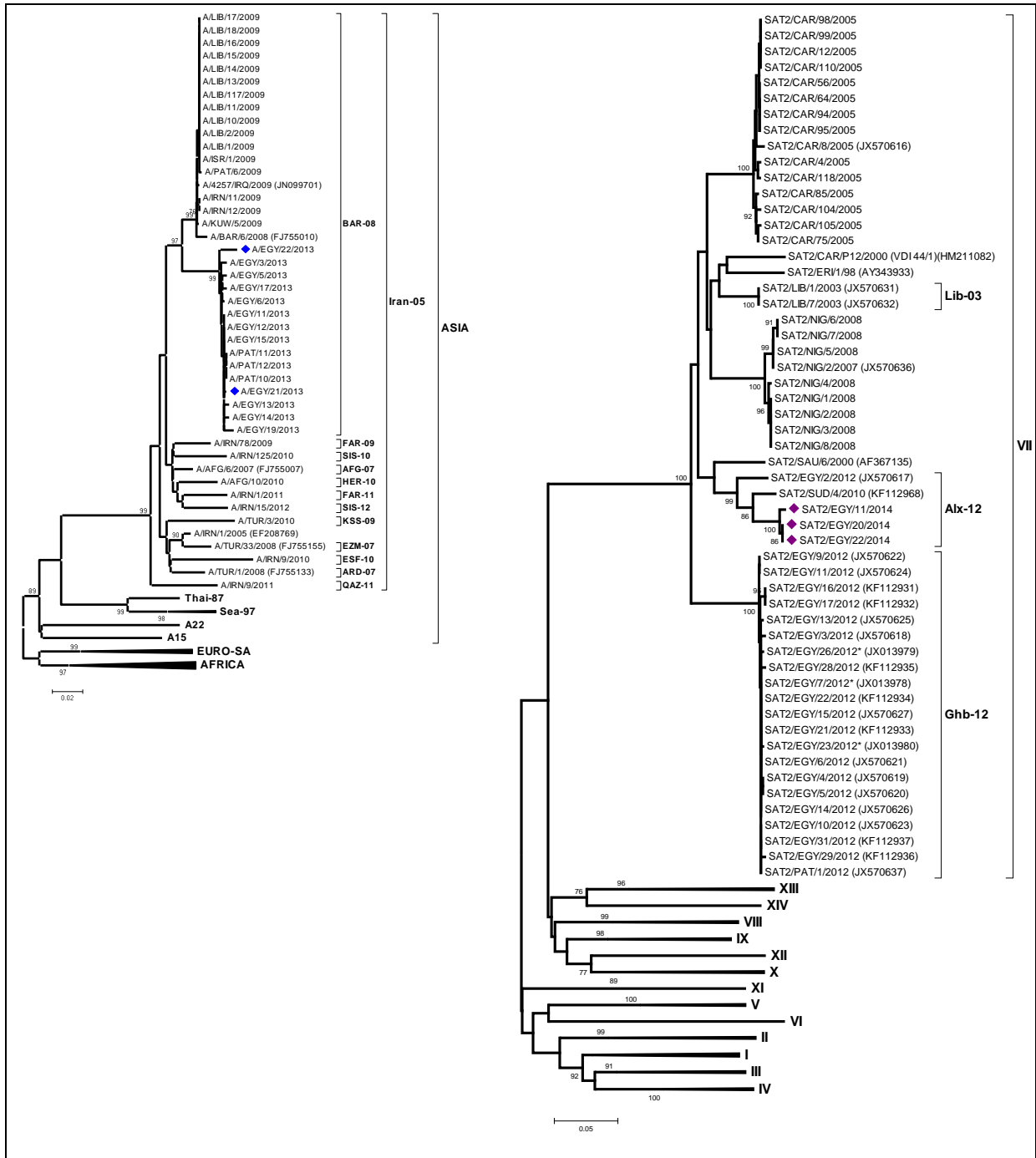
FMDV-GD: 12

NVD: 3

Phylogenetic trees show relationships for serotype O (this page), and serotypes A and SAT 2 (following page).

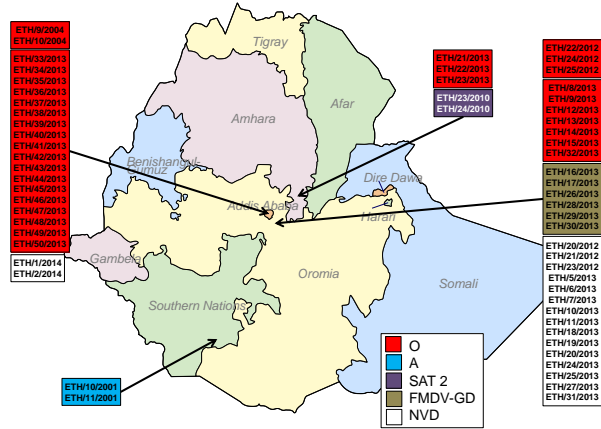


EA-3

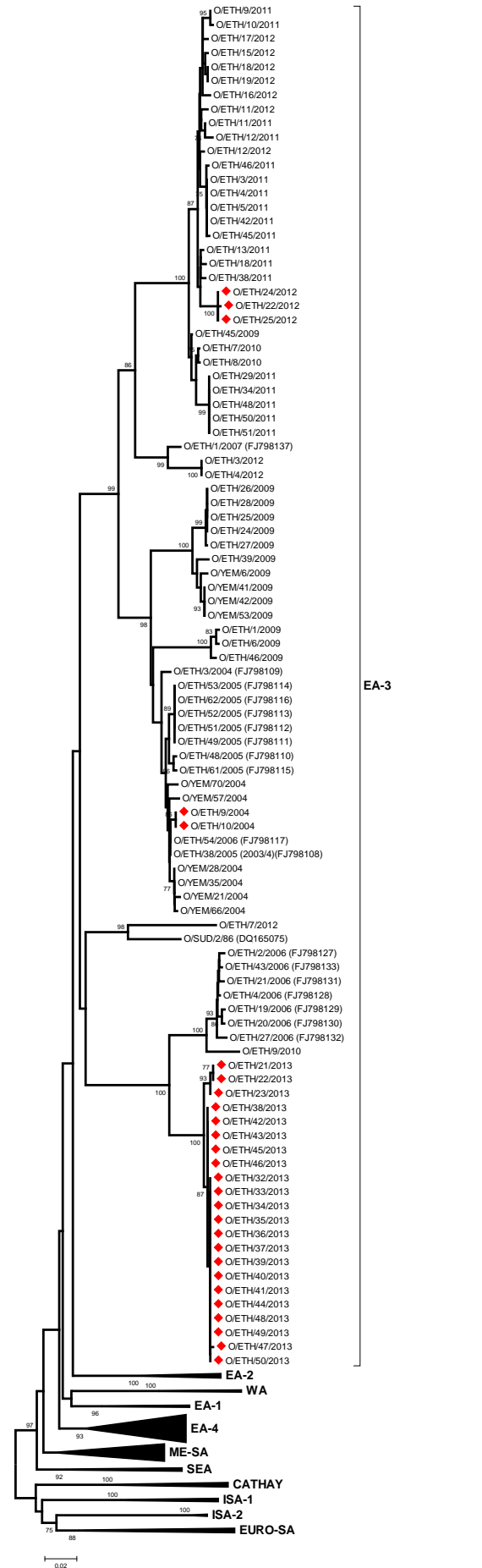
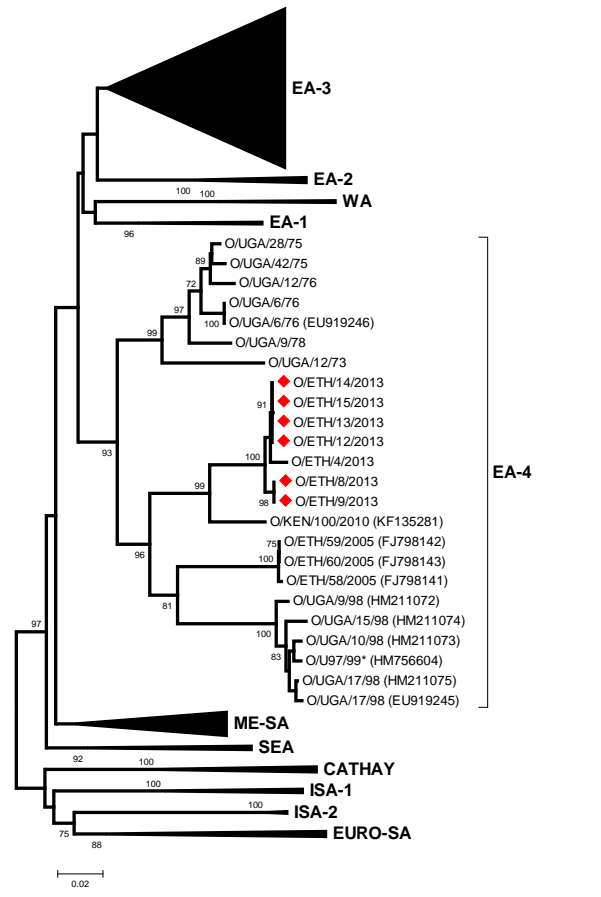


