



# WRLFMD Quarterly Report

## April-June 2010

Reference Laboratory Contract Report

7/15/2010

WRLFMD

This page deliberately blank

**FAO/OIE Reference Laboratory Report<sup>1</sup>  
April-June 2010**

**Foot-and-Mouth Disease**

---

<sup>1</sup> N.B. Copies of all the individual reports cited herein can be obtained from Dr. Jef Hammond, IAH-Pirbright, [jef.hammond@bbsrc.ac.uk](mailto:jef.hammond@bbsrc.ac.uk)

## Summary

### ASIA

#### *Republic of Korea*

Seven new outbreaks of FMDV type O were reported in April 2010, with no further reports in May or June. After the completion of stamping-out and disinfection in the restricted zones, clinical surveillance and serological testing in the restricted zones were completed by the government veterinary authorities. All results were negative. Therefore, on 7 June 2010, the Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF) lifted the protection and surveillance zones as well as the risk zone which had been established within Kangwha-gun and Kimpo city on 8 April and 19 April, respectively.

#### *P.R. China*

Nine further outbreaks of FMDV type O occurred between April and June 2010:

07/04/2010 Nanyuan, GANSU.

17/04/2010 Tianfeng, Wushan, Tianshui, GANSU.

13/04/2010 Guding, Shibing, Qiandongnanzhou, GUIZHOU.

23/04/2010 Xuanhe Town, Shapotou District, Zhongwei, NINGXIA.

20/04/2010 Yecheng, Yecheng, Kashi prefecture, XINJIANG.

17/05/2010 Shigatse, TIBET.

10/06/2010 Shayidong, Kuerle, Bayingolin Mongolia Autonomous Prefecture, XINJIANG.

19/06/2010 The Aksu Western Suburb pig farming area, Aksu, XINJIANG.

22/06/2010 Haomen Town Qunawan Road Farm, Menyuan, Haibei Zhou, QINGHAI.

No information concerning the genotyping of viruses from these outbreaks is yet available.

#### *Taiwan POC*

An outbreak occurred on 22/06/2010 in pigs at Baozhong Township, YUN-LIN. During routine active surveillance in the livestock markets, a pig was found to be NSP antibody positive. The prefecture animal disease control competent authority traced back to the farm of origin. The clinical investigation showed that 112 pigs on the farm had healed vesicular lesions. The prefecture animal disease control competent authority immediately destroyed a total of 163 pigs apparently all in the same pen. Cleaning and disinfection was then carried out on the index farm. Samples for serological tests and virus isolation were collected and sent to the National Laboratory (Animal Health Research Institute). The laboratory confirmed 6 positive results for NSP with all being negative for RT-PCR and virus isolation.

#### *Japan*

In early April 2010, FMDV type O was reported in Miyazaki Prefecture on the island of Kyūshū. Subsequently, a further 291 outbreaks have been reported. The virus was identified as Southeast Asia (SEA) topotype (Mya-98 lineage) and found to be closely related to viruses occurring recently in the P.R. China, Hong Kong SAR, Republic of Korea, Myanmar and Thailand. This is the first outbreak of FMD in Japan since 2000. It appears that although disease was first identified on 9<sup>th</sup> April, FMD was not confirmed by laboratory testing until 20<sup>th</sup> April.

#### *Mongolia*

An outbreak of FMD type O was reported on 21/04/2010 in cattle (n=269/849) at Tashgai Bayanburd, Khalkhol soum, Dornod. Subsequently, two further outbreaks were reported: on 14/05/2010 in cattle (n=37/375) at Zuun Shorvog, Buyanondor, Matad Soum, Dornod; and on 14/06/2010 in cattle (n=17) at Bayasgalant, Bulgan soum, Dornod. A VP1 sequence was submitted to the WRLFMD from ARRIAH and shown to belong to the SEA topotype, Mya-98 lineage; Importantly, it appears to be a different introduction to outbreaks in the P.R. China, Hong Kong SAR, Republic of Korea and Japan, as it is most closely related to viruses from Thailand and Malaysia from 2009.

