



WRLFMD Quarterly Report

January-March 2011

Reference Laboratory Contract Report

3/31/2011

WRLFMD

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**FAO/OIE Reference Laboratory Contract Report^{1,2}
January-March 2011**

Foot-and-Mouth Disease

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² Copies of all the individual reports cited herein can be obtained from Dr. Jef Hammond, IAH-Pirbright, jef.hammond@bbsrc.ac.uk.

Summary

ASIA

Afghanistan, Iran, Pakistan and Turkey

The O/ME-SA/PanAsia-2^{ANT-10} and A-Iran-05^{AFG-07} lineages continue to dominate in these countries.

FMD type Asia 1 in Pakistan, Iran and Bahrain

The recent appearance of Asia 1 in Bahrain and Iran in 2011 has been linked to viruses from Pakistan.

Israel

On 01/03/2011 and outbreak of FMD type O occurred in cattle at Bet Zera, Kineret, Hazafon. The VP1 sequences of two virus isolates showed them to be ME-SA/PanAsia-2^{ANT-10} and closely related to viruses from Turkey and Bulgaria.

P.R. China

A further three outbreaks due to type O were reported in pigs in Xinjiang Autonomous Region (19/02/2011 and 19/03/2011) and Guizhou province (29/03/2011). No phylogenetic analyses have been reported.

Republic of Korea (South Korea)

Between 23/12/2010 and 05/01/2011, 36 outbreaks were identified in cattle and pigs in the following provinces: Chungcheongbuk-do, Chungcheongnam-do, Gangwon-do, Gyeonggi-do and Gyeongsangbuk-do. These belonged to the SEA/Mya-98 lineage.

Russian Federation

On the 13/03/2011 FMD was reported in cattle and pigs in Us't-Imalka village, Ononsky, Zabajkal'Skij Kray. ARRIAH reported the outbreak was due to type O, SEA toptotype.

Taiwan POC

Two outbreaks of FMD type O in pigs in Makung City, P'eng-Hu (22/03/2011); 30 pigs, which had been transported to a slaughterhouse from a pig farm on P'eng-Hu Island, were found with vesicular lesions. Clinical investigation found that 110 pigs in the farm of origin also had vesicular lesions. Serotype O was shown to be the causative agent, but no phylogenetic results have yet been reported. A third FMD outbreak, also in pigs, occurred in Siaying District, T'ai-Nan (21/03/2011). Routine inspection found abnormal lesions on 15 pigs' feet while the animals were still on the transportation vehicle before they entered into the auction market of Tainan City. Trace-back back to the farm of origin showed that 15 pigs on farm had the same clinical lesions. Laboratory investigations found antibody to FMDV O but no virus or virus RNA was detected.

The Democratic People's Republic of Korea (North Korea)

Between 25/12/2010 and 17/03/2011, 139 outbreaks of FMD type O were reported in cattle, goats and pigs in North Korea (provinces of P'yongyang-Si, Hwanghae-Bukto, Kangwon-Do, P'yongan-Namdo, P'yongan-Bukto and Chagang-Do). No samples have been received by the WRLFMD and no genetic analyses are available.

AFRICA

Botswana

On 04/02/2011 an outbreak of FMD was reported in cattle at Kaepe crush, Okavango, Ngamiland, Maun. The causal virus was type SAT 2. No phylogenetic analyses have been reported.

Libya

On 22/12/2010, two outbreaks of FMD were reported in cattle in Tripoli. Viruses from this and a subsequent outbreak belonged to the ME-SA/PanAsia-2^{ANT-10} lineage and were closely related to viruses from Pakistan and Iran.

South Africa

Between 01/02/2011 and 17/03/2011 FMDV non-structural antibodies were discovered in cattle, goats and sheep at 44 locations in KwaZulu-Natal. No virus could be isolated, nor FMDV genome detected. The causal virus remains untyped.

EUROPE

Bulgaria

Following the identification of FMDV type O in a wild boar shot in the Burgas region on 30/12/2010, nine outbreaks in cattle, sheep, goats and pigs were identified between 04/01/2011 and 25/03/2011. All viruses so far examined belonged to the ME-SA/PanAsia-2^{ANT-10} lineage and were most closely related to viruses from Turkey.

SOUTH AMERICA

No FMD outbreaks reported.

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.

WRLFMD vaccine recommendations have not changed from the previous report (Annex 3). However, a recently available PanAsia 2 vaccine is being tested in WRLFMD vaccine matching assays and its ability to match current field strains will be carefully monitored and reported in due course.

Importantly, the recent isolates of serotype Asia 1 from Pakistan, Iran and Bahrain have failed to match with the Asia 1 Shamir vaccine strain in WRLFMD laboratory testing. Further 'in vivo' work is needed to determine the level of protection that may be offered in the field by currently available high potency Asia 1 vaccines. A careful watch will be maintained for further outbreaks of Asia 1 and any isolates obtained will be tested for vaccine matching as rapidly as possible.

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 January and March 2011 is shown in Annex 1 Table A. A record of all samples received to IAH-Pirbright (January-March 2011) is shown in Annex 1 Table B.

Table 1: Status of sequencing of samples received by the WRLFMD from January to March 2011.

Batch	Date Recd.	Country	Serotype	No. of sequences	Status
WRLFMD/2011/00001	04/01/2011	Libya	O	2	Completed
WRLFMD/2011/00002	07/01/2011	Bulgaria	O	3	Completed
WRLFMD/2011/00003	18/01/2011	Pakistan	O	38	Completed
			Asia 1	27	Completed
WRLFMD/2011/00004	18/01/2011	Afghanistan	O	92*	Completed†
			A	5	Completed†
WRLFMD/2011/00005	20/01/2011	Malaysia	O-GD	17	Completed
WRLFMD/2011/00006	07/02/2011	South Korea	O	5	Completed
WRLFMD/2011/00007	09/02/2011	Libya	O-GD	1	Completed
WRLFMD/2011/00008	09/02/2011	Kenya	O	9	Completed
			SAT 1	4	Completed
WRLFMD/2011/00009	16/02/2011	Bulgaria	O	5	Completed
WRLFMD/2011/00010	26/01/2011	Iran	O	6	Completed†
			A	10	Completed†
WRLFMD/2011/00011	03/03/2011	South Korea	O	1	Completed
WRLFMD/2011/00012	07/03/2011	Bahrain	Asia 1	4	Completed
WRLFMD/2011/00013	25/02/2011	Turkey	O	7	Completed
			A	19	Completed
WRLFMD/2011/00015	23/03/2011	Bulgaria	O	5	Completed
WRLFMD/2011/00016	23/03/2011	Israel	O	2	Completed
WRLFMD/2011/00020	10/03/2011	Iran	O	7	Completed†
			A	14	Completed†
			Asia 1	7	Completed
WRLFMD/2011/00021	31/03/2011	Pakistan	O	11	Pending
			A	1	Completed†
			Asia 1	20	Completed
WRLFMD/2011/00023	31/03/2011	Afghanistan	?		Pending
Total				322	

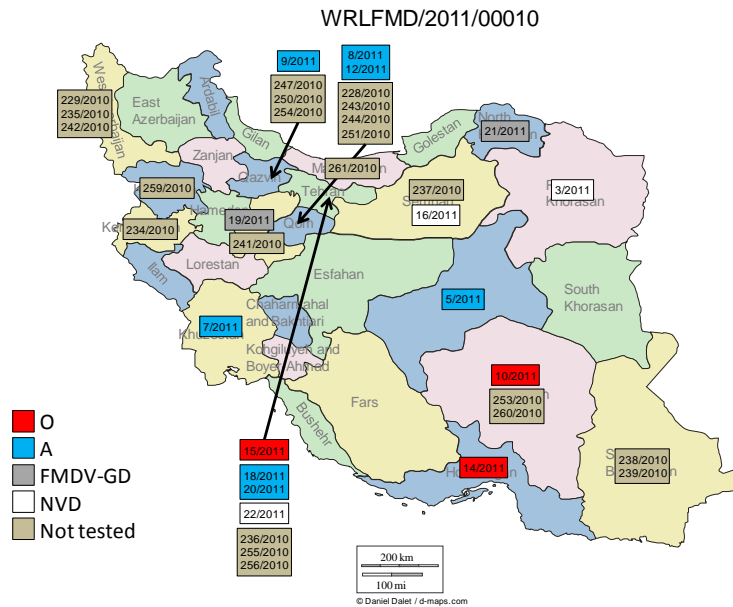
*, from 89 virus isolates (three each contained two different sequences).

†, sequencing completed but report pending.

GD, genome detected.

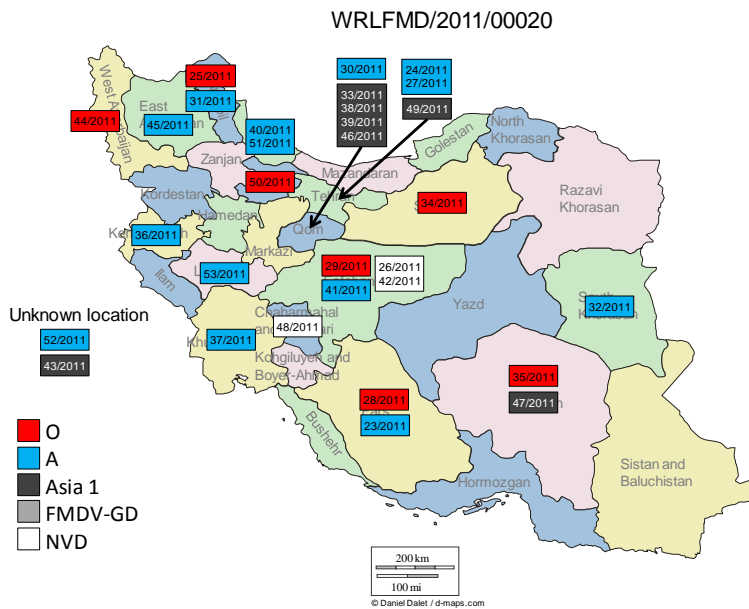
Iran

WRLFMD/2011/00010
 Date received: 26/01/2011
 No. of samples: 60
 O: 6 (phylogenetic analysis pending)
 A: 10 (phylogenetic analysis pending)
 GD: 3
 NVD: 3
 NOT TESTED: 38



WRLFMD/2011/00020
 Date received: 10/03/2011
 No. of samples: 31
 O: 7 (phylogenetic analysis pending)
 A: 14 (phylogenetic analysis pending)
 Asia 1: 7
 NVD: 3

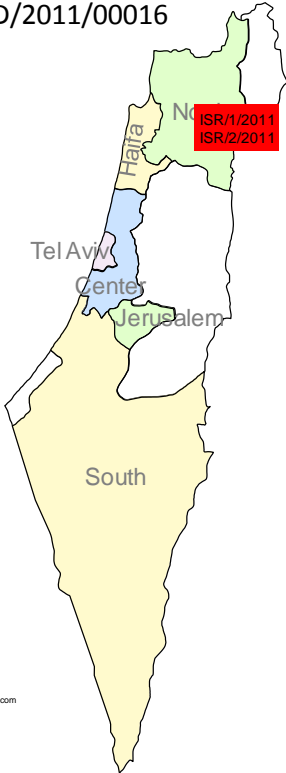
All seven Asia 1 viruses were closely related to viruses from Pakistan and Bahrain (see Pakistan tree below).



Israel

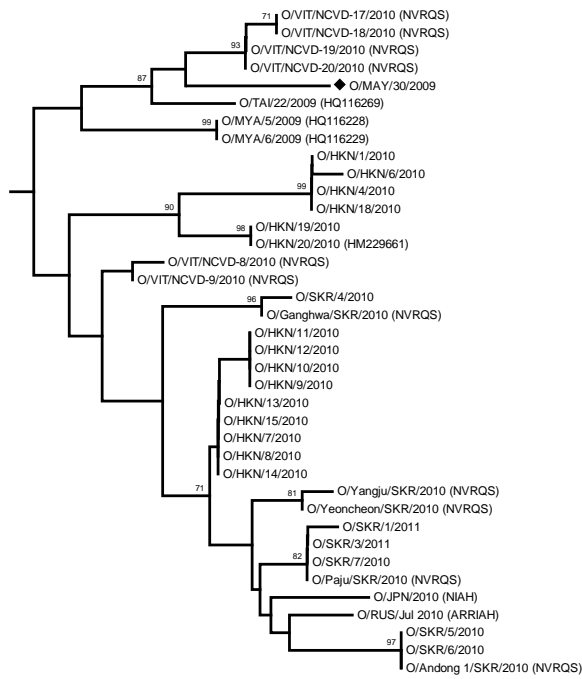
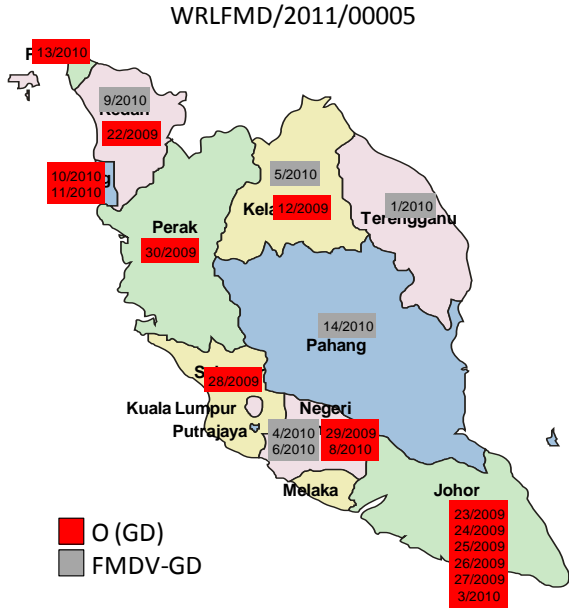
WRLFMD/2011/00016
 Date received: 23/03/2011
 No. of samples: 2
 O: 2 (ME-SA/PanAsia-2^{ANT-10})

WRLFMD/2011/00016

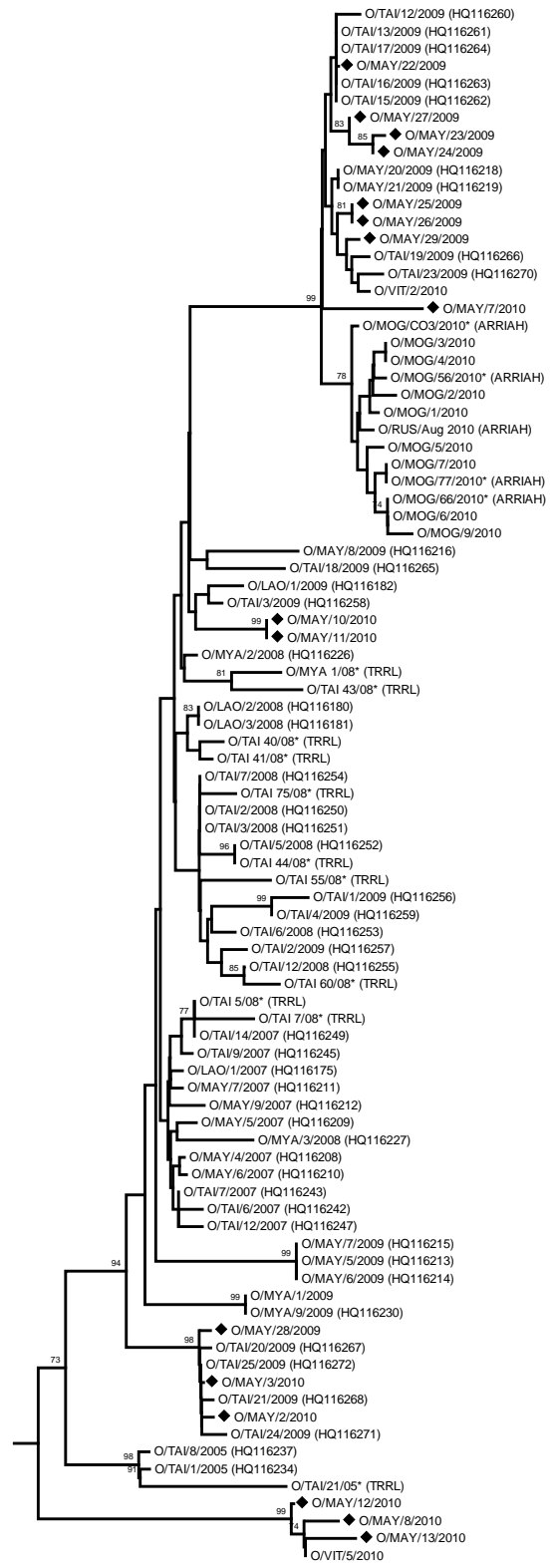


Malaysia

WRLFMD/2011/00005
 Date received: 20/01/2011
 No. of samples: 23
 O-GD: 17 (16 x ME-SA/PanAsia; 1 x SEA/Mya-98)
 GD: 6