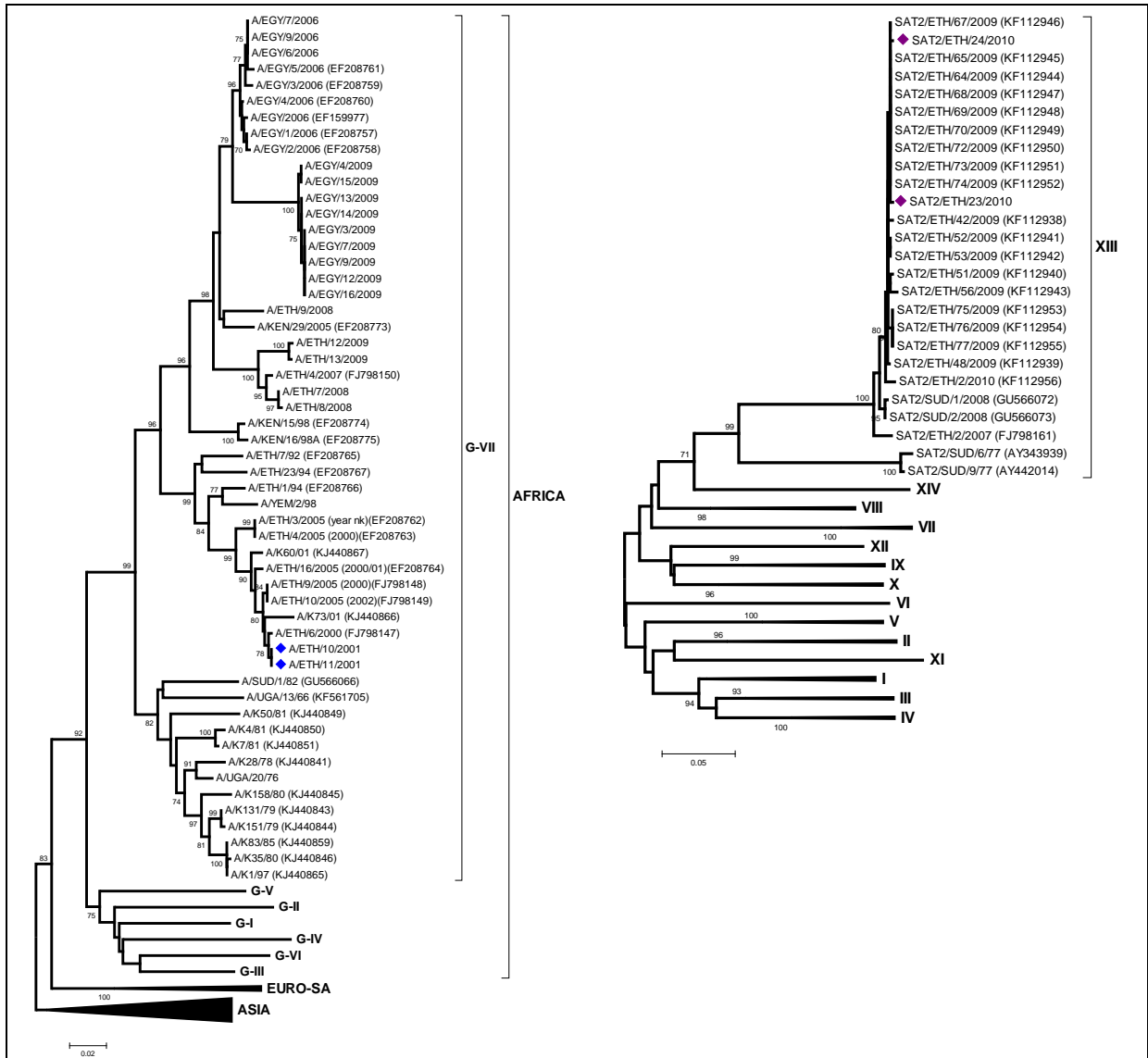
Ethiopia

WRLFMD/2014/00013
 Date received: 27/02/2014
 No. of samples: 60
 O (EA-3): 27
 O (EA-4): 6
 A (AFRICA/G-VII): 2
 SAT 2 (XIII): 2
 FMDV-GD: 6
 NVD: 17



Phylogenetic trees show relationships for serotype O (this page: EA-3 and EA-4), and serotypes A and SAT 2 (following page).





