



WRLFMD Quarterly Report January to March 2017

Foot-and-Mouth Disease





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1. Summary of samples tested and reported FMD outbreaks

1.1. Asia

Bhutan

A batch of 14 samples was received to WRLFMD on 13th December 2016; all were collected between August 2015 and June 2016. FMD type O virus was isolated from a single sample, while FMDV genome was detected in a further 12 samples and one was NVD. Applying VP1 RT-PCRs to the FMDV-GD samples revealed a further five type O sequences. All were genotyped as O/ME-SA/Ind-2001d (see below).

Israel

An outbreak of FMD type O was reported in cattle at Nir Yizhaq, Beer-Sheva, Hadarom on 4th February 2017. Viruses were sequenced at the Kimron Veterinary Institute (KVI) in Israel and at the WRLFMD. Genotyping revealed the virus to belong to the EAST AFRICA 3 (EA-3) topotype (see below).

Jordan

FMD type O has been reported in sheep at Jiza, Amman (21st February 2017), goats at Der Alla, Al Balqa (2nd March 2017), cattle at Hwarah, Irbid (9th March 2017) and cattle at Kraymah, Jordan Valley, Al Balqa (14th March 2017). VP1 sequencing (performed at the Jordan University of Science and Technology) has determined the genotype of these viruses as O/ME-SA/Ind-2001d.

Mongolia

Three outbreaks of FMD type O were reported Ulziitiin Shand, 4 bag, Erdenetsagaan soum, Sukhbaatar (cattle, sheep and goats, 24th January 2017), Utugtiin khondii, 8 bag, Asgat soum, Sukhbaatar (cattle, sheep and goats, 29th January 2017) and Engeriin ferm, 3 bag, Matad soum, Dornod (cattle, 29th January 2017). No genotyping has yet been reported.

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Nepal

Twenty-four samples were received to WRLFMD on 7th March 2017. FMD type O viruses were isolated from 19 samples collected between November 2016 and January 2017. Genotyping revealed all to belong to the O/ME-SA/Ind-2001d lineage (see below). FMDV genome was detected in the other six samples and investigations are continuing to identify the serotype involved.

Palestinian Autonomous Territories

Two outbreaks of FMD type O were reported in cattle at Rafah (2nd February 2017) and Jabalia (5th February 2017) in the Gaza Strip. Viruses were sequenced at the KVI (Israel) and at the WRLFMD. Genotyping revealed the virus to belong to the O/EA-3 topotype (see below).

People's Republic of China

FMD type O has been reported in cattle at Pishan, Hetian, Xinjiang (5th January 2017) and Kashgar Prefecture, Marabishi, Xinjiang (7th February 2017). VP1 sequences were determined at the Lanzhou Veterinary Research Institute (Gansu, P.R. China) and genotyping has shown the virus to belong to the ME-SA topotype, Ind-2001d lineage (see below).

A further outbreak of FMD type O was reported in cattle at Shigatse, Rinbung, Tibet (25th January 2017); no genotyping has been reported.

Russian Federation

Two FMD type O VP1 sequences were received from FGBI-ARRIAH on 13/02/2017. They were obtained from viruses from cattle in Pad' Shirokaya, Priargunskiy raion (28th November 2016) and Kailastuy, Krasnokamenskiy (14th December 2016), both in the Zabajkalskiy kray. Genotyping showed both to belong to the O/ME-SA/Ind-2001d lineage.

Saudi Arabia

Twenty-five samples were received to WRLFMD on 28th February 2017; all had been collected between October and December 2016. FMD type A viruses were isolated from seven samples and FMD type O virus from one. Genotyping revealed A/ASIA/G-VII and O/ME-SA/PanAsia-2^{ANT-10} (see below). FMDV genome was detected in an addition two samples, while the remaining 15 were NVD.

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South Korea

On the 5th February 2017 and 6th February 2017, two outbreaks of FMD O were reported in cattle. The first was in province of Chungcheongbuk-do and the second in the province of Jeollabuk-do. Subsequently, over the next five days, a further six outbreaks were reported in Chungcheongbuk-do. VP1 sequencing was performed at the Animal and Plant Quarantine Agency (QIA) and at the WRLFMD. Genotyping identified the viruses as O/ME-SA/Ind-2001d (see below).

On the 8th February 2017, an outbreak of FMD type A was reported in cattle in a third province, Gyeonggi-do. VP1 sequencing was performed at the QIA and at the WRLFMD. Genotyping identified the viruses as A/ASIA/Sea-97 (see below).

Vietnam

A batch of 35 samples was received on 20th December 2016; they were collected between June 2015 and November 2016. The typing and sequencing results are pending. FMD type O viruses were isolated from 21 samples and FMD type A viruses from eight samples. Genotyping revealed O/ME-SA/Ind-2001d (9), O/SEA/Mya-98 (11), O/CATHAY (1) and A/ASIA/Sea-97 (8) (see below). FMDV genome was detected in a further five samples and one was NVD.

1.2. Africa

Algeria

An outbreak, reported to be FMD type A, was detected in cattle on 24th March 2017 at Ouled Soud, Zemmoura, Relizane. Genotyping is awaited.

South Africa

An outbreak of FMD type SAT 2 was reported in cattle on 1st March 2017 at Bushbuckridge, Mpumalanga. No genotyping has yet been reported. This outbreak is located in South Africa's FMD Protection Zone, which is not part of the FMD Free Zone and therefore does not affect South Africa's OIE recognised FMD free status.

Zimbabwe

Five outbreaks of FMD type SAT 2 were reported in cattle between 9th January 2017 and 6th March 2017. They occurred in Matabeleland North and Midlands provinces

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and are a continuation of outbreaks which have occurred since June 2015. No genotyping has been reported.

1.3. South America

No new outbreaks of FMD were reported in the region.

1.4. 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/2016.htm.

Results from samples or sequences 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 from January to March 2017 is shown in Annex 1 (Summary of Submissions). A record of all samples received by WRLFMD (January to March 2017) is shown in Annex 1 (Clinical Samples).

STOP PRESS....

FMD positive samples from the recent cases in Algeria (described above) have now been genetically characterised as belonging to the A/AFRICA/G-IV genotype by the OIE Reference Laboratory for FMD at IZSLER, Brescia, Italy. Other recent field outbreaks due to this viral lineage have been recognized in Nigeria, Cameroon and Egypt, and the sequence analysis indicates a West African origin for the Algerian outbreaks. Initial reports suggesting the involvement of SAT 1 have not been confirmed.

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Table 1: Status of sequencing of samples or sequences received by the WRLFMD from January to March 2017 (* indicates samples carried over from the last quarter)

WRLFMD Batch No.	Date received	Country	Serotype	No. of samples	No. of sequences	Sequencing status
WRLFMD/2016/00036*	13/12/2016	Bhutan	O	6	6	Completed
WRLFMD/2016/00037*	20/12/2016	Vietnam	O	21	21	Completed
			A	8	8	Completed
WRLFMD/2017/00001	13/02/2017	South Korea	O	2	2	Completed
			A	1	1	Completed
WRLFMD/2017/00002	28/02/2017	Saudi Arabia	O	1	1	Completed
			A	7	7	Completed
WRLFMD/2017/00003	07/03/2017	Nepal	O	19	19	Completed
WRLFMD/2017/00004	15/03/2017	Israel	O	8	8	Completed
WRLFMD/2017/00005	15/03/2017	Palestinian AT	O	8	8	Completed
Total				81	81	

*, received during the 4th quarter of 2016

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2. Detailed Analysis

Key for maps and trees:

Serotype O
Serotype A
Serotype C
Serotype Asia-1
Serotype SAT 1
Serotype SAT 2
Serotype SAT 3
FMDV Genome Detected
No Virus Detected