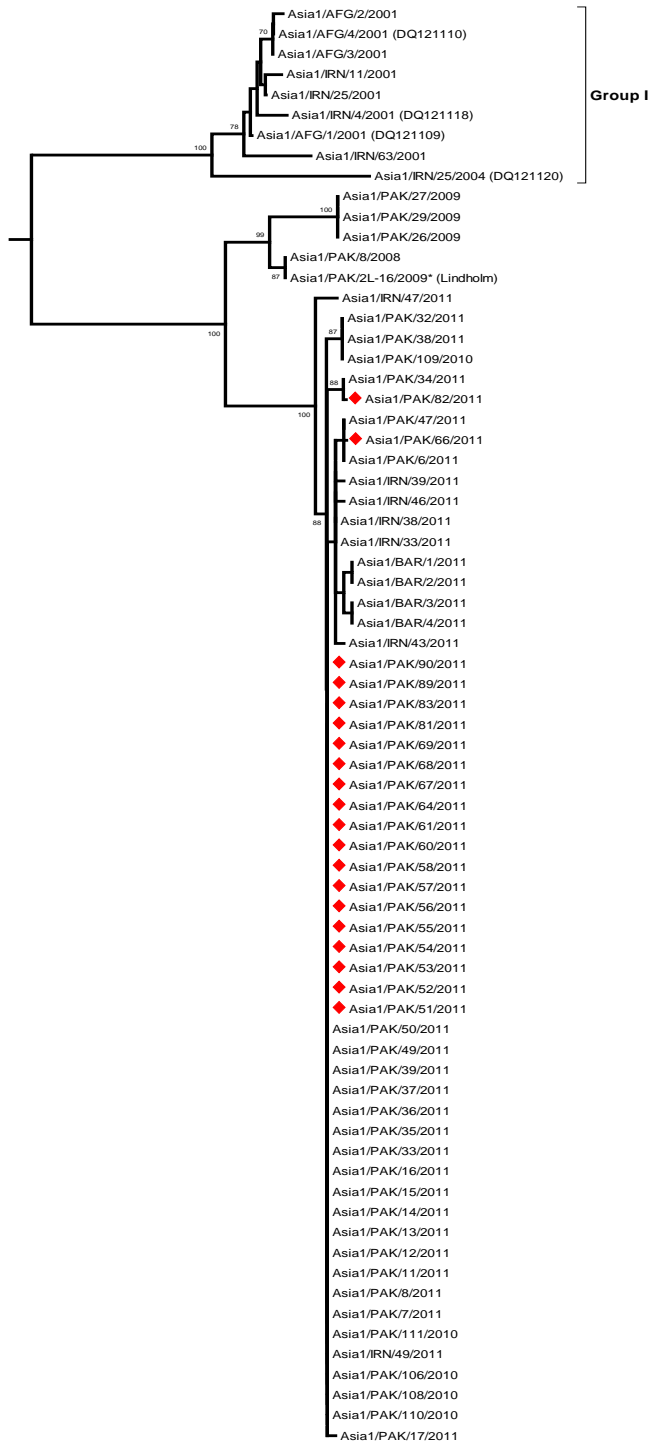
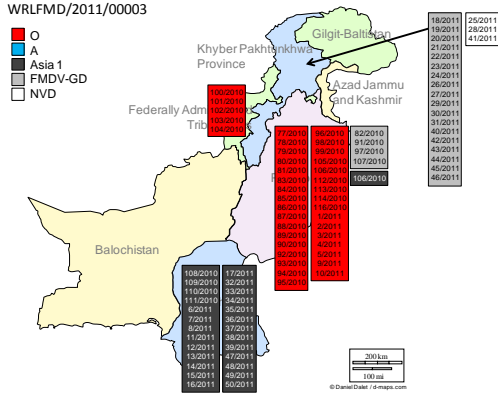
Topotype SEA, lineage Mya-98



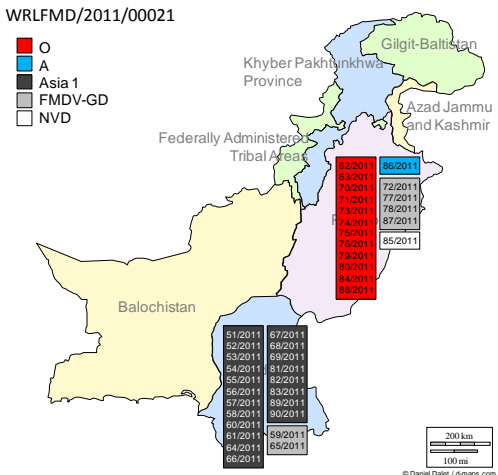
Topotype ME-SA, lineage PanAsia

Pakistan

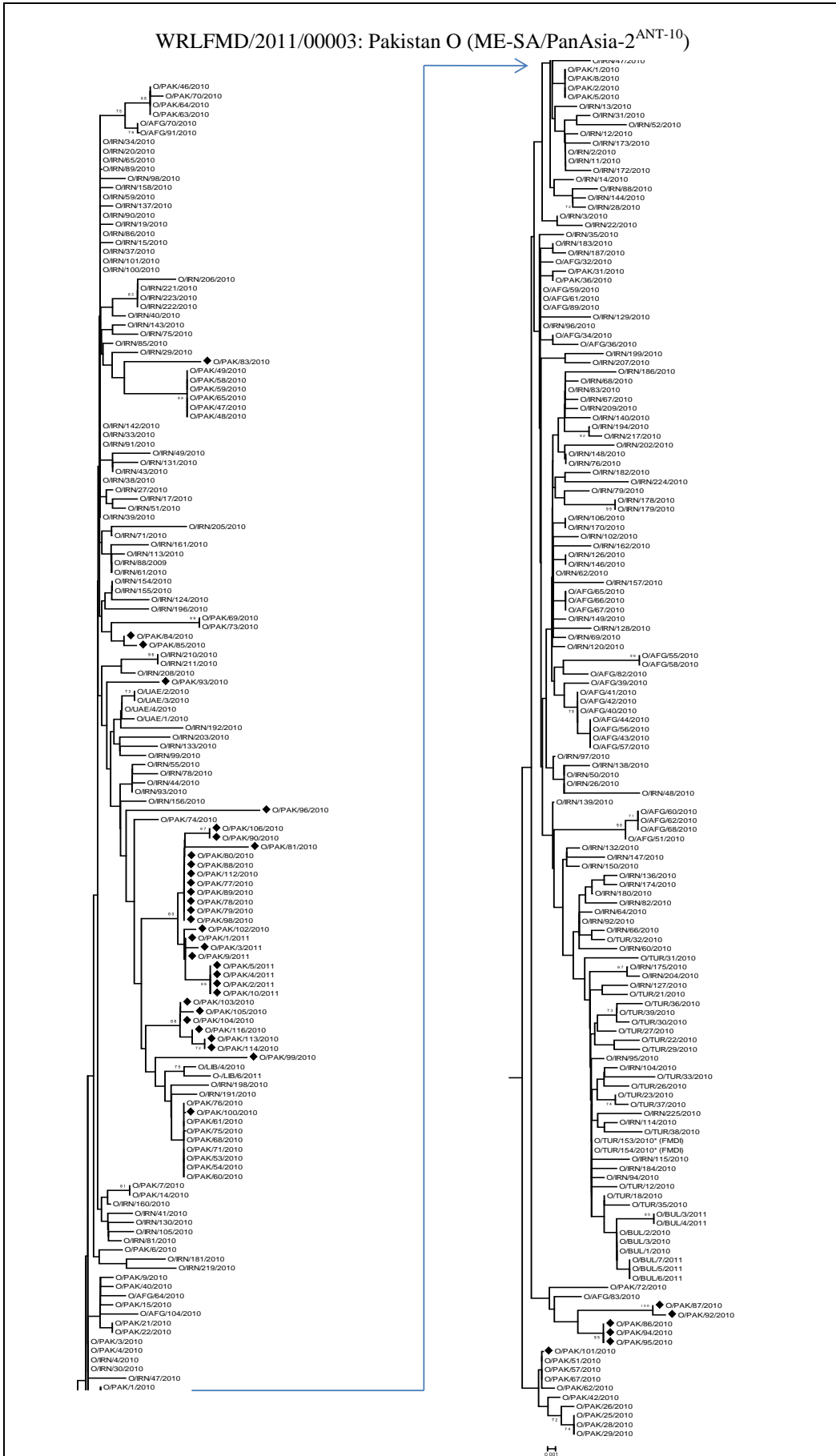
WRLFMD/2011/00003
 Date received: 18/01/2011
 No. of samples: 90
 O: 37 (ME-SA/PanAsia-2^{ANT-10})
 O + Asia 1: 1
 Asia 1: 26
 GD: 22
 NVD: 4



WRLFMD/2011/00021
 Date received: 31/03/2011
 No. of samples: 40
 O: 12 (phylogenetic analysis pending)
 A: 1 (phylogenetic analysis pending)
 Asia 1: 20
 GD: 6
 NVD: 1



WRLFMD/2011/00003: Pakistan O (ME-SA/PanAsia-2^{ANT-10})



Republic of Korea (South Korea)

WRLFMD/2011/00006

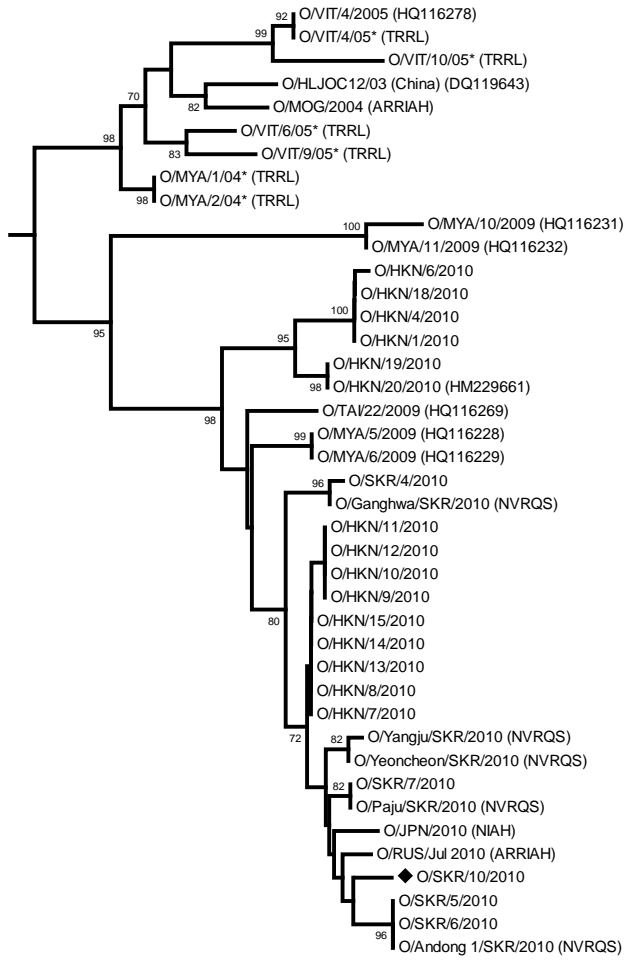
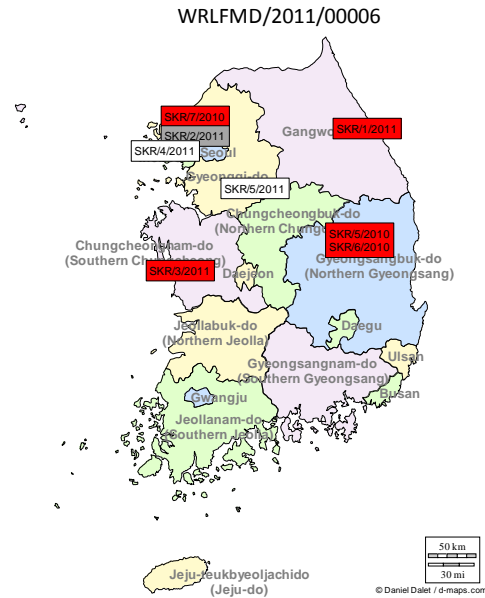
Date received: 07/02/2011

No. of samples: 8

O: 5 (SEA/Mya-98)

GD: 1

NVD: 2



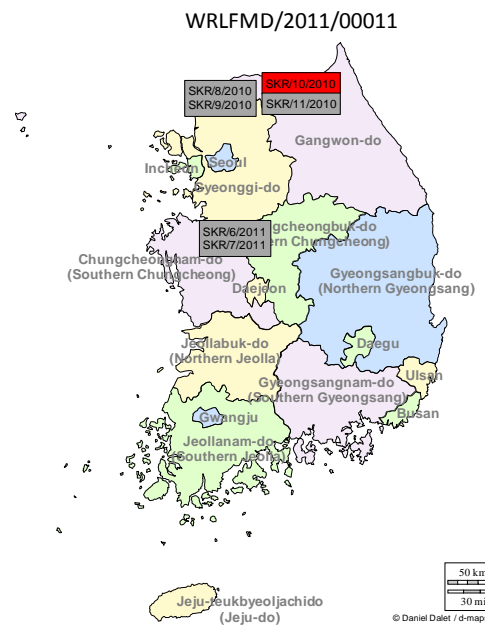
WRLFMD/2011/00011

Date received: 03/03/2011

No. of samples: 6

O: 1 (SEA/Mya-98)

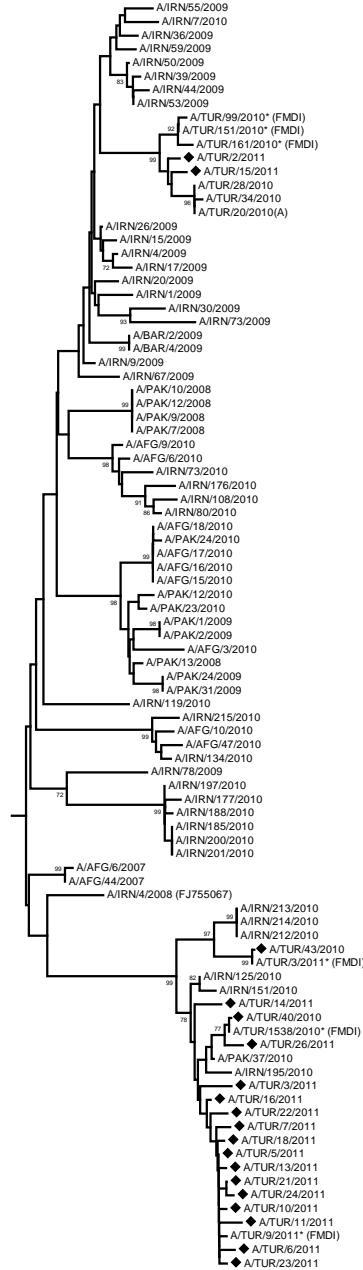
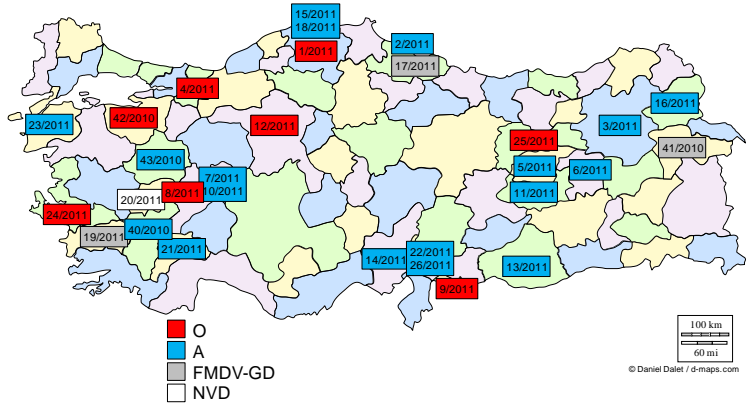
GD: 5



Turkey

WRLFMD/2011/00013
 Date received: 25/02/2011
 No. of samples: 30
 O: 7 (ME-SA/PanAsia-2^{ANT-10})
 A: 19 (ASIA/Iran-05^{AFG-07})
 GD: 3
 NVD: 1

