



WRLFMD Quarterly Report January-March 2010

Reference Laboratory Contract Report

4/27/2010

WRLFMD

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**Reference Laboratory Contract Report¹
January-March 2010**

Foot-and-Mouth Disease

¹ N.B. Copies of all the individual reports cited herein can be obtained from Dr. Jef Hammond, IAH-Pirbright, jef.hammond@bbsrc.ac.uk

Summary

ASIA

Southeast Asia, P.R. China, Hong Kong SAR, Taiwan POC and the Republic of Korea

The FMDV O SEA topotype (Mya-98 lineage) was detected in samples from Lao PDR (2008-2009), Myanmar (2008-2009) and Thailand (2009). In a sample collected in 2008 in southern Vietnam, a single virus isolate of the O CATHAY topotype was identified. FMDV O was detected in pigs in Guangdong province, P.R. China in February and March 2010. Further occurrences have occurred in Gansu, Shanxi and Jiangxi provinces in March 2010. In February 2010 an outbreak due to FMDV O occurred in pigs on Penghu Island, Taiwan POC. The animals had been imported for slaughter from the Taiwan mainland. Genotyping of all these outbreaks is not yet available. FMDV O was isolated from samples received from pigs in Hong Kong SAR. These viruses belonged to the SEA topotype (Mya-98 lineage) which is currently widely circulating in Southeast Asia.

FMDV type A (ASIA topotype) was found in Lao PDR (2008), Thailand (2009) and Vietnam (2008-2009). The viruses from these countries were closely related to each other and to viruses isolated in the P.R. China (2009) suggesting widespread circulation of this strain (which has yet to be named). In 2010 this strain was also detected in the Republic of Korea where seven outbreaks occurred in cattle and farmed deer in the Kyonggi-Do region between January and March. In the P.R. China two outbreaks of FMDV A occurred in January 2010 (Xinjiang & Beijing provinces), however, genetic analyses are not yet available.

Bhutan

The O-Ind-2001 lineage (ME-SA topotype) was detected in Bhutan. This lineage was also recently found in Bangladesh and Nepal.

Iran & Turkey

The O-PanAsia-2 and A-Iran-05 lineages continue to dominate in both countries. A single example of the O-Ind-2001 lineage was detected in a sample from Kerman province, Iran in 2009 (O/IRN/72/2009). No further occurrence has so far been detected in 2010.

AFRICA

Eritrea

FMDV type A (AFRICA topotype, G-IV lineage) was detected in 7 out of 53 samples.

Ethiopia

FMDV types O (EA-3 topotype) and SAT 2 (XIII topotype) were detected.

Senegal

FMDV SAT 2 (VII topotype) was detected in 1 out of 24 samples.

Other samples

Samples received from Nigeria and Tanzania are currently being examined and the results will be presented in the next quarterly report.

Uncharacterised FMD viruses

A number of other 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/2010.htm.

WRL vaccine recommendations have not changed from the previous report (Annex 3).

Results from samples received at WRL (status of samples being tested) are shown in Table 1 and a complete

list of clinical sample diagnostics made by the WRL between January and March 2010 is shown in Annex 1 Table A. A record of all samples received to IAH-Pirbright (January-March 2010) is shown in Annex 1 Table B.

Table 1: Status of sequencing of samples received by the WRLFMD from January-March 2010.

Batch	Date Recd.	Country	Serotype(s)	No. of isolates	Status
WRLFMD/2009/00054*	04/12/2009	Iran	O	18	Completed
			A	7	Completed
WRLFMD/2009/00055*	07/12/2009	Bhutan	O	16	Completed
WRLFMD/2009/00056*	19/12/2009	Ethiopia	SAT 2	4	Completed
WRLFMD/2009/00057*	22/12/2009	Bhutan	O	3	Completed
WRLFMD/2010/00001	18/01/2010	Senegal	SAT 2	1	Completed
WRLFMD/2010/00002	20/01/2010	Eritrea	A	7	Completed
WRLFMD/2010/00003	04/02/2010	Turkey	O	6	Completed
			A	12	Completed
WRLFMD/2010/00004	05/02/2010	Thailand	O	13	Completed
			A	7	Completed
WRLFMD/2010/00005	05/02/2010	Laos	O	3	Completed
			A	1	Completed
WRLFMD/2010/00006	05/02/2010	Myanmar	O	4	Completed
WRLFMD/2010/00007	05/02/2010	Vietnam	O	1	Completed
			A	15	Completed
WRLFMD/2010/00008	20/02/2010	Ethiopia	O	2	Completed
			SAT 2	13	Completed
WRLFMD/2010/00009	05/03/2010	Hong Kong SAR	O	14	Completed
WRLFMD/2010/00010	16/03/2010	Hong Kong SAR	O	1	Completed
WRLFMD/2010/00011	18/03/2010	Iran	O	35	Completed
			A	3	Completed
WRLFMD/2010/00012	18/03/2010	Ethiopia	O	3	Completed
WRLFMD/2010/00013	23/03/2010	Hong Kong SAR	O	1	Unable to PCR VP1
WRLFMD/2010/00014	10/03/2010	Tanzania	Virus isolation & typing in progress (82 samples)		
Not yet allocated	?	Nigeria	Virus isolation & typing in progress (50 samples)		
Total				190	

* carried over from last report.

Detailed Analysis:

MIDDLE EAST & SOUTH ASIA

Iran

WRLFMD/2009/00054

Received: 04/12/2009; 31 samples

Type O: 18 isolates

Topotype: ME-SA

Lineage: PanAsia-2 & Ind-2001 (IRN/72/2009)

Type A: 7 isolates

Topotype: ASIA

Lineage: Iran-05^{AFG-07} & Iran-05^{BAR-08}

FMDV-GD: 4 samples

NVD: 2 samples

WRLFMD/2010/00011

Received: 18/03/2010; 44 samples

Type O: 35 isolates

Topotype: ME-SA

Lineage: PanAsia-2

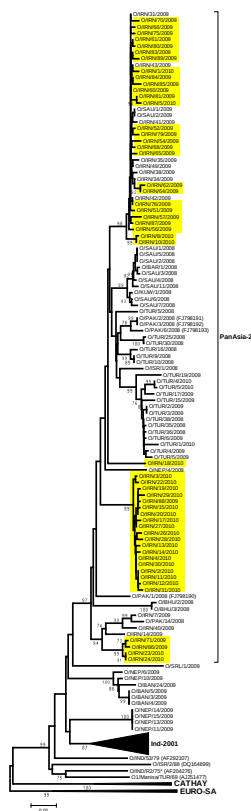
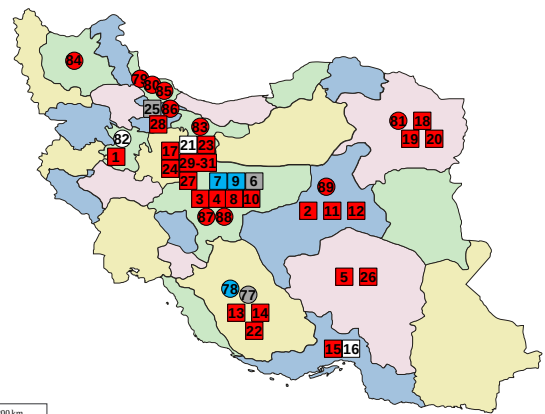
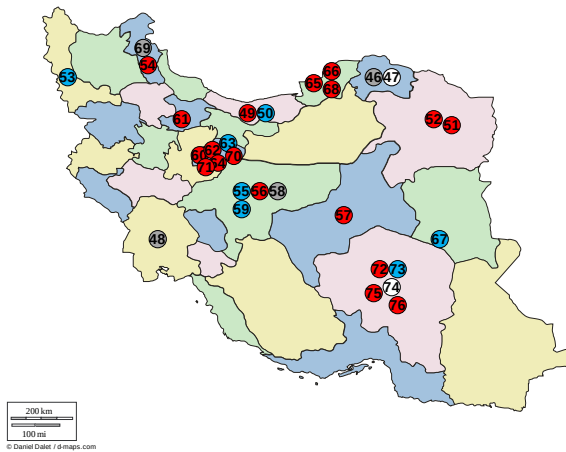
Type A: 3 isolates

Topotype: ASIA

Lineage: : Iran-05^{AFG-07} & A-Iran-05 (unnamed)

FMDV-GD: 3 samples

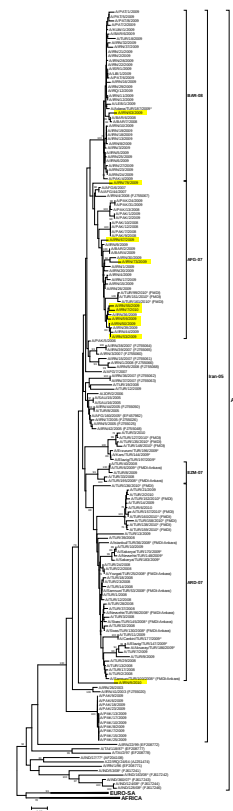
NVD: 3 samples



FMDV O in Iran



FMDV O in Iran



FMDV A in Iran

Turkey

WRLFMD/2010/00003

Received: 04/02/2010; 20 samples

Type O: 6 isolates

Topotype: ME-SA

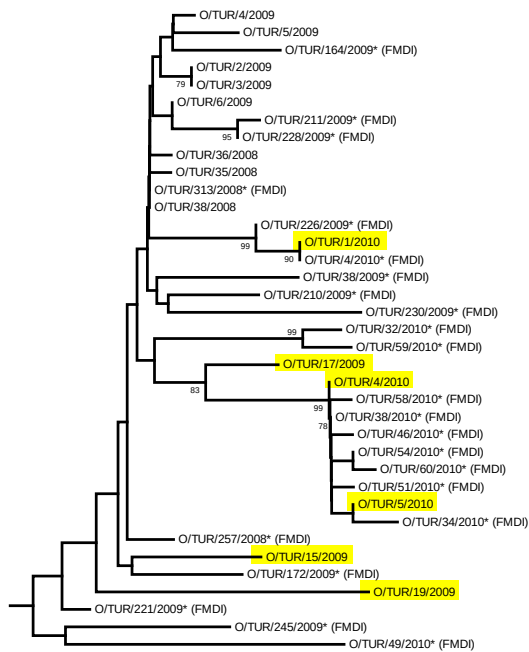
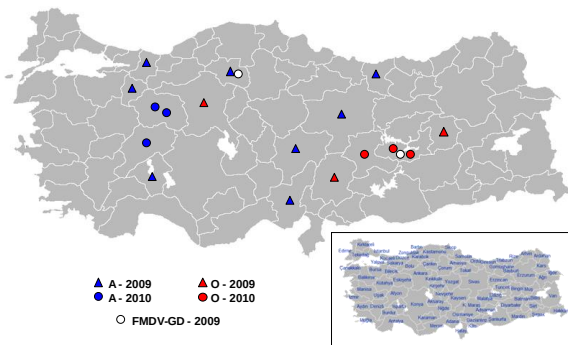
Lineage: PanAsia-2