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2.1. ASIA

Bhutan

Batch:
WRLFMD/2016/00036

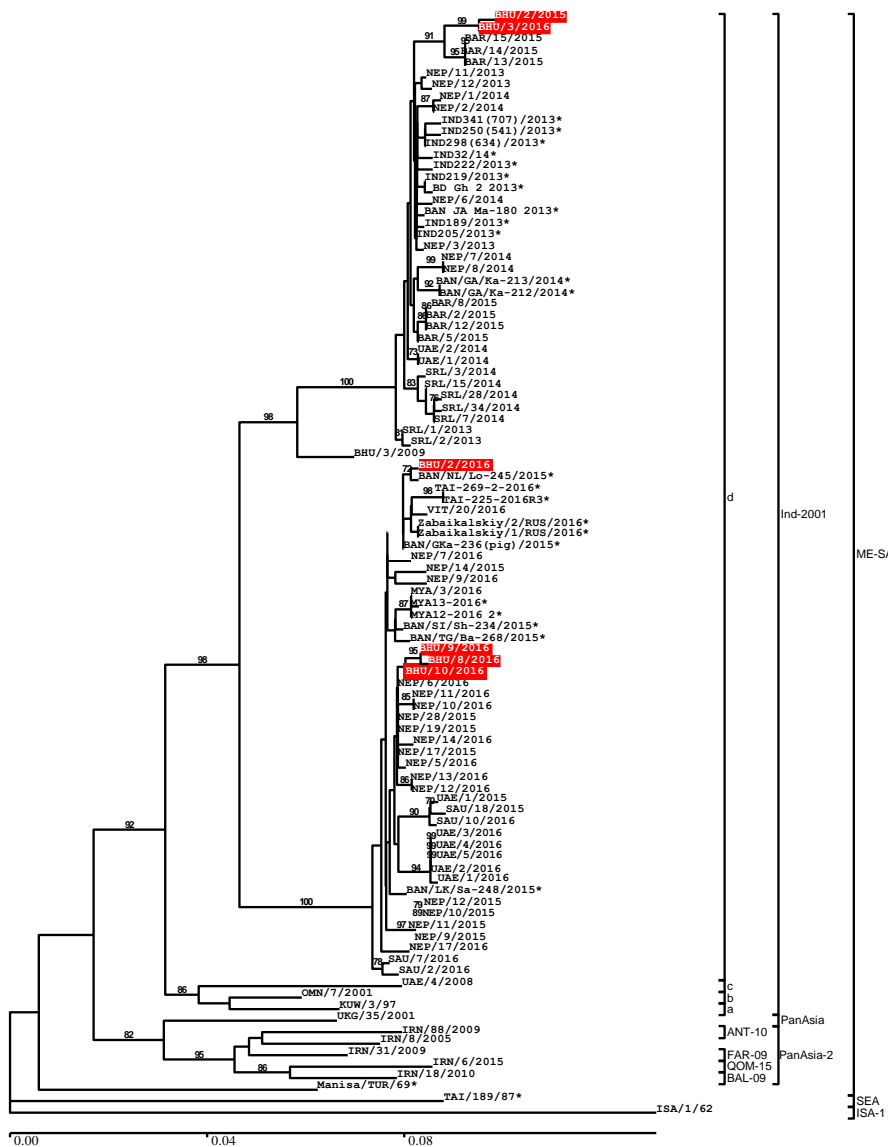
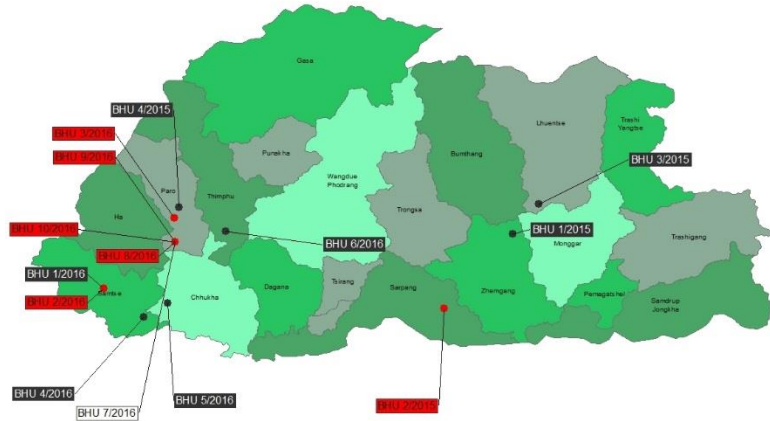
Date received:
13/12/2016

No. of samples: 14

O (ME-SA/Ind-2001d): 6

FMDV-GD: 7

NVD: 1



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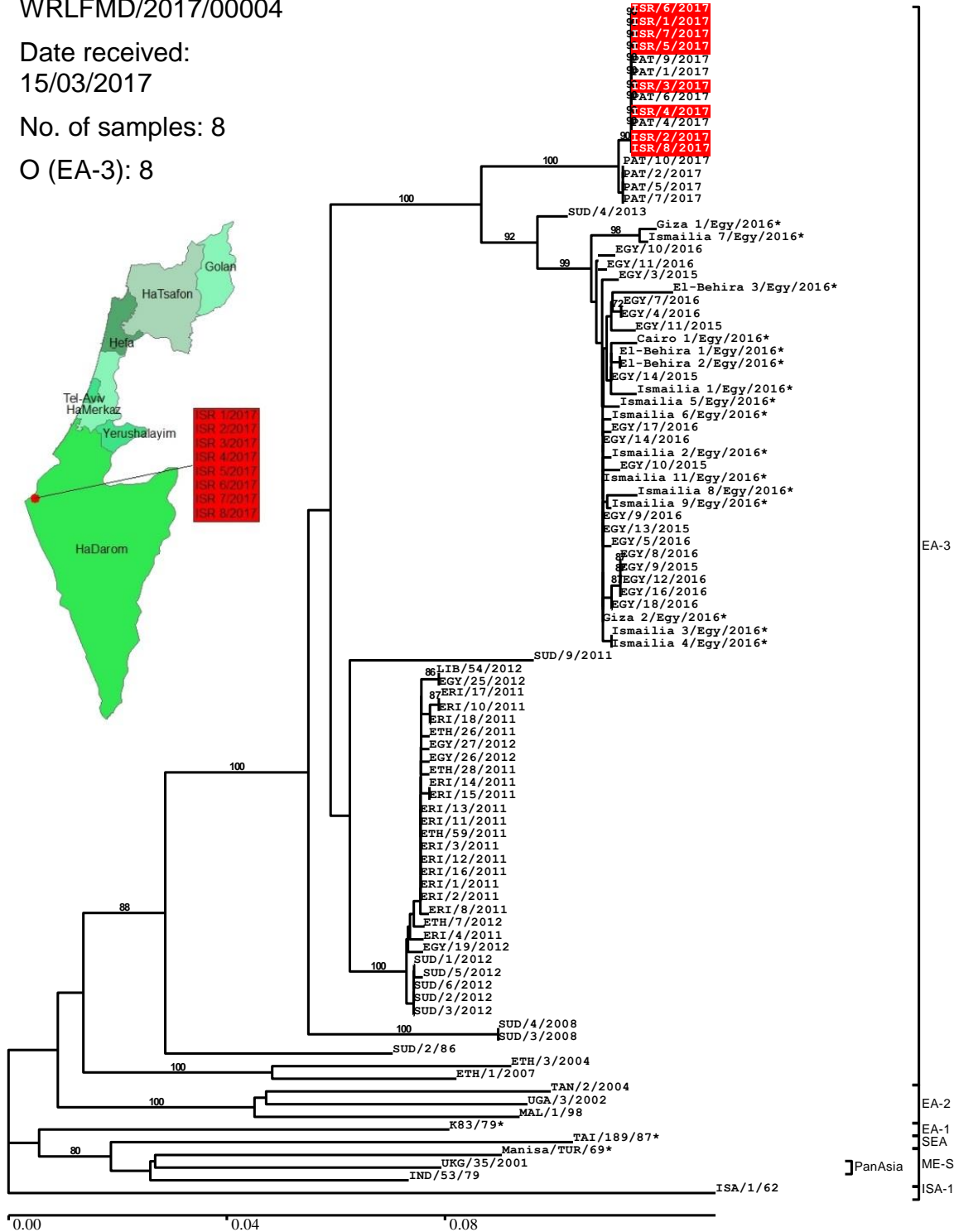
Israel