#### *Afghanistan, Iran & Pakistan*

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

#### *Kazakhstan*

An outbreak of FMD type O occurred on 09/06/2010 in cattle (n=140/639) at Novodolinka, Ereymentau, Aqmola, Kokchetav. A sequence was submitted to the WRLFMD from ARRIAH and found to belong to the ME-SA toptype, PanAsia-2 strain.

#### *United Arab Emirates*

An outbreak of FMDV type O occurred in gazelle the Al Ain Wildlife Park & Resort, Abu Dhabi in March-April 2010. Analysis of VP1 sequences showed the virus to belong to the ME-SA toptype, PanAsia-2 strain and to be closely related to viruses from Iran and Pakistan.

### **AFRICA**

#### *Kenya*

FMDV types O, SAT 1 and SAT 2 were isolated from samples collected in 2009 and 2010. A single type O virus belonged to the EA-1 toptype and was closely related to the vaccine strain K77/78. Nineteen SAT 1 viruses all belonged to toptype I (NWZ), but clustered with previously isolated viruses in four different sub-lineages. The single SAT 2 virus belonged to toptype IV and was closely related to two viruses previously isolated in 2009.

#### *Namibia*

An outbreak of FMD (serotype pending) was reported on 09/04/2010 in cattle (n=88/1066) on Impalila island, Kabbe constituency, Caprivi. It is suspected that transmission of FMDV occurred from wild African buffalo (*Syncerus caffer*) resident in the area.

#### *Nigeria*

FMDV types O and A were isolated from samples collected in 2009. A single type O virus belonged to the EA-3 toptype and was most closely related to viruses from Nigeria (2007) and Sudan (2004-2008). Eight type A viruses belonged to the AFRICA toptype (lineage G-I) but fell into two distinct sub-lineages, one of which clustered closely with Kenyan viruses. The single SAT 2 virus belonged to toptype IV, but was not closely related to other SAT 2's. Four type A viruses all belonged to the AFRICA toptype, G-IV lineage; but fell into two distinct sub-lineage which correlated with their place of collection.

#### *Tanzania*

FMDV types O, A and SAT 2 were isolated from samples collected in 2008 and 2009. Three type O viruses belonged to the EA-2 toptype, but fell into two distinct sub-lineages.

#### *Zimbabwe*

An outbreak of FMD type SAT 2 was reported in cattle (n=163/1377) at Kitwe dip tank, Plumtree, Mangwe, Matabeleland South on 28/05/2010. Further outbreaks have been reported: on 04/06/2010 at Inswingo Dip Tank, Mangwe, Matabeleland South; and on 01/06/2010 at Kwhite, Mangwe, Matabeleland South and Ingwizi Dip Tank, Mangwe, Matabeleland South. No sequence data is available yet and samples have not yet been submitted to the WRLFMD.

### **SOUTH AMERICA**

#### *Ecuador*

Nine FMD type O viruses were isolated from samples sent from various locations in Ecuador. These are the first samples WRLFMD have received from this region. With the gratefully appreciated assistance of Panaftosa we were able to compare the VP1 sequences to those from six virus isolates from Ecuador in 2009. These all

belonged to the EURO-SA toptotype and viruses from each year clustered together and the clusters were most closely related to each other.

### 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](http://www.wrlfmd.org/fmd_genotyping/2010.htm).

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

Results from samples received at WRLFMD (status of samples being tested) are shown in Table 1 and a complete list of clinical sample diagnostics made by the WRLFMD between April and June 2010 is shown in Annex 1 Table A. A record of all samples received to IAH-Pirbright (April-June 2010) is shown in Annex 1 Table B.