Nigeria

WRLFMD/2014/00016

Date received: 11/04/2014

No. of samples: 42

O (WA): 7

O (EA-3): 3*

A (AFRICA/G-IV): 9

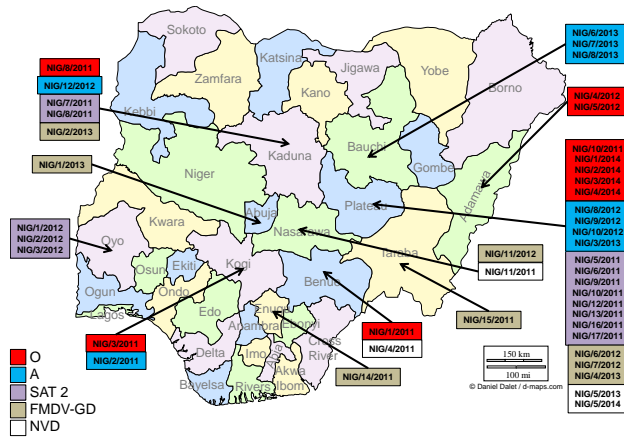
SAT 2 (VII): 13*

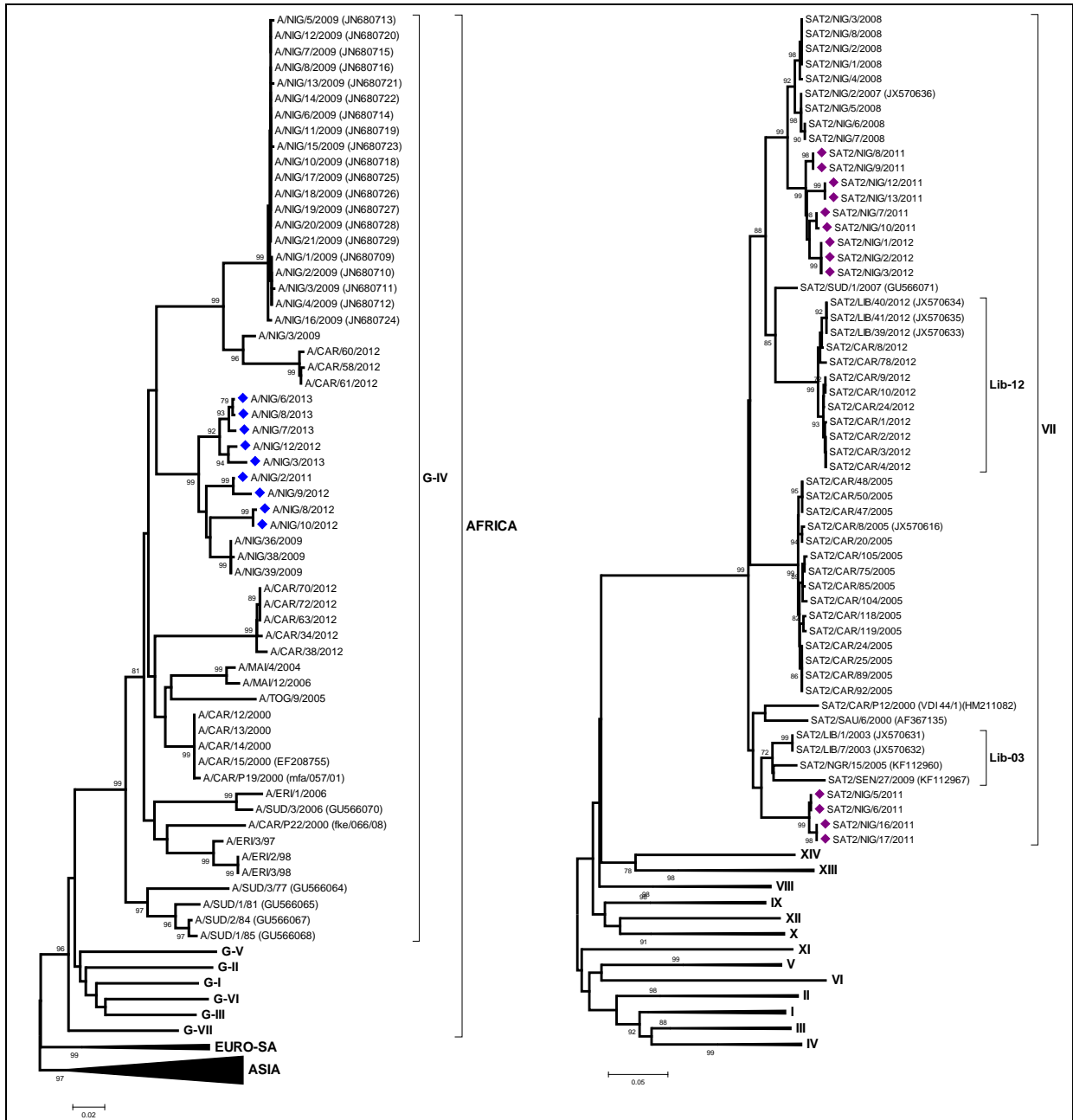
FMDV-GD: 8

NVD: 4

*. two samples (NIG/8/2011 and NIG/10/2011) contained both types O and SAT 2.

Phylogenetic trees show relationships for serotype O (this page), and serotypes A and SAT 2 (following page).





Tunisia

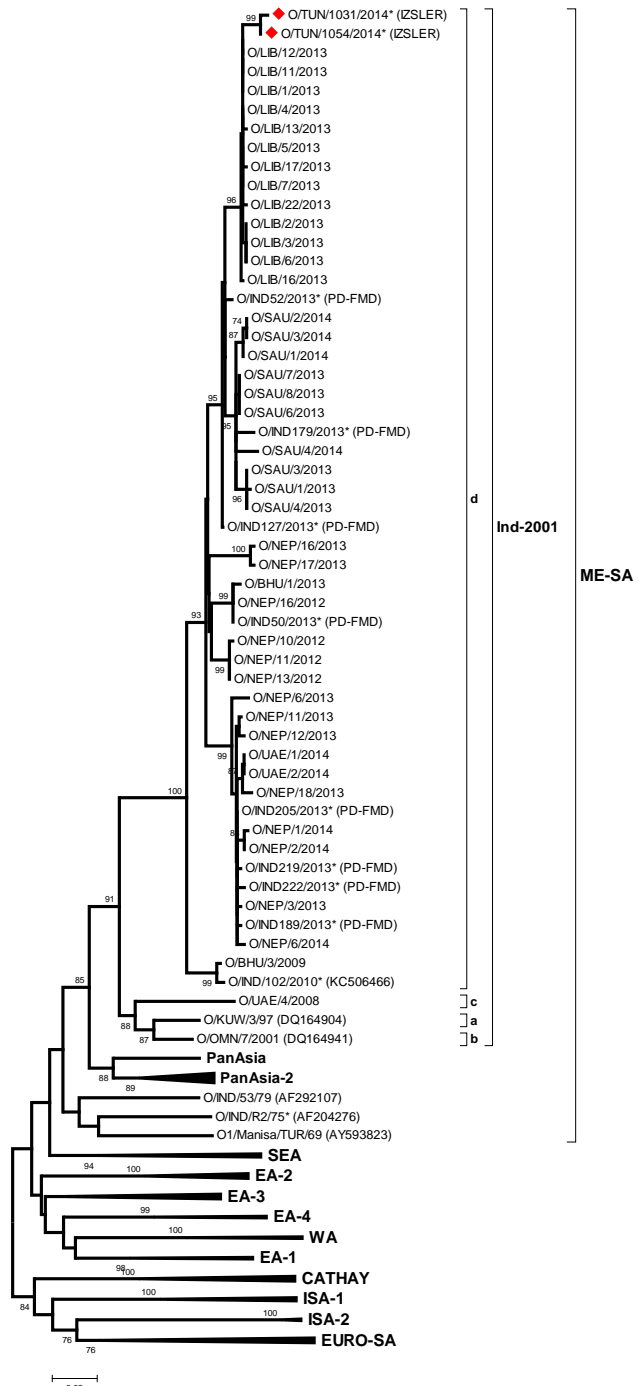
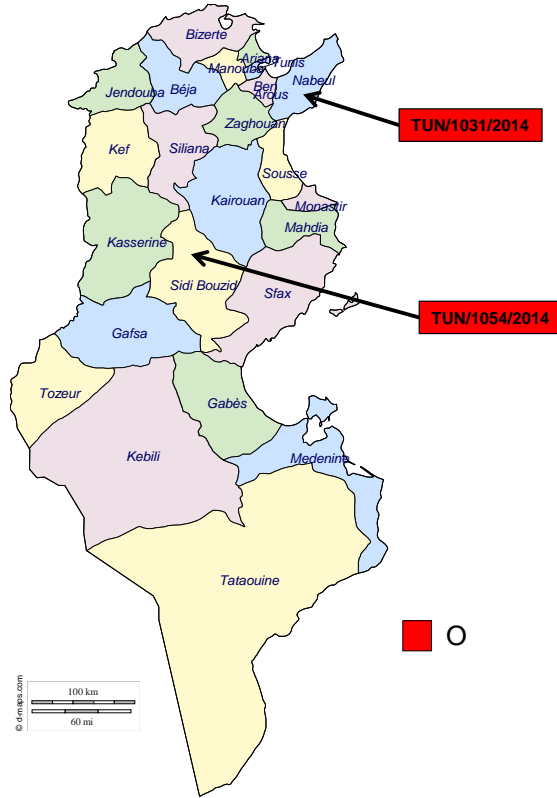
WRLMEG/2014/00010