Batch:
WRLFMD/2017/00004

Date received:
15/03/2017

No. of samples: 8

O (EA-3): 8



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Nepal

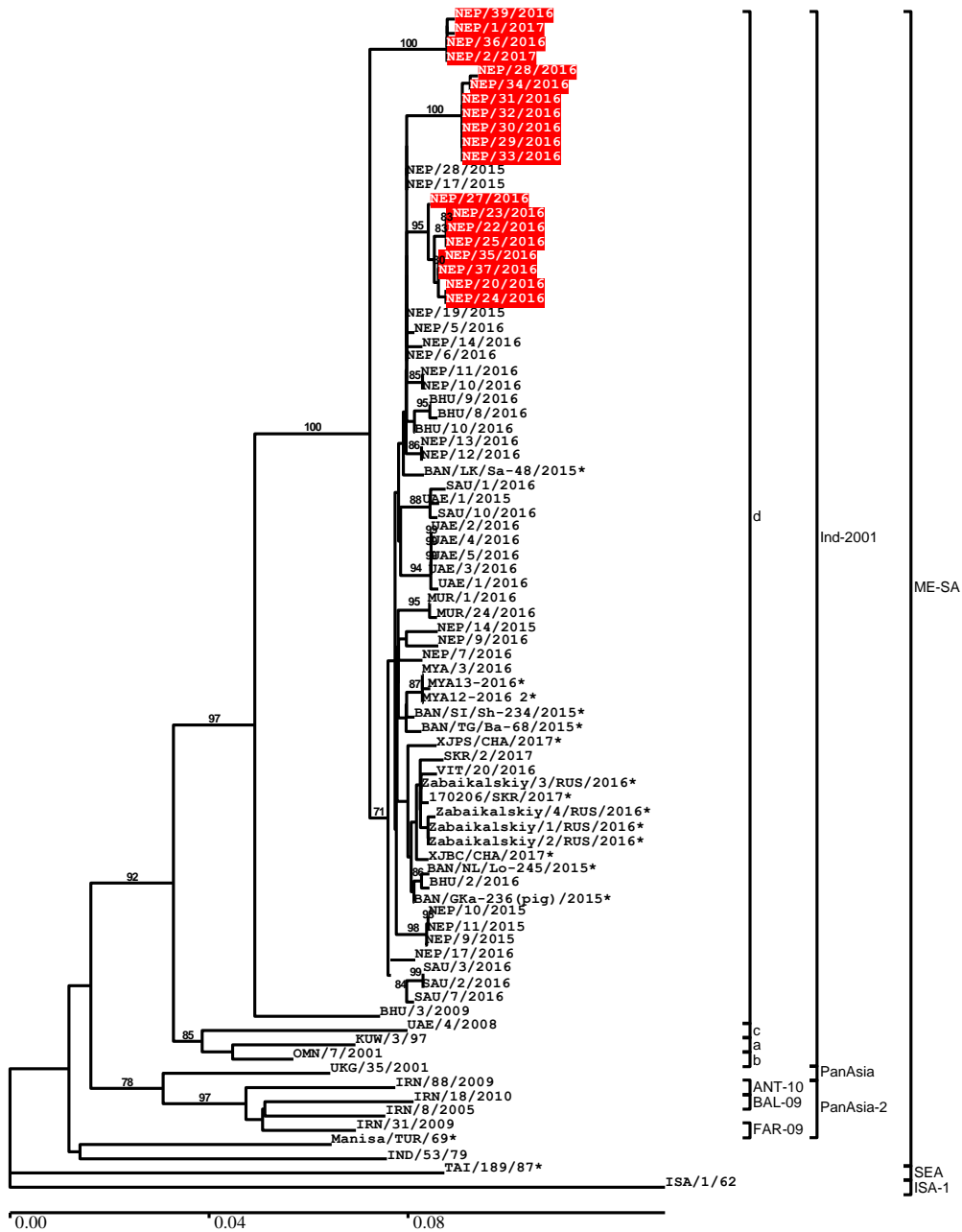
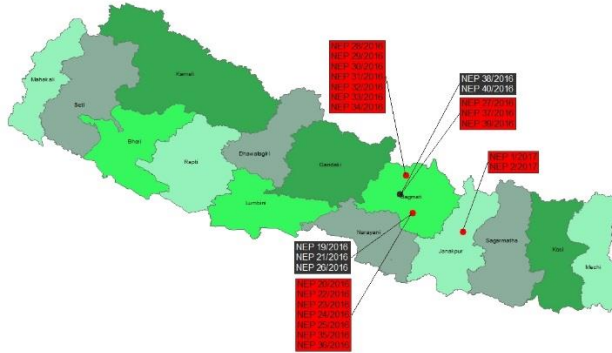
Batch:
WRLFMD/2017/00003

Date received:
07/03/2017

No. of samples: 19

O (ME-SA/Ind-2001d):
19

FMDV-GD: 6



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Palestinian AT

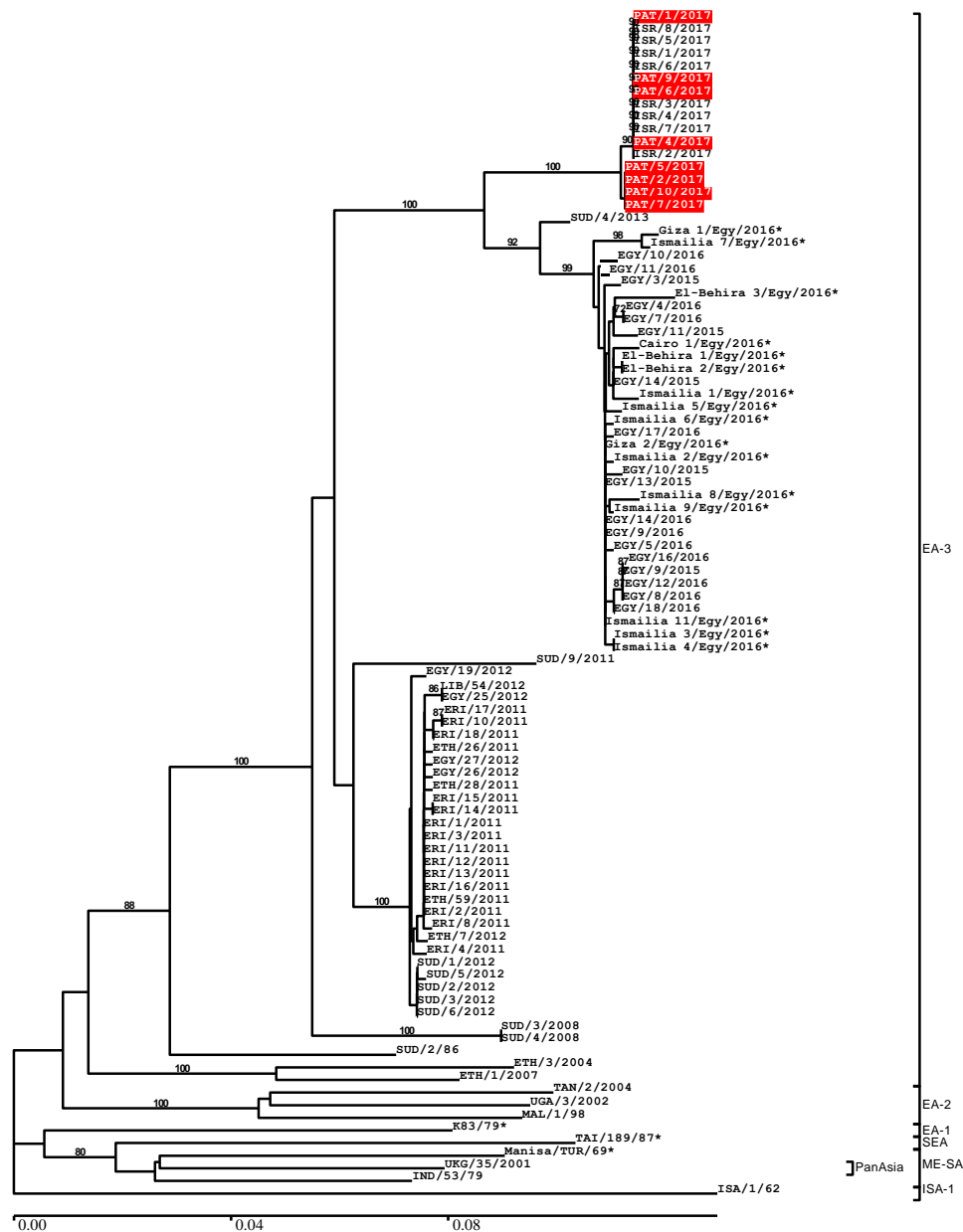
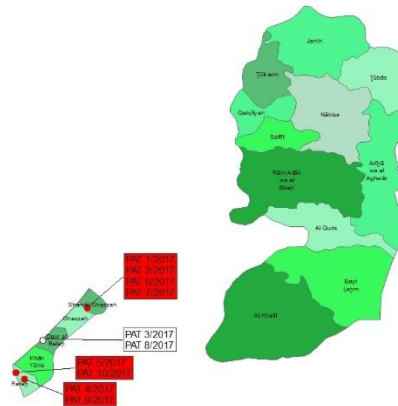
Batch:
WRLFMD/2017/00005

Date received:
15/03/2017

No. of samples: 10

O (EA-3): 8

NVD: 2



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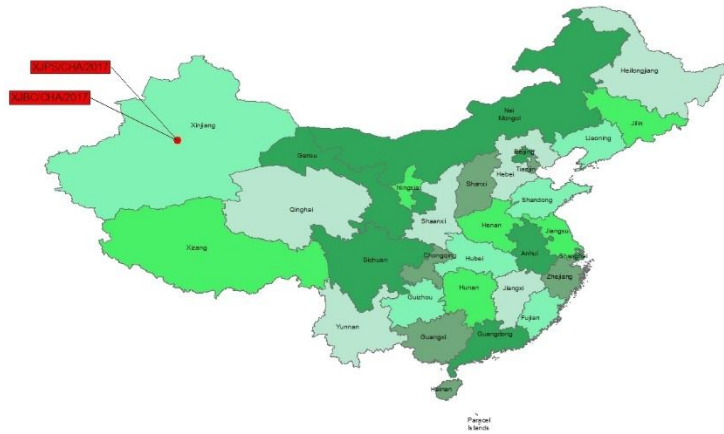
People's Republic of China

