



WRLFMD Quarterly Report October-December 2009

Reference Laboratory Contract Report

1/28/2010
WRLFMD

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**FAO/OIE World Reference Laboratory Report¹
October-December 2009
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

There were no outbreaks officially reported in FMD-free countries that did not practice vaccination between October and December 2009.

ASIA

Bangladesh: Samples were received from Bangladesh for the first time since 1999. FMD type O viruses were isolated and fell into two groups within the ME-SA toptype. Twelve belonged to the Ind-2001 lineage and were most closely related to recent viruses from Nepal. Five belonged to an unnamed lineage which also contained some Nepalese viruses from 2009.

People's Republic of China: FMD type A continues to occur sporadically, the latest occurring in the western Autonomous Region of Xinjiang in October 2009.

Myanmar & Malaysia: The FMDV O SEA toptype (Mya-98 lineage) has been detected in samples from both countries in 2009. In Malaysia a single virus belonging to the FMDV O ME-SA toptype (PanAsia lineage) was also found; it is not clear if this could be a new introduction into the country or if it is endemic. FMDV type A was also found in Malaysia and was closely related to virus circulating in P.R. China, Thailand and Vietnam.

AFRICA

Kenya: FMD virus types O and SAT 1 were found in samples from various parts of the country. The type O viruses all came from the same location and belonged to the EA-1 toptype. They were very closely related to the Kenya vaccine virus K77/78. The SAT 1 viruses all belonged to toptype I (NWZ) and fell on two distinct lineages.

Malawi: Another outbreak of SAT 2 has occurred, the last being in December 2008; however, no samples or sequence data have been received by the WRLFMD.

South Africa: Two further outbreaks of SAT 1 have been reported in the FMD buffer zone.

Other samples

Samples received from Bhutan, Ethiopia and Iran are currently being examined and will be reported in the first quarterly report of 2010.

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/2009.htm.

WRL vaccine recommendations have not changed from the previous report (Annex 3) where the availability of new vaccines against the FMDV serotype A Iran-05 strain was highlighted.

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 October and December 2009 is shown in annex 1 Table A. A record of all samples received to IAH-Pirbright (October-December 2009) is shown in annex 1 Table B.

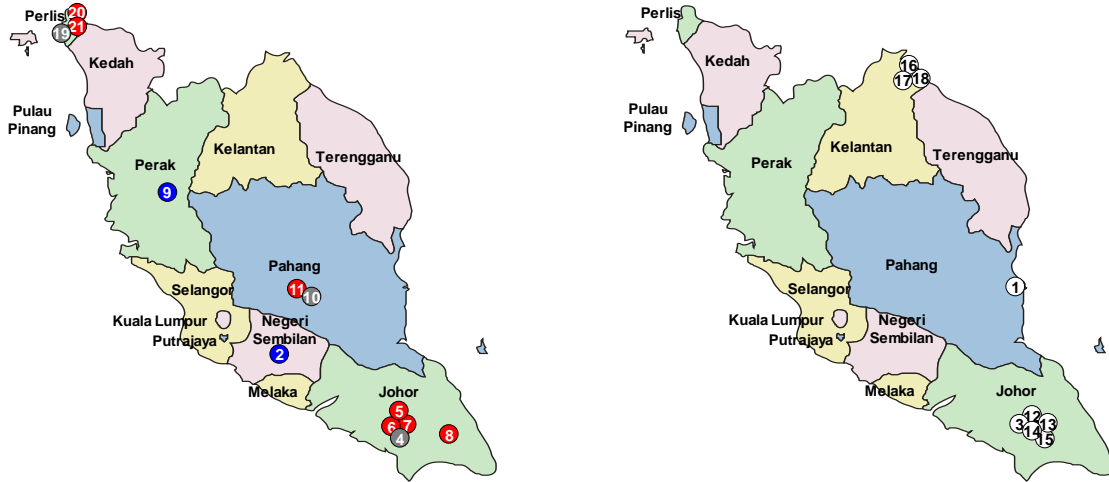
Table 1: Status of sequencing of samples received by the WRLFMD from October-December 2009.

Batch	Date Recd.	Country	Serotype	No. of isolates	Status
WRLFMD/2009/00050	26/10/2009	Malaysia	O	7*	Finished
			A	2*	Finished
WRLFMD/2009/00051	06/11/2009	Kenya	O	6	Finished
			SAT 1	5	Finished
WRLFMD/2009/00052	19/11/2009	Myanmar	O	2	Finished
WRLFMD/2009/00053	27/11/2009	Bangladesh	O	18	Finished
WRLFMD/2009/00054	04/12/2009	Iran	Virus isolation and typing in progress (31 samples)		
WRLFMD/2009/00055	07/12/2009	Bhutan	Virus isolation and typing in progress (26 samples)		
WRLFMD/2009/00056	19/12/2009	Ethiopia	Virus isolation and typing in progress (7 samples)		
WRLFMD/2009/00057	22/12/2009	Bhutan	Virus isolation and typing in progress (22 samples)		
Total				40+	

*, originally reported as FMDV-GD (no virus isolated in cell culture).