Type A: 12 isolates

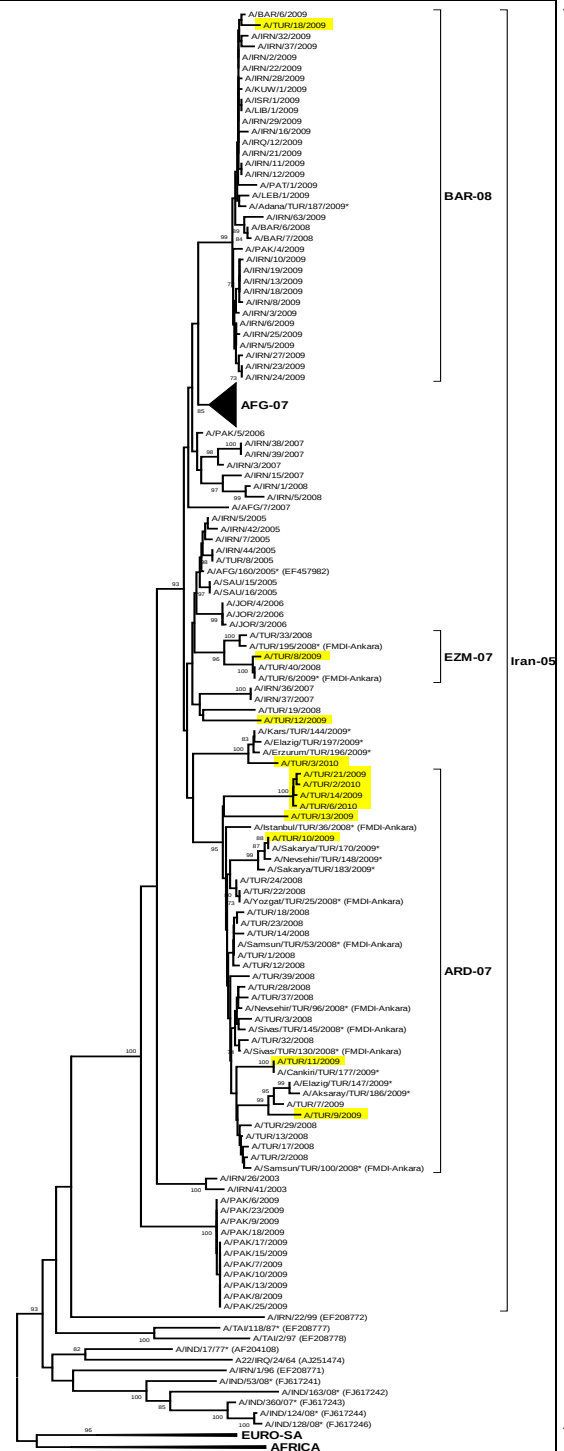
Topotype: ASIA

Lineages: Iran-05^{ARD-07}, Iran-05^{EZM-07} & Iran-05 (unnamed)

FMDV-GD: 2



FMDV O in Turkey



FMDV A in Turkey

Bhutan

WRLFMD/2009/00055

Received: 07/12/2009; 26 samples

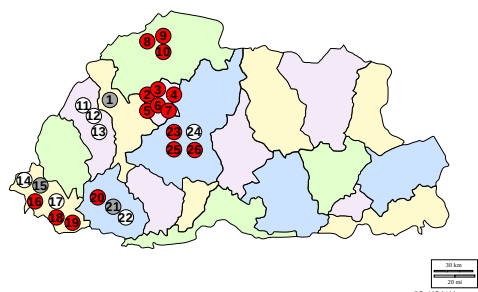
Type O: 16 isolates

Topotype: ME-SA

Lineage: Ind-2001

FMDV-GD: 3 samples

NVD: 7 samples



WRLFMD/2009/00057

Received: 22/12/2009; 22 samples

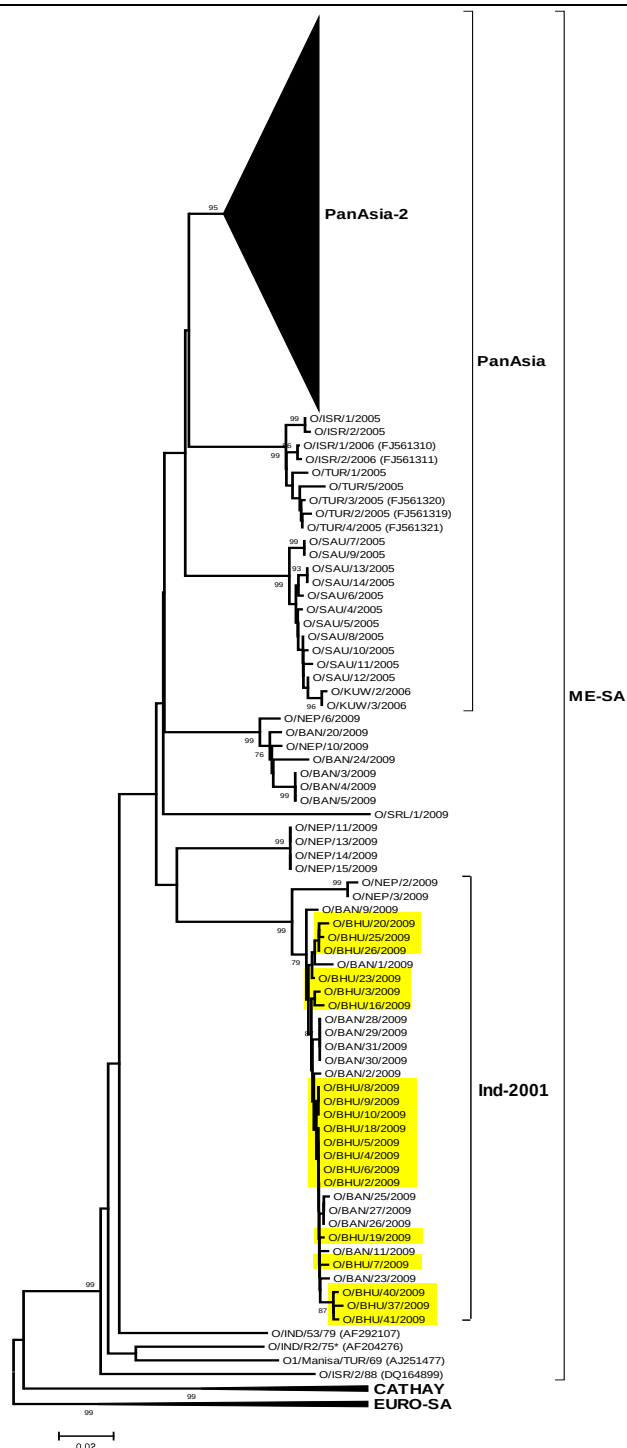
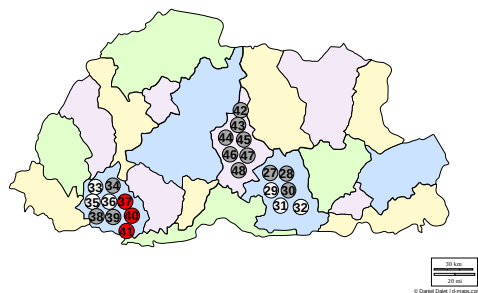
Type O: 3 isolates

Topotype: ME-SA

Lineage: Ind-2001

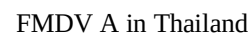
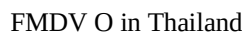
FMDV-GD: 13 samples

NVD: 6 samples

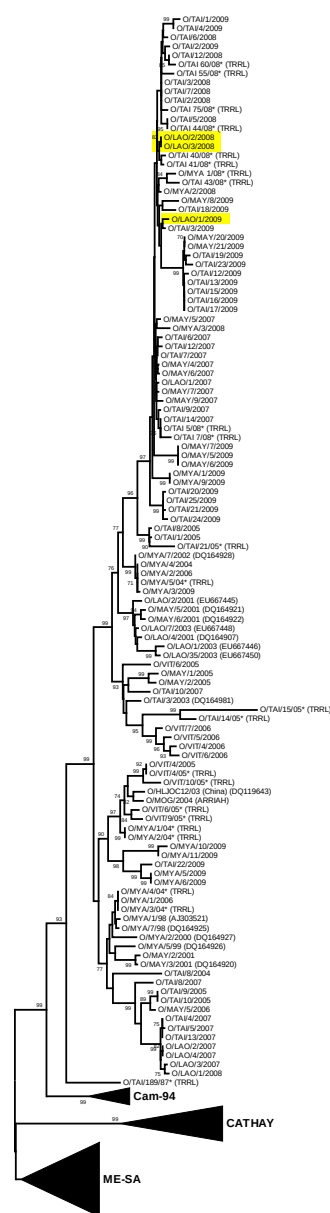
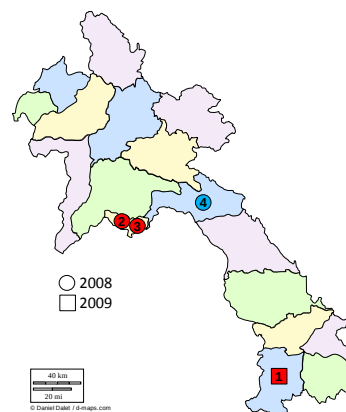