Batch:
WRLMEG/2017/00024

Date received: 15/03/2017

No. of sequences: 2

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



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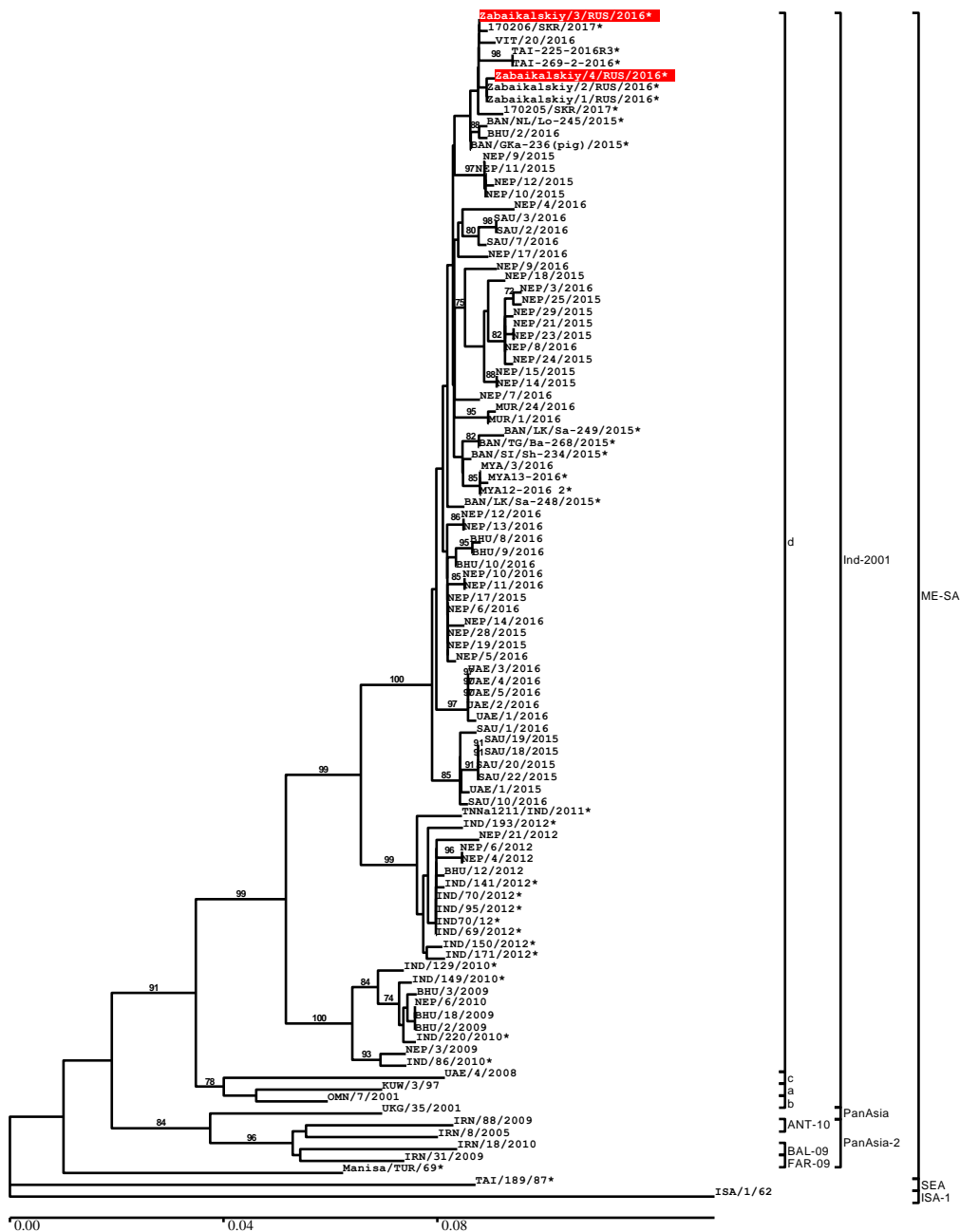
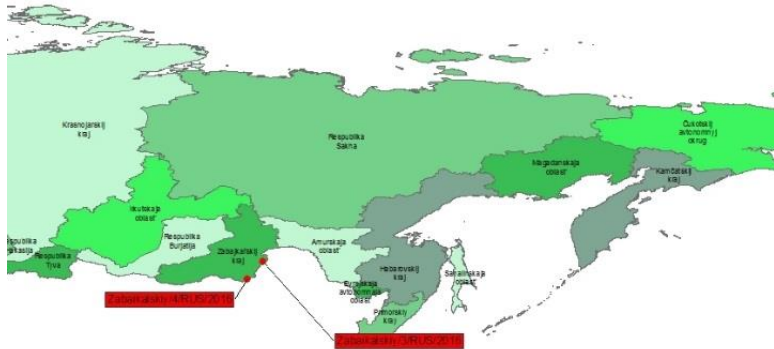
Russian Federation

Batch:
WRLMEG/2017/00013

Date received:
13/02/2017

No. of sequences: 2

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



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Saudi Arabia

Batch:
WRLFMD/2017/00002

Date received:
28/02/2017

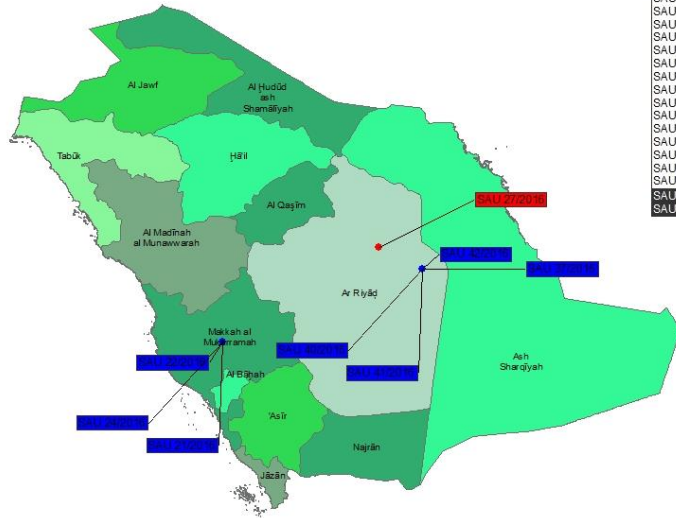
No. of samples: 25

O (ME-SA/PanAsia-2^{ANT-10}): 1

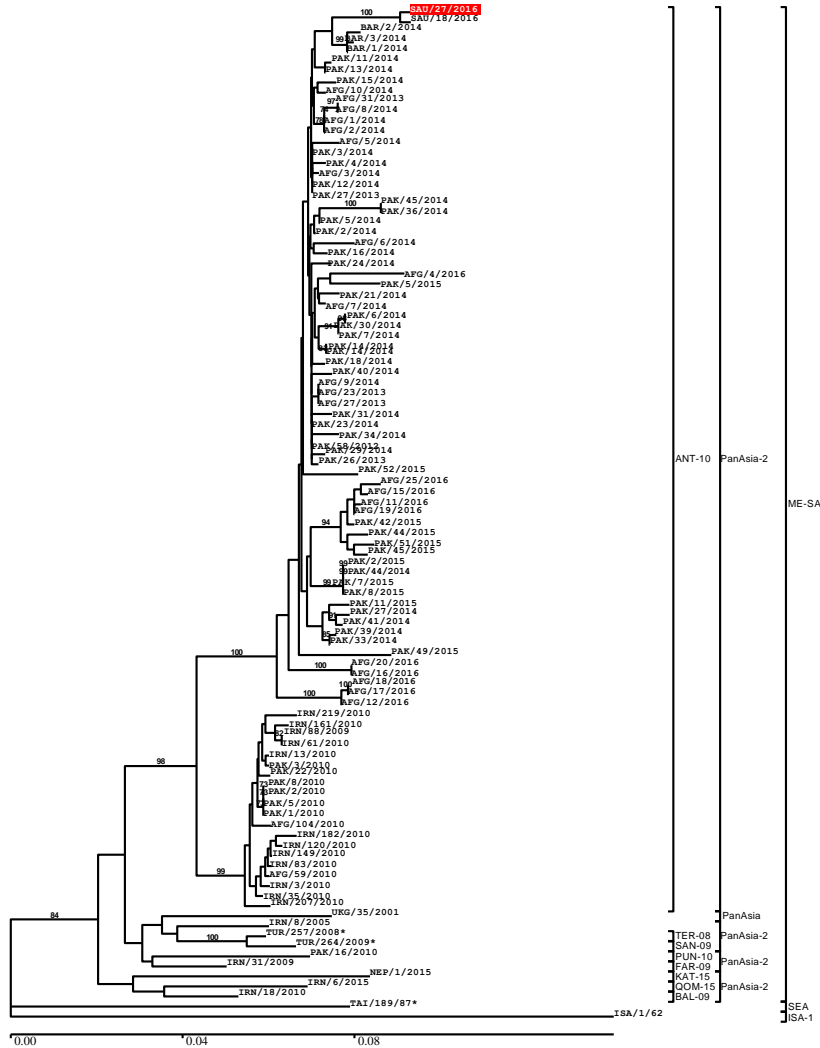
A (ASIA/G-VII): 7

FMDV-GD: 2

NVD: 15



SAU 23/2016
SAU 25/2016
SAU 26/2016
SAU 28/2016
SAU 30/2016
SAU 31/2016
SAU 32/2016
SAU 33/2016
SAU 34/2016
SAU 35/2016
SAU 36/2016
SAU 38/2016
SAU 39/2016
SAU 43/2016
SAU 44/2016
SAU 23/2016
SAU 45/2016