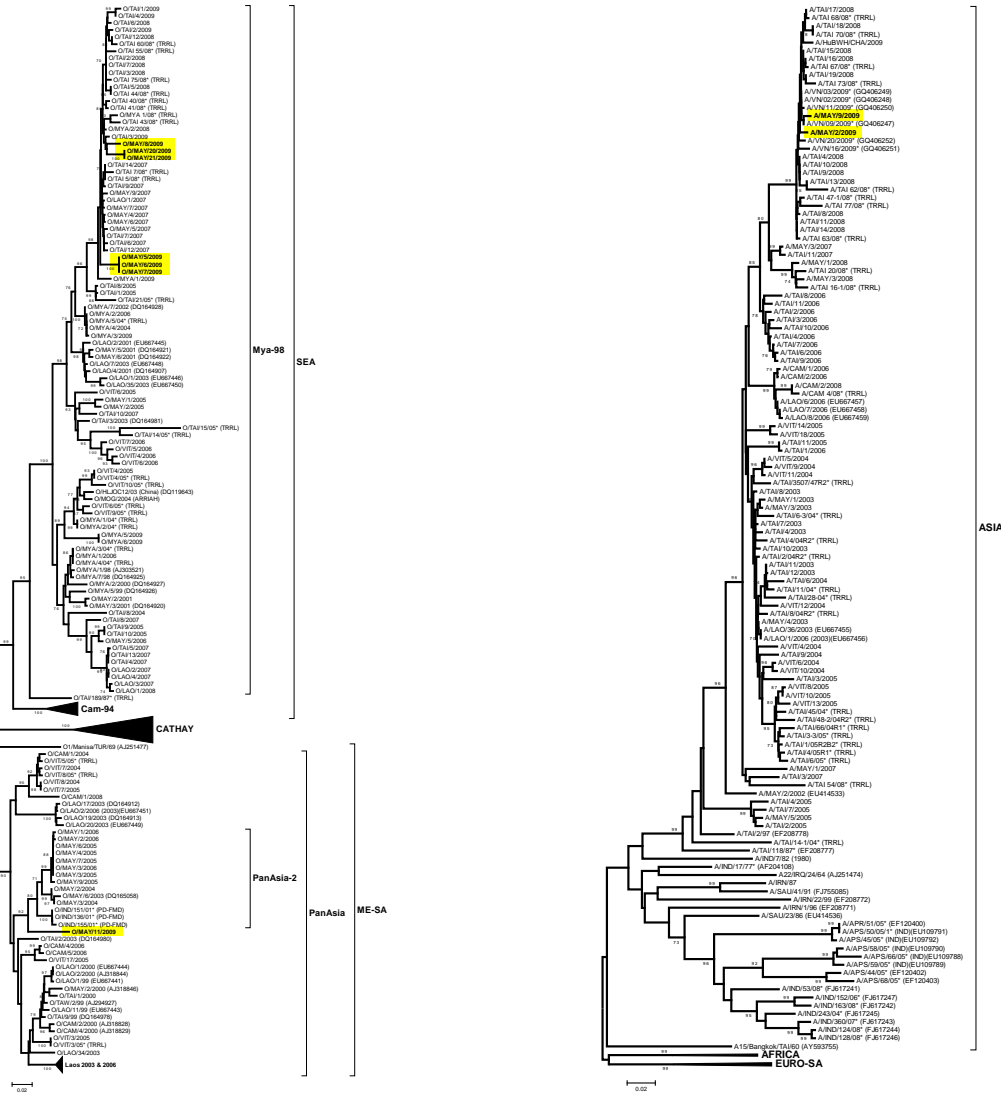
Detailed Analysis:

Malaysia: 19 samples were received. All but one were epithelial suspensions in Trizol. We were able to amplify the VP1 regions of 7 type O and 2 type A viruses. In 3 others FMDV genome was detected and 9 were NVD. Six of the type O's belonged to the SEA toptotype, Mya-98 lineage and the seventh belonged to the ME-SA toptotype, PanAsia strain. The two type A viruses belonged to the ASIA toptotype and were closely related to viruses from Thailand (2008), Vietnam (2009) and the People's Republic of China (2009).