FMDV O in Bhutan

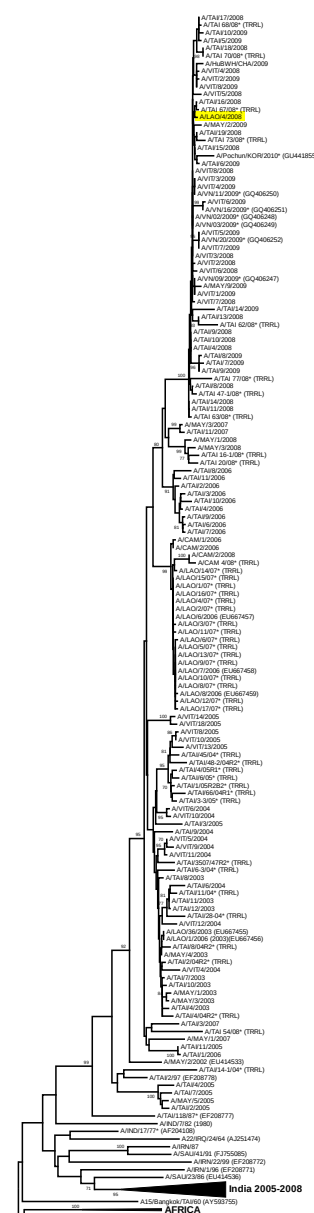
Thailand



Lineage: unnamed



FMDV O in Laos



FMDV A in Laos

Myanmar

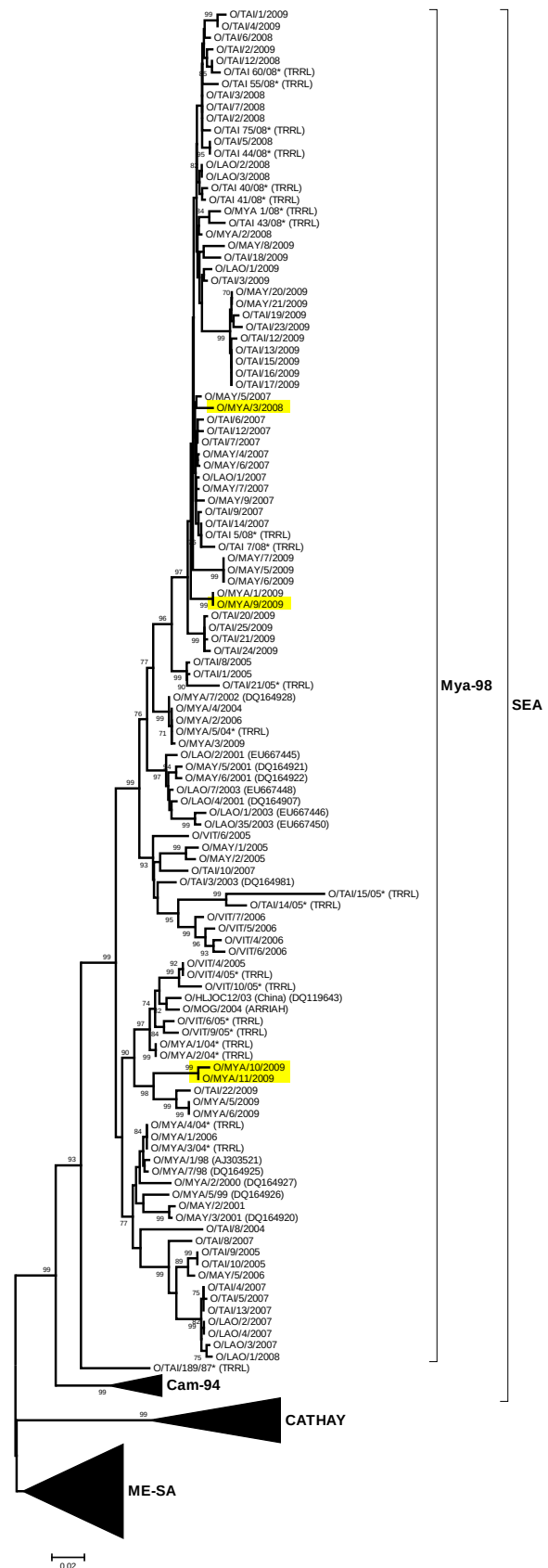
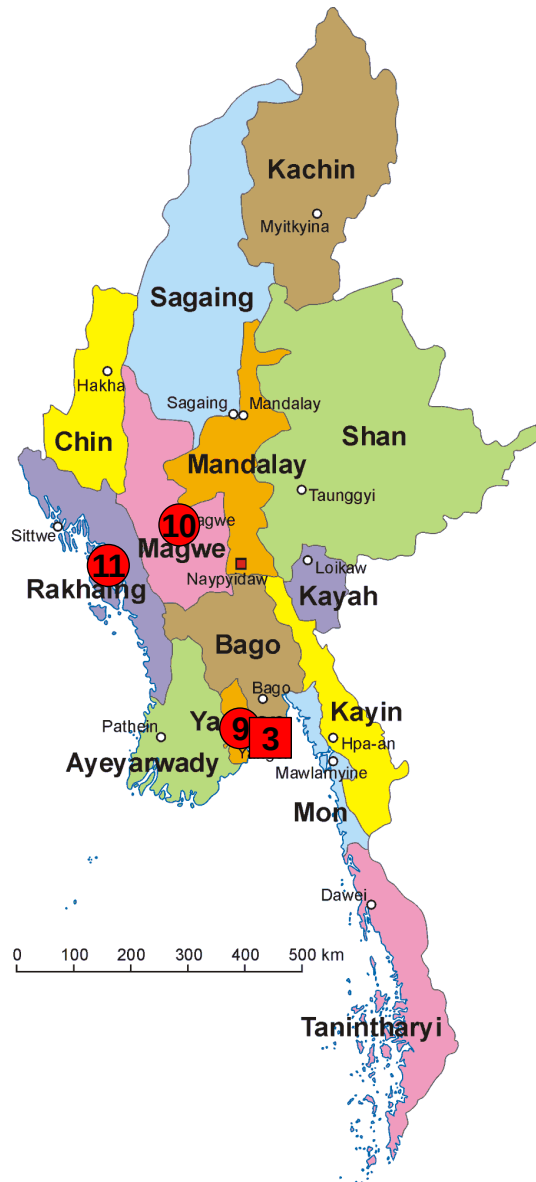
WRLFMD/2010/00006

Received: 05/02/2010; 4 samples

Type O: 4 isolates

Topotype: SEA

Lineage: Mya-98



FMDV O in Myanmar

Vietnam

WRLFMD/2010/00007

Received: 05/02/2010; 16 samples

Type O: 1 isolates

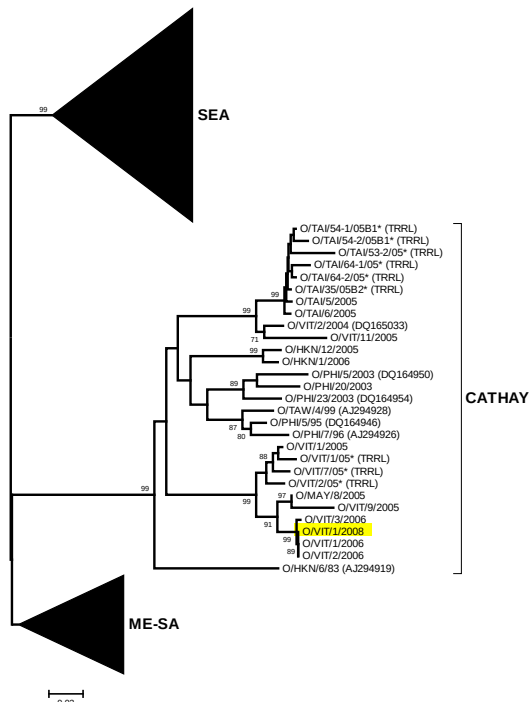
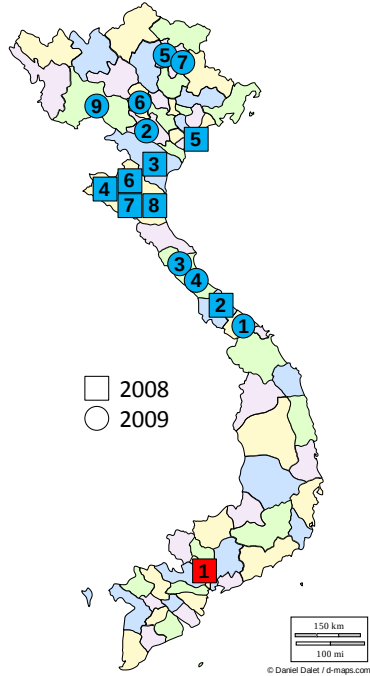
Topotype: CATHAY