**Table 1:** Status of sequencing of samples received by the WRLFMD from April-June 2010.

Batch	Date Recd.	Country	Serotype(s)	No. of isolates	Status
WRLFMD/2010/00014*	10/03/2010	Tanzania	O	3	Completed
			A	8	Completed
			SAT 2	1	Completed
WRLFMD/2010/00015	09/04/2010	Pakistan	O	18	Completed
			A	4	Completed
WRLFMD/2010/00016	28/04/2010	United Arab Emirates	O	4	Completed
WRLFMD/2010/00017	09/04/2010	Afghanistan	O	43	Completed
			A	17	Completed
WRLFMD/2010/00018	21/04/2010	Iran	O	18	Completed
			A	1	Completed
WRLFMD/2010/00019	17/05/2010	South Korea	O	1	Completed
			A	1	Completed
WRLFMD/2010/00021	06/04/2010	Kenya	O	1	Completed
			SAT 1	19	Completed
			SAT 2	1	Completed
WRLFMD/2010/00022*	16/03/2010	Nigeria	O	1	Completed
			A	4	Completed
WRLFMD/2010/00024	26/05/2010	Iran	Virus isolation & typing in progress (118 samples)		
WRLFMD/2010/00025	14/06/2010	Ecuador	O	9	Completed
WRLFMD/2010/00026	10/06/2010	Kenya	Virus isolation & typing in progress (54 samples)		
Total†				154	

\*, carried over from last report.

†, not including those in progress.

Detailed Analysis:

ASIA

**Afghanistan**

WRLFMD/2010/00017

Date received: 09/04/2010

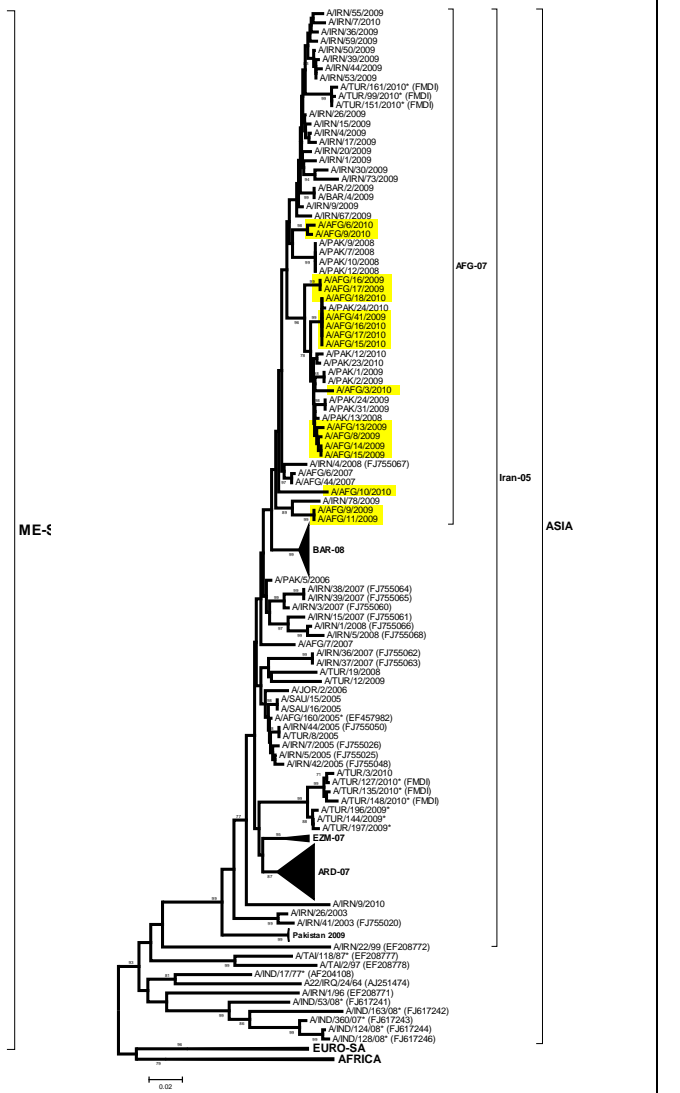
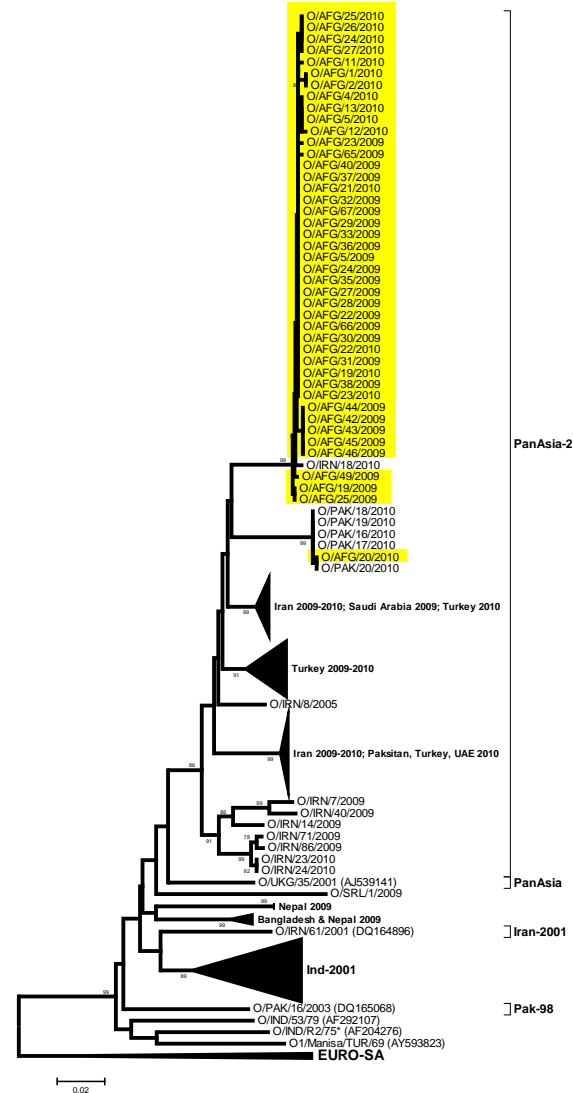
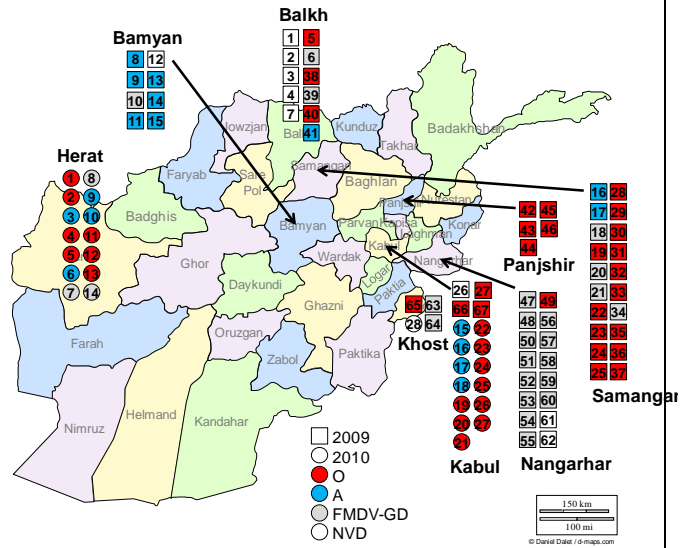
No. samples: 95 (submitted in RNAlater®)

O: 43 (by RT-PCR of VP1)

A: 17 (by RT-PCR of VP1)