Red, type O-GD; blue, type A-GD; grey, FMDV-GD

White, NVD



FMDV type O

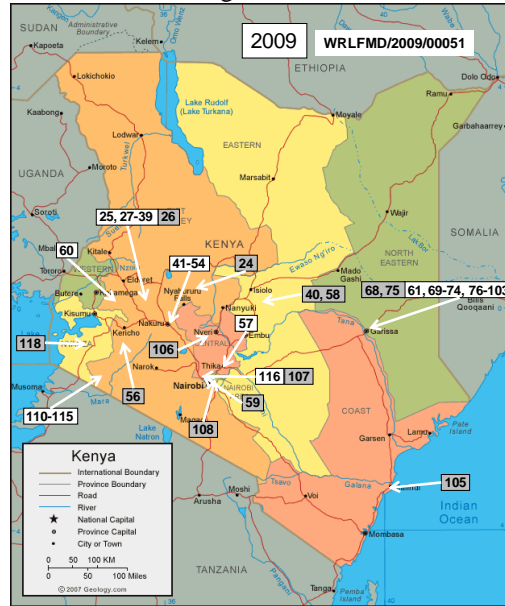
FMDV type A

Batch: WRLFMD/2009/00050; received 26/10/2009

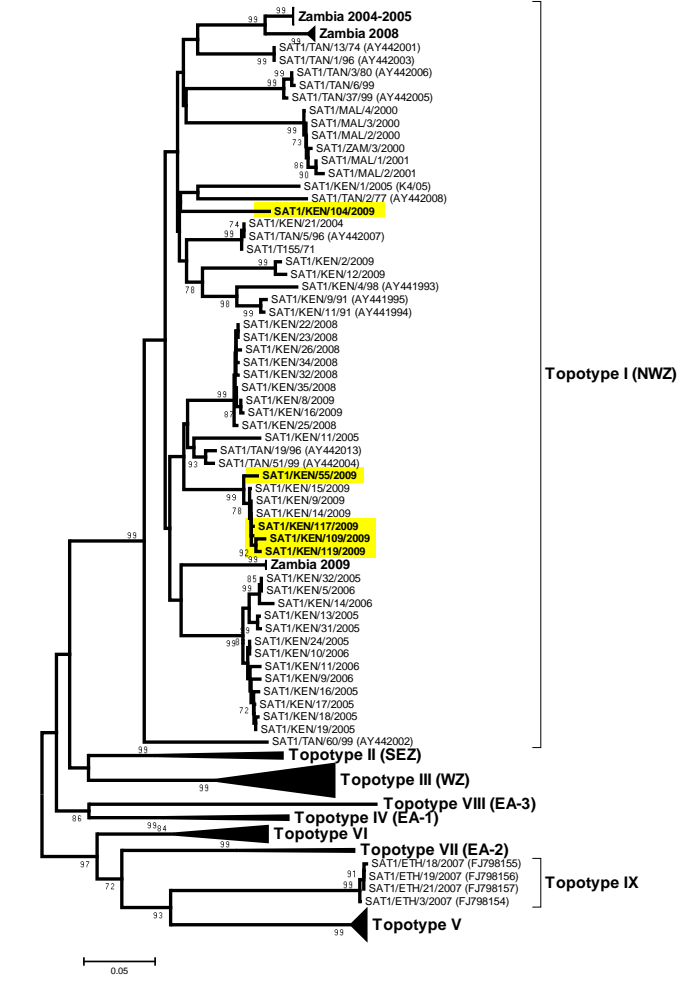
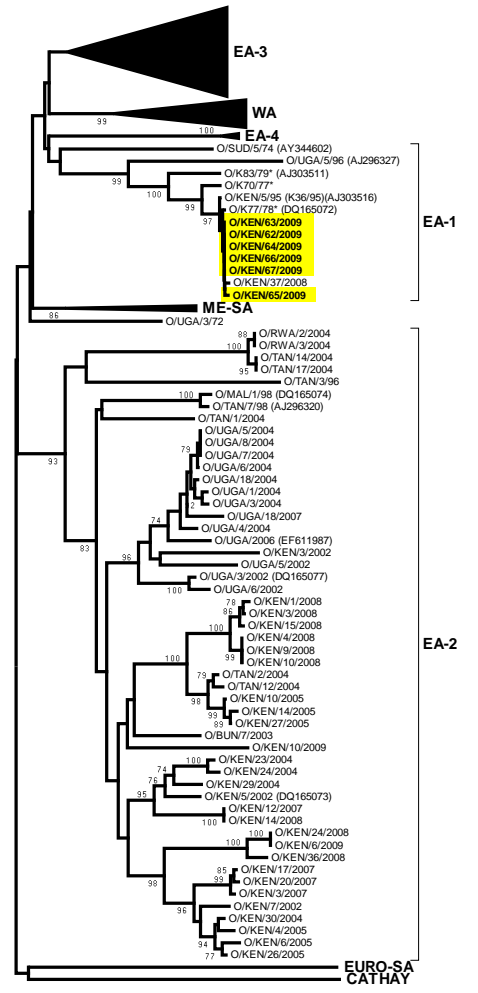
Kenya: 96 samples were received (16 epithelium or epithelial suspensions and 80 probangs); 6 were type O, 5 were type SAT 1, 13 were FMDV-GD and 72 were NVD (70 of which were probing samples). The type O viruses belonged to the EA-1 toptotype and were very closely related to the Kenya vaccine virus K77/78. The SAT 1 viruses all belonged to toptotype I (NWZ) and fell on two distinct lineages.