WRLFMD/2011/00013



AFRICA

Kenya

WRLFMD/2011/00008

Date received: 09/02/2011

No. of samples: 22

O: 9 (EA-2)

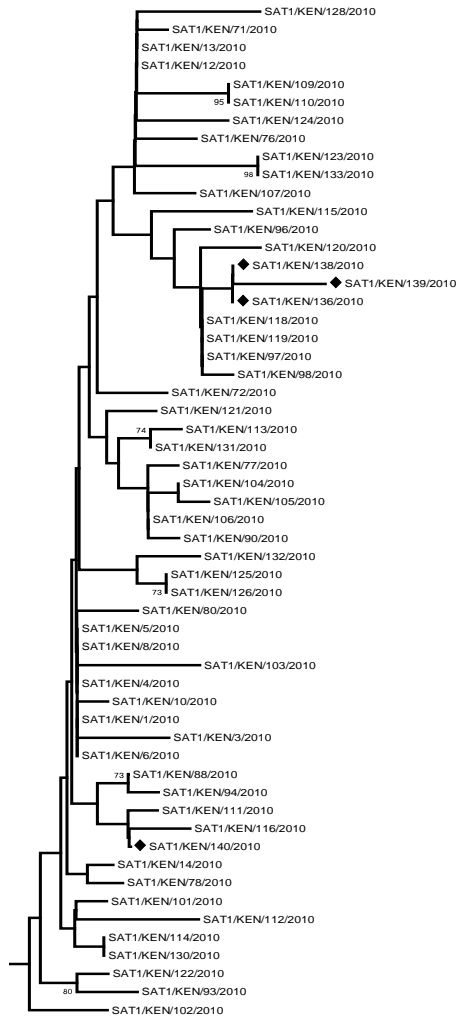
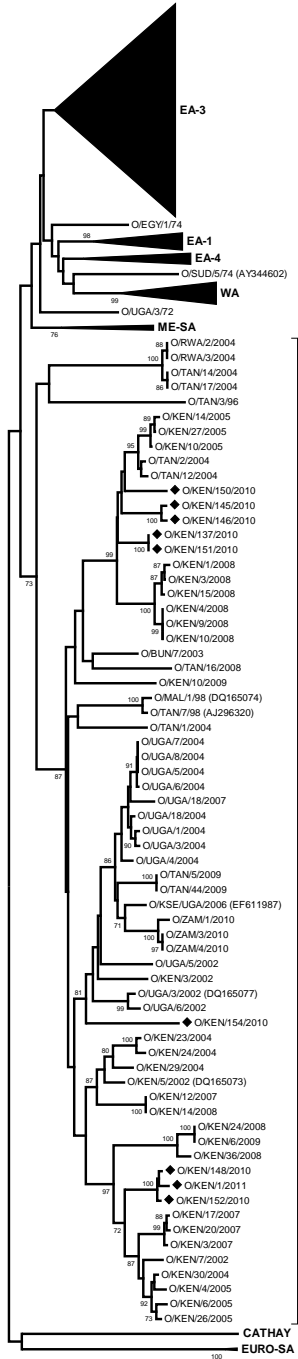
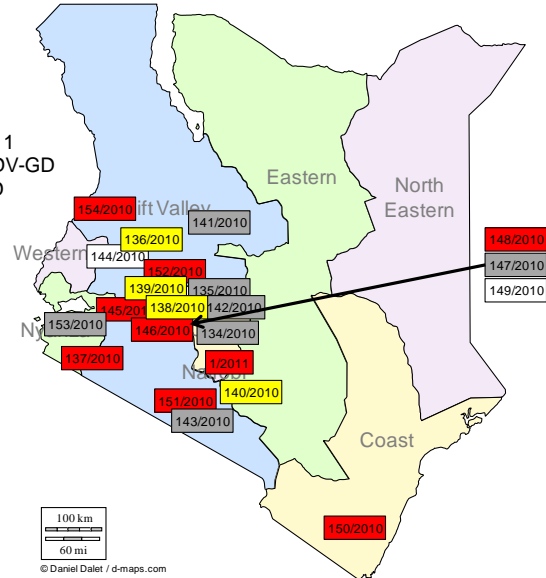
SAT 1: 4 (I – NWZ)

GD: 7

NVD: 2

WRLFMD/2011/00008

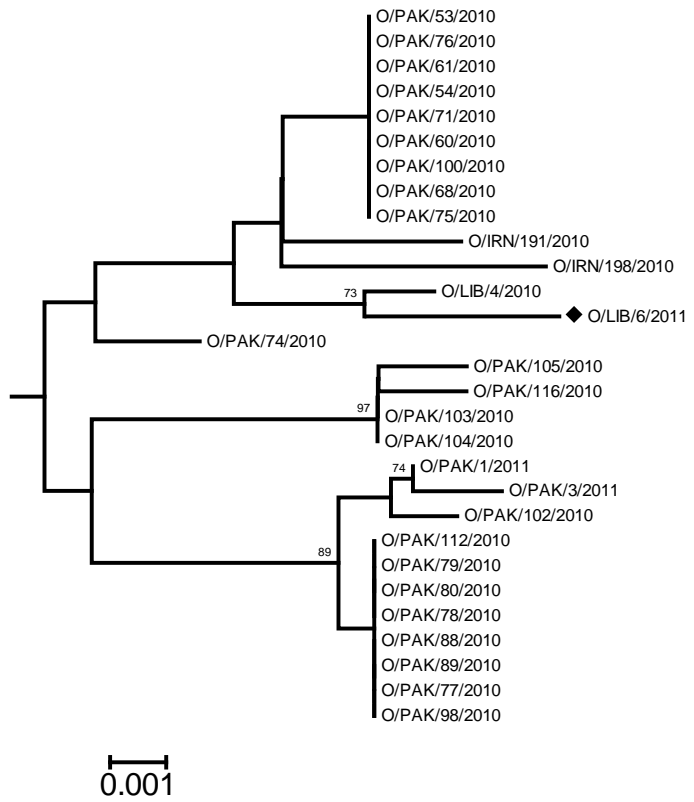
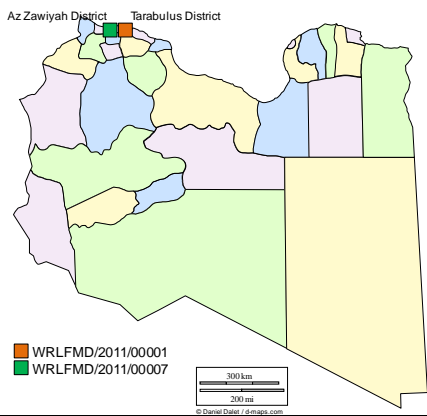
- O
- SAT 1
- FMDV-GD
- NVD



Libya

WRLFMD/2011/00001
 Date received: 04/01/2011
 No. of samples: 36
 O: 2 (ME-SA/PanAsia-2^{ANT-10})
 GD: 12
 NVD: 22

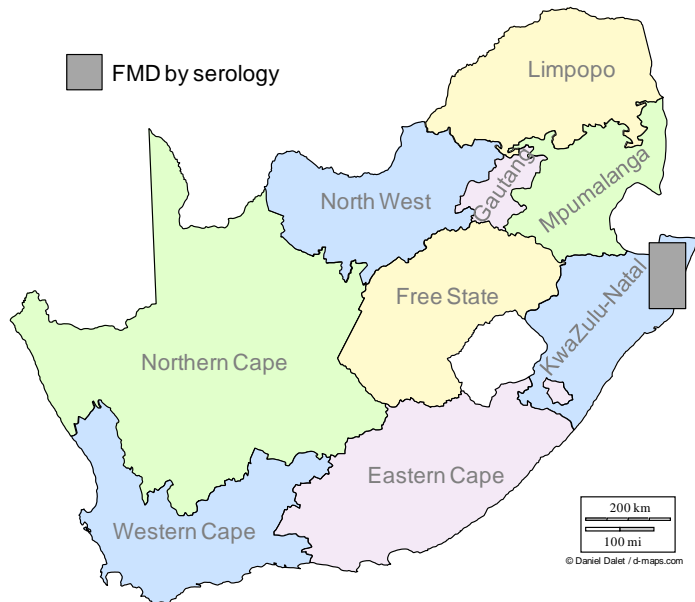
WRLFMD/2011/00007
 Date received: 09/02/2011
 No. of samples: 16
 O-GD: 1 (ME-SA/PanAsia-2^{ANT-10})
 NVD: 15



South Africa

WRLFMD/2011/00014

WRLFMD/2011/00014
 Date received: 08/03/2011
 No. of samples: 24
 NVD: 24



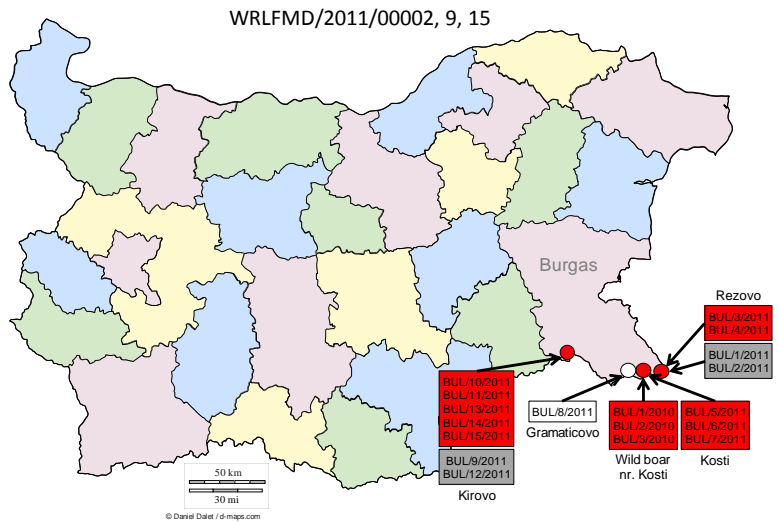
EUROPE

Bulgaria

WRLFMD/2011/00002
 Date received: 07/01/2011
 No. of samples: 3
 O-GD: 3 (ME-SA/PanAsia-2^{ANT-10})

WRLFMD/2011/00009
 Date received: 16/02/2011
 No. of samples: 8
 O: 5 (ME-SA/PanAsia-2^{ANT-10})
 GD: 2
 NVD: 1

WRLFMD/2011/00015
 Date received: 23/03/2011
 No. of samples: 7
 O: 5 (ME-SA/PanAsia-2^{ANT-10})
 GD: 2



Vaccine matching

Thirty five FMDV type O isolates (See Table C, Type O for details) from Bulgaria, Cambodia, Ecuador, Hong Kong, Iran, Israel, Kenya, Libya, Mongolia, Nepal, Pakistan, South Korea, Thailand and Turkey collected in 2009, 2010 and 2011 were analysed antigenically by the two dimensional virus neutralisation test (2dmVNT). Isolates from Bulgaria, Cambodia, Iran, Israel, Libya, Nepal (not tested against O 4625), Kenya, Pakistan and Turkey showed antigenic matching with vaccines of O 4625, O Campos, O Manisa and O TUR except one virus from Cambodia and one from Kenya which did not match with O Manisa, respectively. Virus from Ecuador showed no match with O Campos with 1 out of two viruses showing antigenic match with the O TUR vaccine strain. Both viruses from Hong Kong; one out of three from Mongolia (not tested against O TUR) and one out of two from Thailand were not antigenically close to either O Manisa or O Tur vaccine strain. Three out of five tested S. Korea viruses showed close matching with O Manisa, while two gave close antigenic match with O 4625, O IND R2/75 O TAW 98 and O TUR vaccine strains. (Table C).

Six FMDV type A viruses (see table C, Type A for details) from Afghanistan collected in 2010 and 2011 were antigenically matched with three type A vaccine strains. All viruses, except one virus from Turkey, showed antigenic matching with A IRAN 05 and A TUR 06 vaccine strains (Table C).

Four FMDV type Asia 1 viruses (see table C, Type Asia 1 for details) from Bahrain and Pakistan collected in 2010 and 2011 were antigenically matched with three type Asia 1 vaccine strains. All viruses showed no antigenic matching all of Asia 1 IND 8/79, Asia 1 Shamir and Asia 1 WBN (Table C).

Two FMDV type SAT 1 viruses (see table C, Type SAT 1 for details) from Kenya collected in 2010 were analysed for antigenic relationships with two vaccine strains by 2dmVNT. Both showed an antigenic match with SAT 1 RHO (Table C).

Annex 1.

TABLE A: Clinical sample diagnostics made by the WRL between January and March 2011

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		
				VI/ELISA	RT-PCR	Final report
AFGHANISTAN	AFG 110/2001	Cattle	00.00.10	O	Positive	O
	AFG 111/2010	Cattle	00.00.10	O	Positive	O
	AFG 112/2010	Cattle	00.00.10	NVD	Negative	NVD
	AFG 113/2010	Cattle	00.00.10	NVD	Positive	FMDV GD
	AFG 114/2010	Cattle	00.00.10	NVD	Negative	NVD
	AFG 115/2010	Cattle	00.05.10	NVD	Negative	NVD
	AFG 116/2010	Cattle	06.05.10	NVD	Negative	NVD
	AFG 117/2010	Cattle	28.05.10	NVD	Positive	FMDV GD
	AFG 118/2010	Cattle	07.06.20	NVD	Positive	FMDV GD
	AFG 119/2010	Cattle	08.08.10	O	Positive	O
	AFG 120/2010	Cattle	10.06.10	O	Positive	O
	AFG 121/2010	Cattle	12.06.10	O	Positive	O
	AFG 122/2010	Cattle	17.06.10	NVD	Positive	FMDV GD
	AFG 123/2010	Cattle	18.06.10	NVD	Negative	NVD
	AFG 124/2010	Cattle	19.06.10	NVD	Negative	NVD
	AFG 125/2010	Cattle	20.06.10	A	Positive	A
	AFG 126/2010	Cattle	20.06.10	O	Positive	O
	AFG 127/2010	Cattle	20.06.10	NVD	Negative	NVD
	AFG 128/2010	Cattle	21.06.10	A	Positive	A
	AFG 129/2010	Cattle	23.06.10	NVD	Negative	NVD
	AFG 130/2010	Cattle	23.06.10	NVD	Negative	NVD
	AFG 131/2010	Cattle	24.06.10	O	Positive	O
	AFG 132/2010	Cattle	24.06.10	NVD	Positive	FMDV GD
	AFG 133/2010	Cattle	24.06.10	O	Positive	O
	AFG 134/2010	Cattle	24.06.10	NVD	Positive	FMDV GD
	AFG 135/2010	Cattle	26.06.10	O	Positive	O
	AFG 136/2010	Cattle	26.06.10	NVD	Negative	NVD
	AFG 137/2010	Cattle	27.06.10	NVD	Positive	FMDV GD
	AFG 138/2010	Cattle	28.06.10	NVD	Positive	FMDV GD
	AFG 139/2010	Cattle	28.06.10	NVD	Positive	FMDV GD
	AFG 140/2010	Cattle	29.06.10	A	Positive	A
	AFG 141/2010	Cattle	29.06.10	O	Positive	O
	AFG 142/2010	Cattle	29.06.10	O	Positive	O
	AFG 143/2010	Cattle	29.06.10	NVD	Negative	NVD
	AFG 144/2010	Cattle	30.06.10	NVD	Positive	FMDV GD
	AFG 145/2010	Cattle	30.06.10	O	Positive	O
	AFG 146/2010	Cattle	01.07.10	NVD	Positive	FMDV GD
	AFG 147/2010	Cattle	05.07.10	NVD	Negative	NVD
	AFG 148/2010	Cattle	06.07.10	O	Positive	O
	AFG 149/2010	Cattle	07.07.10	NVD	Negative	NVD
	AFG 150/2010	Cattle	09.07.10	O	Positive	O
	AFG 151/2010	Cattle	09.07.10	O	Positive	O
	AFG 152/2010	Cattle	09.07.10	O	Positive	O
	AFG 153/2010	Cattle	09.07.10	O	Positive	O
	AFG 154/2010	Cattle	11.07.10	NVD	Negative	NVD
	AFG 155/2010	Cattle	11.07.10	NVD	Negative	NVD
	AFG 156/2010	Cattle	11.07.10	NVD	Negative	NVD