Date received: 26/05/2014

No. of sequences: 2

O (ME-SA/Ind-2001d): 2

VPI sequences received from: Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna (IZSLER)



Vaccine matching (for individual data see: Annex 1 Table C)**Serotype O**

Vaccine matching was carried out for Serotype O samples from Iran (n=2), Turkey (n=2), Egypt (n=2) and Ethiopia (n=2). The samples from Ethiopia and one sample from Iran were collected in 2013. All of these viruses were a match to O 3039, except one Ethiopian sample. All samples were also a match to O/TUR/5/2009. The Turkish samples were also a match to O Manisa and O TAW/98; however, no other viruses were a match to O Manisa.

Serotype A

Vaccine matching was carried out for Serotype A samples from Afghanistan (n=2), Egypt (n=1), Iran (n=3) and Turkey (n=3). None of these viruses were a vaccine match to A/IRN/05 and only one (A/TUR/02/2014) was a match to A/IRQ/24/64. Half of the samples (AFG/5/2013, AFG/19/2013, IRN/3/2014 and IRN/4/2014) were a vaccine match to A/TUR/06. The Iranian samples were also tested against A/TUR/20/06 and were not a match. The African virus, A/EGY/21/2013 (from the A/ASIA/Iran-05/BAR-08 lineage) was also tested against ERI/98 and was found not to be a match.

Of interest is that the Turkey viruses A/TUR/41/3013 and A/TUR/16/2014 showed no in-vitro neutralization against A/IRQ/24/64 and very little neutralisation against A/IRN/05. These Turkish viruses were also not a match to A/TUR/06. These changing antigenicity patterns of viruses from the Middle East will be monitored in the months to come.

Serotype Asia 1

Vaccine matching was carried out for one virus from Iran and two viruses from Turkey. The virus from Iran was from 2013. Neither the IND/8/79 nor the Asia 1 Shamir vaccine was a match to these strains.

Serotype SAT 2

Two viruses from Egypt (2014) and two viruses from Ethiopia (2010) had a vaccine match to ERI 3218; however, only one (EGY/22/2014) was a vaccine match to ZIM/7/83.

Annex 1. TABLE A: Clinical sample diagnostics made (and samples received) by the WRLFMD® between January-March 2014

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		
				VI/ELISA	RT-PCR	Final report
ETHIOPIA *	ETH 10/2001	BOVINE	01-Jan-01	A	POS	A
	ETH 11/2001	BOVINE	01-Jan-01	A	POS	A
	ETH 9/2004	BOVINE	01-Apr-04	O	POS	O
	ETH 10/2004	BOVINE	01-Apr-04	O	POS	O
	ETH 23/2010	SWINE	01-Jan-10	SAT 2	POS	SAT 2
	ETH 24/2010	SWINE	01-Jan-10	SAT 2	POS	SAT 2
	ETH 20/2012	SWINE	11-Oct-12	NVD	NEG	NVD
	ETH 21/2012	SWINE	11-Oct-12	NVD	NEG	NVD
	ETH 22/2012	SWINE	11-Oct-12	O	POS	O
	ETH 23/2012	SWINE	11-Oct-12	NEG	NEG	NVD
	ETH 24/2012	SWINE	11-Oct-12	O	POS	O
	ETH 25/2012	SWINE	11-Oct-12	O	POS	O
	ETH 5/2013	BOVINE	11-Oct-13	NVD	NEG	NVD
	ETH 6/2013	BOVINE	11-Oct-13	NVD	NEG	NVD
	ETH 7/2013	BOVINE	11-Oct-13	NVD	NEG	NVD
	ETH 8/2013	BOVINE	11-Oct-13	O	POS	O
	ETH 9/2013	BOVINE	11-Oct-13	O	POS	O
	ETH 10/2013	BOVINE	11-Oct-13	NVD	NEG	NVD
	ETH 11/2013	BOVINE	17-Oct-13	NVD	NEG	NVD
	ETH 12/2013	BOVINE	17-Oct-13	O	POS	O
	ETH 13/2013	BOVINE	17-Oct-13	O	POS	O
	ETH 14/2013	BOVINE	17-Oct-13	O	POS	O
	ETH 15/2013	BOVINE	17-Oct-13	O	POS	O
	ETH 16/2013	SWINE	29-Oct-13	NVD	POS	FMDV GD
	ETH 17/2013	SWINE	29-Oct-13	NVD	POS	FMDV GD
	ETH 18/2013	SWINE	30-Oct-13	NVD	NEG	NVD
	ETH 19/2013	SWINE	30-Oct-13	NVD	NEG	NVD
	ETH 20/2013	SWINE	30-Oct-13	NVD	NEG	NVD
	ETH 21/2013	BOVINE	12-Nov-13	O	POS	O
	ETH 22/2013	BOVINE	12-Nov-13	O	POS	O
	ETH 23/2013	BOVINE	12-Nov-13	O	POS	O
	ETH 24/2013	SWINE	13-Nov-13	NVD	NEG	NVD
	ETH 25/2013	SWINE	13-Nov-13	NVD	NEG	NVD
	ETH 26/2013	SWINE	13-Nov-13	NEG	POS	FMDV GD
	ETH 27/2013	SWINE	13-Nov-13	NVD	NEG	NVD
	ETH 28/2013	SWINE	13-Nov-13	NVD	POS	FMDV GD
	ETH 29/2013	SWINE	13-Nov-13	NEG	POS	FMDV GD
	ETH 30/2013	SWINE	13-Nov-13	NVD	POS	FMDV GD
	ETH 31/2013	SWINE	13-Nov-13	NVD	NEG	NVD
	ETH 32/2013	SWINE	13-Nov-13	O	POS	O
	ETH 33/2013	SWINE	14-Nov-13	O	POS	O
	ETH 34/2013	SWINE	14-Nov-13	O	POS	O
	ETH 35/2013	SWINE	14-Nov-13	O	POS	O
	ETH 36/2013	SWINE	14-Nov-13	O	POS	O
	ETH 37/2013	SWINE	14-Nov-13	O	POS	O
	ETH 38/2013	SWINE	14-Nov-13	O	POS	O