Lineage: unnamed

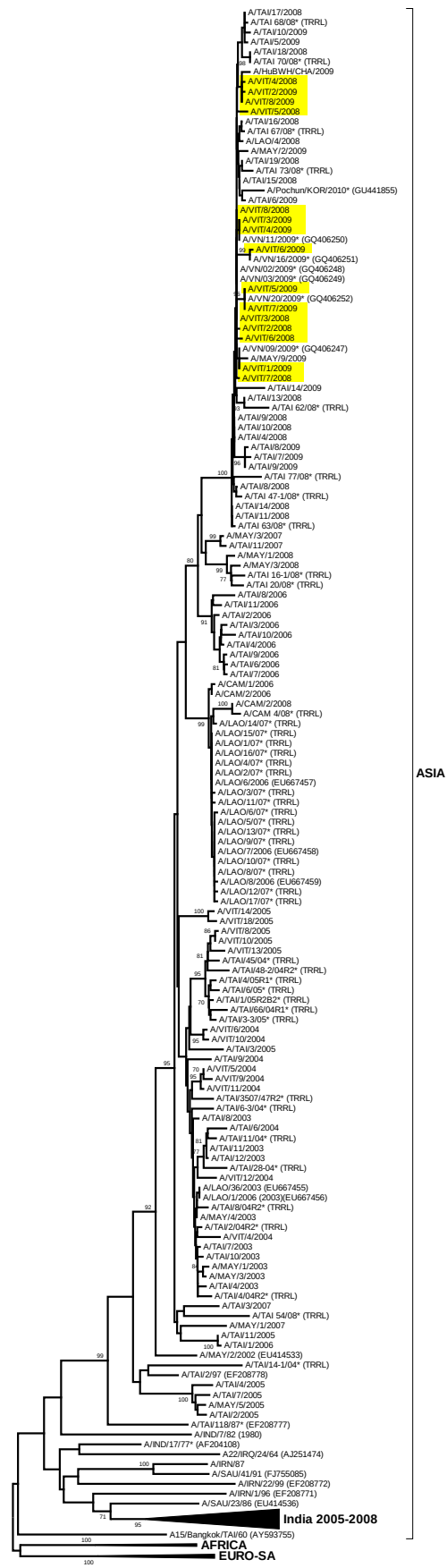
Type A: 15 isolates

Topotype: ASIA

Lineage: unnamed



FMDV O in Vietnam



FMDV A in Vietnam

Hong Kong SAR

WRLFMD/2010/00009

Received: 05/03/2010; 19 samples

Type O: 14 isolates

Topotype: SEA

Lineage: Mya-98

FMDV-GD: 5 samples

WRLFMD/2010/00010

Received: 16/03/2010; 1 sample

Hong Kong SAR

Type O: 1 isolate

Topotype: SEA

Lineage: Mya-98

WRLFMD/2010/00013

Received: 23/03/2010; 3 samples

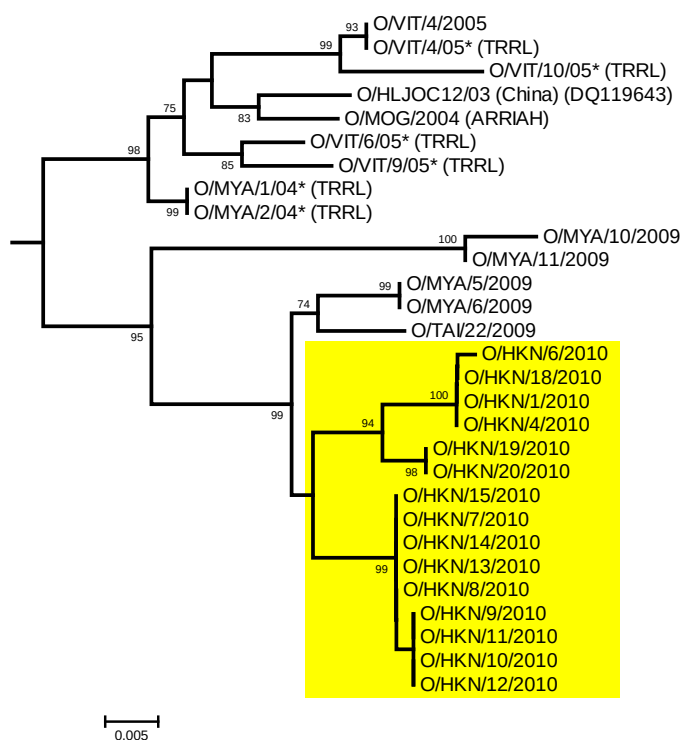
Hong Kong SAR

Type O: 1 sample typed

No virus was isolated and we were
unable to PCR the VP1 region.

FMDV-GD: 1 sample

NVD: 1 sample

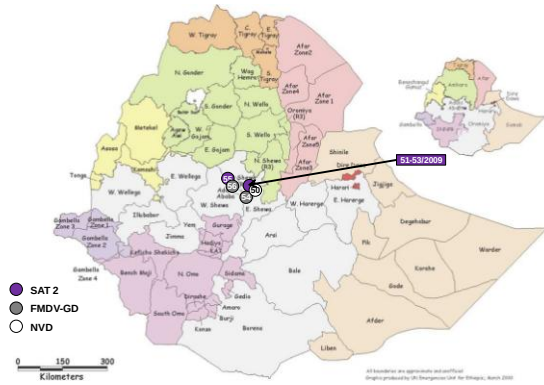


FMDV O in Hong Kong SAR

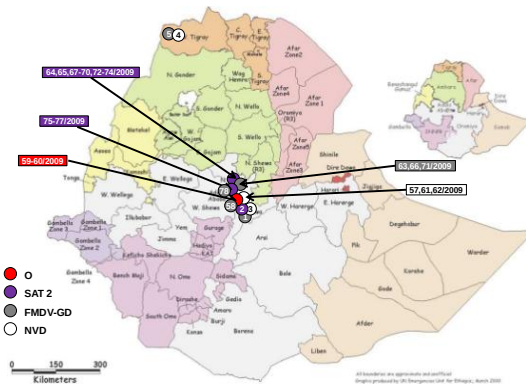
AFRICA

Ethiopia

WRLFMD/2009/00056
 Received: 19/12/2009; 7 samples
 Type SAT 2: 4 isolates
 Topotype: XIII
 Lineage: unnamed
 FMDV-GD: 2 samples
 NVD: 1 sample

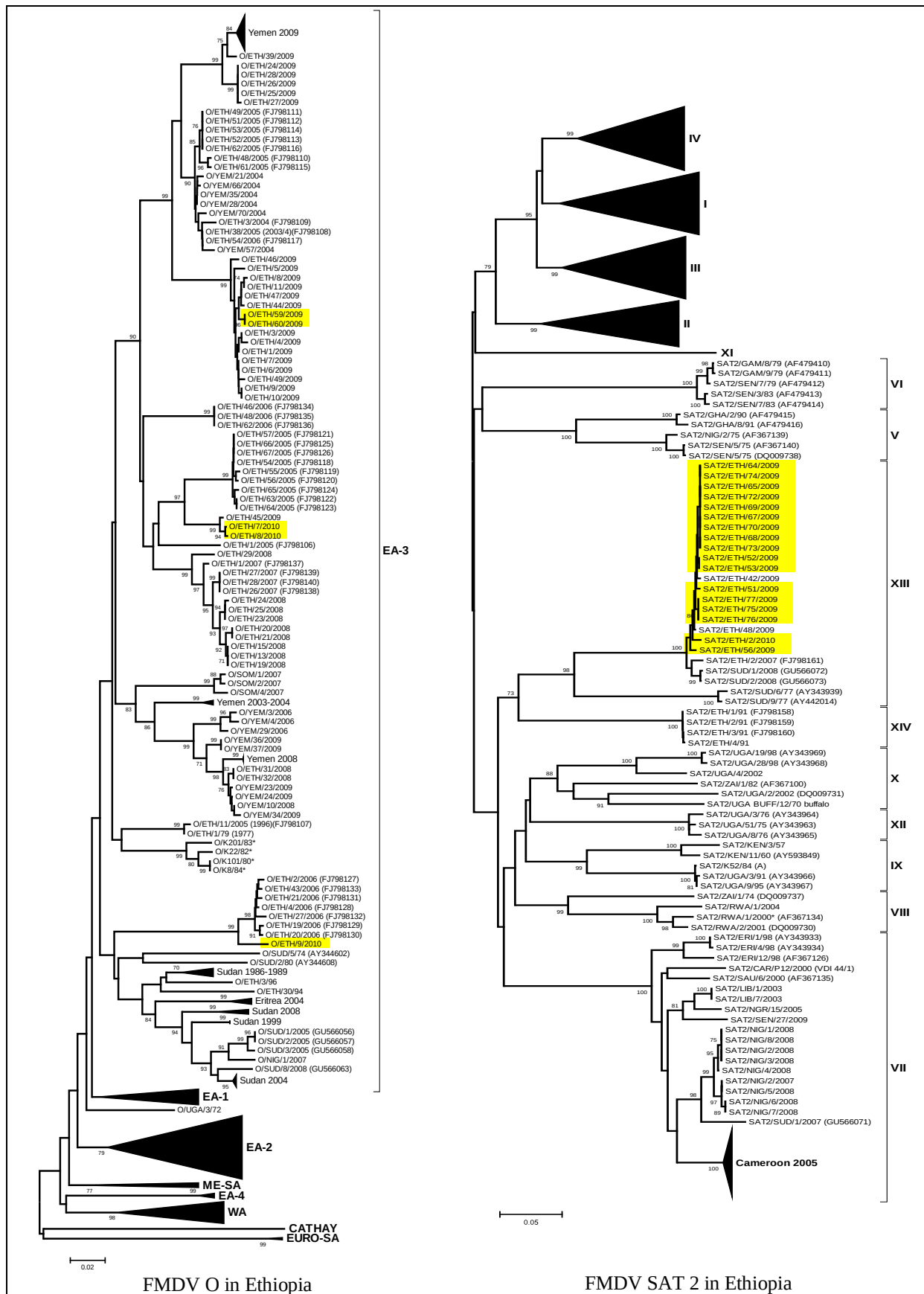


WRLFMD/2010/00008
 Received: 20/02/2010; 27 samples
 Type O: 2 isolates
 Topotype: EA-3
 Lineage: unnamed
 Type SAT 2: 13 isolates
 Topotype: XIII
 Lineage: unnamed
 FMDV-GD: 7 samples
 NVD: 5 samples



WRLFMD/2010/00012
 Received: 18/03/2010; 5 samples
 Type O: 3 isolates
 Topotype: EA-3
 Lineage: unnamed
 FMDV-GD: 2 samples