Red, type O; yellow, type SAT 1

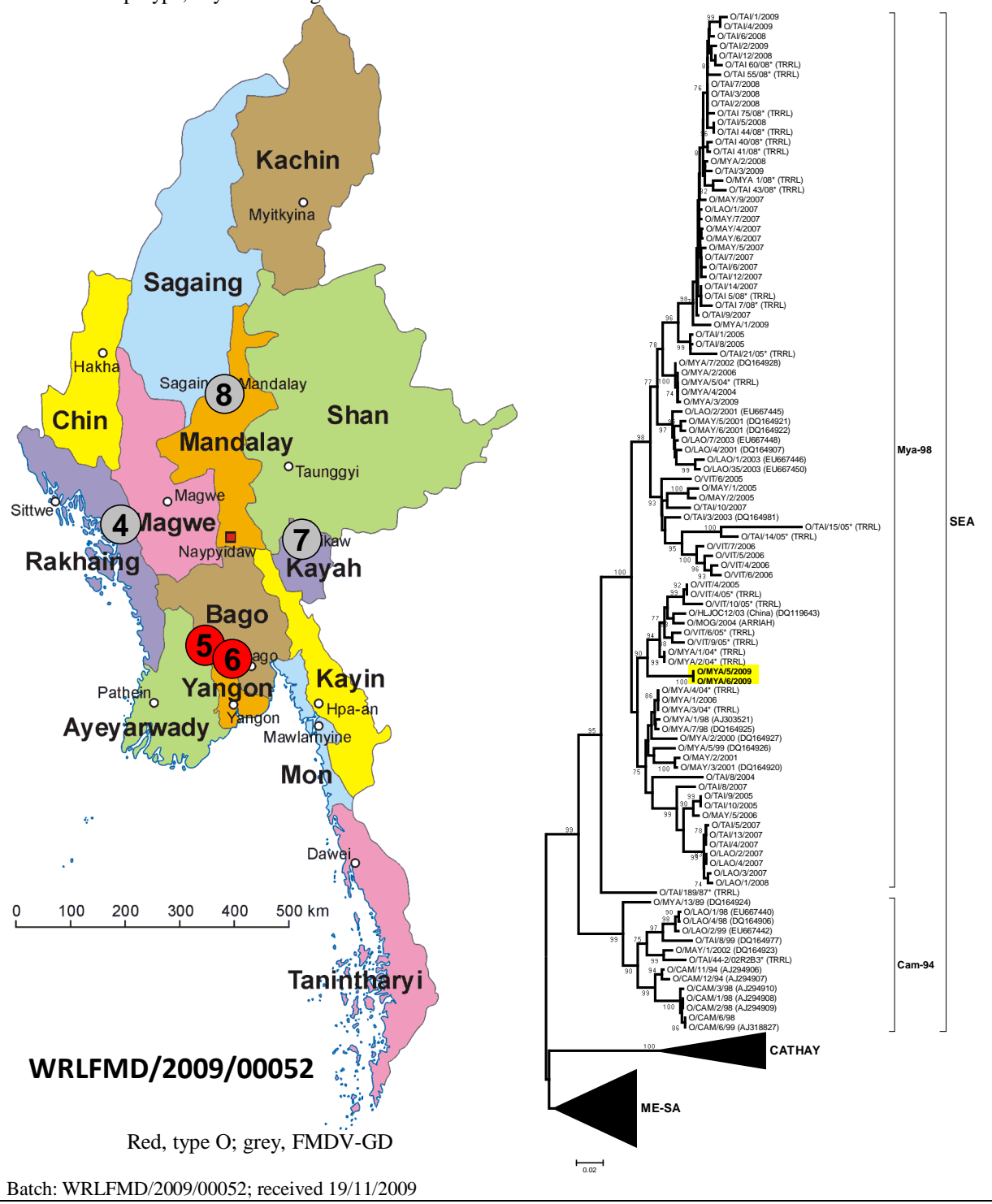


Grey, FMDV-GD; white, NVD

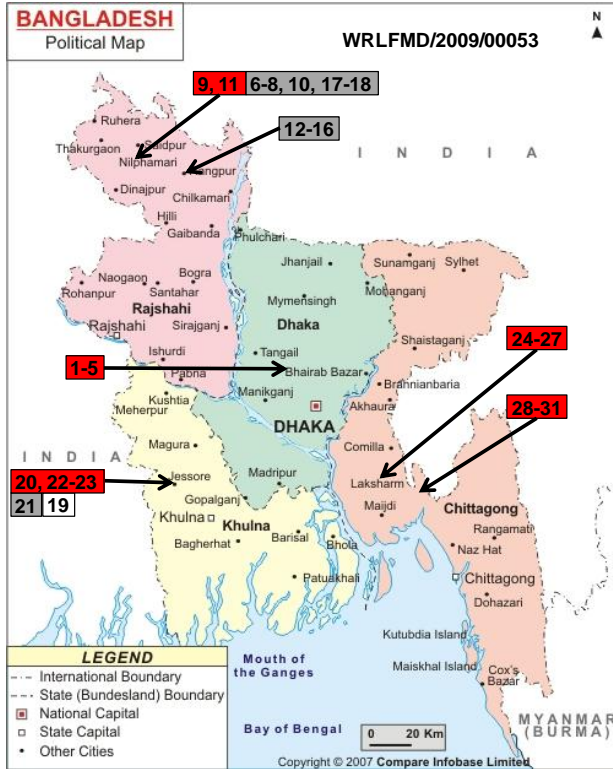


Batch: WRLFMD/2009/00051; received 06/11/2009

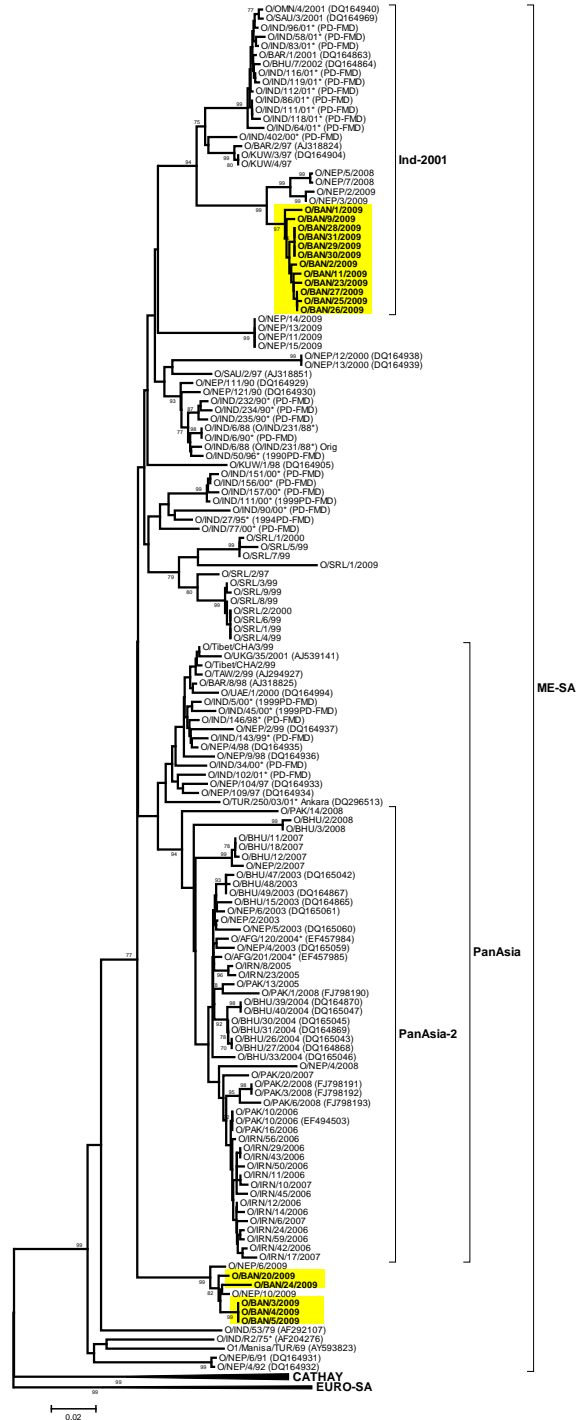
Myanmar: Five samples were received. Two were type O and three were FMDV-GD. Both type O's belonged to the SEA toptotype, Mya-98 lineage.