	ETH 39/2013	SWINE	14-Nov-13	O	POS	O
	ETH 40/2013	SWINE	14-Nov-13	O	POS	O
	ETH 41/2013	SWINE	14-Nov-13	O	POS	O
	ETH 42/2013	SWINE	14-Nov-13	O	POS	O
	ETH 43/2013	SWINE	14-Nov-13	O	POS	O
	ETH 44/2013	SWINE	14-Nov-13	O	POS	O
	ETH 45/2013	SWINE	14-Nov-13	O	POS	O
	ETH 46/2013	SWINE	14-Nov-13	O	POS	O
	ETH 47/2013	SWINE	14-Nov-13	O	POS	O
	ETH 48/2013	SWINE	14-Nov-13	O	POS	O
	ETH 49/2013	SWINE	14-Nov-13	O	POS	O
	ETH 50/2013	SWINE	14-Nov-13	O	POS	O
	ETH 1/2014	BOVINE	03-Jan-14	NVD	NEG	NVD
	ETH 2/2014	BOVINE	03-Jan-14	NVD	NEG	NVD
TURKEY *	TUR 39/2013	CATTLE	19-Oct-13	NVD	NEG	NVD
	TUR 40/2013	CATTLE	15-Nov-13	NVD	NEG	NVD
	TUR 41/2013	CATTLE	31-Dec-13	A	POS	A
	TUR 1/2014	CATTLE	03-Jan-14	A	POS	A
	TUR 2/2014	CATTLE	06-Jan-14	A	POS	A
	TUR 3/2014	CATTLE	41645	O	POS	O
	TUR 4/2014	SHEEP	08-Jan-14	O	POS	O
	TUR 5/2014	CATTLE	13-Jan-14	A	POS	A
	TUR 6/2014	CATTLE	14-Jan-14	ASIA-1	POS	ASIA-1
	TUR 7/2014	CATTLE	14-Jan-14	A	POS	A
	TUR 8/2014	CATTLE	14-Jan-14	A	POS	A
	TUR 9/2014	CATTLE	15-Jan-14	O	POS	O
	TUR 10/2014	CATTLE	16-Jan-14	NVD	POS	FMDV GD
	TUR 11/2014	CATTLE	01-Feb-14	O	POS	O
	TUR 12/2014	CATTLE	05-Feb-14	A	POS	A
	TUR 13/2014	CATTLE	06-Feb-14	O	POS	O
	TUR 14/2014	CATTLE	07-Feb-14	O	POS	O
	TUR 15/2014	CATTLE	07-Feb-14	O	POS	O
	TUR 16/2014	CATTLE	10-Feb-14	A	POS	A
	TUR 17/2014	CATTLE	11-Feb-14	O	POS	O
	TUR 18/2014	CATTLE	14-Feb-14	A	POS	A
	TUR 19/2014	CATTLE	21-Feb-14	A	POS	A
	TUR 20/2014	CATTLE	24-Feb-14	NVD	POS	FMDV GD
	TUR 21/2014	CATTLE	24-Feb-14	A	POS	A
	TUR 22/2014	CATTLE	26-Feb-14	NVD	POS	FMDV GD
	TUR 23/2014	CATTLE	27-Feb-14	ASIA-1	POS	ASIA-1
	TUR 24/2014	CATTLE	28-Feb-14	O	POS	O
	TUR 25/2014	CATTLE	04-Mar-14	NVD	POS	FMDV GD
	TUR 26/2014	CATTLE	04-Mar-14	A	POS	A
	TUR 27/2014	CATTLE	07-Mar-14	O	POS	O
	TUR 28/2014	CATTLE	09-Mar-14	A	POS	A
	TUR 29/2014	CATTLE	11-Mar-14	A	POS	A
	TUR 30/2014	CATTLE	12-Mar-14	A	POS	A
TOTAL:			93			

* Sample results pending from previous report

CAMBODIA	CAM 1/2013	CATTLE	19-Sep-13	Pending	Pending	Pending
	CAM 2/2013	CATTLE	19-Sep-13	Pending	Pending	Pending
	CAM 3/2013	CATTLE	19-Sep-13	Pending	Pending	Pending

CAMEROON	CAR 1/2013	CATTLE	12-Jul-13	Pending	Pending	Pending
	CAR 2/2013	CATTLE	12-Jul-13	Pending	Pending	Pending
	CAR 3/2013	CATTLE	14-Jul-13	Pending	Pending	Pending
	CAR 4/2013	CATTLE	15-Jul-13	Pending	Pending	Pending
	CAR 5/2013	CATTLE	15-Jul-13	Pending	Pending	Pending
	CAR 6/2013	CATTLE	16-Jul-13	Pending	Pending	Pending
	CAR 7/2013	CATTLE	16-Jul-13	Pending	Pending	Pending
	CAR 8/2013	CATTLE	16-Jul-13	Pending	Pending	Pending
	CAR 9/2013	CATTLE	16-Jul-13	Pending	Pending	Pending
	CAR 10/2013	CATTLE	17-Jul-13	Pending	Pending	Pending
	CAR 11/2013	CATTLE	17-Jul-13	Pending	Pending	Pending
	CAR 12/2013	CATTLE	18-Jul-13	Pending	Pending	Pending
	CAR 13/2013	CATTLE	19-Jul-13	Pending	Pending	Pending
	CAR 14/2013	CATTLE	19-Jul-13	Pending	Pending	Pending
	CAR 15/2013	CATTLE	20-Jul-13	Pending	Pending	Pending
	CAR 16/2013	CATTLE	20-Jul-13	Pending	Pending	Pending
	CAR 17/2013	CATTLE	20-Jul-13	Pending	Pending	Pending
	CAR 18/2013	CATTLE	20-Jul-13	Pending	Pending	Pending
	CAR 19/2013	CATTLE	21-Jul-13	Pending	Pending	Pending
	CAR 20/2013	CATTLE	21-Jul-13	Pending	Pending	Pending
	CAR 21/2013	CATTLE	22-Jul-13	Pending	Pending	Pending
	CAR 22/2013	CATTLE	22-Jul-13	Pending	Pending	Pending
	CAR 23/2013	CATTLE	22-Jul-13	Pending	Pending	Pending
	CAR 24/2013	CATTLE	22-Jul-13	Pending	Pending	Pending
	CAR 25/2013	CATTLE	22-Jul-13	Pending	Pending	Pending
	CAR 26/2013	CATTLE	23-Jul-13	Pending	Pending	Pending
	CAR 27/2013	CATTLE	23-Jul-13	Pending	Pending	Pending
	CAR 28/2013	CATTLE	23-Jul-13	Pending	Pending	Pending
	CAR 29/2013	CATTLE	24-Jul-13	Pending	Pending	Pending
	CAR 30/2013	CATTLE	25-Jul-13	Pending	Pending	Pending
	CAR 31/2013	CATTLE	25-Jul-13	Pending	Pending	Pending
	CAR 32/2013	CATTLE	25-Jul-13	Pending	Pending	Pending
	CAR 33/2013	CATTLE	25-Jul-13	Pending	Pending	Pending
	CAR 34/2013	CATTLE	26-Jul-13	Pending	Pending	Pending
	CAR 35/2013	CATTLE	26-Jul-13	Pending	Pending	Pending
	CAR 36/2013	CATTLE	27-Jul-13	Pending	Pending	Pending
	CAR 37/2013	CATTLE	28-Jul-13	Pending	Pending	Pending
	CAR 38/2013	CATTLE	28-Jul-13	Pending	Pending	Pending
	CAR 39/2013	CATTLE	28-Jul-13	Pending	Pending	Pending
	CAR 40/2013	CATTLE	28-Jul-13	Pending	Pending	Pending
	CAR 41/2013	CATTLE	28-Jul-13	Pending	Pending	Pending
	CAR 42/2013	CATTLE	29-Jul-13	Pending	Pending	Pending
	CAR 43/2013	CATTLE	29-Jul-13	Pending	Pending	Pending
	CAR 44/2013	CATTLE	07-Aug-13	Pending	Pending	Pending
	CAR 45/2013	CATTLE	07-Aug-13	Pending	Pending	Pending
	CAR 46/2013	CATTLE	07-Aug-13	Pending	Pending	Pending
EGYPT	EGY 21/2013	CATTLE	11-Feb-13	A	POS	A
	EGY 22/2013	CATTLE	05-Oct-13	O	POS	O
	EGY 23/2013	CATTLE	05-Oct-13	NVD	POS	FMDV GD
	EGY 24/2013	CATTLE	27-Nov-13	O	POS	O
	EGY 25/2013	CATTLE	12-Dec-13	O	POS	O
	EGY 26/2013	SHEEP	17-Dec-13	NVD	NEG	NVD
	EGY 27/2013	BUFFALO	22-Dec-13	NVD	POS	FMDV GD