Senegal

WRLFMD/2010/00001

Received: 18/01/2010; 29 samples

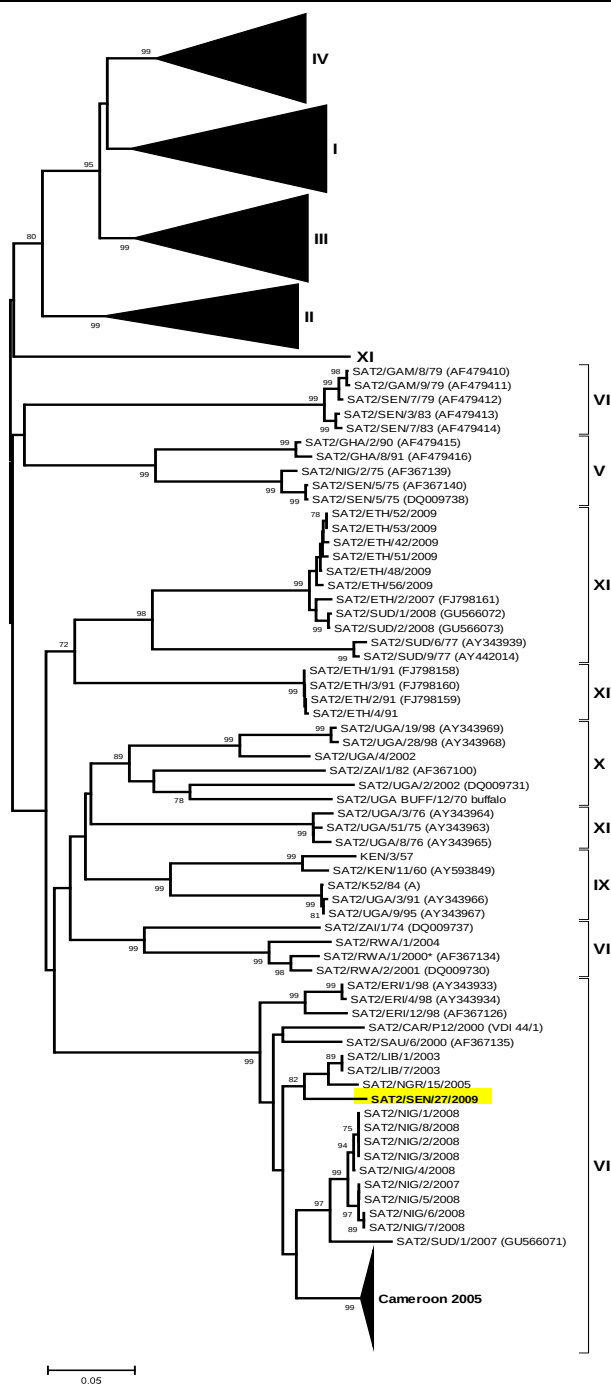
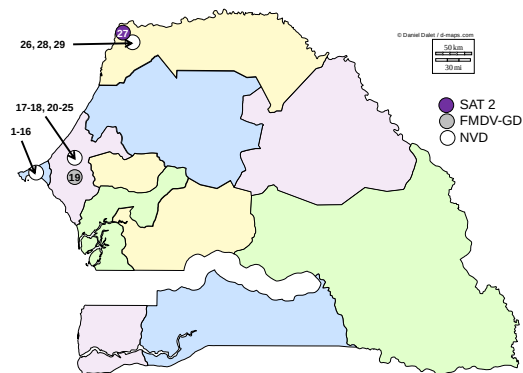
Type SAT 2: 1 isolate

Topotype: VII

Lineage: unnamed

FMDV-GD: 4 samples

NVD: 24 samples



FMDV SAT 2 in Senegal

Eritrea

WRLFMD/2010/00002

Received: 20/01/2010; 89 samples

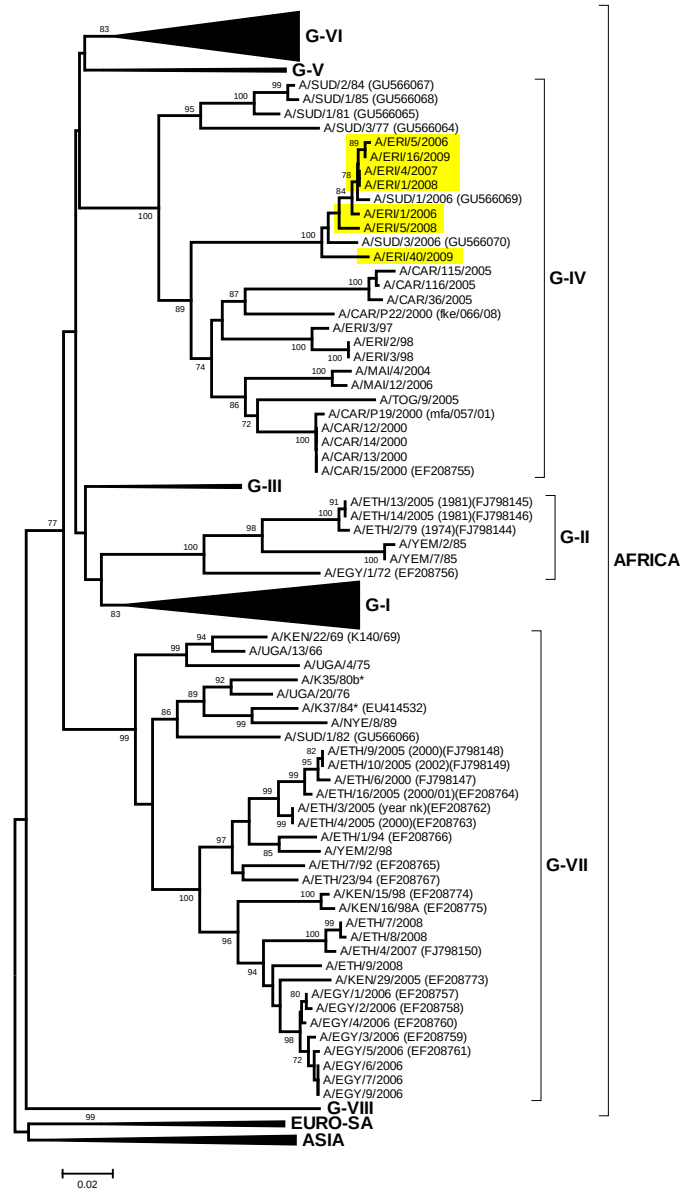
Type A: 7 isolates

Topotype: AFRICA

Lineage: G-IV

FMDV-GD: 29 samples

NVD: 53 samples



FMDV A in Eritrea

Vaccine matching

Twelve FMDV type O isolates (See Table C Type O) from Bangladesh, Bhutan, Turkey and Thailand collected in 2008, 2009 and 2010 were analysed antigenically by two dimensional virus neutralisation test (2dmVNT) and/or LPBE. All isolates except O Tai 7/2008 were matched with O IND R2/75. Two isolates from Bangladesh and Bhutan, respectively, one virus from Thailand but none from Turkey were matched with O Manisa by VNT. Two isolates from both Bangladesh and Bhutan, three out of four from Thailand and one out of four isolates from Turkey showed antigenic match with O BFS by VNT. Two, 2 and 3 isolates from Turkey, Thailand and Tailand were matched with O Tunisia 89, O HKN 6/83 and O TAW 189/87 by LPBE, respectively. All isolates from Thailand were antigenically close with O 4171 by LPBE; and all isolates from Bangladesh and Bhutan were closely related to O TAI 189/87 vaccine strains by LPBE (Table C).

Two FMDV type A viruses (see table C for details) from Iran collected in 2009 were analysed for antigenic relationships with various vaccine strains by 2dmVNT and/or LPBE. Both isolates showed antigenic matches with A TUR 06 but only one with A₂₂ Irq and A SAU 41/91 vaccine strains. No virus matched with A IND 17/82, A Eri 98 or A Iran 87. However, both viruses were antigenically close with A May 97 by LPBE (Table C).

One Asia1 isolate from Pakistan collected in 2009 was received and analysed for vaccine matching by both VNT and LPBE. Surprisingly, it did not match with Asia1 Shamir but was antigenically close with Asia1 WBN 117/85 by VNT.

Two FMDV SAT 1 viruses (see table C for details) from Kenya collected in 2009, were analysed for antigenic relationship with two vaccine strains by 2dmVNT and/or LPBE. They were both antigenically matched with SAT 1 Rho vaccine by both VNT and LPBE (Table C).

Two FMDV SAT 2 viruses (see table C for details) from Ethiopia collected in 2009 were analysed for antigenic relationship with various vaccine strains by 2dmVNT and/or LPBE. Both isolates showed a good match with SAT 2 Eritrea (by both VNT and LPBE) and Sat 251 vaccines (by VNT). No virus was antigenically close with SAT 2 BOT 3/77 by LPBE (Table C).

Annex 1.