Bangladesh: 31 samples were received. 18 were typed as O, 12 were FMDV-GD and 1 was NVD. All the type O viruses belonged to the ME-SA toptotype. Twelve of these belonged to the Ind-2001 and were closely related to Nepalese viruses from 2009. Five belonged to an unnamed lineage which also contained some Nepalese viruses from 2009. One type O virus failed to grow on cell culture and was not examined.



Red, type O; grey, FMDV-GD; white, NVD



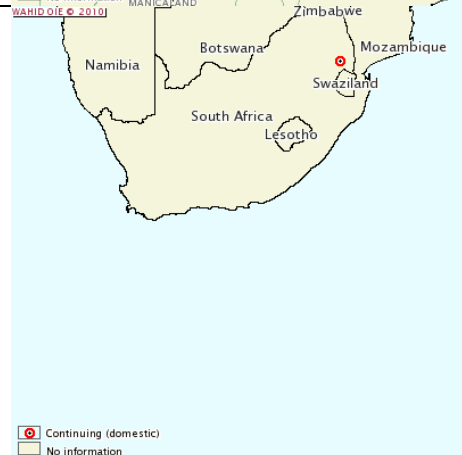
Batch: WRLFMD/2009/00053; received 27/11/2009

Reports to the OIE of new FMD outbreaks between October and December 2009

Malawi: An outbreak of SAT 2 was reported in cattle at Ndirande crush pen, Chikwawa, Shire Valley on 11/10/2009. Diagnosis was made at the OIE’s Reference Laboratory, Botswana.



South Africa: Further outbreaks of FMDV SAT 1 were reported in cattle in two villages (Malekutu 1 and Shweni) in Mbombela, Mpumalanga (20/10/2009). The outbreaks occurred in the FMD Buffer Zone and will not have an effect on the FMD free status of South Africa.



People’s Republic of China: An outbreak of FMDV A was reported in cattle in Fukang City, Changji Prefecture, Xinjiang Autonomous Region (25/10/2009).



Vaccine matching

Two FMDV type O isolates (O SRL 1/2009 and O IRN 40/2009) from Sri Lanka and Iran collected in 2009 were analysed antigenically by two dimensional virus neutralisation test (2dmVNT) and/or LPBE. Both isolates matched with O Manisa, O BFS, O IND R2/75, O 4171 vaccine strains by VNT and/or LPBE (Table C).

Six FMDV type A viruses (see table C for details) from Iran, Pakistan and Palestinian Autonomous Territories collected in 2009 were analysed for antigenic relationship with various vaccine strains by 2dmVNT and/or LPBE. Two isolates from Iran and one isolate from Palestinian Autonomous Territories showed antigenic matches with A22 Irq and A Turkey 06 vaccine strains. Virus A PAK 23/2009 and A PAT 1/2009 failed to match any of the vaccine strains tested (Table C).

Four FMDV SAT 1 viruses (see table C for details) from Kenya and Zambia collected in 2009, were analysed for antigenic relationship with two vaccine strains by 2dmVNT and/or LPBE. All except SAT 1 KEN 12/2009 showed an antigenic match with SAT 1 Rho vaccine by either VNT or LPBE (Table C).

Five FMDV SAT 2 viruses (see table C for details) from Botswana, Ethiopia and Kenya collected in 2009 were analysed for antigenic relationship with various vaccine strains by 2dmVNT and/or LPBE. All except SAT 2 BOT 6/2009 showed a good match with SAT 2 Eritrea vaccine and all except SAT 2 ETH 42/2009 (not tested) showed an antigenic match with SAT 2 ZIM vaccine (Table C).

Annex 1.

TABLE A: Clinical sample diagnostics made by the WRL between October and December 2009

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		
				VI/ELISA	RT-PCR	Final report
BANGLADESH	BAN 1/2009	Cattle	07.09.09	O	Positive	O
	BAN 2/2009	Cattle	07.09.09	O	Positive	O
	BAN 3/2009	Cattle	07.09.09	O	Positive	O
	BAN 4/2009	Cattle	07.09.09	O	Positive	O
	BAN 5/2009	Cattle	07.09.09	O	Positive	O
	BAN 6/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 7/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 8/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 9/2009	Cattle	16.09.09	O	Positive	O
	BAN 10/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 11/2009	Cattle	16.09.09	O	Positive	O
	BAN 12/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 13/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 14/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 15/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 16/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 17/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 18/2009	Cattle	16.09.09	NVD	Positive	FMDV GD
	BAN 19/2009	Cattle	01.10.09	NVD	Negative	NVD
	BAN 20/2009	Cattle	01.10.09	O	Positive	O
	BAN 21/2009	Cattle	01.10.09	NVD	Positive	FMDV GD
	BAN 22/2009	Cattle	01.10.09	O	Positive	O
	BAN 23/2009	Cattle	01.10.09	O	Positive	O