EGY 28/2013	BUFFALO	22-Dec-13	O	POS	O	
EGY 29/2013	BUFFALO	26-Dec-13	O	POS	O	
EGY 1/2014	CATTLE	01-Jan-14	O	POS	O	
EGY 2/2014	BUFFALO	01-Jan-14	NVD	NEG	NVD	
EGY 3/2014	CATTLE	05-Jan-14	O	POS	O	
EGY 4/2014	CATTLE	05-Jan-14	O	POS	O	
EGY 5/2014	CATTLE	06-Jan-14	O	POS	O	
EGY 6/2014	CATTLE	16-Jan-14	O	POS	O	
EGY 7/2014	CATTLE	20-Jan-14	NVD	POS	FMDV GD	
EGY 8/2014	BUFFALO	26-Jan-14	NVD	POS	FMDV GD	
EGY 9/2014	CATTLE	28-Jan-14	NVD	POS	FMDV GD	
EGY 10/2014	CATTLE	29-Jan-14	O	POS	O	
EGY 11/2014	CATTLE	03-Feb-14	SAT 2	POS	SAT 2	
EGY 12/2014	SHEEP	03-Feb-14	NVD	POS	FMDV GD	
EGY 13/2014	BUFFALO	04-Feb-14	NVD	POS	FMDV GD	
EGY 14/2014	CATTLE	05-Feb-14	NVD	POS	FMDV GD	
EGY 15/2014	CATTLE	19-Feb-14	NVD	POS	FMDV GD	
EGY 16/2014	BUFFALO	20-Feb-14	NVD	POS	FMDV GD	
EGY 17/2014	SHEEP	23-Feb-14	NVD	NEG	NVD	
EGY 18/2014	BUFFALO	01-Mar-14	O	POS	O	
EGY 19/2014	CATTLE	03-Mar-14	NVD	POS	FMDV GD	
EGY 20/2014	CATTLE	04-Mar-14	SAT 2	POS	SAT 2	
EGY 21/2014	CATTLE	04-Mar-14	NVD	POS	FMDV GD	
EGY 22/2014	CATTLE	17-Mar-14	SAT 2	POS	SAT 2	
HONG KONG, SAR OF PRC	HKN 13/2014	PIG	07-May-14	O	NEG	O
LAOS	LAO 1/2013	CATTLE	19-Jul-13	Pending	Pending	Pending
	LAO 2/2013	CATTLE	19-Jul-13	Pending	Pending	Pending
	LAO 3/2013	CATTLE	19-Jul-13	Pending	Pending	Pending
	LAO 1/2014	CATTLE	20-Feb-14	Pending	Pending	Pending
	LAO 2/2014	CATTLE	20-Feb-14	Pending	Pending	Pending
	LAO 3/2014	CATTLE	20-Feb-14	Pending	Pending	Pending
MALAYSIA	MAY 19/2012	CATTLE	03-Sep-12	Pending	Pending	Pending
	MAY 20/2012	CATTLE	03-Sep-12	Pending	Pending	Pending
	MAY 21/2012	CATTLE	17-Sep-12	Pending	Pending	Pending
	MAY 22/2012	CATTLE	24-Sep-12	Pending	Pending	Pending
	MAY 23/2012	CATTLE	24-Sep-12	Pending	Pending	Pending
	MAY 24/2012	CATTLE	11-Oct-12	Pending	Pending	Pending
	MAY 25/2012	CATTLE	03-Nov-12	Pending	Pending	Pending
	MAY 26/2012	CATTLE	06-Nov-12	Pending	Pending	Pending
	MAY 27/2012	CATTLE	06-Nov-12	Pending	Pending	Pending
	MAY 28/2012	CATTLE	09-Nov-12	Pending	Pending	Pending
	MAY 29/2012	CATTLE	09-Nov-12	Pending	Pending	Pending
	MAY 30/2012	CATTLE	09-Dec-12	Pending	Pending	Pending
	MAY 31/2012	CATTLE	09-Dec-12	Pending	Pending	Pending
	MAY 32/2012	CATTLE	10-Dec-12	Pending	Pending	Pending
	MAY 33/2012	CATTLE	10-Dec-12	Pending	Pending	Pending
	MAY 34/2012	CATTLE	10-Dec-12	Pending	Pending	Pending
	MAY 35/2012	CATTLE	14-Dec-12	Pending	Pending	Pending
	MAY 36/2012	CATTLE	19-Dec-12	Pending	Pending	Pending
	MAY 37/2012	CATTLE	19-Dec-12	Pending	Pending	Pending
	MAY 1/2013	CATTLE	06-Jan-13	Pending	Pending	Pending
	MAY 2/2013	CATTLE	06-Feb-13	Pending	Pending	Pending