AFG 157/2010	Cattle	11.07.10	NVD	Negative	NVD
AFG 158/2010	Cattle	11.07.10	O	Positive	O
AFG 159/2010	Cattle	11.07.10	NVD	Negative	NVD
AFG 160/2010	Cattle	11.07.10	O	Positive	O
AFG 161/2010	Cattle	11.07.10	NVD	Positive	FMDV GD
AFG 162/2010	Cattle	18.07.10	NVD	Positive	FMDV GD
AFG 163/2010	Cattle	27.07.10	A	Positive	A
AFG 164/2010	Cattle	27.07.10	O	Positive	O
AFG 165/2010	Cattle	29.07.10	NVD	Negative	NVD
AFG 166/2010	Cattle	31.07.10	O	Positive	O
AFG 167/2010	Cattle	31.07.10	NVD	Negative	NVD
AFG 168/2010	Cattle	31.07.10	NVD	Negative	NVD
AFG 169/2010	Cattle	01.08.10	NVD	Negative	NVD
AFG 170/2010	Cattle	03.08.10	O	Positive	O
AFG 171/2010	Cattle	03.08.10	O	Positive	O
AFG 172/2010	Cattle	06.08.10	NVD	Negative	NVD
AFG 173/2010	Cattle	07.08.10	NVD	Negative	NVD
AFG 174/2010	Cattle	10.08.10	O	Positive	O
AFG 175/2010	Cattle	12.08.10	NVD	Negative	NVD
AFG 176/2010	Cattle	12.08.10	NVD	Positive	FMDV GD
AFG 177/2010	Cattle	12.08.10	O	Positive	O
AFG 178/2010	Cattle	15.08.10	O	Positive	O
AFG 179/2010	Cattle	16.08.10	NVD	Positive	FMDV GD
AFG 180/2010	Cattle	16.08.10	O	Positive	O
AFG 181/2010	Cattle	16.08.10	O	Positive	O
AFG 182/2010	Cattle	16.08.10	O	Positive	O
AFG 183/2010	Cattle	16.08.10	O	Positive	O
AFG 184/2010	Cattle	16.08.10	NVD	Positive	FMDV GD
AFG 185/2010	Cattle	18.08.10	NVD	Positive	FMDV GD
AFG 186/2010	Cattle	19.08.10	NVD	Negative	NVD
AFG 187/2010	Cattle	21.08.10	NVD	Negative	NVD
AFG 188/2010	Cattle	23.08.10	NVD	Negative	NVD
AFG 189/2010	Cattle	23.08.10	NVD	Negative	NVD
AFG 190/2010	Cattle	29.08.10	O	Positive	O
AFG 191/2010	Cattle	29.08.10	NVD	Positive	FMDV GD
AFG 192/2010	Cattle	30.08.10	O	Positive	O
AFG 193/2010	Cattle	02.09.10	O	Positive	O
AFG 194/2010	Cattle	05.09.10	NVD	Negative	NVD
AFG 195/2010	Cattle	05.09.10	O	Positive	O
AFG 196/2010	Cattle	07.09.10	O	Positive	O
AFG 197/2010	Cattle	15.09.10	O	Positive	O
AFG 198/2010	Cattle	15.09.10	NVD	Positive	FMDV GD
AFG 199/2010	Cattle	15.09.10	O	Positive	O
AFG 200/2010	Cattle	15.09.10	O	Positive	O
AFG 201/2010	Cattle	15.09.10	O	Positive	O
AFG 202/2010	Cattle	15.09.10	O	Positive	O
AFG 203/2010	Cattle	15.09.10	NVD	Negative	NVD
AFG 204/2010	Cattle	15.09.10	O	Positive	O
AFG 205/2010	Cattle	15.09.10	O	Positive	O
AFG 206/2010	Cattle	15.09.10	NVD	Positive	FMDV GD
AFG 207/2010	Cattle	18.09.10	O	Positive	O
AFG 208/2010	Cattle	18.09.10	O	Positive	O
AFG 209/2010	Cattle	18.09.10	O	Positive	O
AFG 210/2010	Cattle	18.09.10	O	Positive	O
AFG 211/2010	Cattle	18.09.10	O	Negative	O

AFG 212/2010	Cattle	18.09.10	O	Negative	O
AFG 213/2010	Cattle	18.09.10	O	Positive	O
AFG 214/2010	Cattle	18.09.10	O	Positive	O
AFG 215/2010	Cattle	19.09.10	NVD	Negative	NVD
AFG 216/2010	Cattle	19.09.10	NVD	Negative	NVD
AFG 217/2010	Cattle	09.10.10	O	Positive	O
AFG 218/2010	Cattle	09.10.10	NVD	Positive	FMDV GD
AFG 219/2010	Cattle	09.10.10	O	Positive	O
AFG 220/2010	Cattle	09.10.10	O	Positive	O
AFG 221/2010	Cattle	09.10.10	O	Positive	O
AFG 222/2010	Cattle	09.10.10	NVD	Negative	NVD
AFG 223/2010	Cattle	10.10.10	O	Positive	O
AFG 224/2010	Cattle	10.10.10	O	Positive	O
AFG 225/2010	Cattle	10.10.10	O	Positive	O
AFG 226/2010	Cattle	10.10.10	O	Positive	O
AFG 227/2010	Cattle	10.10.10	O	Positive	O
AFG 228/2010	Cattle	10.10.10	NVD	Negative	NVD
AFG 229/2010	Cattle	12.10.10	O	Positive	O
AFG 230/2010	Cattle	12.10.10	NVD	Positive	FMDV GD
AFG 231/2010	Cattle	12.10.10	NVD	Positive	FMDV GD
AFG 232/2010	Cattle	13.10.10	A	Positive	A
AFG 233/2010	Cattle	13.10.10	NVD	Positive	FMDV GD
AFG 234/2010	Cattle	13.10.10	NVD	Positive	FMDV GD
AFG 235/2010	Cattle	19.10.10	O	Positive	O
AFG 236/2010	Cattle	20.10.10	O	Positive	O
AFG 237/2010	Cattle	20.10.10	O	Positive	O
AFG 238/2010	Cattle	20.10.10	O	Positive	O
AFG 239/2010	Cattle	20.10.10	O	Positive	O
AFG 240/2010	Cattle	20.10.10	O	Positive	O
AFG 241/2010	Cattle	20.10.10	O	Positive	O
AFG 242/2010	Cattle	20.10.10	O	Positive	O
AFG 243/2010	Cattle	20.10.10	O	Positive	O
AFG 244/2010	Cattle	21.10.10	O	Positive	O
AFG 245/2010	Cattle	05.11.10	O	Positive	O
AFG 246/2010	Cattle	05.11.10	O	Positive	O
AFG 247/2010	Cattle	05.11.10	O	Positive	O
AFG 248/2010	Cattle	05.11.10	O	Positive	O
AFG 249/2010	Cattle	05.11.10	O	Positive	O
AFG 250/2010	Cattle	05.11.10	O	Positive	O
AFG 251/2010	Cattle	05.11.10	O	Positive	O
AFG 252/2010	Cattle	22.11.10	O	Positive	O
AFG 253/2010	Cattle	22.11.10	O	Positive	O
AFG 254/2010	Cattle	22.11.10	NVD	Positive	FMDV GD
AFG 255/2010	Cattle	22.11.10	NVD	Negative	NVD
AFG 256/2010	Cattle	23.11.10	O	Positive	O
AFG 257/2010	Cattle	23.11.10	NVD	Negative	NVD
AFG 258/2010	Cattle	23.11.10	NVD	Positive	FMDV GD
AFG 259/2010	Cattle	25.11.10	O	Positive	O
AFG 260/2010	Cattle	25.11.10	NVD	Negative	NVD
AFG 261/2010	Cattle	25.11.10	O	Positive	O
AFG 262/2010	Cattle	25.11.10	O	Positive	O
AFG 263/2010	Cattle	25.11.10	O	Positive	O
AFG 264/2010	Cattle	25.11.10	O	Positive	O
AFG 265/2010	Cattle	25.11.10	O	Positive	O
AFG 266/2010	Cattle	25.11.10	O	Positive	O

AFG 267/2010	Cattle	25.11.10	O	Positive	O
AFG 268/2010	Cattle	25.11.10	O	Positive	O
AFG 269/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 270/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 271/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 272/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 273/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 274/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 275/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 276/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 277/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
AFG 278/2010	NK	05.07.10	Pending	Pending	Pending
AFG 279/2010	NK	08.07.10	Pending	Pending	Pending
AFG 280/2010	NK	08.07.10	Pending	Pending	Pending
AFG 281/2010	NK	08.07.10	Pending	Pending	Pending
AFG 282/2010	NK	08.07.10	Pending	Pending	Pending
AFG 283/2010	NK	10.07.10	Pending	Pending	Pending
AFG 284/2010	NK	13.07.10	Pending	Pending	Pending
AFG 285/2010	NK	21.07.10	Pending	Pending	Pending
AFG 286/2010	NK	26.07.10	Pending	Pending	Pending
AFG 287/2010	NK	02.08.10	Pending	Pending	Pending
AFG 288/2010	NK	02.08.10	Pending	Pending	Pending
AFG 289/2010	NK	02.08.10	Pending	Pending	Pending
AFG 290/2010	NK	02.08.10	Pending	Pending	Pending
AFG 291/2010	NK	02.08.10	Pending	Pending	Pending
AFG 292/2010	NK	02.08.10	Pending	Pending	Pending
AFG 293/2010	NK	04.08.10	Pending	Pending	Pending
AFG 294/2010	NK	10.08.10	Pending	Pending	Pending
AFG 295/2010	NK	16.08.10	Pending	Pending	Pending
AFG 296/2010	NK	18.08.10	Pending	Pending	Pending
AFG 297/2010	NK	28.08.10	Pending	Pending	Pending
AFG 298/2010	NK	06.09.10	Pending	Pending	Pending
AFG 299/2010	NK	10.09.10	Pending	Pending	Pending
AFG 300/2010	NK	11.09.10	Pending	Pending	Pending
AFG 301/2010	NK	14.09.10	Pending	Pending	Pending
AFG 302/2010	NK	14.09.10	Pending	Pending	Pending
AFG 303/2010	NK	15.09.10	Pending	Pending	Pending
AFG 304/2010	NK	15.09.10	Pending	Pending	Pending
AFG 305/2010	NK	20.09.10	Pending	Pending	Pending
AFG 306/2010	NK	20.09.10	Pending	Pending	Pending
AFG 307/2010	NK	20.09.10	Pending	Pending	Pending
AFG 308/2010	NK	20.09.10	Pending	Pending	Pending
AFG 309/2010	NK	20.09.10	Pending	Pending	Pending
AFG 310/2010	NK	26.09.10	Pending	Pending	Pending
AFG 311/2010	NK	01.10.10	Pending	Pending	Pending
AFG 312/2010	NK	07.10.10	Pending	Pending	Pending
AFG 313/2010	NK	07.10.10	Pending	Pending	Pending
AFG 314/2010	NK	07.10.10	Pending	Pending	Pending
AFG 315/2010	NK	08.10.10	Pending	Pending	Pending
AFG 316/2010	NK	08.10.10	Pending	Pending	Pending
AFG 317/2010	NK	08.10.10	Pending	Pending	Pending
AFG 318/2010	NK	08.10.10	Pending	Pending	Pending
AFG 319/2010	NK	08.10.10	Pending	Pending	Pending
AFG 320/2010	NK	08.10.10	Pending	Pending	Pending
AFG 321/2010	NK	08.10.10	Pending	Pending	Pending

AFG 322/2010	NK	09.10.10	Pending	Pending	Pending
AFG 323/2010	NK	09.10.10	Pending	Pending	Pending
AFG 324/2010	NK	09.10.10	Pending	Pending	Pending
AFG 325/2010	NK	09.10.10	Pending	Pending	Pending
AFG 326/2010	NK	09.10.10	Pending	Pending	Pending
AFG 327/2010	NK	09.10.10	Pending	Pending	Pending
AFG 328/2010	NK	09.10.10	Pending	Pending	Pending
AFG 329/2010	NK	10.10.10	Pending	Pending	Pending
AFG 330/2010	NK	10.10.10	Pending	Pending	Pending
AFG 331/2010	NK	11.10.10	Pending	Pending	Pending
AFG 332/2010	NK	12.10.10	Pending	Pending	Pending
AFG 333/2010	NK	15.10.10	Pending	Pending	Pending
AFG 334/2010	NK	15.10.10	Pending	Pending	Pending
AFG 335/2010	NK	18.10.10	Pending	Pending	Pending
AFG 336/2010	NK	18.10.10	Pending	Pending	Pending
AFG 337/2010	NK	18.10.10	Pending	Pending	Pending
AFG 338/2010	NK	20.10.10	Pending	Pending	Pending
AFG 339/2010	NK	20.10.10	Pending	Pending	Pending
AFG 340/2010	NK	21.10.10	Pending	Pending	Pending
AFG 341/2010	NK	15.11.10	Pending	Pending	Pending
AFG 1/2011	NK	09.01.11	Pending	Pending	Pending
AFG 2/2011	NK	10.01.11	Pending	Pending	Pending
AFG 3/2011	NK	10.01.11	Pending	Pending	Pending
AFG 4/2011	NK	10.01.11	Pending	Pending	Pending
AFG 5/2011	NK	10.01.11	Pending	Pending	Pending
AFG 6/2011	NK	10.01.11	Pending	Pending	Pending
AFG 7/2011	NK	13.01.11	Pending	Pending	Pending
AFG 8/2011	NK	13.01.11	Pending	Pending	Pending
AFG 9/2011	NK	13.01.11	Pending	Pending	Pending
AFG 10/2011	NK	13.01.11	Pending	Pending	Pending
AFG 11/2011	NK	13.01.11	Pending	Pending	Pending
AFG 12/2011	NK	28.01.11	Pending	Pending	Pending
AFG 13/2011	NK	31.01.11	Pending	Pending	Pending
AFG 14/2011	NK	31.01.11	Pending	Pending	Pending
AFG 15/2011	NK	31.01.11	Pending	Pending	Pending
AFG 16/2011	NK	31.01.11	Pending	Pending	Pending
AFG 17/2011	NK	31.01.11	Pending	Pending	Pending
AFG 18/2011	NK	02.02.11	Pending	Pending	Pending
AFG 19/2011	NK	02.02.11	Pending	Pending	Pending
AFG 20/2011	NK	03.02.11	Pending	Pending	Pending
AFG 21/2011	NK	03.02.11	Pending	Pending	Pending
AFG 22/2011	NK	03.02.11	Pending	Pending	Pending
AFG 23/2011	NK	03.02.11	Pending	Pending	Pending
AFG 24/2011	NK	03.02.11	Pending	Pending	Pending
AFG 25/2011	NK	04.02.11	Pending	Pending	Pending
AFG 26/2011	NK	04.02.11	Pending	Pending	Pending
AFG 27/2011	NK	04.02.11	Pending	Pending	Pending
AFG 28/2011	NK	04.02.11	Pending	Pending	Pending
AFG 29/2011	NK	04.02.11	Pending	Pending	Pending
AFG 30/2011	NK	08.02.11	Pending	Pending	Pending
AFG 31/2011	NK	09.02.11	Pending	Pending	Pending
AFG 32/2011	NK	12.02.11	Pending	Pending	Pending
AFG 33/2011	NK	14.02.11	Asia 1	Pending	Asia 1
AFG 34/2011	NK	16.02.11	Pending	Pending	Pending
AFG 35/2011	NK	20.02.11	Pending	Pending	Pending