	BAN 24/2009	Cattle	22.10.09	O	Positive	O
	BAN 25/2009	Cattle	22.10.09	O	Positive	O
	BAN 26/2009	Cattle	22.10.09	NVD	Positive	FMDV GD
	BAN 27/2009	Cattle	22.10.09	O	Negative	O
	BAN 28/2009	Cattle	22.10.09	O	Positive	O
	BAN 29/2009	Cattle	22.10.09	O	Positive	O
	BAN 30/2009	Cattle	22.10.09	O	Positive	O
	BAN 31/2009	Cattle	22.10.09	O	Positive	O
BHUTAN*	BHU 1/2009	Cattle	24.04.09	NVD	Positive	FMDV GD
	BHU 2/2009	Cattle	05.06.09	O	Positive	O
	BHU 3/2009	Cattle	05.06.09	O	Positive	O
	BHU 4/2009	Cattle	05.06.09	O	Positive	O
	BHU 5/2009	Cattle	05.06.09	O	Positive	O
	BHU 6/2009	Cattle	05.06.09	O		O
	BHU 7/2009	Cattle	05.06.09	O		O
	BHU 8/2009	Cattle	03.07.09	O		O
	BHU 9/2009	Cattle	03.07.09	O		O
	BHU 10/2009	Cattle	03.07.09	O		O
	BHU 11/2009	Cattle	08.09.09	NVD		
	BHU 12/2009	Cattle	08.09.09	NVD		
	BHU 13/2009	Cattle	08.09.09	NVD		
	BHU 14/2009	Cattle	08.09.09	NVD		
	BHU 15/2009	Cattle	08.09.09	NVD		
	BHU 16/2009	Cattle	08.09.09	O		O
	BHU 17/2009	Cattle	08.09.09	NVD		
	BHU 18/2009	Cattle	08.09.09	O	Positive	O
	BHU 19/2009	Cattle	08.09.09	O	Positive	O
	BHU 20/2009	Cattle	05.11.09	O	Negative	O
	BHU 21/2009	Cattle	05.11.09	NVD	Positive	FMDV GD
	BHU 22/2009	Cattle	05.11.09	NVD	Negative	NVD
	BHU 23/2009	Cattle	23.11.09	O	Negative	O
	BHU 24/2009	Cattle	23.11.09	NVD	Negative	NVD
	BHU 25/2009	Cattle	23.11.09	O	Positive	O
	BHU 26/2009	Cattle	23.11.09	O	Positive	O
	BHU 27/2009	Cattle	22.11.09	NVD	Positive	FMDV GD
	BHU 28/2009	Cattle	22.11.09	NVD	Positive	FMDV GD
	BHU 29/2009	Cattle	22.11.09	NVD	Negative	NVD
	BHU 30/2009	Cattle	22.11.09	NVD	Positive	FMDV GD
	BHU 31/2009	Cattle	22.11.09	NVD	Negative	NVD
	BHU 32/2009	Cattle	02.12.09	NVD	Negative	NVD
	BHU 33/2009	Cattle	04.12.09	NVD	Negative	NVD
	BHU 34/2009	Cattle	04.12.09	NVD	Positive	FMDV GD
	BHU 35/2009	Cattle	04.12.09	NVD		
	BHU 36/2009	Cattle	04.12.09	NVD		
	BHU 37/2009	Cattle	04.12.09	O		O
	BHU 38/2009	Cattle	04.12.09	NVD		
	BHU 39/2009	Cattle	04.12.09	NVD		
	BHU 40/2009	Cattle	04.12.09	O		O
	BHU 41/2009	Cattle	04.12.09	O		O
	BHU 42/2009	Cattle	05.12.09	NVD		
	BHU 43/2009	Cattle	05.12.09	NVD		
	BHU 44/2009	Cattle	05.12.09	NVD		
	BHU 45/2009	Cattle	07.12.09			
	BHU 46/2009	Cattle	07.12.09			

	BHU 47/2009	Cattle	07.12.09			
	BHU 48/2009	Cattle	07.12.09			
ETHIOPIA	ETH 50/2009	Cattle	05.11.09	NVD	Negative	NVD
	ETH 51/2009	Cattle	05.11.09	SAT 2	Positive	SAT 2
	ETH 52/2009	Cattle	17.11.09	SAT 2	Positive	SAT 2
	ETH 53/2009	Cattle	17.11.09	SAT 2	Positive	SAT 2
	ETH 54/2009	Cattle	20.11.09	NVD	Positive	FMDV GD
	ETH 55/2009	Cattle	02.12.09	NVD	Positive	FMDV GD
	ETH 56/2009	Cattle	02.12.09	SAT 2	Positive	SAT 2
IRAN	IRN 46/2009	Sheep	01.07.09	NVD	Positive	FMDV GD
	IRN 47/2009	Sheep	12.07.09	NVD	Negative	NVD
	IRN 48/2009	Cattle	16.07.09	NVD	Positive	FMDV GD
	IRN 49/2009	Cattle	16.07.09	O	Positive	O
	IRN 50/2009	Cattle	16.07.09	A	Positive	A
	IRN 51/2009	Cattle	19.07.09	O	Positive	O
	IRN 52/2009	Sheep	20.07.09	O	Positive	O
	IRN 53/2009	Cattle	20.07.09	A	Positive	A
	IRN 54/2009	Cattle	23.07.09	O	Positive	O
	IRN 55/2009	Cattle	23.07.09	A	Positive	A
	IRN 56/2009	Cattle	25.07.09	O	Positive	O
	IRN 57/2009	Sheep	27.07.09	O	Positive	O
	IRN 58/2009	Cattle	27.07.09	NVD	Positive	FMDV GD
	IRN 59/2009	Cattle	27.07.09	A	Positive	A
	IRN 60/2009	NK	27.07.09	O	Positive	O
	IRN 61/2009	Cattle	28.07.09	O	Positive	O
	IRN 62/2009	Cattle	02.08.09	O	Positive	O
	IRN 63/2009	Cattle	02.08.09	A	Positive	A
	IRN 64/2009	Cattle	03.08.09	O	Positive	O
	IRN 65/2009	Sheep	24.08.09	O	Positive	O
	IRN 66/2009	NK	26.08.09	O	Positive	O
	IRN 67/2009	Sheep	01.09.09	A	Positive	A
	IRN 68/2009	Cattle	02.09.09	O	Positive	O
	IRN 69/2009	Cattle	24.09.09	NVD	Positive	FMDV GD
	IRN 70/2009	Sheep/Goat	07.11.09	O	Positive	O
	IRN 71/2009	Cattle	11.11.09	O	Positive	O
	IRN 72/2009	Cattle	20.11.09	O	Positive	O
	IRN 73/2009	NK	NK	A	Positive	A
	IRN 74/2009	NK	NK	NVD	Negative	NVD
	IRN 75/2009	NK	NK	O	Positive	O
	IRN 76/2009	Cattle	NK	O	Positive	O
KENYA	KEN 24/2009	Cattle	29.04.09	NVD	Positive	FMDV GD
	KEN 25/2009	Cattle	06.05.09	NVD	Negative	NVD
	KEN 26/2009	Cattle	06.05.09	NVD	Positive	FMDV GD
	KEN 27/2009	Cattle	06.05.09	NVD	Negative	NVD
	KEN 28/2009	Cattle	06.05.09	NVD	NT	NVD
	KEN 29/2009	Cattle	06.05.09	NVD	Negative	NVD
	KEN 30/2009	Cattle	06.05.09	NVD	Negative	NVD
	KEN 31/2009	Cattle	06.05.09	NVD	Negative	NVD
	KEN 32/2009	Cattle	06.05.09	NVD	NT	NVD
	KEN 33/2009	Cattle	06.05.09	NVD	Negative	NVD
	KEN 34/2009	Sheep	06.05.09	NVD	NT	NVD
	KEN 35/3009	Goat	06.05.09	NVD	Negative	NVD