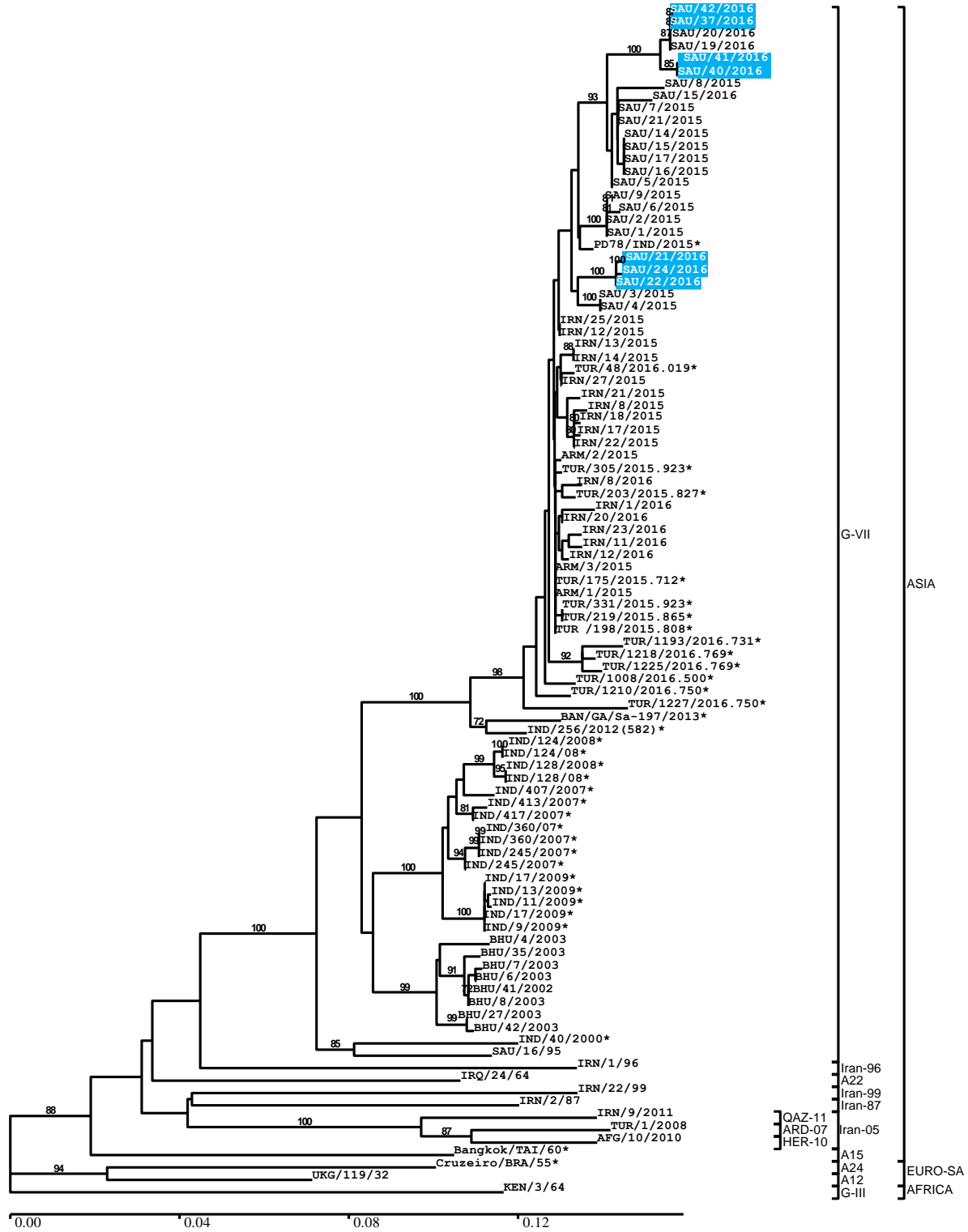
Saudi Arabia continued on next page

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Saudi Arabia continued



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South Korea (Republic of Korea)

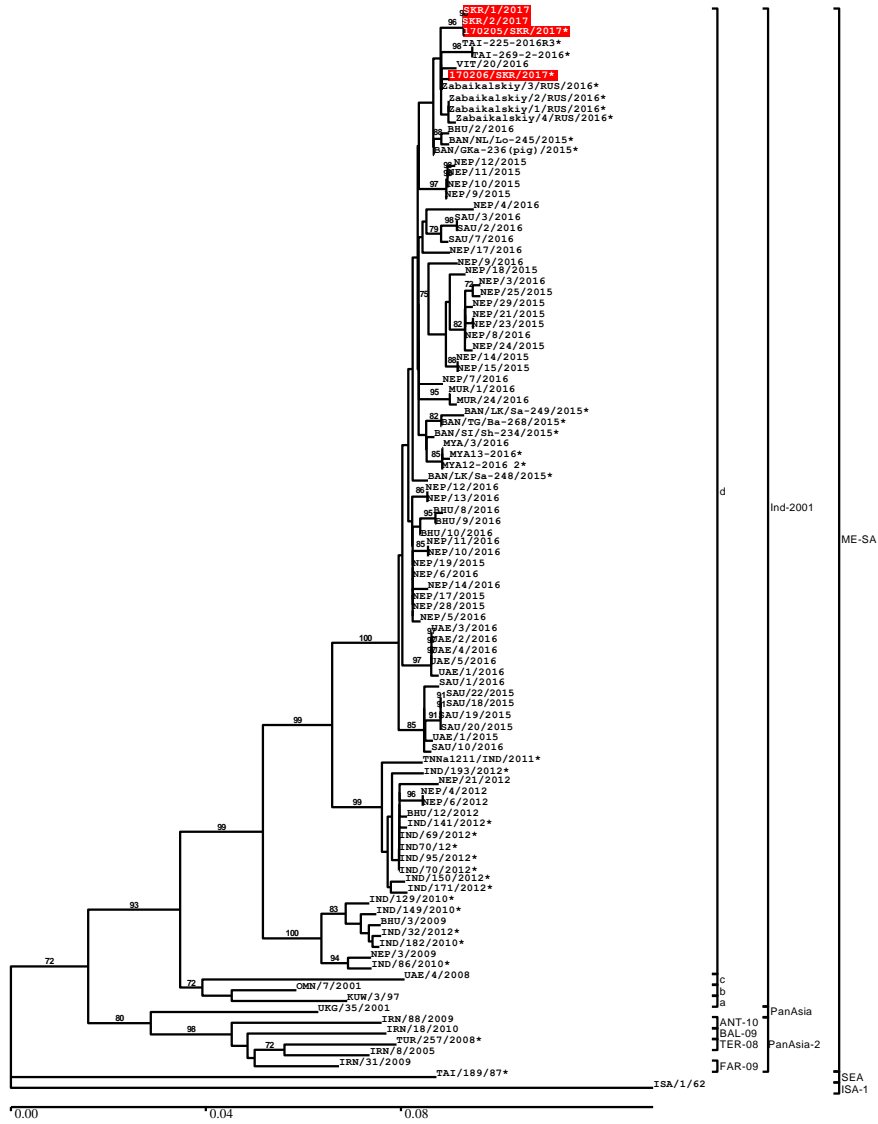
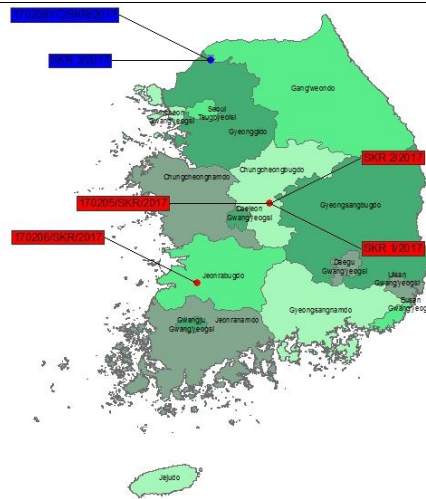
Batch:
WRLFMD/2017/00001