MAY 3/2013	CATTLE	06-Feb-13	Pending	Pending	Pending
MAY 4/2013	CATTLE	05-Mar-13	Pending	Pending	Pending
MAY 5/2013	CATTLE	05-Mar-13	Pending	Pending	Pending
MAY 6/2013	CATTLE	21-May-13	Pending	Pending	Pending
MAY 7/2013	CATTLE	21-May-13	Pending	Pending	Pending
MAY 8/2013	CATTLE	27-Jun-13	Pending	Pending	Pending
MAY 9/2013	CATTLE	27-Jun-13	Pending	Pending	Pending
MAY 10/2013	CATTLE	01-Oct-13	Pending	Pending	Pending
MAY 11/2013	CATTLE	01-Oct-13	Pending	Pending	Pending
MAY 12/2013	CATTLE	12-Oct-13	Pending	Pending	Pending
MAY 13/2013	CATTLE	14-Oct-13	Pending	Pending	Pending
MAY 14/2013	CATTLE	14-Oct-13	Pending	Pending	Pending
MAY 15/2013	CATTLE	18-Oct-13	Pending	Pending	Pending
MAY 16/2013	CATTLE	18-Oct-13	Pending	Pending	Pending
MAY 17/2013	CATTLE	05-Nov-13	Pending	Pending	Pending
MAY 18/2013	CATTLE	13-Nov-13	Pending	Pending	Pending
MAY 19/2013	CATTLE	13-Nov-13	Pending	Pending	Pending
MAY 20/2013	CATTLE	25-Nov-13	Pending	Pending	Pending
MAY 21/2013	CATTLE	25-Nov-13	Pending	Pending	Pending
MAY 22/2013	CATTLE	16-Dec-13	Pending	Pending	Pending
MAY 23/2013	CATTLE	26-Dec-13	Pending	Pending	Pending
MAY 1/2014	CATTLE	22-Jan-14	Pending	Pending	Pending
MAY 2/2014	CATTLE	06-Feb-14	Pending	Pending	Pending
MAY 3/2014	CATTLE	25-Feb-14	Pending	Pending	Pending
MAY 4/2014	CATTLE	21-May-14	Pending	Pending	Pending
MAY 5/2014	CATTLE	21-May-14	Pending	Pending	Pending
MAY 6/2014	CATTLE	28-May-14	Pending	Pending	Pending
MAY 7/2014	CATTLE	28-May-14	Pending	Pending	Pending
MAY 8/2014	CATTLE	10-Jun-14	Pending	Pending	Pending
MAY 9/2014	CATTLE	15-Jun-14	Pending	Pending	Pending
NIGERIA					
NIG 1/2011	BOVINE	11-Jun-11	O	POS	O
NIG 2/2011	BOVINE	26-Jun-11	A	POS	A
NIG 3/2011	BOVINE	26-Jun-11	O	POS	O
NIG 4/2011	BOVINE	07-Jul-11	NVD	NEG	NVD
NIG 5/2011	BOVINE	20-Jul-11	SAT 2	POS	SAT 2
NIG 6/2011	BOVINE	20-Jul-11	SAT 2	POS	SAT 2
NIG 7/2011	BOVINE	22-Jul-11	SAT 2	POS	SAT 2
NIG 8/2011	BOVINE	22-Jul-11	SAT 2, O	POS	SAT 2, O
NIG 9/2011	BOVINE	02-Aug-11	SAT 2	POS	SAT 2
NIG 10/2011	BOVINE	02-Aug-11	SAT 2, O	POS	SAT 2, O
NIG 11/2011	BOVINE	02-Aug-11	NVD	NEG	NVD
NIG 12/2011	BOVINE	06-Aug-11	SAT 2	POS	SAT 2
NIG 13/2011	BOVINE	06-Aug-11	SAT 2	POS	SAT 2
NIG 14/2011	BOVINE	10-Aug-11	NVD	POS	FMDV GD
NIG 15/2011	BOVINE	09-Sep-11	NVD	POS	FMDV GD
NIG 16/2011	BOVINE	03-Nov-11	SAT 2	POS	SAT 2
NIG 17/2011	BOVINE	03-Nov-11	SAT 2	POS	SAT 2
NIG 1/2012	BOVINE	22-Jun-12	SAT 2	POS	SAT 2
NIG 2/2012	BOVINE	22-Jun-12	SAT 2	POS	SAT 2
NIG 3/2012	BOVINE	22-Jun-12	SAT 2	POS	SAT 2
NIG 4/2012	BOVINE	03-Aug-12	O	POS	O
NIG 5/2012	BOVINE	03-Aug-12	O	POS	O
NIG 6/2012	BOVINE	08-Aug-12	NVD	POS	FMDV GD
NIG 7/2012	BOVINE	09-Sep-12	NVD	POS	FMDV GD

	NIG 8/2012	BOVINE	06-Nov-12	A	POS	A
	NIG 9/2012	BOVINE	06-Nov-12	A	POS	A
	NIG 10/2012	BOVINE	06-Nov-12	A	POS	A
	NIG 11/2012	BOVINE	07-Nov-12	NVD	POS	FMDV GD
	NIG 12/2012	BOVINE	13-Nov-12	A	POS	A
	NIG 1/2013	BOVINE	03-Jan-13	NVD	POS	FMDV GD
	NIG 2/2013	BOVINE	26-Jun-13	NVD	POS	FMDV GD
	NIG 3/2013	BOVINE	17-Sep-13	A	POS	A
	NIG 4/2013	BOVINE	17-Sep-13	NVD	POS	FMDV GD
	NIG 5/2013	BOVINE	17-Sep-13	NVD	NEG	NVD
	NIG 6/2013	BOVINE	21-Nov-13	A	POS	A
	NIG 7/2013	BOVINE	21-Nov-13	A	POS	A
	NIG 8/2013	BOVINE	21-Nov-13	A	POS	A
	NIG 1/2014	BOVINE	03-Jan-14	O	POS	O
	NIG 2/2014	BOVINE	03-Jan-14	O	POS	O
	NIG 3/2014	BOVINE	03-Jan-14	O	POS	O
	NIG 4/2014	BOVINE	14-Jan-14	O	POS	O
	NIG 5/2014	BOVINE	18-Jan-14	NVD	NEG	NVD
PAKISTAN	PAK 57/2012	BUFFALO	08-May-12	Pending	Pending	Pending
	PAK 58/2012	CATTLE	24-Jul-12	Pending	Pending	Pending
	PAK 59/2012	BUFFALO	16-Oct-12	Pending	Pending	Pending
	PAK 60/2012	CATTLE	21-Nov-12	Pending	Pending	Pending
	PAK 26/2013	CATTLE	05-Dec-13	Pending	Pending	Pending
	PAK 27/2013	BUFFALO	17-Dec-13	Pending	Pending	Pending
	PAK 1/2014	CATTLE	03-Jan-14	Pending	Pending	Pending
	PAK 2/2014	BUFFALO	04-Jan-14	Pending	Pending	Pending
	PAK 3/2014	CATTLE	04-Jan-14	Pending	Pending	Pending
	PAK 4/2014	BUFFALO	09-Jan-14	Pending	Pending	Pending
	PAK 5/2014	CATTLE	10-Jan-14	Pending	Pending	Pending
	PAK 6/2014	CATTLE	12-Jan-14	Pending	Pending	Pending
	PAK 7/2014	CATTLE	12-Jan-14	Pending	Pending	Pending
	PAK 8/2014	BUFFALO	15-Jan-14	Pending	Pending	Pending
	PAK 9/2014	BUFFALO	15-Jan-14	Pending	Pending	Pending
	PAK 10/2014	CATTLE	17-Jan-14	Pending	Pending	Pending
	PAK 11/2014	CATTLE	30-Jan-14	Pending	Pending	Pending
	PAK 12/2014	CATTLE	11-Feb-14	Pending	Pending	Pending
	PAK 13/2014	CATTLE	11-Feb-14	Pending	Pending	Pending
	PAK 14/2014	CATTLE	20-Feb-14	Pending	Pending	Pending
	PAK 15/2014	CATTLE	06-Mar-14	Pending	Pending	Pending
	PAK 16/2014	BUFFALO	10-Mar-14	Pending	Pending	Pending
	PAK 17/2014	BUFFALO	17-Mar-14	Pending	Pending	Pending
	PAK 18/2014	BUFFALO	20-Mar-14	Pending	Pending	Pending
	PAK 19/2014	CATTLE	22-Mar-14	Pending	Pending	Pending
	PAK 20/2014	BUFFALO	24-Mar-14	Pending	Pending	Pending
	PAK 21/2014	CATTLE	02-Apr-14	Pending	Pending	Pending
	PAK 22/2014	CATTLE	09-Apr-14	Pending	Pending	Pending
	PAK 23/2014	BUFFALO	10-Apr-14	Pending	Pending	Pending
	PAK 24/2014	CATTLE	14-Apr-14	Pending	Pending	Pending
	PAK 25/2014	CATTLE	15-Apr-14	Pending	Pending	Pending
THAILAND	TAI 6/2013	CATTLE	17-Jul-13	Pending	Pending	Pending
	TAI 7/2013	CATTLE	19-Jul-13	Pending	Pending	Pending
	TAI 8/2013	CATTLE	29-Jul-13	Pending	Pending	Pending
	TAI 9/2013	CATTLE	01-Aug-13	Pending	Pending	Pending