	AFG 36/2011	NK	21.02.11	Pending	Pending	Pending
	AFG 37/2011	NK	22.02.11	Pending	Pending	Pending
	AFG 38/2011	NK	24.02.11	Asia 1	Pending	Asia 1
	AFG 39/2011	NK	24.02.11	Pending	Pending	Pending
	AFG 40/2011	NK	24.02.11	Pending	Pending	Pending
	AFG 41/2011	NK	25.02.11	Pending	Pending	Pending
	AFG 42/2011	NK	26.02.11	Pending	Pending	Pending
	AFG 43/2011	NK	27.02.11	Asia 1	Pending	Asia 1
	AFG 44/2011	NK	28.02.11	Pending	Pending	Pending
	AFG 45/2011	NK	05.03.11	Pending	Pending	Pending
	AFG 46/2011	NK	06.03.11	Asia 1	Pending	Asia 1
	AFG 47/2011	NK	06.03.11	Pending	Pending	Pending
	AFG 48/2011	NK	06.03.11	Pending	Pending	Pending
	AFG 49/2011	NK	06.03.11	Pending	Pending	Pending
	AFG 50/2011	NK	06.03.11	Pending	Pending	Pending
	AFG 51/2011	NK	06.03.11	Pending	Pending	Pending
	AFG 52/2011	NK	07.03.11	Pending	Pending	Pending
	AFG 53/2011	NK	07.03.11	Pending	Pending	Pending
	AFG 54/2011	NK	07.03.11	Pending	Pending	Pending
	AFG 55/2011	NK	07.03.11	Pending	Pending	Pending
	AFG 56/2011	NK	15.03.11	Pending	Pending	Pending
	AFG 57/2011	NK	15.03.11	Pending	Pending	Pending
	AFG 58/2011	NK	20.03.11	Pending	Pending	Pending
	AFG 59/2011	NK	20.03.11	Pending	Pending	Pending
	AFG 60/2011	NK	20.03.11	Pending	Pending	Pending
BAHRAIN	BAR 1/2011	Cattle	22.02.11	Asia 1	Positive	Asia 1
	BAR 2/2011	Cattle	22.02.11	Asia 1	Positive	Asia 1
	BAR 3/2011	Cattle	22.02.11	Asia 1	Positive	Asia 1
	BAR 4/2011	Cattle	22.02.11	Asia 1	Positive	Asia 1
	BAR 5/2011	Cattle	22.02.11	NVD	Positive	FMDV GD
	BAR 6/2011	Cattle	22.02.11	NVD	Negative	NVD
	BAR 7/2011	Cattle	22.02.11	NVD	Negative	NVD
	BAR 8/2011	Cattle	22.02.11	NVD	Negative	NVD
	BAR 9/2011	Cattle	22.02.11	NVD	Negative	NVD
	BAR 10/2011	Cattle	22.02.11	NVD	Not tested	NVD
	BAR 11/2011	Cattle	22.02.11	NVD	Not tested	NVD
	BAR 12/2011	Cattle	22.02.11	NVD	Not tested	NVD
	BAR 13/2011	Cattle	22.02.11	NVD	Negative	NVD
	BAR 14/2011	Cattle	22.02.11	NVD	Negative	NVD
	BAR 15/2011	Cattle	22.02.11	NVD	Negative	NVD
BULGARIA	BUL 1/2010	Wild boar	30.12.10	NVD	Positive	FMDV GD
	BUL 2/2010	Wild boar	30.12.10	NVD	Positive	FMDV GD
	BUL 3/2010	Wild boar	30.12.10	O	Positive	O
	BUL 1/2011	Buffalo	NK	NVD	Positive	FMDV GD
	BUL 2/2011	Buffalo	NK	NVD	Positive	FMDV GD
	BUL 3/2011	Cattle	NK	O	Positive	O
	BUL 4/2011	Cattle	NK	O	Positive	O
	BUL 5/2011	Cattle	NK	O	Positive	O
	BUL 6/2011	Cattle	NK	O	Positive	O
	BUL 7/2011	Cattle	NK	O	Positive	O
	BUL 8/2011	Cattle	NK	NVD	Negative	NVD
	BUL 9/2011	Cattle	19.03.11	NVD	Positive	FMDV GD
	BUL 10/2011	Cattle	19.03.11	O	Positive	O

	BUL 11/2011	Cattle	19.03.11	O	Positive	O
	BUL 12/2011	Cattle	19.03.11	NVD	Positive	FMDV GD
	BUL 13/2011	Cattle	19.03.11	O	Positive	O
	BUL 14/2011	Cattle	19.03.11	O	Positive	O
	BUL15/2011	Cattle	19.03.11	O	Positive	O
IRAN	IRN 226/2010	Cattle	09.11.10	Pending	Pending	Pending
	IRN 227/2010	Cattle	14.11.10	Pending	Pending	Pending
	IRN 228/2010	Cattle	15.11.10	Pending	Pending	Pending
	IRN 229/2010	Cattle	16.11.10	Pending	Pending	Pending
	IRN 230/2010	Cattle	18.11.10	Pending	Pending	Pending
	IRN 231/2010	Cattle	18.11.10	Pending	Pending	Pending
	IRN 232/2010	Cattle	18.11.10	Pending	Pending	Pending
	IRN 233/2010	Cattle	18.11.10	Pending	Pending	Pending
	IRN 234/2010	Cattle	19.11.10	Pending	Pending	Pending
	IRN 235/2010	Cattle	23.11.10	Pending	Pending	Pending
	IRN 236/2010	Cattle	23.11.10	Pending	Pending	Pending
	IRN 237/2010	Sheep	23.11.10	Pending	Pending	Pending
	IRN 238/2010	Cattle	23.11.10	Pending	Pending	Pending
	IRN 239/2010	Cattle	23.11.10	Pending	Pending	Pending
	IRN 240/2010	Cattle	24.11.10	Pending	Pending	Pending
	IRN 241/2010	Cattle	25.11.10	Pending	Pending	Pending
	IRN 242/2010	Cattle	25.11.10	Pending	Pending	Pending
	IRN 243/2010	Cattle	27.11.10	Pending	Pending	Pending
	IRN 244/2010	Cattle	27.11.10	Pending	Pending	Pending
	IRN 245/2010	Cattle	28.11.10	Pending	Pending	Pending
	IRN 246/2010	Cattle	28.11.10	Pending	Pending	Pending
	IRN 247/2010	Cattle	29.11.10	Pending	Pending	Pending
	IRN 248/2010	Cattle	30.11.10	Pending	Pending	Pending
	IRN 249/2010	Cattle	01.12.10	Pending	Pending	Pending
	IRN 250/2010	Sheep	04.12.10	Pending	Pending	Pending
	IRN 251/2010	Cattle	04.12.10	Pending	Pending	Pending
	IRN 252/2010	Cattle	04.12.10	Pending	Pending	Pending
	IRN 253/2010	Cattle	08.12.10	Pending	Pending	Pending
	IRN 254/2010	Cattle	09.12.10	Pending	Pending	Pending
	IRN 255/2010	Cattle	09.12.10	Pending	Pending	Pending
	IRN 256/2010	Cattle	11.12.10	Pending	Pending	Pending
	IRN 257/2010	Cattle	12.12.10	Pending	Pending	Pending
	IRN 258/2010	Sheep	28.12.10	Pending	Pending	Pending
	IRN 259/2010	Cattle	28.12.10	Pending	Pending	Pending
	IRN 260/2010	Cattle	28.12.10	Pending	Pending	Pending
	IRN 261/2010	Cattle	29.12.10	Pending	Pending	Pending
	IRN 262/2010	Cattle	29.12.10	Pending	Pending	Pending
	IRN 263/2010	Cattle	30.12.10	Pending	Pending	Pending
	IRN 1/2011	Cattle	02.01.11	A	Positive	A
	IRN 2/2011	Cattle	03.01.11	O	Positive	O
	IRN 3/2011	Sheep	04.01.11	NVD	Negative	NVD
	IRN 4/2011	Cattle	04.01.11	A	Positive	A
	IRN 5/2011	Cattle	04.01.11	A	Positive	A
	IRN 6/2011	Cattle	05.01.11	O	Positive	O
	IRN 7/2011	Cattle	05.01.11	A	Positive	A
	IRN 8/2011	Cattle	05.01.11	A	Positive	A
	IRN 9/2011	Cattle	05.01.11	A	Positive	A
	IRN 10/2011	Cattle	05.01.11	O	Positive	O
	IRN 11/2011	Cattle	06.01.11	NVD	Positive	FMDV GD

	IRN 12/2011	Cattle	08.01.11	A	Positive	A
	IRN 13/2011	Cattle	09.01.11	O	Positive	O
	IRN 14/2011	Cattle	10.01.11	O	Positive	O
	IRN 15/2011	Cattle	10.01.11	O	Positive	O
	IRN 16/2011	Cattle	10.01.11	NVD	Negative	NVD
	IRN 17/2011	Cattle	12.01.11	A	Positive	A
	IRN 18/2011	Cattle	16.01.11	A	Positive	A
	IRN 19/2011	Cattle	16.01.11	NVD	Positive	FMDV GD
	IRN 20/2011	Cattle	18.01.11	A	Positive	A
	IRN 21/2011	Cattle	18.01.11	NVD	Positive	FMDV GD
	IRN 22/2011	Cattle	NK	NVD	Negative	NVD
	IRN 23/2011	Cattle	10.01.11	A	Positive	A
	IRN 24/2011	Cattle	13.01.11	A	Positive	A
	IRN 25/2011	Cattle	13.01.11	O	Positive	O
	IRN 26/2011	Sheep	15.01.11	NVD	Negative	NVD
	IRN 27/2011	Cattle	20.01.11	A	Positive	A
	IRN 28/2011	Cattle	20.01.11	O	Positive	O
	IRN 29/2011	Sheep	22.01.11	O	Positive	O
	IRN 30/2011	Cattle	23.01.11	A	Positive	A
	IRN 31/2011	Cattle	25.01.11	A	Positive	A
	IRN 32/2011	Cattle	27.01.11	A	Positive	A
	IRN 33/2011	Cattle	31.01.11	Asia 1	Positive	Asia 1
	IRN 34/2011	Sheep	03.02.11	O	Positive	O
	IRN 35/2011	Sheep	06.02.11	O	Positive	O
	IRN 36/2011	Cattle	07.02.11	A	Positive	A
	IRN 37/2011	Cattle	09.02.11	A	Positive	A
	IRN 38/2011	Cattle	09.02.11	Asia 1	Positive	Asia 1
	IRN 39/2011	Cattle	15.02.11	Asia 1	Positive	Asia 1
	IRN 40/2011	Cattle	16.02.11	A	Positive	A
	IRN 41/2011	Cattle	16.02.11	A	Positive	A
	IRN 42/2011	Sheep	17.02.11	NVD	Negative	NVD
	IRN 43/2011	Cattle	19.02.11	Asia 1	Positive	Asia 1
	IRN 44/2011	Cattle	20.02.11	O	Positive	O
	IRN 45/2011	Cattle	20.02.11	A	Positive	A
	IRN 46/2011	Cattle	20.02.11	Asia 1	Positive	Asia 1
	IRN 47/2011	Cattle	22.02.11	Asia 1	Positive	Asia 1
	IRN 48/2011	Sheep	22.02.11	NVD	Negative	NVD
	IRN 49/2011	Cattle	24.02.11	Asia 1	Positive	Asia 1
	IRN 50/2011	Cattle	25.02.11	O	Positive	O
	IRN 51/2011	Cattle	NK	A	Positive	A
	IRN 52/2011	Cattle	NK	A	Positive	A
	IRN 53/2011	Cattle	NK	A	Positive	A
ISRAEL	ISR 1/2011	Cattle	10.03.11	O	Positive	O
	ISR 2/2011	Cattle	11.03.11	O	Positive	O
KENYA	KEN 134/2010	Cattle	15.06.10	NVD	Positive	FMDV GD
	KEN 135/2010	Cattle	16.06.10	NVD	Positive	FMDV GD
	KEN 136/2010	Cattle	28.06.10	SAT 1	Positive	SAT 1
	KEN 137/2010	Cattle	06.07.10	O	Positive	O
	KEN 138/2010	Cattle	13.08.10	SAT 1	Positive	SAT 1
	KEN 139/2010	Cattle	25.08.10	SAT 1	Positive	SAT 1
	KEN 140/2010	Cattle	03.09.10	SAT 1	Positive	SAT 1
	KEN 141/2010	Cattle	20.09.10	NVD	Positive	FMDV GD
	KEN 142/2010	Cattle	27.09.10	NVD	Positive	FMDV GD

	KEN 143/2010	Cattle	04.10.10	NVD	Positive	FMDV GD
	KEN 144/2010	Sheep	06.10.10	NVD	Negative	NVD
	KEN 145/2010	Cattle	19.10.10	O	Positive	O
	KEN 146/2010	Cattle	16.11.10	O	Positive	O
	KEN 147/2010	Cattle	16.11.10	NVD	Positive	FMDV GD
	KEN 148/2010	Cattle	17.11.10	O	Positive	O
	KEN 149/2010	Cattle	17.11.10	NVD	Negative	NVD
	KEN 150/2010	Cattle	22.11.10	O	Positive	O
	KEN 151/2010	Cattle	01.12.10	O	Positive	O
	KEN 152/2010	Cattle	23.12.10	O	Positive	O
	KEN 153/2010	Cattle	23.12.10	NVD	Positive	FMDV GD
	KEN 154/2010	Cattle	29.12.10	O	Positive	O
	KEN 1/2011	Cattle	12.01.11	O	Positive	O
LIBYA	LIB 1/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 2/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 3/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 4/2010	Cattle	22.12.10	O	Negative	O
	LIB 5/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 6/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 7/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 8/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 9/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 10/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 11/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 12/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 13/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 14/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 15/2010	Cattle	22.12.10	O	Positive	O
	LIB 16/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 17/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	LIB 18/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 19/2010	Cattle	22.12.10	NVD	Negative	NVD
	LIB 20/2010	Cattle	23.12.10	NVD	Negative	NVD
	LIB 21/2010	Cattle	23.12.10	NVD	Negative	NVD
	LIB 22/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 23/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 24/2010	Cattle	23.12.10	NVD	Negative	NVD
	LIB 25/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 26/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 27/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 28/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 29/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 30/2010	Cattle	23.12.10	NVD	Negative	NVD
	LIB 31/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 32/2010	Cattle	23.12.10	NVD	Positive	FMDV GD
	LIB 33/2010	Cattle	23.12.10	NVD	Not tested	NVD
	LIB 34/2010	Cattle	23.12.10	NVD	Negative	NVD
	LIB 35/2010	Cattle	23.12.10	NVD	Positive	FMDV GD
	LIB 36/2010	Cattle	NK	NVD	Positive	FMDV GD
	LIB 1/2011	Cattle	31.01.11	NVD	Negative	NVD
	LIB 2/2011	Cattle	31.01.11	NVD	Negative	NVD
	LIB 3/2011	Cattle	31.01.11	NVD	Negative	NVD
	LIB 4/2011	Cattle	31.01.11	NVD	Negative	NVD
	LIB 5/2011	Cattle	31.01.11	NVD	Negative	NVD

	LIB 6/2011	Cattle	31.01.11	NVD	Positive	FMDV GD
	LIB 7/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 8/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 9/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 10/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 11/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 12/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 13/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 14/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 15/2011	Sheep	31.01.11	NVD	Negative	NVD
	LIB 16/2011	Sheep	31.01.11	NVD	Negative	NVD
MALAYSIA**	MAY 22/2009	Cattle	29.09.09	Not done	Positive	FMDV GD
	MAY 23/2009	Cattle	02.12.09	Not done	Positive	FMDV GD
	MAY 24/2009	Cattle	02.12.09	Not done	Positive	FMDV GD
	MAY 25/2009	Cattle	09.12.09	Not done	Positive	FMDV GD
	MAY 26/2009	Cattle	09.12.09	Not done	Positive	FMDV GD
	MAY 27/2009	Cattle	09.12.09	Not done	Positive	FMDV GD
	MAY 28/2009	Cattle	17.12.09	Not done	Positive	FMDV GD
	MAY 29/2009	Cattle	21.12.09	Not done	Positive	FMDV GD
	MAY 30/2009	Cattle	30.12.09	Not done	Positive	FMDV GD
	MAY 1/2010	Cattle	06.01.10	NVD	Positive	FMDV GD
	MAY 2/2010	Cattle	07.01.10	Not done	Positive	FMDV GD
	MAY 3/2010	Cattle	24.02.10	Not done	Positive	FMDV GD
	MAY 4/2010	Cattle	05.04.10	Not done	Positive	FMDV GD
	MAY 5/2010	Cattle	26.04.10	NVD	Positive	FMDV GD
	MAY 6/2010	Cattle	16.06.10	NVD	Positive	FMDV GD
	MAY 7/2010	Cattle	29.07.10	Not done	Positive	FMDV GD
	MAY 8/2010	Cattle	30.09.10	NVD	Positive	FMDV GD
	MAY 9/2010	Cattle	14.10.10	NVD	Positive	FMDV GD
	MAY 10/2010	Pig	18.10.10	Not done	Positive	FMDV GD
	MAY 11/2010	Pig	18.10.10	Not done	Positive	FMDV GD
	MAY 12/2010	Cattle	24.10.10	O	Positive	O
	MAY 13/2010	Cattle	12.11.10	Not done	Positive	FMDV GD
	MAY 14/2010	Buffalo	22.11.10	Not done	Positive	FMDV GD
PAKISTAN	PAK 77/2010	Buffalo	18.11.10	O	Positive	O
	PAK 78/2010	Cattle	18.11.10	O	Positive	O
	PAK 79/2010	Buffalo	18.11.10	O	Positive	O
	PAK 80/2010	Cattle	22.11.10	O	Positive	O
	PAK 81/2010	Cattle	22.11.10	O	Positive	O
	PAK 82/2010	Cattle	22.11.10	NVD	Positive	FMDV GD
	PAK 83/2010	Buffalo	28.11.10	O	Positive	O
	PAK 84/2010	Buffalo	01.12.10	O	Positive	O
	PAK 85/2010	Buffalo	01.12.10	O	Positive	O
	PAK 86/2010	Buffalo	01.12.10	O	Positive	O
	PAK 87/2010	Cattle	01.12.10	O	Positive	O
	PAK 88/2010	Cattle	07.12.10	O	Positive	O
	PAK 89/2010	Cattle	07.12.10	O	Positive	O
	PAK 90/2010	Cattle	07.12.10	O	Positive	O
	PAK 91/2010	Cattle	07.12.10	NVD	Positive	FMDV GD
	PAK 92/2010	Cattle	07.12.10	O	Positive	O
	PAK 93/2010	Cattle	07.12.10	O	Positive	O
	PAK 94/2010	Cattle	07.12.10	O	Positive	O
	PAK 95/2010	Cattle	07.12.10	O	Positive	O