Date received: 13/02/2017

No. of samples: 3

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

A (ASIA/Sea-97): 1



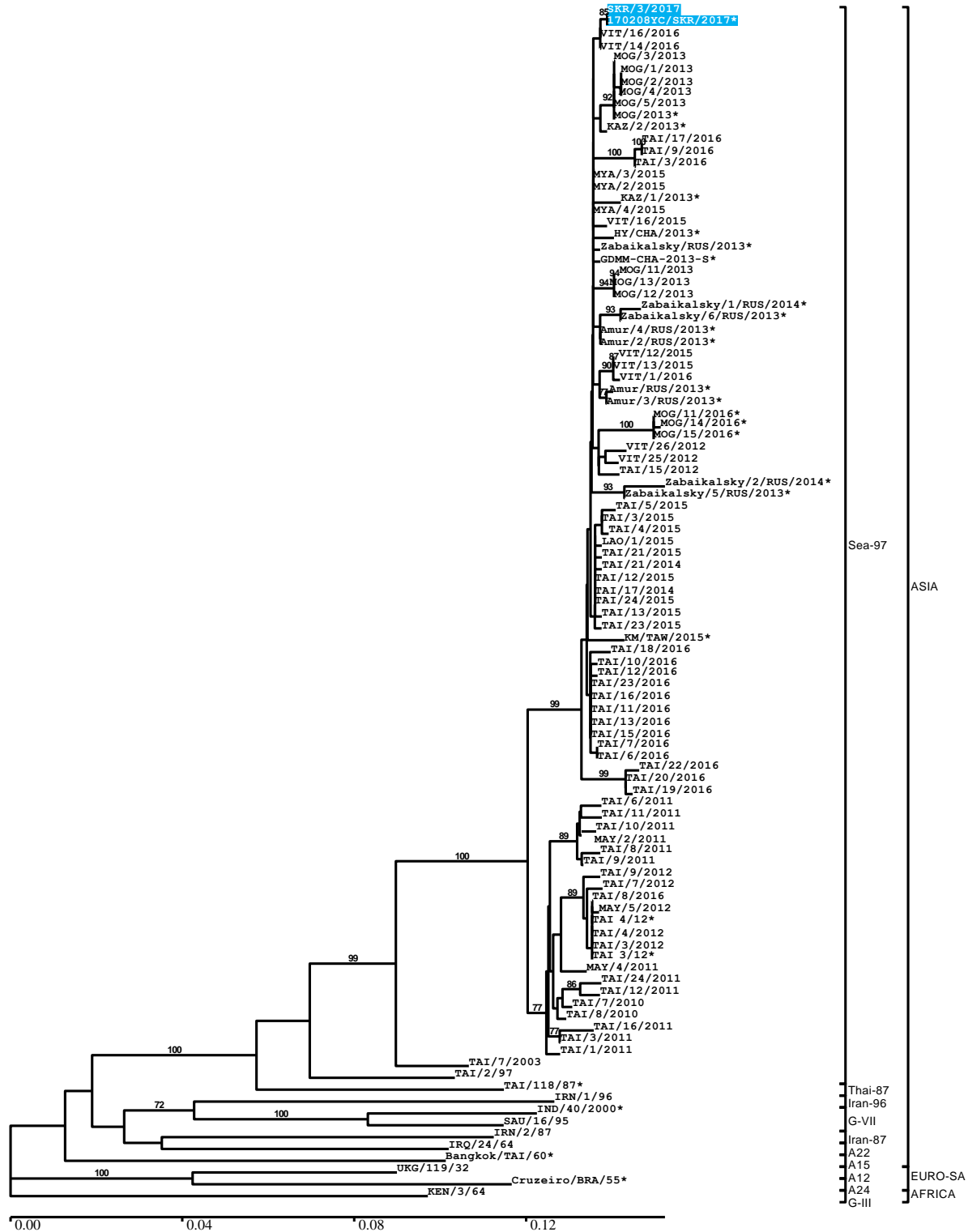
South Korea continued on next page

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South Korea continued



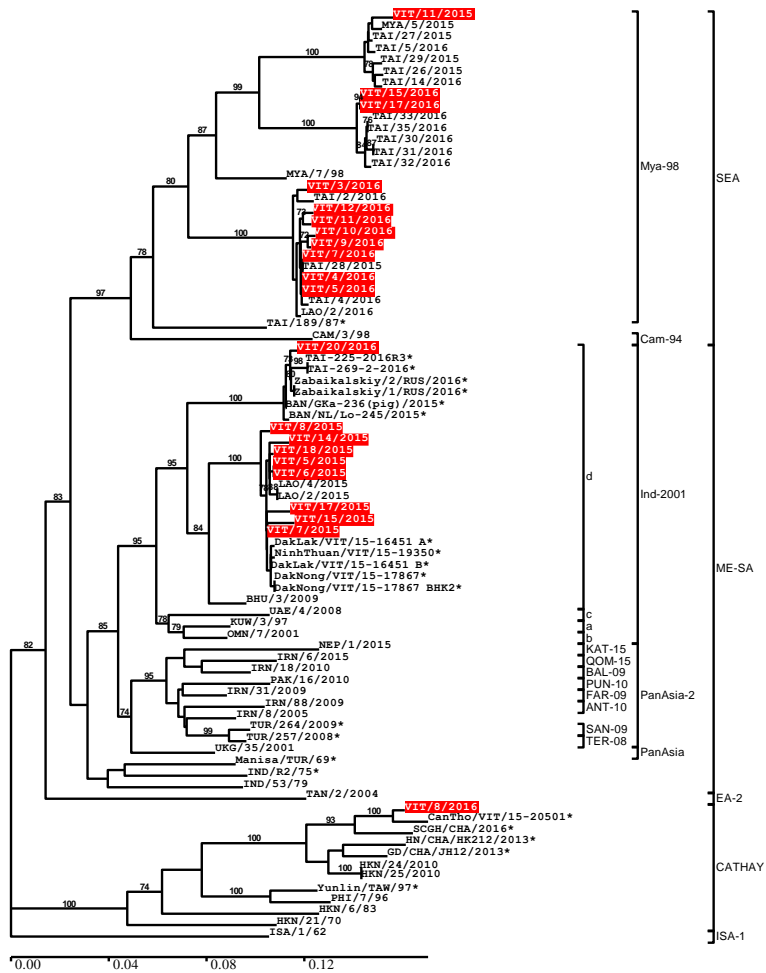
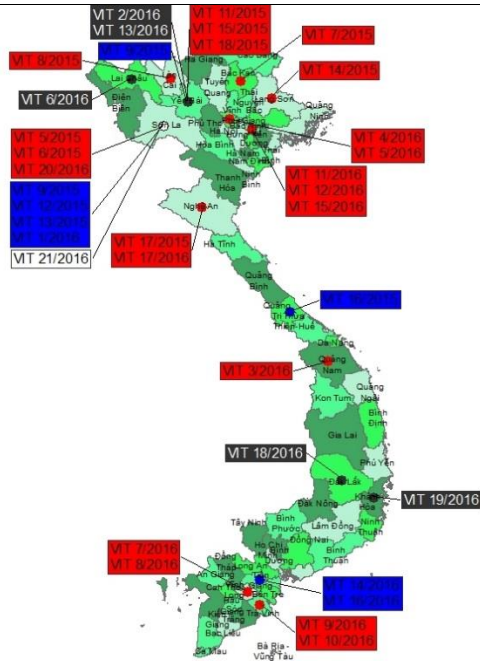
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Vietnam

Batch:
WRLFMD/2016/00037
Date received: 20/12/2016
No. of samples: 35
O (ME-SA/Ind-2001d): 9
O (SEA/Mya-98): 11
O (CATHAY): 1
A (ASIA/Sea-97): 8
FMDV-GD: 5
NVD: 1