TABLE A: Clinical sample diagnostics made by the WRL between January and March 2010

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		
				VI/ELISA	RT-PCR	Final report
ETHIOPIA	ETH 57/2009	Cattle	12.11.09	NVD	Negative	NVD
	ETH 58/2009	Cattle	12.11.09	NVD	Positive	FMDV GD
	ETH 59/2009	Cattle	12.11.09	O	Positive	O
	ETH 60/2009	Cattle	12.11.09	O	Positive	O
	ETH 61/2009	Cattle	12.11.09	NVD	Negative	NVD
	ETH 62/2009	Cattle	12.11.09	NVD	Negative	NVD
	ETH 63/2009	Cattle	19.11.09	NVD	Positive	FMDV GD
	ETH 64/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 65/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 66/2009	Cattle	19.11.09	NVD	Positive	FMDV GD
	ETH 67/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 68/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 69/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 70/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 71/2009	Pig	19.11.09	NVD	Positive	FMDV GD
	ETH 72/2009	Pig	19.11.09	SAT 2	Positive	SAT 2
	ETH 73/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 74/2009	Cattle	19.11.09	SAT 2	Positive	SAT 2
	ETH 75/2009	Cattle	29.12.09	SAT 2	Positive	SAT 2
	ETH 76/2009	Cattle	29.12.09	SAT 2	Positive	SAT 2
	ETH 77/2009	Cattle	29.12.09	SAT 2	Positive	SAT 2
	ETH 78/2009	Cattle	29.12.09	NVD	Positive	FMDV GD
	ETH 1/2010	Cattle	25.01.10	NVD	Positive	FMDV GD
	ETH 2/2010	Cattle	25.01.10	SAT 2	Positive	SAT 2
	ETH 3/2010	Cattle	25.01.10	NVD	Negative	NVD
	ETH 4/2010	Cattle	29.01.10	NVD	Negative	NVD
	ETH 5/2010	Cattle	29.01.10	NVD	Positive	FMDV GD
	ETH 6/2010	Cattle	10.02.10	NVD	Positive	FMDV GD
	ETH 7/2010	Cattle	10.02.10	O	Positive	O
	ETH 8/2010	Cattle	10.02.10	O	Positive	O
	ETH 9/2010	Cattle	12.02.10	O	Positive	O
	ETH 10/2010	Cattle	23.02.10	NVD	Positive	FMDV GD

ERITREA	ERI 1/2005	Cattle	05.08.05	NVD	Positive	FMDV GD
	ERI 1/2006	Cattle	15.12.06	A	Positive	A
	ERI 2/2006	Cattle	15.12.06	NVD	Positive	FMDV GD
	ERI 3/2006	Cattle	27.12.06	NVD	Positive	FMDV GD
	ERI 4/2006	Cattle	27.12.06	NVD	Positive	FMDV GD
	ERI 5/2006	Cattle	00.00.06	A	Positive	A
	ERI 6/2006	Cattle	00.00.06	NVD	Positive	FMDV GD
	ERI 1/2007	Cattle	05.01.07	NVD	Negative	NVD
	ERI 2/2007	Cattle	07.02.07	NVD	Positive	FMDV GD
	ERI 3/2007	Cattle	14.02.07	NVD	Positive	FMDV GD
	ERI 4/2007	Cattle	14.02.07	A	Positive	A
	ERI 5/2007	Cattle	14.02.07	NVD	Positive	FMDV GD
	ERI 6/2007	Goat	13.04.07	NVD	Negative	NVD
	ERI 7/2007	Cattle	01.12.07	NVD	Positive	FMDV GD
	ERI 8/2007	Cattle	01.12.07	NVD	Positive	FMDV GD
	ERI 1/2008	Cattle	04.01.08	A	Positive	A
	ERI 2/2008	Cattle	04.01.08	NVD	Positive	FMDV GD
	ERI 3/2008	Cattle	26.02.08	NVD	Negative	NVD
	ERI 4/2008	Cattle	16.12.08	NVD	Positive	FMDV GD
	ERI 5/2008	Cattle	16.12.08	A	Positive	A
	ERI 1/2009	Cattle	09.01.09	NVD	Positive	FMDV GD
	ERI 2/2009	Cattle	09.01.09	NVD	Positive	FMDV GD
	ERI 3/2009	Cattle	05.10.09	NVD	Positive	FMDV GD
	ERI 4/2009	Cattle	05.10.09	NVD	Positive	FMDV GD
	ERI 5/2009	Cattle	07.10.09	NVD	Positive	FMDV GD
	ERI 6/2009	Cattle	07.10.09	NVD	Positive	FMDV GD
	ERI 7/2009	Cattle	07.10.09	NVD	Positive	FMDV GD
	ERI 8/2009	Cattle	07.10.09	NVD	Positive	FMDV GD
	ERI 9-14/2009	Cattle	07.10.09	NVD	Negative	NVD
	ERI 15/2009	Cattle	09.10.09	NVD	Negative	NVD
	ERI 16/2009	Cattle	09.10.09	A	Positive	A
	ERI 17/2009	Cattle	11.10.09	NVD	Positive	FMDV GD
	ERI 18/2009	Cattle	11.10.09	NVD	Negative	NVD
	ERI 19-22/2009	Cattle	11.10.09	NVD	Negative	NVD
	ERI 23-28/2009	Cattle	11.10.09	NVD	Negative	NVD
	ERI 29/2009	Cattle	12.10.09	NVD	Positive	FMDV GD
	ERI 30/2009	Cattle	12.10.09	NVD	Positive	FMDV GD
	ERI 31/2009	Cattle	12.10.09	NVD	Positive	FMDV GD
	ERI 32/2009	Cattle	12.10.09	NVD	Positive	FMDV GD
	ERI 33/2009	Cattle	12.10.09	NVD	Positive	FMDV GD
	ERI 34/2009	Cattle	12.10.09	NVD	Positive	FMDV GD
	ERI 35-39/2009	Cattle	12.10.09	NVD	Negative	NVD
	ERI 40/2009	Cattle	19.10.09	A	Positive	A
	ERI 41-42/2009	Cattle	19.10.09	NVD	Negative	NVD
	ERI 43-44/2009	Cattle	27.10.09	NVD	Negative	NVD
	ERI 45/2009	Cattle	27.10.09	NVD	Negative	NVD
	ERI 46/2009	Cattle	27.10.09	NVD	Negative	NVD
	ERI 47-48/2009	Sheep	27.10.09	NVD	Negative	NVD
	ERI 49-50/2009	Goat	27.10.09	NVD	Negative	NVD
	ERI 51-52/2009	Cattle	27.10.09	NVD	Negative	NVD
	ERI 53-56/2009	Cattle	28.10.09	NVD	Negative	NVD
	ERI 57-58/2009	Cattle	28.10.09	NVD	Negative	NVD
	ERI 59-63/2009	Cattle	28.10.09	NVD	Negative	NVD
	ERI 64-65/2009	Cattle	28.10.09	NVD	Negative	NVD
	ERI 66-67/2009	Cattle	17.11.09	NVD	Positive	FMDV GD

	ERI 68-69/2009	Cattle	04.12.09	NVD	Negative	NVD
HONG KONG	HKN 1/2010	Pig	05.02.10	O	Positive	O
	HKN 2/2010	Pig	05.02.10	NVD	Positive	FMDV GD
	HKN 3/2010	Pig	10.02.10	NVD	Positive	FMDV GD
	HKN 4/2010	Pig	10.02.10	O	Positive	O
	HKN 5/2010	Pig	10.02.10	NVD	Positive	FMDV GD
	HKN 6/2010	Pig	10.02.10	O	Positive	O
	HKN 7/2010	Pig	23.02.10	O	Positive	O
	HKN 8/2010	Pig	23.02.10	O	Positive	O
	HKN 9/2010	Pig	24.02.10	O	Positive	O
	HKN 10/2010	Pig	24.02.10	O	Positive	O
	HKN 11/2010	Pig	24.02.10	O	Positive	O
	HKN 12/2010	Pig	24.02.10	O	Positive	O
	HKN 13/2010	Pig	24.02.10	O	Positive	O
	HKN 14/2010	Pig	24.02.10	O	Positive	O
	HKN 15/2010	Pig	24.02.10	O	Positive	O
	HKN 16/2010	Pig	01.03.10	NVD	Positive	FMDV GD
	HKN 17/2010	Pig	01.03.10	NVD	Positive	FMDV GD
	HKN 18/2010	Pig	01.03.10	O	Positive	O
	HKN 19/2010	Pig	03.03.10	O	Positive	O
	HKN 20/2010	Pig	03.03.10	O	Positive	O
	HKN 21/2010	Pig	16.03.10	O	Positive	O
	HKN 22/2010	Pig	16.03.10	NVD	Positive	FMDV GD
	HKN 23/2010	Pig	17.03.10	NVD	Negative	NVD
IRAN	IRN 77/2009	NK	04.11.09	NVD	Positive	FMDV GD
	IRN 78/2009	NK	04.11.09	A	Positive	A
	IRN 79/2009	NK	09.11.09	O	Positive	O
	IRN 80/2009	NK	19.11.09	O	Positive	O
	IRN 81/2009	NK	01.12.09	O	Positive	O
	IRN 82/2009	Cattle	10.12.09	NVD	Negative	NVD
	IRN 83/2009	NK	13.12.09	O	Positive	O
	IRN 84/2009	NK	13.12.09	O	Positive	O
	IRN 85/2009	NK	15.12.09	O	Positive	O
	IRN 86/2009	NK	21.12.09	O	Positive	O
	IRN 87/2009	NK	21.12.09	O	Positive	O
	IRN 88/2009	NK	21.12.09	O	Positive	O
	IRN 89/2009	NK	24.12.09	O	Positive	O
	IRN 1/2010	Cattle	01.01.10	O	Positive	O
	IRN 2/2010	Sheep	02.10.10	O	Positive	O
	IRN 3/2010	NK	12.10.10	O	Positive	O
	IRN 4/2010	NK	16.01.10	O	Positive	O
	IRN 5/2010	NK	18.01.10	O	Positive	O
	IRN 6/2010	Cattle	19.01.10	NVD	Positive	FMDV GD
	IRN 7/2010	NK	20.01.10	A	Positive	A
	IRN 8/2010	Cattle	23.01.10	O	Positive	O
	IRN 9/2010	Cattle	23.01.10	A	Positive	A
	IRN 10/2010	NK	23.01.10	O	Positive	O
	IRN 11/2010	Cattle	26.01.10	O	Positive	O
	IRN 12/2010	Cattle	26.01.10	O	Positive	O
	IRN 13/2010	NK	02.02.10	O	Positive	O
	IRN 14/2010	NK	03.02.10	O	Positive	O
	IRN 15/2010	Sheep/Goat	04.02.10	O	Positive	O
	IRN 16/2010	Cattle	11.02.10	NVD	Negative	NVD