PAK 96/2010	Cattle	07.12.10	O	Positive	O
PAK 97/2010	Cattle	10.12.10	NVD	Positive	FMDV GD
PAK 98/2010	Cattle	10.12.10	O	Positive	O
PAK 99/2010	Cattle	10.12.10	O	Positive	O
PAK 100/2010	Buffalo	11.12.10	O	Positive	O
PAK 101/2010	Cattle	11.12.10	O	Positive	O
PAK 102/2010	Cattle	12.12.10	O	Positive	O
PAK 103/2010	Cattle	12.12.10	O	Positive	O
PAK 104/2010	Buffalo	12.12.10	O	Positive	O
PAK 105/2010	Buffalo	15.12.10	O	Positive	O
PAK 106/2010	Buffalo	15.12.10	O/Asia 1	Positive	O/Asia 1
PAK 107/2010	Buffalo	15.12.10	NVD	Positive	FMDV GD
PAK 108/2010	Cattle	24.12.10	Asia 1	Positive	Asia 1
PAK 109/2010	Cattle	24.12.10	Asia 1	Positive	Asia 1
PAK 110/2010	Cattle	24.12.10	Asia 1	Positive	Asia 1
PAK 111/2010	Cattle	24.12.10	Asia 1	Positive	Asia 1
PAK 112/2010	Cattle	27.12.10	O	Positive	O
PAK 113/2010	Cattle	31.12.10	O	Positive	O
PAK 114/2010	Cattle	31.12.10	O	Positive	O
PAK 115/2010	Cattle	31.12.10	NVD	Negative	NVD
PAK 116/2010	Cattle	31.12.10	O	Positive	O
PAK 1/2011	Buffalo	03.01.11	O	Positive	O
PAK 2/2011	Cattle	03.01.11	O	Positive	O
PAK 3/2011	Cattle	03.01.11	O	Positive	O
PAK 4/2011	Cattle	03.01.11	O	Positive	O
PAK 5/2011	Cattle	03.01.11	O	Positive	O
PAK 6/2011	Buffalo	03.01.11	Asia 1	Positive	Asia 1
PAK 7/2011	Buffalo	03.01.11	Asia 1	Positive	Asia 1
PAK 8/2011	Buffalo	03.01.11	Asia 1	Negative	Asia 1
PAK 9/2011	Cattle	04.01.11	O	Positive	O
PAK 10/2011	Cattle	04.01.11	O	Positive	O
PAK 11/2011	Cattle	04.01.11	Asia 1	Positive	Asia 1
PAK 12/2011	Cattle	04.01.11	Asia 1	Positive	Asia 1
PAK 13/2011	Cattle	04.01.11	Asia 1	Positive	Asia 1
PAK 14/2011	Buffalo	05.01.11	Asia 1	Positive	Asia 1
PAK 15/2011	Buffalo	05.01.11	Asia 1	Positive	Asia 1
PAK 16/2011	Buffalo	05.01.11	Asia 1	Positive	Asia 1
PAK 17/2011	Cattle	05.01.11	Asia 1	Positive	Asia 1
PAK 18/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 19/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 20/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 21/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 22/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 23/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 24/2011	Cattle	05.01.11	NVD	Positive	FMDV GD
PAK 25/2011	Cattle	07.01.11	NVD	Negative	NVD
PAK 26/2011	Cattle	07.01.11	NVD	Positive	FMDV GD
PAK 27/2011	Cattle	07.01.11	NVD	Positive	FMDV GD
PAK 28/2011	Cattle	07.01.11	NVD	Negative	NVD
PAK 29/2011	Cattle	07.01.11	NVD	Positive	FMDV GD
PAK 30/2011	Cattle	07.01.11	NVD	Positive	FMDV GD
PAK 31/2011	Cattle	07.01.11	NVD	Positive	FMDV GD
PAK 32/2011	Buffalo	08.01.11	Asia 1	Positive	Asia 1
PAK 33/2011	Buffalo	08.01.11	Asia 1	Positive	Asia 1
PAK 34/2011	Buffalo	08.01.11	Asia 1	Positive	Asia 1

PAK 35/2011	Buffalo	08.01.11	Asia 1	Positive	Asia 1
PAK 36/2011	Cattle	10.01.11	Asia 1	Positive	Asia 1
PAK 37/2011	Cattle	10.01.11	Asia 1	Positive	Asia 1
PAK 38/2011	Cattle	10.01.11	Asia 1	Positive	Asia 1
PAK 39/2011	Cattle	10.01.11	Asia 1	Positive	Asia 1
PAK 40/2011	Cattle	10.01.11	NVD	Positive	FMDV GD
PAK 41/2011	Cattle	10.01.11	NVD	Negative	NVD
PAK 42/2011	Cattle	10.01.11	NVD	Positive	FMDV GD
PAK 43/2011	Cattle	10.01.11	NVD	Positive	FMDV GD
PAK 44/2011	Cattle	10.01.11	NVD	Positive	FMDV GD
PAK 45/2011	Cattle	10.01.11	NVD	Positive	FMDV GD
PAK 46/2011	Cattle	10.01.11	NVD	Positive	FMDV GD
PAK 47/2011	Cattle	12.01.11	Asia 1	Positive	Asia 1
PAK 48/2011	Buffalo	13.01.11	Asia 1	Positive	Asia 1
PAK 49/2011	Buffalo	13.01.11	Asia 1	Positive	Asia 1
PAK 50/2011	Buffalo	13.01.11	Asia 1	Positive	Asia 1
PAK 51/2011	Cattle	07.01.11	Asia 1	Pending	Asia 1
PAK 52/2011	Cattle	07.01.11	Asia 1	Pending	Asia 1
PAK 53/2011	Buffalo	07.01.11	Asia 1	Pending	Asia 1
PAK 54/2011	Cattle	07.01.11	Asia 1	Pending	Asia 1
PAK 55/2011	Buffalo	07.01.11	Asia 1	Pending	Asia 1
PAK 56/2011	Cattle	07.01.11	Asia 1	Pending	Asia 1
PAK 57/2011	Buffalo	15.01.11	Asia 1	Pending	Asia 1
PAK 58/2011	Cattle	15.01.11	Asia 1	Pending	Asia 1
PAK 59/2011	Buffalo	15.01.11	NVD	Pending	Pending
PAK 60/2011	Cattle	15.01.11	Asia 1	Pending	Asia 1
PAK 61/2011	Cattle	15.01.11	Asia 1	Pending	Asia 1
PAK 62/2011	Buffalo	12.02.11	O	Pending	O
PAK 63/2011	Buffalo	12.02.11	O	Pending	O
PAK 64/2011	Buffalo	13.02.11	Asia 1	Pending	Asia 1
PAK 65/2011	Buffalo	13.02.11	NVD	Pending	Pending
PAK 66/2011	Cattle	13.02.11	Asia 1	Pending	Asia 1
PAK 67/2011	Cattle	13.02.11	Asia 1	Pending	Asia 1
PAK 68/2011	Buffalo	13.02.11	Asia 1	Pending	Asia 1
PAK 69/2011	Buffalo	13.02.11	Asia 1	Pending	Asia 1
PAK 70/2011	Cattle	14.02.11	O	Pending	O
PAK 71/2011	Cattle	14.02.11	O	Pending	O
PAK 72/2011	Buffalo	14.02.11	NVD	Pending	Pending
PAK 73/2011	Cattle	14.02.11	O	Pending	O
PAK 74/2011	Cattle	16.02.11	O	Pending	O
PAK 75/2011	Cattle	16.02.11	O	Pending	O
PAK 76/2011	Cattle	16.02.11	O	Pending	O
PAK 77/2011	Cattle	16.02.11	NVD	Pending	
PAK 78/2011	Buffalo	17.02.11	NVD	Pending	
PAK 79/2011	Buffalo	17.02.11	O	Pending	O
PAK 80/2011	Buffalo	17.02.11	O	Pending	O
PAK 81/2011	Cattle	19.02.11	Asia 1	Pending	Asia 1
PAK 82/2011	Cattle	19.02.11	Asia 1	Pending	Asia 1
PAK 83/2011	Buffalo	19.02.11	Asia 1	Pending	Asia 1
PAK 84/2011	Buffalo	20.02.11	O	Pending	O
PAK 85/2011	Cattle	21.02.11	NVD	Pending	Pending
PAK 86/2011	Cattle	21.02.11	A	Pending	A
PAK 87/2011	Buffalo	22.02.11	NVD	Pending	Pending
PAK 88/2011	Buffalo	22.02.11	NVD	Pending	Pending
PAK 89/2011	Cattle	25.02.11	Asia 1	Pending	Asia 1

	PAK 90/2011	Cattle	25.02.11	Asia 1	Pending	Asia 1
SOUTH AFRICA	SAR 1/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 2/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 3/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 4/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 5/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 6/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 7/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 8/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 9/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 10/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 11/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 12/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 13/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 14/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 15/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 16/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 17/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 18/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 19/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 20/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 21/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 22/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 23/2011	Cattle	02.03.11	NVD	Negative	NVD
	SAR 24/2011	Cattle	02.03.11	NVD	Negative	NVD
SOUTH KOREA	SKR 5/2010	Pig	28.11.10	O	Positive	O
	SKR 6/2010	Pig	28.11.10	O	Positive	O
	SKR 7/2010	Cattle	15.12.10	O	Positive	O
	SKR 8/2010	Pig	14.12.10	NVD	Positive	FMDV GD
	SKR 9/2010	Pig	14.12.10	NVD	Positive	FMDV GD
	SKR 10/2010	Cattle	22.12.10	O	Positive	O
	SKR 11/2010	Cattle	22.12.10	NVD	Positive	FMDV GD
	SKR 1/2011	Cattle	01.01.11	O	Positive	O
	SKR 2/2011	Cattle	01.01.11	NVD	Positive	FMDV GD
	SKR 3/2011	Pig	02.01.11	O	Positive	O
	SKR 4/2011	Cattle	03.01.11	NVD	Negative	NVD
	SKR 5/2011	Pig	10.01.11	NVD	Negative	NVD
	SKR 6/2011	Cattle	02.01.11	NVD	Positive	FMDV GD
	SKR 7/2011	Cattle	02.01.11	NVD	Positive	FMDV GD
TURKEY	TUR 40/2010	Cattle	22.11.10	A	Positive	A
	TUR 41/2010	Cattle	25.12.10	NVD	Positive	FMDV GD
	TUR 42/2010	Sheep	25.12.10	O	Positive	O
	TUR 43/2010	Cattle	26.12.10	A	Positive	A
	TUR 1/2011	Cattle	01.01.11	O	Positive	O
	TUR 2/2011	Cattle	01.01.11	A	Positive	A
	TUR 3/2011	Cattle	01.01.11	A	Positive	A
	TUR 4/2011	Cattle	05.01.11	O	Positive	O
	TUR 5/2011	Cattle	05.01.11	A	Positive	A
	TUR 6/2011	NK	10.01.11	A	Positive	A
	TUR 7/2011	Cattle	14.01.11	A	Positive	A
	TUR 8/2011	Cattle	14.01.11	O	Positive	O
	TUR 9/2011	Cattle	15.01.11	O	Positive	O

TUR 10/2011	Cattle	16.01.11	A	Positive	A
TUR 11/2011	Cattle	16.01.11	A	Positive	A
TUR 12/2011	NK	17.01.11	O	Positive	O
TUR 13/2011	Cattle	17.01.11	A	Positive	A
TUR 14/2011	Cattle	17.01.11	A	Positive	A
TUR 15/2011	Cattle	17.01.11	A	Positive	A
TUR 16/2011	Cattle	18.01.11	A	Positive	A
TUR 17/2011	Cattle	18.01.11	NVD	Positive	FMDV GD
TUR 18/2011	Cattle	20.01.11	A	Positive	A
TUR 19/2011	Cattle	21.01.11	NVD	Positive	FMDV GD
TUR 20/2011	NK	22.01.11	NVD	Negative	NVD
TUR 21/2011	Cattle	22.01.11	A	Positive	A
TUR 22/2011	Cattle	23.01.11	A	Positive	A
TUR 23/2011	Cattle	23.01.11	A	Positive	A
TUR 24/2011	Cattle	25.01.11	A	Positive	A
TUR 25/2011	Cattle	25.01.11	O	Positive	O
TUR 26/2011	Cattle	25.01.11	A	Positive	A

TOTAL : 711

*	Institute for Animal Health, Pirbright Laboratory, Woking, Surrey GU24 0NF
**	all but 6 samples from Malaysia were supplied in Trizol for PCR analysis
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

TABLE B: Summary of samples collected and received to IAH-Pirbright (January-March 2011)

Country	No. of samples	Virus isolation in cell culture/ELISA								RT-PCR for FMD (or SVD)					
		FMD virus serotypes							NVD	NT	P	virus (where appropriate)			
		O	A	C	SAT 1	SAT 2	SAT 3	Asia 1				Pos	Neg	NT	P
AFGHANISTAN	292	89	5	-	-	-	-	-	74	-	124	128	40	-	124
BAHRAIN	15	-	-	-	-	-	-	4	11	-	-	5	7	3	-
BULGARIA	18	11	-	-	-	-	-	-	7	-	-	17	1	-	-
IRAN	91	-	-	-	-	-	-	-	-	-	91	-	-	-	91
KENYA	22	9	-	-	4	-	-	-	9	-	-	20	2	-	-
LIBYA	52	2	-	-	-	-	-	-	50	-	-	14	29	9	-
MALAYSIA	23	1	-	-	-	-	-	-	5	17	-	23	-	-	-
PAKISTAN**	130	38	-	-	-	-	-	27	26	-	40	85	5	-	40
SOUTH AFRICA	24	-	-	-	-	-	-	-	24	-	-	-	24	-	-
SOUTH KOREA	14	6	-	-	-	-	-	-	8	-	-	12	2	-	-
TURKEY	30	7	19	-	-	-	-	-	4	-	-	29	1	-	-
TOTAL	711	163	24	-	4	-	-	31	218	17	255	333	111	12	255

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
P	pending
RT-PCR	reverse transcription polymerase chain reaction for FMD (or SVD) viral genome
**	one sample from Pakistan contained a mixture of FMDVs of types O and Asia 1

TABLE C: Antigenic characterisation of FMD field isolates by matching with vaccine strains by VNT and/or LPBE from 1st January to 31st March 2011**Type O:**