	KEN 36/2009	Sheep	06.05.09	NVD	Negative	NVD
	KEN 37/2009	Sheep	06.05.09	NVD	Negative	NVD
	KEN 38/2009	Goat	06.05.09	NVD	Negative	NVD
	KEN 39/2009	Goat	06.05.09	NVD	Negative	NVD
	KEN 40/2009	Cattle	11.05.09	NVD	Positive	FMDV GD
	KEN 41/2009	Goat	13.05.09	NVD	Negative	NVD
	KEN 42/2009	Sheep	13.05.09	NVD	Negative	NVD
	KEN 43-45/2009	Cattle	13.05.09	NVD	Negative	NVD
	KEN 46/2009	Sheep	13.05.09	NVD	Negative	NVD
	KEN 47/2009	Goat	13.05.09	NVD	Negative	NVD
	KEN 48/2009	Cattle	13.05.09	NVD	Negative	NVD
	KEN 49/2009	Cattle	14.05.09	NVD	Negative	NVD
	KEN 50/2009	Sheep	14.05.09	NVD	Negative	NVD
	KEN 51/2009	Sheep	14.05.09	NVD	Negative	NVD
	KEN 52/2009	Cattle	14.05.09	NVD	Negative	NVD
	KEN 53/2009	Cattle	14.05.09	NVD	Negative	NVD
	KEN 54/2009	Goat	14.05.09	NVD	Negative	NVD
	KEN 55/2009	Cattle	21.05.09	SAT 1	Positive	SAT 1
	KEN 56/2009	Cattle	26.05.09	NVD	Positive	FMDV GD
	KEN 57/2009	Cattle	04.06.09	NVD	Negative	NVD
	KEN 58/2009	Cattle	10.06.09	NVD	Positive	FMDV GD
	KEN 59/2009	Cattle	18.06.09	NVD	Positive	FMDV GD
	KEN 60-61/2009	Cattle	01.07.09	NVD	Negative	NVD
	KEN 62-64/2009	Cattle	01.07.09	O	Positive	O
	KEN 65/2009	Cattle	01.07.09	O	NT	O
	KEN 66/2009	Cattle	01.07.09	O	Negative	O
	KEN 67/2009	Cattle	01.07.09	O	Positive	O
	KEN 68/2009	Cattle	01.07.09	NVD	Positive	FMDV GD
	KEN 69-74/2009	Cattle	01.07.09	NVD	Negative	NVD
	KEN 75/2009	Cattle	01.07.09	NVD	Positive	FMDV GD
	KEN 76-84/2009	Cattle	01.07.09	NVD	Negative	NVD
	KEN 85-103/2009	Cattle	01.07.09	NVD	Negative	NVD
	KEN 104/2009	Cattle	10.07.09	SAT 1	Positive	SAT 1
	KEN 105/2009	Cattle	16.07.09	NVD	Positive	FMDV GD
	KEN 106/2009	Cattle	23.07.09	NVD	Positive	FMDV GD
	KEN 107/2009	Cattle	18.08.09	NVD	Positive	FMDV GD
	KEN 108/2009	Cattle	24.08.09	NVD	Positive	FMDV GD
	KEN 109/2009	Cattle	03.09.09	SAT 1	Positive	SAT 1
	KEN 110-115/2009	Cattle	04.09.09	NVD	Negative	NVD
	KEN 116/2009	Cattle	17.09.09	NVD	Negative	NVD
	KEN 117/2009	Cattle	17.09.09	SAT 1	Positive	SAT 1
	KEN 118/2009	Cattle	24.09.09	NVD	Positive	FMDV GD
	KEN 119/2009	Cattle	08.10.09	SAT 1	Positive	SAT 1
MALAYSIA**	MAY 1/2009	Cattle	03.03.09	Not done	Negative	NVD
	MAY 2/2009	Cattle	17.03.09	Not done	Positive	FMDV GD
	MAY 3/2009	Cattle	29.03.09	Not done	Negative	NVD
	MAY 4/2009	Cattle	29.03.09	Not done	Positive	FMDV GD
	MAY 5/2009	Cattle	29.03.09	Not done	Positive	FMDV GD
	MAY 6/2009	Cattle	29.03.09	Not done	Positive	FMDV GD
	MAY 7/2009	Cattle	29.03.09	Not done	Positive	FMDV GD
	MAY 8/2009	Cattle	07.04.09	Not done	Positive	FMDV GD
	MAY 9/2009	Cattle	20.04.09	Not done	Positive	FMDV GD
	MAY 10/2009	Cattle	27.04.09	Not done	Positive	FMDV GD
	MAY 11/2009	Cattle	27.04.09	Not done	Positive	FMDV GD