TAI 10/2013	CATTLE	01-Oct-13	Pending	Pending	Pending	
TAI 11/2013	CATTLE	09-Oct-13	Pending	Pending	Pending	
TAI 12/2013	CATTLE	09-Oct-13	Pending	Pending	Pending	
TAI 13/2013	CATTLE	12-Oct-13	Pending	Pending	Pending	
TAI 14/2013	CATTLE	16-Oct-13	Pending	Pending	Pending	
TAI 15/2013	CATTLE	21-Oct-13	Pending	Pending	Pending	
TAI 16/2013	CATTLE	31-Oct-13	Pending	Pending	Pending	
TAI 17/2013	CATTLE	12-Nov-13	Pending	Pending	Pending	
TAI 18/2013	CATTLE	12-Oct-13	Pending	Pending	Pending	
TAI 19/2013	CATTLE	12-Oct-13	Pending	Pending	Pending	
TAI 20/2013	CATTLE	14-Nov-13	Pending	Pending	Pending	
TAI 21/2013	CATTLE	21-Nov-13	Pending	Pending	Pending	
TAI 22/2013	CATTLE	29-Nov-13	Pending	Pending	Pending	
TAI 1/2014	CATTLE	02-Jan-14	Pending	Pending	Pending	
TAI 2/2014	CATTLE	02-Jan-14	Pending	Pending	Pending	
TAI 3/2014	CATTLE	10-Jan-14	Pending	Pending	Pending	
TAI 4/2014	CATTLE	16-Jan-14	Pending	Pending	Pending	
TRINIDAD & TOBAGO						
TRI 1/2014	OVINE	20-Apr-14	NVD	NEG	NVD	
TRI 2/2014	OVINE	20-Apr-14	NVD	NEG	NVD	
TRI 3/2014	OVINE	20-Apr-14	NVD	NEG	NVD	
TRI 4/2014	OVINE	20-Apr-14	NVD	NEG	NVD	
TRI 5/2014	OVINE	20-Apr-14	NVD	NEG	NVD	
TRI 6/2014	OVINE	20-Apr-14	NVD	NEG	NVD	
TOTAL:		238				

FMD(V)	Foot-and-mouth disease (virus)
FMDV GD	Genome detected
VI/ELISA	FMDV serotype identified following virus isolation in cell culture and antigen ELISA
RT-PCR	Reverse transcription polymerase chain reaction on epithelial suspension for FMD (or SVD) viral genome
NVD	No foot-and-mouth disease, swine vesicular disease or vesicular stomatitis virus detected
NT	Not tested

TABLE B: Summary of samples collected and received to The Pirbright Institute (April-June 2014)

Country	No. of samples	Virus isolation in cell culture/ELISA							NVD	RT-PCR for FMD (or SVD) virus (where appropriate)	
		FMD virus serotypes								Positive	Negative
		O	A	C	SAT 1	SAT 2	SAT 3	Asia 1			
ETHIOPIA*	60	33	2	-	-	2	-	-	23	43	17
TURKEY*	33	10	15	-	-	-	-	2	6	31	2
TOTAL	93	43	17	0	0	2	-	2	29	74	19

* Sample results pending from previous report

CAMBODIA	3	-	-	-	-	-	-	-	-	-	-
CAMEROON	46	-	-	-	-	-	-	-	-	-	-
EGYPT	31	12	1	-	-	3	-	-	15	28	3
HONG KONG, SAR OF PRC	1	1	-	-	-	-	-	-	-	-	1
LAOS	6	-	-	-	-	-	-	-	-	-	-
MALAYSIA	51	-	-	-	-	-	-	-	-	-	-
NIGERIA **	42	10	9	-	-	13	-	-	12	38	4
PAKISTAN	31	-	-	-	-	-	-	-	-	-	-
THAILAND	21	-	-	-	-	-	-	-	-	-	-
TRINIDAD & TOBAGO	6	-	-	-	-	-	-	-	6	-	6
TOTAL	238	23	10	-	0	16	-	-	33	66	14

VI/ELISA	FMD (or SVD) virus serotype identified following virus isolation in cell culture and antigen detection ELISA
FMD	foot-and-mouth disease
SVD	swine vesicular disease
NVD	no FMD, SVD or vesicular stomatitis virus detected
NT	not tested
RT-PCR	reverse transcription polymerase chain reaction for FMD (or SVD) viral genome
*	Sample results pending from previous report
**	2 samples from Nigeria contained a mixture of FMDVs of types O and SAT 2

TABLE C: Antigenic characterisation of FMD field isolates by matching with vaccine strains by 2dmVNT from April to June 2014.**Type O:**

Vaccine Matching Studies for Serotype O FMDV by VNT				
Sample Reference	O 3039	O Manisa	O TAW/98	O TUR/5/09
IRN/17/2013	M	N		M
IRN/1/2014	M	N		M
TUR/3/2014	M	M	M	M
TUR/9/2014	M	M	M	M
EGY/10/2014	M	N		M
EGY/18/2014	M	N		M
ETH/12/2013	Borderline	N		M
ETH/22/2013	M	N		M

Type A:

Vaccine Matching Studies for Serotype A FMDV by VNT					
	A/ERI/98	A/Iran/05	A22 IRQ	TUR/20/06	TUR/06
AFG/5/2013		N	N		M
AFG/19/2013		N	N		M
EGY/21/2013	N	N	N		N
IRN/2/2014		N	N	N	N
IRN/3/2014		N	N	N	M
IRN/4/2014		N	N	N	M
TUR/41/2013		N	N		N
TUR/2/2014		N	M		N
TUR/16/2014		N	N		N

Type Asia 1:

Vaccine Matching Studies for Serotype Asia-1 FMDV by VNT		
	IND/8/79	Asia1 Shamir
IRN/15/2013	N	N
TUR/6/2014	N	N
TUR/23/2014	N	N

Type SAT 2:

Vaccine Matching Studies for Serotype SAT 2 FMDV by VNT		
	ERI 3218	ZIM/7/83
EGY/20/2014	M	N
EGY/22/2014	M	M
ETH/23/2010	M	N
ETH/24/2010	M	N

Results Descriptor:

M : = Vaccine Match- $r_1 = \geq 0.3$. Suggests that there is a close relationship between field isolate and vaccine strain. A potent vaccine containing the vaccine strain is likely to confer protection.

N : = No Vaccine Match - $r_1 = < 0.3$. Suggests that the field isolate is so different from the vaccine strain that the vaccine is unlikely to protect

Borderline = Any r_1 values between 0.28 to 0.32

= Not tested against this vaccine

Annex 2. Recent FMD Publications (April-June 2014) cited by PubMed (Pirbright Institute papers and authors are highlighted in **BOLD**)

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Annex 3. RECOMMENDATIONS FROM WRLFMD® ON FMD VIRUS STRAINS TO BE INCLUDED IN FMDV ANTIGEN BANKS –June 2014

High Priority

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*)

(not in order of importance)

Medium Priority

A Eritrea
SAT 2 Zimbabwe
SAT 1 South Africa
A Malaysia 97 (*or Thai equivalent such as A/NPT/TAI/86*)
A Argentina 2001
O Taiwan 97 (*pig-adapted strain or Philippine equivalent*)

(not in order of importance)

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