Isolates	Vaccine matching for type O FMDV by VNT-WRL FMD									
	O 3039	O 4625	O BFS	O Campos	O Ind R2/75	O Manisa	O Manisa ≥6PD50	O Taw98	O TNN 24/84	O Tur 5/09
Bul 3/2011	M	M		M		M				M
Bul 7/2011	M	M		M		M				M
Bul 10/11		M		M		M				M
Bul 15/11		M		M		M				M
Cam 01/2010	M		N			N		M	N	M
Cam 05/2010	M		N			M		M	M	M
Ecu 01/10				N						N
Ecu 09/10				N						M
Hkn 24/2010		N	N			N		N	N	N
Hkn 26/2010		M	N			N		M	N	N
Irn 225/2010		M	N		M	M				M
Isr 01/2011		M		M		M				M
Isr 02/2011		M		M		M				M
Ken 137/10		M		M		N				M
Ken 01/11		M		M		M				M
Lib 04/2010		M	M		M	M				M
Mog 03/2010										M
Mog 04/2010										N
Mog 09/2010										N
Nep 03/2010	M		N			M		M	M	M
Nep 16/2010	M		N			M		M	M	M
Pak 46/10	M		N		M	N		M	M	M
Pak 76/10	M		M		M	M		M	M	M
Pak 116/10		M		M		M				M
Pak 10/11		M		M		M				M
Skr 04/2010				M		M				
Skr 05/2010						M	M	N	N	
Skr 06/2010		M	N	N	M	N		M	N	M
Skr 07/2010						M		M	M	
Skr 10/2010						N	N	M	N	
Skr 03/2011		M	N	N	M	M	M	M	M	M
Tai 06/2010			N			M			M	M
Tai 27/2009			N			N		M	N	N
Tur 08/11		M		M		M				M
Tur 25/11		M		M		M				M

Type A:

Vaccine matching for type A FMDV by VNT-WRL FMD			
Isolates	Iran 2005	Irq 24/64	Tur06
Afg 140/10	M	N	M
Afg 163/10	M	M	M
Tur 40/10	M	M	M
Tur 43/10	N	N	N
Tur 02/11	M	N	M
Tur 13/10	M	N	M

Type Asia 1:

Vaccine matching for type Asia 1 FMDV by VNT-WRL FMD			
Isolates	Ind 8/79	Shamir	WBN
Bar 03/11	N	N	N
Bar 04/11	N	N	N
Pak 108/10	N	N	N
Pak 50/11	N	N	N

Type SAT 1:

Vaccine matching for type SAT 1 FMDV by VNT-WRL FMD	
Isolates	SAT 1 Rho
Sat1 Ken 138/10	M
Sat1 Ken 140/10	M

M: the isolate was antigenically matched with the vaccine strain
N: the isolate showed no antigenic match with the vaccine strain

Interpretation of r_1 values

In 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

- 1: Loth L, Osmani MG, Kalam MA, Chakraborty RK, Wadsworth J, Knowles NJ, Hammond JM, Benigno C. Molecular Characterization of Foot-and-Mouth Disease Virus: Implications for Disease Control in Bangladesh. *Transbound Emerg Dis.* 2011 Jun;58(3):240-6. doi: 10.1111/j.1865-1682.2011.01206.x. Epub 2011 Feb 14. PubMed PMID: 21320294.
- 2: He DS, Li KN, Lin XM, Lin SR, Su DP, Liao M. Genomic comparison of foot-and-mouth disease virus R strain and its chick-passaged attenuated strain. *Vet Microbiol.* 2011 May 12;150(1-2):185-90. Epub 2011 Jan 15. PubMed PMID: 21330068.
- 3: Díaz-San Segundo F, Weiss M, Perez-Martín E, Koster MJ, Zhu J, Grubman MJ, de Los Santos T. Antiviral activity of bovine type III interferon against foot-and-mouth disease virus. *Virology.* 2011 May 10;413(2):283-92. Epub 2011 Mar 24. PubMed PMID: 21435672.
- 4: Yoon SH, Lee KN, Park JH, Kim H. Molecular epidemiology of foot-and-mouth disease virus serotypes A and O with emphasis on Korean isolates: temporal and spatial dynamics. *Arch Virol.* 2011 May;156(5):817-26. Epub 2011 Jan 29. PubMed PMID: 21279395.
- 5: Bøtner A, Kakker NK, Barbezange C, Berryman S, Jackson T, Belsham GJ. Capsid proteins from field strains of foot-and-mouth disease virus confer a pathogenic phenotype in cattle on an attenuated, cell-culture-adapted virus. *J Gen Virol.* 2011 May;92(Pt 5):1141-51. Epub 2011 Jan 26. PubMed PMID: 21270284.
- 6: Reid E, Juleff N, Gubbins S, Prentice H, Seago J, Charleston B. Bovine Plasmacytoid Dendritic Cells Are the Major Source of Type I Interferon in Response to Foot-and-Mouth Disease Virus In Vitro and In Vivo. *J Virol.* 2011 May;85(9):4297-308. Epub 2011 Feb 9. PubMed PMID: 21307187.
- 7: Wu L, Jiang T, Lu ZJ, Yang YM, Sun P, Liang Z, Li D, Fu YF, Cao YM, Liu XT, Liu ZX. Development and validation of a prokaryotically expressed foot-and-mouth disease virus non-structural protein 2C'3AB-based immunochromatographic strip to differentiate between infected and vaccinated animals. *Viol J.* 2011 Apr 23;8(1):186. [Epub ahead of print] PubMed PMID: 21513550.
- 8: Mahapatra M, Seki C, Upadhyaya S, Barnett PV, La Torre J, Paton DJ. Characterisation and epitope mapping of neutralising monoclonal antibodies to A24 Cruzeiro strain of FMDV. *Vet Microbiol.* 2011 Apr 21;149(1-2):242-7. Epub 2010 Nov 9. PubMed
- 9: Li Z, Yin X, Yi Y, Li X, Li B, Lan X, Zhang Z, Liu J. FMD subunit vaccine produced using a silkworm-baculovirus expression system: protective efficacy against two type Asia1 isolates in cattle. *Vet Microbiol.* 2011 Apr 21;149(1-2):99-103. Epub 2010 Nov 4. PubMed PMID: 21109368.
- 10: Golde WT, de Los Santos T, Robinson L, Grubman MJ, Sevilla N, Summerfield A, Charleston B. Evidence of Activation and Suppression during the Early Immune Response to Foot-and-Mouth Disease Virus. *Transbound Emerg Dis.* 2011 Apr 18. doi:10.1111/j.1865-1682.2011.01223.x. [Epub ahead of print] PubMed PMID: 21501424.
- 11: Yang X, Zhou YS, Wang HN, Zhang Y, Wei K, Wang T. Isolation, identification and complete genome sequence analysis of a strain of foot-and-mouth disease virus serotype Asia1 from pigs in southwest of China. *Viol J.* 2011 Apr 16;8(1):175. [Epub ahead of print] PubMed PMID: 21496298.
- 12: Toka FN, Kenney MA, Golde WT. Rapid and Transient Activation of $\gamma\delta$ T Cells to IFN- γ Production, NK Cell-Like Killing, and Antigen Processing during Acute Virus Infection. *J Immunol.* 2011 Apr 15;186(8):4853-61. Epub 2011 Mar 7. PubMed PMID: 21383249.
- 13: Liu CC, Chou AH, Lien SP, Lin HY, Liu SJ, Chang JY, Guo MS, Chow YH, Yang WS, Chang KH, Sia C, Chong P. Identification and characterization of a cross-neutralization epitope of Enterovirus 71. *Vaccine.* 2011 Apr 15. [Epub ahead of print] PubMed PMID: 21501643.
- 14: King DP, Burman A, Gold S, Shaw AE, Jackson T, Ferris NP. Integrin sub-unit expression in cell cultures used for the diagnosis of foot-and-mouth disease. *Vet Immunol Immunopathol.* 2011 Apr 15;140(3-4):259-65. Epub 2011 Jan 25. PubMed PMID: 21329991.

- 15: Huang X, Li Y, Fang H, Zheng C. Establishment of persistent infection with foot-and-mouth disease virus in BHK-21 cells. *Virol J.* 2011 Apr 14;8(1):169.[Epub ahead of print] PubMed PMID: 21492421.
- 16: Abdul-Hamid NF, Fırat-Saraç M, Radford AD, Knowles NJ, King DP. Comparative sequence analysis of representative foot-and-mouth disease virus genomes from Southeast Asia. *Virus Genes.* 2011 Apr 9. [Epub ahead of print] PubMed PMID:21479678.
- 17: Chen TH, Lee F, Lin YL, Dekker A, Chung WB, Pan CH, Jong MH, Huang CC, Lee MC, Tsai HJ. Differentiation of Foot-and-Mouth Disease-Infected Pigs from Vaccinated Pigs Using Antibody-Detecting Sandwich ELISA. *J Vet Med Sci.* 2011 Apr 4. [Epub ahead of print] PubMed PMID: 21467761.
- 18: Mohapatra JK, Subramaniam S, Pandey LK, Pawar SS, De A, Das B, Sanyal A, Pattnaik B. Phylogenetic structure of serotype A foot-and-mouth disease virus:global diversity and the Indian perspective. *J Gen Virol.* 2011 Apr;92(Pt4):873-9. Epub 2011 Jan 12. PubMed PMID: 21228130.
- 19: Blignaut B, Visser N, Theron J, Rieder E, Maree FF. Custom-engineered chimeric foot-and-mouth disease vaccine elicits protective immune responses in pigs. *J Gen Virol.* 2011 Apr;92(Pt 4):849-59. Epub 2010 Dec 22. PubMed PMID:21177923.
- 20: Wang D, Fang L, Li P, Sun L, Fan J, Zhang Q, Luo R, Liu X, Li K, Chen H, Chen Z, Xiao S. The Leader Proteinase of Foot-and-Mouth Disease Virus Negatively Regulates the Type I Interferon Pathway by Acting as a Viral Deubiquitinase. *J Virol.* 2011 Apr;85(8):3758-66. Epub 2011 Feb 9. PubMed PMID: 21307201.
- 21: Willems T, Lefebvre DJ, Neyts J, De Clercq K. Diagnostic performance and application of two commercial cell viability assays in foot-and-mouth disease research. *J Virol Methods.* 2011 Apr;173(1):108-14. Epub 2011 Feb 3. PubMed PMID: 21295609.
- 22: Ganges L, Borrego B, Fernández-Pacheco P, Revilla C, Fernández-Borges N, Domínguez J, Sobrino F, Rodríguez F. DNA immunization of pigs with foot-and-mouth disease virus minigenes: From partial protection to disease exacerbation. *Virus Res.* 2011 Apr;157(1):121-5. Epub 2011 Feb 17. PubMed PMID: 21315115.
- 23: Ding YZ, Liu YS, Zhou JH, Chen HT, Zhang J, Ma LN, Wei G. A highly sensitive detection for foot-and-mouth disease virus by gold nanoparticle improved immuno-PCR. *Virol J.* 2011 Mar 31;8(1):148. [Epub ahead of print] PubMed PMID: 21453461; PubMed Central PMCID: PMC3080827.
- 24: Dillon MB. Skin as a potential source of infectious foot and mouth disease aerosols. *Proc Biol Sci.* 2011 Mar 30. [Epub ahead of print] PubMed PMID:21450741.
- 25: Yoon SH, Park W, King DP, Kim H. Phylogenomics and molecular evolution of foot-and-mouth disease virus. *Mol Cells.* 2011 Mar 24. [Epub ahead of print] PubMed PMID: 21448588.
- 26: Wang H, Zhao L, Li W, Zhou G, Yu L. Identification of a conformational epitope on the VP1 G-H Loop of type Asia1 foot-and-mouth disease virus defined by a protective monoclonal antibody. *Vet Microbiol.* 2011 Mar 24;148(2-4):189-99. Epub 2010 Sep 22. PubMed PMID: 20961714.
- 27: Guan S, Lu J, Shen X, Qian W, Liu J, Deng X. Florfenicol impairs the immune responses to vaccination against foot-and-mouth disease in mice. *Immunopharmacol Immunotoxicol.* 2011 Mar 23. [Epub ahead of print] PubMed PMID: 21428714.
- 28: Mohamed F, Swafford S, Petrowski H, Bracht A, Schmit B, Fabian A, Pacheco JM, Hartwig E, Berninger M, Carrillo C, Mayr G, Moran K, Kavanaugh D, Leibrecht H, White W, Metwally S. Foot-and-Mouth Disease in Feral Swine: Susceptibility and Transmission. *Transbound Emerg Dis.* 2011 Mar 21. doi:10.1111/j.1865-1682.2011.01213.x. [Epub ahead of print] PubMed PMID: 21418546.
- 29: Perales C, Agudo R, Manrubia SC, Domingo E. Influence of mutagenesis and viral load on the sustained low-level replication of an RNA virus. *J Mol Biol.* 2011 Mar 18;407(1):60-78. Epub 2011 Jan 19. PubMed PMID: 21256131.
- 30: Jamal SM, Ferrari G, Ahmed S, Normann P, Belsham GJ. Genetic diversity of foot-and-mouth disease virus serotype O in Pakistan and Afghanistan, 1997-2009. *Infect Genet Evol.* 2011 Mar 17. [Epub ahead of print] PubMed PMID: 21419880.

- 31: McKillen J, McMenamy M, Reid SM, Duffy C, Hjertner B, King DP, Bélak S, Welsh M, Allan G. Pan-serotypic detection of foot-and-mouth disease virus using a minor groove binder probe reverse transcription polymerase chain reaction assay. *J Virol Methods*. 2011 Mar 16. [Epub ahead of print] PubMed PMID: 21419170.
- 32: Summerfield A. Viewpoint: Factors involved in type I interferon responses during porcine virus infections. *Vet Immunol Immunopathol*. 2011 Mar 12. [Epub ahead of print] PubMed PMID: 21458079.
- 33: Wang D, Fang L, Bi J, Chen Q, Cao L, Luo R, Chen H, Xiao S. Foot-and-mouth disease virus leader proteinase inhibits dsRNA-induced RANTES transcription in PK-15 cells. *Virus Genes*. 2011 Mar 12. [Epub ahead of print] PubMed PMID:21399922.
- 34: Arzt J, Juleff N, Zhang Z, Rodriguez LL. The Pathogenesis of Foot-and-Mouth Disease I: Viral Pathways in Cattle. *Transbound Emerg Dis*. 2011 Mar 2. doi: 10.1111/j.1865-1682.2011.01204.x. [Epub ahead of print] PubMed PMID: 21366894.
- 35: Norder H, De Palma AM, Selisko B, Costenaro L, Papageorgiou N, Arnan C, Coutard B, Lantez V, De Lamballerie X, Baronti C, Solà M, Tan J, Neyts J, Canard B, Coll M, Gorbalenya AE, Hilgenfeld R. Picornavirus non-structural proteins as targets for new anti-virals with broad activity. *Antiviral Res*. 2011 Mar;89(3):204-18. Epub 2011 Jan 12. PubMed PMID: 21236302.
- 36: Li S, Gao M, Zhang R, Song G, Song J, Liu D, Cao Y, Li T, Ma B, Liu X, Wang J. A mutant of Asia 1 serotype of Foot-and-mouth disease virus with the deletion of an important antigenic epitope in the 3A protein. *Can J Microbiol*. 2011 Mar;57(3):169-76. PubMed PMID: 21358757.
- 37: Rodriguez LL, Gay CG. Development of vaccines toward the global control and eradication of foot-and-mouth disease. *Expert Rev Vaccines*. 2011 Mar;10(3):377-87. PubMed PMID: 21434805.
- 38: Bearinger JP, Dugan LC, Baker BR, Hall SB, Ebert K, Mioulet V, Madi M, King DP. Development and initial results of a low cost, disposable, point-of-care testing device for pathogen detection. *IEEE Trans Biomed Eng*. 2011 Mar;58(3):805-8. PubMed PMID: 21342806; PubMed Central PMCID: PMC3071014.
- 39: Abdul-Hamid NF, Hussein NM, Wadsworth J, Radford AD, Knowles NJ, King DP. Phylogeography of foot-and-mouth disease virus types O and A in Malaysia and surrounding countries. *Infect Genet Evol*. 2011 Mar;11(2):320-8. Epub 2010 Nov 18. PubMed PMID: 21093614.
- 40: Gulbahar MY, Kabak YB, Karayigit MO, Yarim M, Guvenc T, Parlak U. The expressions of HSP70 and α B-crystallin in myocarditis associated with foot-and-mouth disease virus in lambs. *J Vet Sci*. 2011 Mar;12(1):65-73. PubMed PMID: 21368565; PubMed Central PMCID: PMC3053469.
- 41: Martín-Acebes MA, Vázquez-Calvo A, Rincón V, Mateu MG, Sobrino F. A single amino acid substitution in the capsid of foot-and-mouth disease virus can increase acid resistance. *J Virol*. 2011 Mar;85(6):2733-40. Epub 2010 Dec 22. PubMed PMID: 21177816.
- 42: Robinson L, Windsor M, McLaughlin K, Hope J, Jackson T, Charleston B. Foot-and-mouth disease virus exhibits an altered tropism in the presence of specific immunoglobulins, enabling productive infection and killing of dendritic cells. *J Virol*. 2011 Mar;85(5):2212-23. Epub 2010 Dec 22. PubMed PMID: 21177807; PubMed Central PMCID: PMC3067760.
- 43: Wright CF, Morelli MJ, Thébaud G, Knowles NJ, Herzyk P, Paton DJ, Haydon DT, King DP. Beyond the consensus: dissecting within-host viral population diversity of foot-and-mouth disease virus by using next-generation genome sequencing. *J Virol*. 2011 Mar;85(5):2266-75. Epub 2010 Dec 15. PubMed PMID: 21159860; PubMed Central PMCID: PMC3067773.
- 44: Nagendrakumar SB, Srinivasan VA, Madhanmohan M, Yuvaraj S, Parida S, Di Nardo A, Horsington J, Paton DJ. Evaluation of cross-protection between O1 Manisa and O1 Campos in cattle vaccinated with foot-and-mouth disease virus vaccine incorporating different payloads of inactivated O1 Manisa antigen. *Vaccine*. 2011 Feb 24;29(10):1906-12. Epub 2011 Jan 13. PubMed PMID: 21236232.
- 45: Cao Y, Lu Z, Sun P, Fu Y, Tian F, Hao X, Bao H, Liu X, Liu Z. A pseudotype baculovirus expressing the capsid protein of foot-and-mouth disease virus and a T-cell immunogen shows enhanced immunogenicity in mice. *Virol J*. 2011 Feb 23;8:77. PubMed PMID: 21342530; PubMed Central PMCID: PMC3050825.