	IRN 17/2010	Goat	15.02.10	O	Positive	O
	IRN 18/2010	Cattle	16.02.10	O	Positive	O
	IRN 19/2010	Cattle	17.02.10	O	Positive	O
	IRN 20/2010	Sheep	17.02.10	O	Positive	O
	IRN 21/2010	Cattle	17.02.10	NVD	Negative	NVD
	IRN 22/2010	Goat	18.02.10	O	Positive	O
	IRN 23/2010	Cattle	20.02.10	O	Positive	O
	IRN 24/2010	Sheep	20.02.10	O	Positive	O
	IRN 25/2010	Cattle	20.02.10	NVD	Positive	FMDV GD
	IRN 26/2010	Cattle	21.02.10	O	Positive	O
	IRN 27/2010	Sheep	21.02.10	O	Positive	O
	IRN 28/2010	Cattle	23.02.10	O	Positive	O
	IRN 29/2010	Cattle	23.02.10	O	Positive	O
	IRN 30/2010	Cattle	23.02.10	O	Positive	O
	IRN 31/2010	Cattle	27.02.10	O	Positive	O
LAOS	LAO 2/2008	Pig	02.04.08	O	Positive	O
	LAO 3/2008	Pig	02.04.08	O	Positive	O
	LAO 4/2008	Cattle	27.11.08	A	Positive	A
	LAO 1/2009	Buffalo	22.01.09	O	Positive	O
MYANMAR	MYA 3/2008	Cattle	16.10.08	O	Positive	O
	MYA 9/2009	Cattle	24.01.09	O	Positive	O
	MYA 10/2009	Cattle	28.01.09	O	Positive	O
	MYA 11/2009	Cattle	25.05.09	O	Positive	O
NIGERIA**	NIG 11/2008	Cattle	21.11.08			
	NIG 12/2008	Cattle	21.11.08			
	NIG 13/2008	Cattle	21.11.08			
	NIG 14/2008	Cattle	21.11.08			
	NIG 15/2008	Cattle	21.11.08			
	NIG 16/2008	Cattle	21.11.08			
	NIG 17/2008	Cattle	21.11.08			
	NIG 18/2008	Cattle	21.11.08			
	NIG 19/2008	Cattle	21.11.08			
	NIG 20/2008	Cattle	00.00.08			
	NIG 1/2009	Cattle	14.01.09			
	NIG 2/2009	Cattle	14.01.09			
	NIG 3/2009	Cattle	14.01.09			
	NIG 4/2009	Cattle	14.01.09			
	NIG 5/2009	Cattle	14.01.09			
	NIG 6/2009	Cattle	25.08.09			
	NIG 7/2009	Cattle	25.08.09			
	NIG 8/2009	Cattle	25.08.09			
	NIG 9/2009	Cattle	25.08.09			
	NIG 10/2009	Cattle	25.08.09			
	NIG 11/2009	Cattle	25.08.09			
	NIG 12/2009	Cattle	25.08.09			
	NIG 13/2009	Cattle	25.08.09			
	NIG 14/2009	Cattle	25.08.09			
	NIG 15/2009	Cattle	25.08.09			
	NIG 16/2009	Cattle	03.09.09			
	NIG 17/2009	Cattle	03.09.09			
	NIG 18/2009	Cattle	03.09.09			
	NIG 19/2009	Cattle	03.09.09			

	NIG 20/2009	Cattle	03.09.09			
	NIG 21/2009	Cattle	03.09.09			
	NIG 22/2009	Cattle	03.09.09			
	NIG 23/2009	Cattle	03.09.09			
	NIG 24/2009	Cattle	03.09.09			
	NIG 25/2009	Cattle	13.10.09			
	NIG 26/2009	Cattle	13.10.09			
	NIG 27/2009	Cattle	13.10.09			
	NIG 28/2009	Cattle	13.10.09			
	NIG 29/2009	Cattle	03.11.09			
	NIG 30/2009	Cattle	00.00.09			
	NIG 31/2009	Cattle	00.00.09			
	NIG 32/2009	Cattle	00.00.09			
	NIG 33/2009	Cattle	00.00.09			
	NIG 34/2009	Cattle	00.00.09			
	NIG 35/2009	Cattle	00.00.09			
	NIG 36/2009	Cattle	00.00.09			
	NIG 37/2009	Cattle	00.00.09			
	NIG 38/2009	Cattle	00.00.09			
	NIG 39/2009	Cattle	00.00.09			
	NIG 40/2009	Cattle	00.00.09			
SENEGAL	SEN 1/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 2/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 3/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 4/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 5/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 6/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 7/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 8/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 9/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 10/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 11/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 12/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 13/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 14/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 15/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 16/2009	Cattle	22.04.09	NVD	Negative	NVD
	SEN 17/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 18/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 19/2009	Cattle	28.09.09	NVD	Positive	FMDV GD
	SEN 20/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 21/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 22/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 23/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 24/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 25/2009	Cattle	28.09.09	NVD	Negative	NVD
	SEN 26/2009	Cattle	09.10.09	NVD	Positive	FMDV GD
	SEN 27/2009	Cattle	09.10.09	SAT 2	Positive	SAT 2
	SEN 28/2009	Cattle	09.10.09	NVD	Positive	FMDV GD
	SEN 29/2009	Cattle	09.10.09	NVD	Positive	FMDV GD
TANZANIA**	TAN 1/2008	Cattle	00.07.08	NVD	Negative	NVD
	TAN 2/2008	Cattle	00.07.08	NVD	Positive	FMDV GD
	TAN 3/2008	Cattle	00.07.08	NVD	Positive	FMDV GD

TAN 4/2008	Cattle	00.07.08	NVD	Positive	FMDV GD
TAN 5/2008	Cattle	00.07.08	NVD	Positive	FMDV GD
TAN 6/2008	Cattle	00.07.08	NVD	Negative	NVD
TAN 7/2008	Cattle	00.07.08	NVD	Negative	NVD
TAN 8/2008	Cattle	00.07.08	NVD	Positive	FMDV GD
TAN 9/2008	Cattle	00.07.08	NVD	Negative	NVD
TAN 10/2008	Cattle	00.07.08	NVD	Negative	NVD
TAN 11/2008	Cattle	00.08.08	A	Positive	A
TAN 12/2008	Cattle	00.08.08	A	Positive	A
TAN 13/2008	Cattle	00.08.08	NVD	Negative	NVD
TAN 14/2008	Cattle	00.08.08	NVD	Negative	NVD
TAN 15/2008	Cattle	00.08.08			
TAN 16/2008	Cattle	25.09.08			
TAN 17/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 18/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 19/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 20/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 21/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 22/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 23/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 24/2008	Cattle	00.09.08	NVD	Negative	NVD
TAN 25/2008	Cattle	00.09.08			
TAN 26/2008	Cattle	00.09.08			
TAN 27/2008	Cattle	00.09.08			
TAN 28/2008	Cattle	00.09.08			
TAN 29/2008	Cattle	00.09.08			
TAN 30/2008	Cattle	00.09.08			
TAN 31/2008	Cattle	00.09.08			
TAN 32/2008	Cattle	00.09.08			
TAN 33/2008	Cattle	00.09.08			
TAN 1/2009	Cattle	28.04.09			
TAN 2/2009	Cattle	00.05.09			
TAN 3/2009	Cattle	00.05.09			
TAN 4/2009	Cattle	00.05.09			
TAN 5/2009	Cattle	00.05.09			
TAN 6/2009	Cattle	12.06.09			
TAN 7/2009	Cattle	12.06.09			
TAN 8/2009	Cattle	12.06.09			
TAN 9/2009	Cattle	13.06.09			
TAN 10/2009	Cattle	13.06.09			
TAN 11/2009	Cattle	21.06.09			
TAN 12/2009	Cattle	21.06.09			
TAN 13/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 14/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 15/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
TAN 16/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
TAN 17/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 18/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
TAN 19/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 20/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 21/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 22/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 23/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 24/2009	Cattle	00.07.09	NVD	Negative	NVD
TAN 25/2009	Cattle	00.07.09	NVD	Negative	NVD

	TAN 26/2009	Cattle	00.07.09	NVD	Negative	NVD
	TAN 27/2009	Cattle	00.07.09	NVD	Negative	NVD
	TAN 28/2009	Cattle	00.07.09	NVD		
	TAN 29/2009	Cattle	00.07.09	NVD		
	TAN 30/2009	Cattle	00.07.09	NVD		
	TAN 31/2009	Cattle	00.07.09	NVD		
	TAN 32/2009	Cattle	00.07.09	NVD		
	TAN 33/2009	Cattle	00.07.09	NVD		
	TAN 34/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
	TAN 35/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
	TAN 36/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
	TAN 37/2009	Cattle	00.07.09	NVD	Positive	FMDV GD
	TAN 38/2009	Cattle	02.08.09			
	TAN 39/2009	Cattle	02.08.09			
	TAN 40/2009	Cattle	07.09.09			
	TAN 41/2009	Cattle	07.09.09			
	TAN 42/2009	Cattle	07.09.09			
	TAN 43/2009	Cattle	27.10.09			
	TAN 44/2009	Cattle	27.10.09			
	TAN 45/2009	Cattle	06.11.09			
	TAN 46/2009	Cattle	00.11.09			
	TAN 47/2009	Cattle	00.11.09			
	TAN 1/2010	Cattle	00.02.10			
	TAN 2/2010	Cattle	00.02.10			
THAILAND	TAI 5/2009	Cattle	08.01.09	A	Positive	A
	TAI 6/2009	Cattle	02.02.09	A	Positive	A
	TAI 7/2009	Cattle	04.02.09	A	Positive	A
	TAI 8/2009	Cattle	12.02.09	A	Positive	A
	TAI 9/2009	Cattle	16.02.09	A	Positive	A
	TAI 10/2009	Cattle	13.03.09	A	Positive	A
	TAI 11/2009	Cattle	29.05.09	NVD	Positive	FMDV GD
	TAI 12/2009	Cattle	10.08.09	O	Positive	O
	TAI 13/2009	Cattle	25.08.09	O	Positive	O
	TAI 14/2009	Cattle	03.09.09	A	Positive	A
	TAI 15/2009	Cattle	04.09.09	O	Positive	O
	TAI 16/2009	Cattle	00.09.09	O	Positive	O
	TAI 17/2009	Cattle	02.10.09	O	Positive	O
	TAI 18/2009	Cattle	13.10.09	O	Positive	O
	TAI 19/2009	Cattle	00.10.09	O	Positive	O
	TAI 20/2009	Cattle	21.11.09	O	Positive	O
	TAI 21/2009	Cattle	17.11.09	O	Positive	O
	TAI 22/2009	Pig	18.11.09	O	Positive	O
	TAI 23/2009	Cattle	18.11.09	O	Positive	O
	TAI 24/2009	Cattle	19.11.09	O	Positive	O
	TAI 25/2009	Cattle	27.11.09	O	Positive	O
TURKEY	TUR 8/2009	Cattle	00.00.09	A	Positive	A
	TUR 9/2009	Cattle	00.00.09	A	Positive	A
	TUR 10/2009	Cattle	00.00.09	A	Positive	A
	TUR 11/2009	Cattle	00.00.09	A	Positive	A
	TUR 12/2009	Cattle	00.00.09	A	Positive	A
	TUR 13/2009	Cattle	00.00.09	A	Positive	A
	TUR 14/2009	Cattle	00.00.09	A	Positive	A
	TUR 15/2009	Cattle	00.00.09	O	Positive	O