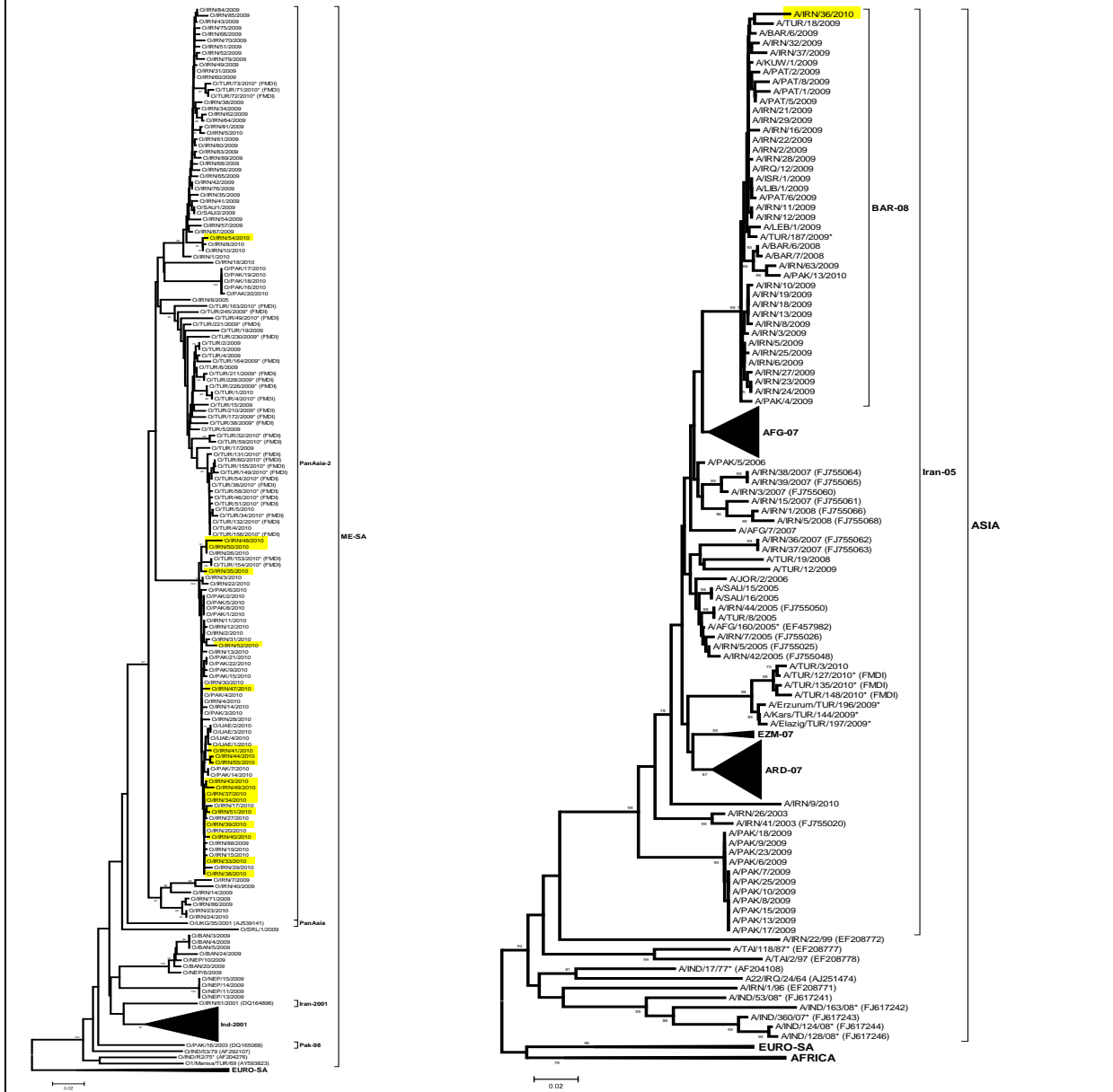
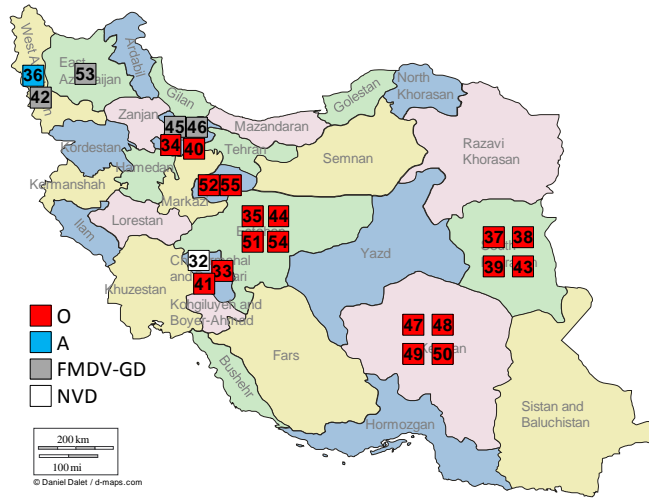
FMDV-GD: 25