- 46: Mohapatra JK, Subramaniam S, Singh NK, Sanyal A, Pattnaik B. Experimental evidence for competitive growth advantage of genotype VII over VI: Implications for foot-and-mouth disease virus serotype A genotype turnover in nature. *Res Vet Sci.* 2011 Feb 19. [Epub ahead of print] PubMed PMID: 21338995.
- 47: Yu Y, Abaeva IS, Marintchev A, Pestova TV, Hellen CU. Common conformational changes induced in type 2 picornavirus IRESs by cognate trans-acting factors. *Nucleic Acids Res.* 2011 Feb 8. [Epub ahead of print] PubMed PMID: 21306989.
- 48: Rodríguez-Calvo T, Díaz-San Segundo F, Sanz-Ramos M, Sevilla N. A replication analysis of foot-and-mouth disease virus in swine lymphoid tissue might indicate a putative carrier stage in pigs. *Vet Res.* 2011 Feb 7;42(1):22. PubMed PMID:21314905; PubMed Central PMCID: PMC3046922.
- 49: O'Donnell V, Pacheco JM, LaRocco M, Burrage T, Jackson W, Rodriguez LL, Borca MV, Baxt B. Foot-and-mouth disease virus utilizes an autophagic pathway during viral replication. *Virology.* 2011 Feb 5;410(1):142-50. Epub 2010 Nov 26. PubMed PMID: 21112602.
- 50: Patch JR, Pedersen LE, Toka FN, Moraes M, Grubman MJ, Nielsen M, Jungersen G, Buus S, Golde WT. Induction of foot-and-mouth disease virus-specific cytotoxic T cell killing by vaccination. *Clin Vaccine Immunol.* 2011 Feb;18(2):280-8. Epub 2010 Dec 22. PubMed PMID: 21177918; PubMed Central PMCID: PMC3067366.
- 51: Sangula AK, Siegismund HR, Belsham GJ, Balinda SN, Masembe C, Muwanika VB. Low diversity of foot-and-mouth disease serotype C virus in Kenya: evidence for probable vaccine strain re-introductions in the field. *Epidemiol Infect.* 2011 Feb;139(2):189-96. Epub 2010 Mar 25. PubMed PMID: 20334728.
- 52: Dias CC, Moraes MP, Segundo FD, de los Santos T, Grubman MJ. Porcine type I interferon rapidly protects swine against challenge with multiple serotypes of foot-and-mouth disease virus. *J Interferon Cytokine Res.* 2011 Feb;31(2):227-36. Epub 2010 Sep 28. PubMed PMID: 20874428.
- 53: Yu Y, Wang H, Zhao L, Zhang C, Jiang Z, Yu L. Fine mapping of a foot-and-mouth disease virus epitope recognized by serotype-independent monoclonal antibody 4B2. *J Microbiol.* 2011 Feb;49(1):94-101. Epub 2011 Mar 3. PubMed PMID: 21369985.
- 54: Leanes LF, Abbiati NN, Pereyra AM, Maizon DO. Risk evaluation of nonvaccinated, weaned calves transported through areas under systematic foot and mouth disease (FMD) vaccination. *Prev Vet Med.* 2011 Feb 1;98(2-3):133-41. Epub 2010 Nov 10. PubMed PMID: 21071104.
- 55: Mohana Subramanian B, Senthuran S, Dhinakar Raj G, Tirumurugaan KG, Thiagarajan D. Difference in the level of interferon gamma mRNA transcripts on stimulation of cattle and buffalo mononuclear cells with foot and mouth disease virus-antigen: a possible role of sequence variation in promoter region. *Res Vet Sci.* 2011 Feb;90(1):55-8. Epub 2010 Jun 11. PubMed PMID: 20541234.
- 56: Dukpa K, Robertson ID, Ellis TM. The epidemiological characteristics of the 2007 foot-and-mouth disease epidemic in Sarpang and Zhemgang districts of Bhutan. *Transbound Emerg Dis.* 2011 Feb;58(1):53-62. doi: 10.1111/j.1865-1682.2010.01181.x. Epub 2010 Nov 15. PubMed PMID: 21078083.
- 57: Jiang T, Liang Z, Ren WW, Chen J, Zhi XY, Qi GY, Liu XT, Cai XP. A simple and rapid colloidal gold-based immunochromatographic strip test for detection of FMDV serotype A. *Viol Sin.* 2011 Feb;26(1):30-9. Epub 2011 Feb 18. PubMed PMID: 21331888.
- 58: Maree FF, Blignaut B, Aschenbrenner L, Burrage T, Rieder E. Analysis of SAT1 type foot-and-mouth disease virus capsid proteins: influence of receptor usage on the properties of virus particles. *Virus Res.* 2011 Feb;155(2):462-72. Epub 2010 Dec 15. PubMed PMID: 21167231.
- 59: Belsham GJ, Jamal SM, Tjørnehøj K, Bøtner A. Rescue of foot-and-mouth disease viruses that are pathogenic for cattle from preserved viral RNA samples. *PLoS One.* 2011 Jan 28;6(1):e14621. PubMed PMID: 21298025; PubMed Central PMCID: PMC3030553.
- 60: Stram Y, Engel O, Rubinstein M, Kuznetsova L, Balaish M, Yadin H, Istumin S, Gelman B. Multiple invasions of O1 FMDV serotype into Israel revealed by genetic analysis of VP1 genes of Israeli's isolates from 1989 to 2007. *Vet Microbiol.* 2011 Jan 27;147(3-4):398-402. Epub 2010 Jul 7. PubMed PMID: 20702050.

- 61: Lee KN, Nguyen T, Kim SM, Park JH, Do HT, Ngo HT, Mai DT, Lee SY, Nguyen CV, Yoon SH, Kweon CH, Cho IS, Kim H. Direct typing and molecular evolutionary analysis of field samples of foot-and-mouth disease virus collected in Viet Nam between 2006 and 2007. *Vet Microbiol.* 2011 Jan 27;147(3-4):244-52. Epub 2010 Jul 7. PubMed PMID: 20667669.
- 62: Fernández N, García-Sacristán A, Ramajo J, Briones C, Martínez-Salas E. Structural analysis provides insights into the modular organization of picornavirus IRES. *Virology.* 2011 Jan 20;409(2):251-61. Epub 2010 Nov 5. PubMed PMID: 21056890.
- 63: Maddur MS, Rao S, Chockalingam AK, Kishore S, Gopalakrishna S, Singh N, Suryanarayana VV, Sathyanarayana ML, Gajendragad MR. Absence of Heat Intolerance (Panting) Syndrome in Foot-and-Mouth Disease-Affected Indian Cattle (*Bos indicus*) is Associated with Intact Thyroid Gland Function. *Transbound Emerg Dis.* 2011 Jan 19. doi: 10.1111/j.1865-1682.2011.01203.x. [Epub ahead of print] PubMed PMID: 21388520.
- 64: Desrosiers R. Transmission of swine pathogens: different means, different needs. *Anim Health Res Rev.* 2011 Jan 18:1-13. [Epub ahead of print] PubMed PMID: 21241537.
- 65: Zhang C, Wang B, Wang M. GM-CSF and IL-2 as adjuvant enhance the immune effect of protein vaccine against foot-and-mouth disease. *Virol J.* 2011 Jan 9;8:7. PubMed PMID: 21214955; PubMed Central PMCID: PMC3024958.
- 66: Shao JJ, Wong CK, Lin T, Lee SK, Cong GZ, Sin FW, Du JZ, Gao SD, Liu XT, Cai XP, Xie Y, Chang HY, Liu JX. Promising multiple-epitope recombinant vaccine against foot-and-mouth disease virus type O in swine. *Clin Vaccine Immunol.* 2011 Jan;18(1):143-9. Epub 2010 Nov 17. PubMed PMID: 21084463; PubMed Central PMCID:PMC3019777.
- 67: Li Z, Liu J. The current state of vaccines used in the field for foot and mouth disease virus in China. *Expert Rev Vaccines.* 2011 Jan;10(1):13-5. PubMed PMID: 21162615.
- 68: Carpenter TE, O'Brien JM, Hagerman AD, McCarl BA. Epidemic and economic impacts of delayed detection of foot-and-mouth disease: a case study of a simulated outbreak in California. *J Vet Diagn Invest.* 2011 Jan;23(1):26-33. PubMed PMID: 21217024.
- 69: Hu B, Li C, Lu H, Zhu Z, Du S, Ye M, Tan L, Ren D, Han J, Kan S, Wang J, Jin N. Immune responses to the oral administration of recombinant *Bacillus subtilis* expressing multi-epitopes of foot-and-mouth disease virus and a cholera toxin B subunit. *J Virol Methods.* 2011 Jan;171(1):272-9. Epub 2010 Dec 1. PubMed PMID: 21129406.
- 70: Fu Y, Cao Y, Sun P, Bao H, Bai X, Li P, Li D, Lu Z, Liu Z. Development of a dot immunoblot method for differentiation of animals infected with foot-and-mouth disease virus from vaccinated animals using non-structural proteins expressed prokaryotically. *J Virol Methods.* 2011 Jan;171(1):234-40. Epub 2010 Nov 16. PubMed PMID: 21087638.
- 71: Mohapatra JK, Pandey LK, Sharma GK, Barik SK, Pawar SS, Palsamy R, Pattnaik B. Multiplex PCR for rapid detection of serotype A foot-and-mouth disease virus variants with amino acid deletion at position 59 of the capsid protein VP3. *J Virol Methods.* 2011 Jan;171(1):287-91. Epub 2010 Oct 26. PubMed PMID: 21029752.
- 72: Jiang T, Liang Z, Ren W, Chen J, Zhi X, Qi G, Yang Y, Liu Z, Liu X, Cai X. Development and validation of a lateral flow immunoassay using colloidal gold for the identification of serotype-specific foot-and-mouth disease virus O, A and Asia 1. *J Virol Methods.* 2011 Jan;171(1):74-80. Epub 2010 Oct 15. PubMed PMID: 20951743.
- 73: Halasa T, Boklund A, Cox S, Enøe C. Meta-analysis on the efficacy of foot-and-mouth disease emergency vaccination. *Prev Vet Med.* 2011 Jan 1;98(1):1-9. Review. PubMed PMID: 20869130.
- 74: Negussie H, Kyule MN, Yami M, Ayelet G, Jenberie S. Outbreak investigations and genetic characterization of foot-and-mouth disease virus in Ethiopia in 2008/2009. *Trop Anim Health Prod.* 2011 Jan;43(1):235-43. Epub 2010 Aug 18. PubMed PMID: 20717724.

- 75: Yang D, Zhang C, Zhao L, Zhou G, Wang H, Yu L. Identification of a conserved linear epitope on the VP1 protein of serotype O foot-and-mouth disease virus by neutralising monoclonal antibody 8E8. *Virus Res.* 2011 Jan;155(1):291-9. Epub 2010 Oct 23. PubMed PMID: 20974198.
- 76: Piccone ME, Diaz-San Segundo F, Kramer E, Rodriguez LL, de los Santos T. Introduction of tag epitopes in the inter-AUG region of foot and mouth disease virus: effect on the L protein. *Virus Res.* 2011 Jan;155(1):91-7. Epub 2010 Sep 16. PubMed PMID: 20849893.
- 77: Durk RC, Singh K, Cornelison CA, Rai DK, Matzek KB, Leslie MD, Schafer E, Marchand B, Adedeji A, Michailidis E, Dorst CA, Moran J, Pautler C, Rodriguez LL, McIntosh MA, Rieder E, Sarafianos SG. Inhibitors of foot and mouth disease virus targeting a novel pocket of the RNA-dependent RNA polymerase. *PLoS One.* 2010 Dec 21;5(12):e15049. PubMed PMID: 21203539; PubMed Central PMCID: PMC3006429.
- 78: Estes DM. Regulation of IgA responses in cattle, humans and mice. *Vet Immunol Immunopathol.* 2010 Dec 15;138(4):312-7. Epub 2010 Oct 14. Review. PubMed PMID: 21074276.
- 79: Ayebazibwe C, Mwiine FN, Tjørnehøj K, Balinda SN, Muwanika VB, Ademun Okurut AR, Belsham GJ, Normann P, Siegismund HR, Alexandersen S. The role of African buffalos (*syncerus caffer*) in the maintenance of foot-and-mouth disease in Uganda. *BMC Vet Res.* 2010 Dec 11;6:54. PubMed PMID: 21143994; PubMed Central PMCID: PMC3022570.
- 80: Wright CF, Gloster J, Mazelet L, Paton DJ, Ryan ED. Short-lived carriage of foot-and-mouth disease virus in human nasal cavities after exposure to infected animals. *Vet Rec.* 2010 Dec 11;167(24):928-31. PubMed PMID: 21262692.
- 81: Reeve R, Blignaut B, Esterhuysen JJ, Opperman P, Matthews L, Fry EE, de Beer TA, Theron J, Rieder E, Vosloo W, O'Neill HG, Haydon DT, Maree FF. Sequence-based prediction for vaccine strain selection and identification of antigenic variability in foot-and-mouth disease virus. *PLoS Comput Biol.* 2010 Dec 9;6(12):e1001027. PubMed PMID: 21151576; PubMed Central PMCID: PMC3000348.
- 82: Leach RJ, Craigmile SC, Knott SA, Williams JL, Glass EJ. Quantitative trait loci for variation in immune response to a Foot-and-Mouth Disease virus peptide. *BMC Genet.* 2010 Dec 7;11:107. PubMed PMID: 21138580; PubMed Central PMCID: PMC3019142.
- 83: Prickett JR, Zimmerman JJ. The development of oral fluid-based diagnostics and applications in veterinary medicine. *Anim Health Res Rev.* 2010 Dec;11(2):207-16. Epub 2010 Mar 5. Review. PubMed PMID: 20202287.
- 84: Madhanmohan M, Nagendrakumar SB, Narasu ML, Srinivasan VA. Effect of FMD vaccine antigen payload on protection, sub-clinical infection and persistence following needle challenge in sheep. *Comp Immunol Microbiol Infect Dis.* 2010 Dec;33(6):e7-13. Epub 2009 Nov 6. PubMed PMID: 19896714.
- 85: Siva Reddy K, Muralidhar Rao D, Badrinaryana N, Suryanaryana VV, Reddy GR. Enhancement of DNA vaccine (P12A3C-pcDNA) efficacy against foot-and-mouth disease by coadministration of interleukin-18-expressing (IL18 pcDNA) plasmid in guinea-pigs. *FEMS Immunol Med Microbiol.* 2010 Dec;60(3):261-9. doi: 10.1111/j.1574-695X.2010.00739.x. Epub 2010 Oct 6. PubMed PMID: 21039923.

Annex 3. RECOMMENDATIONS FROM WRLFMD ON FMD VIRUS STRAINS TO BE INCLUDED IN FMDV ANTIGEN BANKS – March 2011

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)