	TUR 16/2009	Cattle	00.00.09	NVD	Positive	FMDV GD
	TUR 17/2009	Cattle	00.00.09	O	Positive	O
	TUR 18/2009	Cattle	00.00.09	A	Positive	A
	TUR 19/2009	Cattle	00.00.09	O	Positive	O
	TUR 20/2009	Cattle	00.00.09	NVD	Positive	FMDV GD
	TUR 21/2009	Cattle	00.00.09	A	Positive	A
	TUR 1/2010	Cattle	00.01.10	O	Positive	O
	TUR 2/2010	Cattle	00.01.10	A	Positive	A
	TUR 3/2010	Cattle	00.01.10	A	Positive	A
	TUR 4/2010	Cattle	00.01.10	O	Positive	O
	TUR 5/2010	Cattle	00.01.10	O	Positive	O
	TUR 6/2010	Cattle	00.01.10	A	Positive	A
VIETNAM	VIT 1/2008	Pig	00.00.08	O	Positive	O
	VIT 2/2008	Cattle	00.00.08	A	Positive	A
	VIT 3/2008	Cattle	00.00.08	A	Positive	A
	VIT 4/2008	Buffalo	00.00.08	A	Positive	A
	VIT 5/2008	Cattle	00.00.08	A	Positive	A
	VIT 6/2008	Cattle	00.00.08	A	Positive	A
	VIT 7/2008	Buffalo	00.00.08	A	Positive	A
	VIT 8/2008	Cattle	00.00.08	A	Positive	A
	VIT 1/2009	Cattle	00.00.09	A	Positive	A
	VIT 2/2009	Buffalo	00.00.09	A	Positive	A
	VIT 3/2009	Cattle	00.00.09	A	Positive	A
	VIT 4/2009	Cattle	00.00.09	A	Positive	A
	VIT 5/2009	Buffalo	00.00.09	A	Positive	A
	VIT 6/2009	Pig	00.00.09	A	Positive	A
	VIT 7/2009	Buffalo	00.00.09	A	Positive	A
	VIT 8/2009	Buffalo	00.00.09	A	Positive	A

TOTAL : 381

FMD(V)	foot-and-mouth disease (virus)
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 viral genome
NVD	no foot-and-mouth disease, swine vesicular disease or vesicular stomatitis virus detected

**** Note:** At time of report, analysis of samples from Nigeria and Tanzania was not complete.

TABLE B: Summary of samples collected and received to IAH-Pirbright (January-March 2010)

Country	No. of samples	Virus isolation in cell culture/ELISA								RT-PCR for FMD (or SVD) virus (where appropriate)		
		FMD virus serotypes							SVD virus	NVD		
		SAT	SAT	SAT	Asia							
		O	A	C	1	2	3	1			Positive	Negative
ETHIOPIA	32	5	-	-	-	13	-	-	-	5	27	5
ERITREA	56	-	7	-	-	-	-	-	-	21	35	21
HONG KONG	23	16	-	-	-	-	-	-	-	1	22	1
IRAN	44	35	3	-	-	-	-	-	-	3	41	3
LAOS	4	3	1	-	-	-	-	-	-	-	4	-
MYANMAR	4	4	-	-	-	-	-	-	-	-	4	-
NIGERIA*	50											
SENEGAL	29	-	-	-	-	1	-	-	-	24	5	24
TANZANIA*	82	-	2	-	-	-	-	-	-	27	15	27
THAILAND	21	13	7	-	-	-	-	-	-	-	21	-
TURKEY	20	6	12	-	-	-	-	-	-	-	20	-
VIETNAM	16	1	15	-	-	-	-	-	-	-	16	-
TOTAL*	381	83	47	-	-	14	-	-	-	81	210	81

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

RT-PCR reverse transcription polymerase chain reaction for FMD (or SVD) viral genome

* At time of report, analysis of samples from Nigeria and Tanzania was not complete.

TABLE C: Antigenic characterisation of FMD field isolates by matching with vaccine strains by VNT and/or LPBE – r1 value data from 1st January to 31st March 2010

Type O:

Field isolates	r1 values by 2dmVNT and LPBE									
	O Manisa		O Ind R2/75	O Bfs		O Tai 189/87	O 4174	O Tunisia 89	O Hkn 6/83	O Taw 189/87
	VNT	LPBE	VNT	VNT	LPBE	LPBE	LPBE	LPBE	LPBE	LPBE
Ban 04/2009	0.32	≥1.50	>0.95	0.68	0.67	≥1				
Ban 30/2009	0.39	>1	>1.0	0.46	0.59	>1	0.19			
Bhu 06/2009	0.44	>1	>0.98	0.44	0.50	>1	0.11			
Bhu 40/2009	0.40	>1	>0.90	0.40	0.42	>1	0.29			
Tur 15/2009	0.19	0.5	0.50	0.20	DNT		DNT	DNT		
Tur 17/2009	0.21	0.17	0.54	0.25	DNT		DNT	DNT		
Tur 01/2010	0.26	0.59	0.72	0.49	0.38		DNT	>1		
Tur 05/2010	0.23	0.50	0.76	0.10	0.38		DNT	>1		
O Tai 7/2008	0.06	>1	0.13	0.09			0.25			
O Tai 1/2009	0.24	>1	0.67	0.34	0.25		0.59			0.42
O Tai 2/2009	0.28	>1	0.79	0.43	0.22		0.53		1.00	0.84
O Tai 4/2009	0.45	>1	>0.83	0.65	0.17		0.59		≥0.75	0.84

Type A:

Field isolates	r1 values by 2dmVNT and LPBE										
	A22 Irq		A Tur06	A Ind 17/82	SAU 41/91	Eri98	Im 87		May-97		IRN99
	VNT	LPBE	VNT	VNT	VNT	LPBE	VNT	LPBE	VNT	LPBE	LPBE
Im 50/2009	0.50	0.63	1.00	0.12	0.44	0.11	0.08	0.25	0.09	0.22	
Im 73/2009	0.11	0.08	0.41	0.10	0.03	0.5	0.06	0.38	0.26	0.5	0.25

Type Asia1:

Field Isolates	VNT			LPBE	
	Asia1 Sham	Asia1 Ind	WBN 117/85	Asia1 Shamir	Asia1 Wbn 117/85
Asia1 Pak 29/2009	0.14	0.13	0.43	0.22	0.00

Type SAT 1:

Field Isolate	r1 value against vaccine Sat1 Rho	
	VNT	LPBE
Sat1 Ken 55/2009	0.51	0.75
Sat1 Ken 119/2009	0.95	0.25

Type SAT 2:

Field isolates	r1 values by 2dmVNT and LPBE				
	Sat2 Eri 3218		SAT251		Sat2 Bot 3/77
	VNT	LPBE	VNT	LPBE	LPBE
Eth 51/2009	0.84	0.5	0.39	DNT	0.16
Eth 56/2009	0.59	0.5	0.33	0.19	0.08

Interpretation of r_1 valuesIn the case of VNT:

$r_1 \geq 0.3$. 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.

$r_1 < 0.3$. Suggests that the field isolate is so different from the vaccine strain that the vaccine is unlikely to protect

In the case of LPB ELISA:

$r_1 = 0.4-1.0$. 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.

$r_1 = 0.2-0.39$, Suggests that the field isolate is antigenically related to the vaccine strain. The vaccine strain might be suitable for use if no closer match can be found provided that a potent vaccine is used and animals are preferably immunised more than once.

$r_1 < 0.2$. Suggests that the field isolate is so different from the vaccine strain that the vaccine is unlikely to protect

Annex 2. Recent FMD Publications cited by PubMed

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Annex 3. RECOMMENDATIONS FROM WRLFMD ON FMD VIRUS STRAINS TO BE INCLUDED IN FMDV ANTIGEN BANKS – March 2010

High Priority

O Manisa (*covers panasian topotype*)
 O BFS or Campos
 A24 Cruzeiro
 Asia 1 Shamir
 *A Iran-05
 A22 Iraq
 SAT 2 Saudi Arabia (*or equivalent*)

(not in order of importance)

Medium Priority

A Eritrea
 A Iran '96
 SAT 2 Zimbabwe
 A Iran 87 or A Saudi Arabia 23/86 (*or equivalent*)
 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*)
 A Iran '99 (not in order of importance)

Low Priority

A15 Bangkok related strain
 A87 Argentina related strain
 C Noville
 SAT 2 Kenya
 SAT 1 Kenya
 SAT 3 Zimbabwe
 A Kenya (not in order of importance)

*= recently available