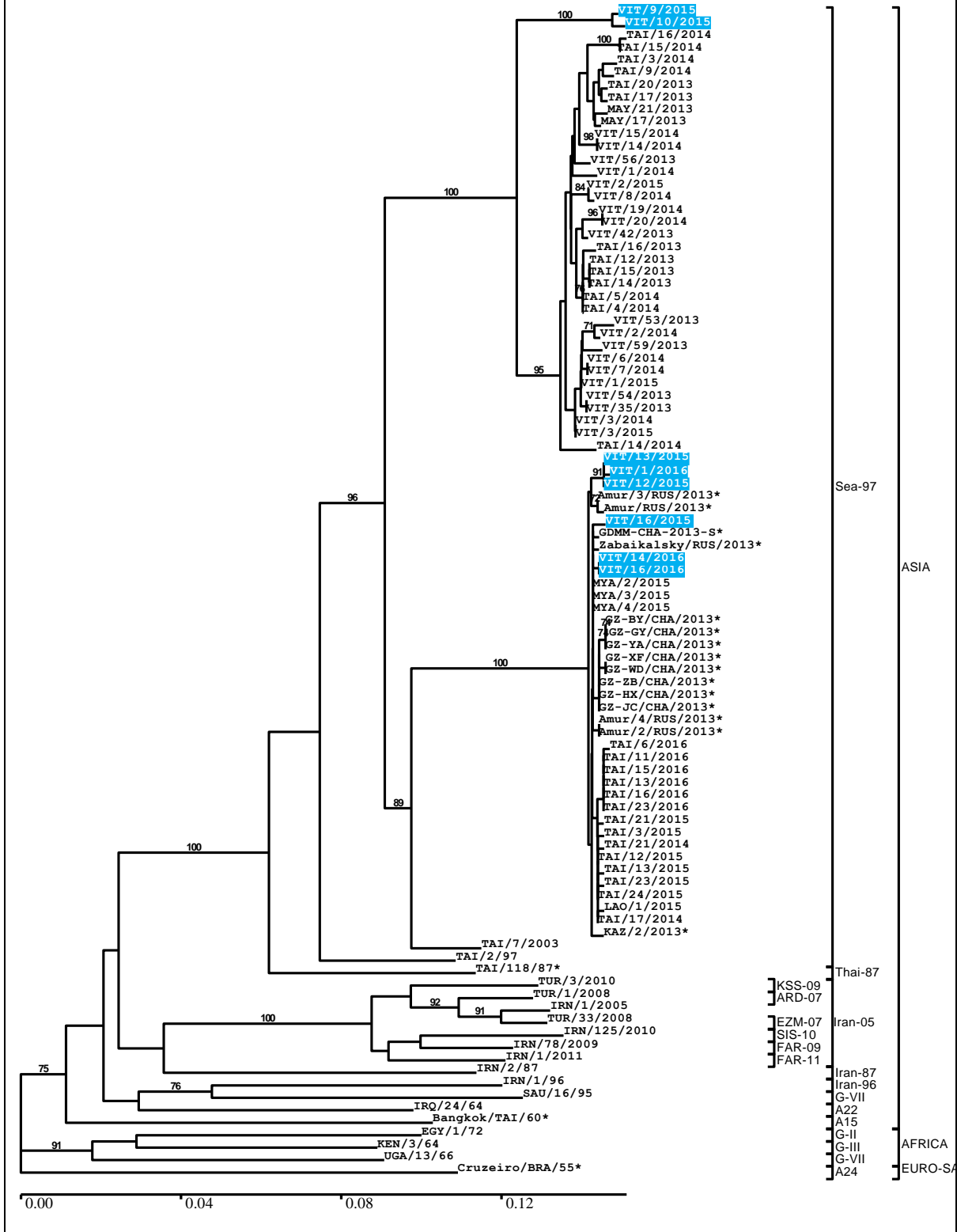
Vietnam continued on next page

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Vietnam continued on next page



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3. Vaccine matching

During this reporting period vaccine matching has been undertaken for 14 FMD virus field strains (serotype O (n=9) and serotype A (n=5)).

For individual data see Annex 1, section 4.3 (Antigenic Characterisation).

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4. Annex 1

4.1. Summary of Submissions

Table 2: Summary of samples collected and received to WRLFMD (January to March 2017)

Country	Nº of samples	Virus isolation in cell culture/ELISA								RT-PCR for FMD (or SVD)		
		FMD virus serotypes								No Virus Detected	virus (where appropriate)	
		O	A	C	SAT 1	SAT 2	SAT 3	ASIA -1	Positive		Negative	
Israel	8	8	-	-	-	-	-	-	-	8	-	
Korea, Republic of	3	2	1	-	-	-	-	-	-	3	-	
Nepal	24	19	-	-	-	-	-	-	5	24	-	
Palestinian Autonomous Territories	10	8	-	-	-	-	-	-	2	8	2	
Saudi Arabia	25	1	7	-	-	-	-	-	17	8	17	
TOTAL	70	38	8	-	-	-	-	0	24	51	19	

Sample results pending from previous report:

Bhutan	14	1	-	-	-	-	-	-	13	13	1
Vietnam	35	21	8	-	-	-	-	-	6	34	1
TOTAL	49	22	8	-	-	-	-	-	19	47	2

Abbreviations used in table

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
rRT-PCR	Real-time reverse transcription polymerase chain reaction for FMD (or SVD) viral genome

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4.2. Clinical Samples

Table 3: Clinical sample diagnostics made by the WRLFMD® January to March 2017

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		
				VV/ELISA	RT-PCR	Final report
Israel	ISR 1/2017	CATTLE	06-Feb-17	O	POS	O
	ISR 2/2017	CATTLE	06-Feb-17	O	POS	O
	ISR 3/2017	CATTLE	06-Feb-17	O	POS	O
	ISR 4/2017	CATTLE	06-Feb-17	O	POS	O
	ISR 5/2017	CATTLE	09-Feb-17	O	POS	O
	ISR 6/2017	CATTLE	09-Feb-17	O	POS	O
	ISR 7/2017	CATTLE	09-Feb-17	O	POS	O
	ISR 8/2017	CATTLE	09-Feb-17	O	POS	O
Republic of Korea	SKR 1/2017	CATTLE	05-Feb-17	O	POS	O
	SKR 2/2017	CATTLE	05-Feb-17	O	POS	O
	SKR 3/2017	CATTLE	08-Feb-17	A	POS	A
Nepal	NEP 19/2016	CATTLE	15-Nov-16	NEG	POS	FMDV GD
	NEP 20/2016	CATTLE	15-Nov-16	O	POS	O
	NEP 21/2016	CATTLE	15-Nov-16	NEG	POS	FMDV GD
	NEP 22/2016	CATTLE	15-Nov-16	O	POS	O
	NEP 23/2016	CATTLE	15-Nov-16	O	POS	O
	NEP 24/2016	CATTLE	15-Nov-16	O	POS	O
	NEP 25/2016	CATTLE	15-Nov-16	O	POS	O
	NEP 26/2016	CATTLE	17-Nov-16	NEG	POS	FMDV GD
	NEP 27/2016	CATTLE	17-Nov-16	O	POS	O
	NEP 28/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 29/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 30/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 31/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 32/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 33/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 34/2016	CATTLE	18-Nov-16	O	POS	O
	NEP 35/3016	CATTLE	18-Nov-16	O	POS	O
	NEP 36/3016	CATTLE	18-Nov-16	O	POS	O
	NEP 37/3016	CATTLE	07-Dec-16	O	POS	O
	NEP 38/3016	CATTLE	07-Dec-16	NEG	POS	FMDV GD
	NEP 39/3016	CATTLE	07-Dec-16	O	POS	O
	NEP 40/2016	CATTLE	07-Dec-16	NEG	POS	FMDV GD
Palestinian Autonomous Territories	NEP 1/2017	CATTLE	20-Jan-17	O	POS	O
	NEP 2/2017	CATTLE	20-Jan-17	O	POS	O
	PAT 1/2017	CATTLE	08-Feb-17	O	POS	O
	PAT 2/2017	CATTLE	08-Feb-17	O	POS	O
	PAT 3/2017	CATTLE	08-Feb-17	NEG	NEG	NVD
	PAT 4/2017	CATTLE	08-Feb-17	O	POS	O