	MAY 12/2009	Cattle	29.04.09	Not done	Negative	NVD
	MAY 13/2009	Cattle	29.04.09	Not done	Negative	NVD
	MAY 14/2009	Cattle	29.04.09	Not done	Negative	NVD
	MAY 15/2009	Cattle	29.04.09	Not done	Negative	NVD
	MAY 16/2009	Cattle	27.07.09	Not done	Negative	NVD
	MAY 17/2009	Cattle	27.07.09	Not done	Negative	NVD
	MAY 18/2009	Cattle	27.07.09	Not done	Negative	NVD
	MAY 19/2009	Cattle	25.09.09	NVD	Positive	FMDV GD
	MAY 20/2009	Cattle	25.09.09	Not done	Positive	FMDV GD
	MAY 21/2009	Cattle	25.09.09	Not done	Positive	FMDV GD
MYANMAR	MYA 4/2009	Cattle	25.05.09	NVD	Positive	FMDV GD
	MYA 5/2009	Cattle	10.06.09	O	Positive	O
	MYA 6/2009	Cattle	17.06.09	O	Positive	O
	MYA 7/2009	Cattle	23.07.09	NVD	Positive	FMDV GD
	MYA 8/2009	Cattle	12.10.09	NVD	Positive	FMDV GD

TOTAL : 239

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
**	all samples from Malaysia were received as epithelial suspensions in Trizol except MAY 19/2009, which was an epithelial sample
*	Note: At time of report, analysis of some samples from Bhutan was not complete.

TABLE B: Summary of samples collected and received to IAH-Pirbright (October-December 2009)

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	Positive	Negative			
		O	A	C	Asia							
BANGLADESH	31	17	-	-	-	-	-	-	-	29	2	
BHUTAN*	48	19	-	-	-	-	-	-	6	14	8	
ETHIOPIA	7	-	-	-	-	4	-	-	-	1	1	
IRAN	31	18	7	-	-	-	-	-	2	29	2	
KENYA**	96	3	-	-	-	5	-	-	-	33	20	31
MALAYSIA***	21	-	-	-	-	-	-	-	-	1	12	9
MYANMAR	5	2	-	-	-	-	-	-	-	3	5	-
TOTAL	239	59	7	-	-	9	-	-	-	46	115	53

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 some samples from Bhutan was not complete.

** A number of samples from Kenya were tested as pools

***All samples from Malaysia were received as epithelial suspensions in Trizol except MAY 19/2009, which was an epithelial sample

TABLE C: Antigenic characterisation of FMD field isolates by matching with vaccine strains by VNT and/or LPBE – r1 value data from 1st October to 31st December 2009

Type O:

Field Isolate	r1 values by 2dmVNT			r1 values by LPBE						
	O Manisa	O BFS	O Ind R2/75	O 4174	O BFS	O Tai 189/87	O Hkn 6/83	O Ind 53/79	O Manisa	O Taw 189/87
O Srl 1/2009	0.28	0.59	>1.0	≥1	0.33	0.25		≥1	>1	
O Im 40/2009	0.44	>0.76	>1.0	0.59	0.25		>1		>1	0.84

Type A:

Field Isolate	r1 values by 2dmVNT							r1 values by LPBE				
	A22 Irq	A Tur06	A Sau 41/91	A Ind 17/82	A Irn87	A Irn99	A May 97	A22 Irq	A Eri 98	A Irn 99	A May 97	A Irn 87
A Irn 39/2009	0.34	0.52	0.21	0.10	0.09	0.08	0.09	0.50	DNT	DNT	DNT	0.19
A Irn 44/2009	0.35	>0.72	0.30	0.11	0.07	0.09	0.09	0.25	DNT	DNT	DNT	0.09
A Pak 23/2009	0.07	0.23	0.04	0.18	0.11	0.08	0.06	0.11		0.16		0.29
A Pak 24/2009	0.10	0.32	0.04	0.17	0.10	0.10	0.09	0.17		0.21		0.21
A PAT 1/2009	0.09	0.24	0.08	0.26	0.08	<0.09	0.08					0.06
A PAT 6/2009	0.19	0.75	0.36	0.43	0.08	0.09	0.13	0.42				0.24

Type SAT 1:

Field Isolate	r1 values by 2dmVNT		r1 values by LPBE	
	Sat1 Rho		Sat1 Rho	Sat1 Bot 1/68
Sat1 Ken 12/2009	0.13		0.00	
Sat1 Ken 15/2009	0.31		0.25	
Sat1 Zam 7/2009	>0.99		0.00	0.08
Sat1 Zam 8/2009	0.70		0.17	0.09

Type SAT 2:

Field Isolate	r1 values by 2dmVNT		r1 values by LPBE				
	Sat2 Eri	Sat2 Zim	Sat2 Zim	Sat2 Zim 11/89	Sat2 Bot 3/77	Sat2 Eri	Sat2 K65/82
Sat2 Bot 6/2009	0.14	0.37		0.59	0.13		
Sat2 Eth 42/2009						0.32	
Sat2 Eth 42/2009	0.61	0.35	0.21	0.08	0.11	≥0.88	
Sat2 Eth 48/2009	0.53	0.32	0.21	0.31	0.13	0.88	
Sat2 Ken 13/09	>1.0	>1.0					0.31

Interpretation of r₁ 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 – December 2009

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