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	PAT 5/2017	CATTLE	08-Feb-17	O	POS	O
	PAT 6/2017	CATTLE	10-Feb-17	O	POS	O
	PAT 7/2017	CATTLE	12-Feb-17	O	POS	O
	PAT 8/2017	CATTLE	12-Feb-17	NEG	NEG	NVD
	PAT 9/2017	CATTLE	12-Feb-17	O	POS	O
	PAT 10/2017	CATTLE	12-Feb-17	O	POS	O
Saudi Arabia	SAU 21/2016	CATTLE	19-Oct-16	A	POS	A
	SAU 22/2016	CATTLE	19-Oct-16	A	POS	A
	SAU 23/2016	CATTLE	19-Oct-16	NEG	NEG	NVD
	SAU 24/2016	CATTLE	19-Oct-16	A	NEG	A
	SAU 25/2016	SHEEP	19-Oct-16	NEG	NEG	NVD
	SAU 26/2016	SHEEP	07-Nov-16	NEG	NEG	NVD
	SAU 27/2016	SHEEP	07-Nov-16	O	NEG	O
	SAU 28/2016	SHEEP	07-Nov-16	NEG	NEG	NVD
	SAU 29/2016	SHEEP	07-Nov-16	NEG	POS	FMDV GD
	SAU 30/2016	GOAT	07-Nov-16	NEG	NEG	NVD
	SAU 31/2016	GOAT	07-Nov-16	NEG	NEG	NVD
	SAU 32/2016	GOAT	07-Nov-16	NEG	NEG	NVD
	SAU 33/2016	SHEEP	07-Nov-16	NEG	NEG	NVD
	SAU 34/2016	SHEEP	07-Nov-16	NEG	NEG	NVD
	SAU 35/2016	SHEEP	07-Nov-16	NEG	NEG	NVD
	SAU 36/2016	SHEEP	29-Dec-16	NEG	NEG	NVD
	SAU 37/2016	CATTLE	29-Dec-16	A	POS	A
	SAU 38/2016	SHEEP	29-Dec-16	NEG	NEG	NVD
	SAU 39/2016	SHEEP	29-Dec-16	NEG	NEG	NVD
	SAU 40/2016	CATTLE	29-Dec-16	A	POS	A
	SAU 41/2016	CATTLE	29-Dec-16	A	POS	A
	SAU 42/2016	CATTLE	29-Dec-16	A	POS	A
	SAU 43/2016	SHEEP	29-Dec-16	NEG	NEG	NVD
	SAU 44/2016	SHEEP	29-Dec-16	NEG	NEG	NVD
	SAU 45/2016	CATTLE	29-Dec-16	NEG	POS	FMDV GD

CARRIED OVER FROM PREVIOUS QUARTERLY REPORT:

Country	WRL for FMD Sample Identification	Animal	Date of Collection	W/ELISA	Results RT-PCR	Final report
Bhutan	BHU 1/2015	CATTLE	14-Aug-15	NEG	POS	FMDV GD
	BHU 2/2015	CATTLE	15-Aug-15	NEG	POS	FMDV GD
	BHU 3/2015	CATTLE	22-Nov-15	NEG	POS	FMDV GD
	BHU 4/2015	CATTLE	26-Dec-15	NEG	POS	FMDV GD
	BHU 1/2016	CATTLE	15-Feb-16	NEG	POS	FMDV GD
	BHU 2/2016	CATTLE	15-Feb-16	NEG	POS	FMDV GD
	BHU 3/2016	CATTLE	15-Feb-16	NEG	POS	FMDV GD
	BHU 4/2016	CATTLE	17-Feb-16	NEG	POS	FMDV GD

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	BHU 5/2016	CATTLE	08-Mar-16	NEG	POS	FMDV GD
	BHU 6/2016	CATTLE	24-Mar-16	NEG	POS	FMDV GD
	BHU 7/2016	CATTLE	04-Jun-16	NEG	NEG	NVD
	BHU 8/2016	CATTLE	04-Jun-16	NEG	POS	FMDV GD
	BUH 9/2016	CATTLE	04-Jun-16	O	POS	O
	BHU 10/2016	CATTLE	04-Jun-16	NEG	POS	FMDV GD
Vietnam	VIT 5/2015	CATTLE	02-Jun-15	O	POS	O
	VIT 6/2015	CATTLE	02-Jun-15	O	POS	O
	VIT 7/2015	PIG	06-Jun-15	O	POS	O
	VIT 8/2015	CATTLE	10-Jul-15	O	POS	O
	VIT 9/2015	BUFFALO	14-Sep-15	A	POS	A
	VIT 10/2015	CATTLE	14-Sep-15	A	POS	A
	VIT 11/2015	PIG	16-Oct-15	O	POS	O
	VIT 12/2015	CATTLE	28-Oct-15	A	POS	A
	VIT 13/2015	CATTLE	28-Oct-15	A	POS	A
	VIT 14/2015	BUFFALO	30-Oct-15	O	POS	O
	VIT 15/2015	BUFFALO	10-Nov-15	O	POS	O
	VIT 16/2015	CATTLE	24-Nov-15	A	POS	A
	VIT 17/2015	PIG	01-Dec-15	O	POS	O
	VIT 18/2015	CATTLE	02-Dec-15	O	POS	O
	VIT 1/2016	BUFFALO	28-Jan-16	A	POS	A
	VIT 2/2016	BUFFALO	16-Feb-16	NEG	POS	FMDV GD
	VIT 3/2016	CATTLE	29-Feb-16	O	POS	O
	VIT 4/2016	PIG	11-Mar-16	O	POS	O
	VIT 5/2016	CATTLE	11-Mar-16	O	POS	O
	VIT 6/2016	BUFFALO	18-Mar-16	NEG	POS	FMDV GD
	VIT 7/2016	CATTLE	24-Mar-16	O	POS	O
	VIT 8/2016	PIG	28-Mar-16	O	POS	O
	VIT 9/2016	CATTLE	06-Apr-16	O	POS	O
	VIT 10/2016	CATTLE	12-Apr-16	O	POS	O
	VIT 11/2016	PIG	26-Apr-16	O	POS	O
	VIT 12/2016	PIG	05-May-16	O	POS	O
	VIT 13/2016	CATTLE	15-May-16	NEG	POS	FMDV GD
	VIT 14/2016	CATTLE	12-Jun-16	A	POS	A
	VIT 15/2016	BUFFALO	03-Aug-16	O	POS	O
	VIT 16/2016	PIG	09-Aug-16	A	POS	A
	VIT 17/2016	CATTLE	25-Aug-16	O	POS	O
	VIT 18/2016	CATTLE	27-Aug-16	NEG	POS	FMDV GD
	VIT 19/2016	CATTLE	21-Sep-16	NEG	POS	FMDV GD
	VIT 20/2016	CATTLE	23-Sep-16	O	POS	O
	VIT 21/2016	CATTLE	01-Nov-16	NEG	NEG	NVD

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Abbreviations used in table

FMD(V)	Foot-and-mouth disease (virus)
FMDV GD	Genome detected
FMDV NGD	Genome not detected (samples submitted in Trizol, only rRT-PCR carried out)
VI/ELISA	FMDV serotype identified following virus isolation in cell culture and antigen ELISA
rRT-PCR	Real-time 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

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4.3. Antigenic Characterisation

Antigenic characterisation of FMD field isolates by matching with vaccine strains by 2dmVNT from January to March 2017.

Table 4: Vaccine matching studies for O FMDV by VNT

Strain	Serotype	Topotype	Strain	O 3039	O 5911	O1 Manisa	O/TUR/5/2009	O Campos 03	O Campos 04	O SKR
SKR/1/2017	O	ME-SA	Ind-2001d	M	M	M	M	N	N	M
SKR/2/2017	O	ME-SA	Ind-2001d	M	M	M	M	N	N	M
VIT/8/2015	O	ME-SA	Ind-2001d	M		M	M			
VIT/8/2016	O	CATHAY	-	N		N	N			
VIT/17/2016	O	ME-SA	Mya-98	N		N	N			
VIT/20/2016	O	ME-SA	Ind-2001d	M		M	M			
BHU/9/2016	O	ME-SA	Ind-2001d	M		M	M			
TAI/26/2016	O	SEA	Mya-98	M		N	B			
TAI/37/2016	O	SEA	Mya-98	M		N	M			

** The vaccinal bovine sera used for O Campos is from individual animals (animal O-Campos 03 and animal O-Campos-04)

Table 5: Vaccine matching studies for A FMDV by VNT

Strain	Serotype	Topotype	Strain	A/IRN/05	A/TUR/20/06	A22/IRQ	A24/Cruzeiro	A/MAY/97
SKR/3/2017	A	ASIA	Sea-97	M	N	M	N	N
VIT/1/2016	A	ASIA	Sea-97	M	N	M		N
VIT/10/2015	A	ASIA	Sea-97	N	N	M	M	M
TAI/20/2016	A	ASIA	Sea-97	N	N	N		N
TAI/23/2016	A	ASIA	Sea-97	M	N	M		N

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Abbreviations used in tables

M	Vaccine Match <i>$r_1 = \geq 0.3$. 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.</i>
N	No Vaccine Match <i>$r_1 = < 0.3$. Suggests that the field isolate is so different from the vaccine strain that the vaccine is unlikely to protect</i>
B	Borderline <i>Any r_1 values between 0.28 to 0.32</i>
NT	Not tested against this vaccine

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5. Annex 2

Recent FMD Publications (January to March 2016) cited by Web of Science (Pirbright Institute papers and authors are highlighted in **BOLD AND GREY**)

1. Abdela, N. (2017). Sero-prevalence, risk factors and distribution of foot and mouth disease in Ethiopia. *Acta Tropica*, **169**: 125-132.
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6. Annex 3

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.

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