NVD: 10



**Iran**

WRLFMD/2010/00018  
 Date received: 21/04/2010  
 No. samples: 24  
 O: 18  
 A: 1  
 FMDV-GD: 4  
 NVD: 1





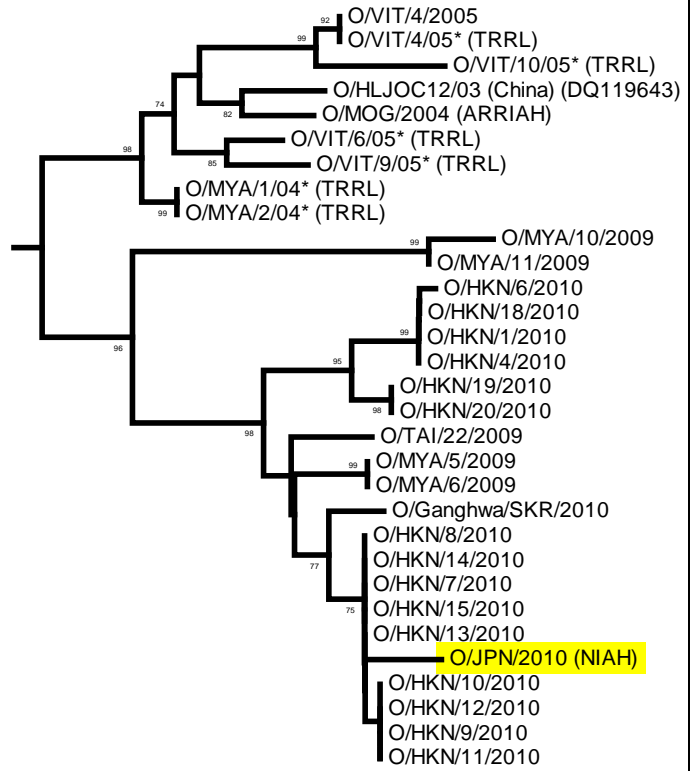
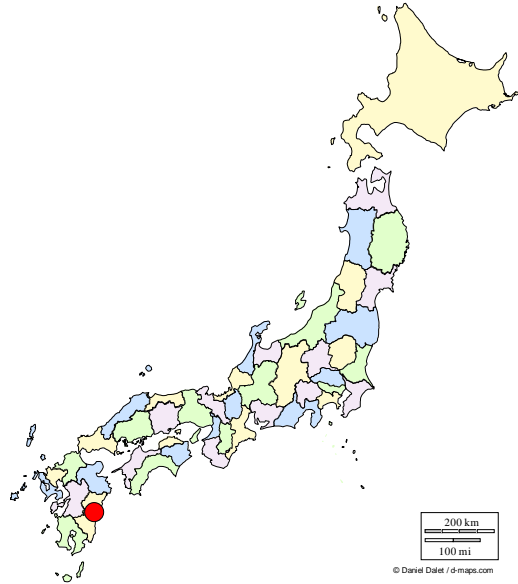
**Japan**

Date received: 27/04/2010

No. sequences: 1

O: 1

VP1 sequence received from the National Institute for Animal Health, Kodaira, Tokyo, Japan.



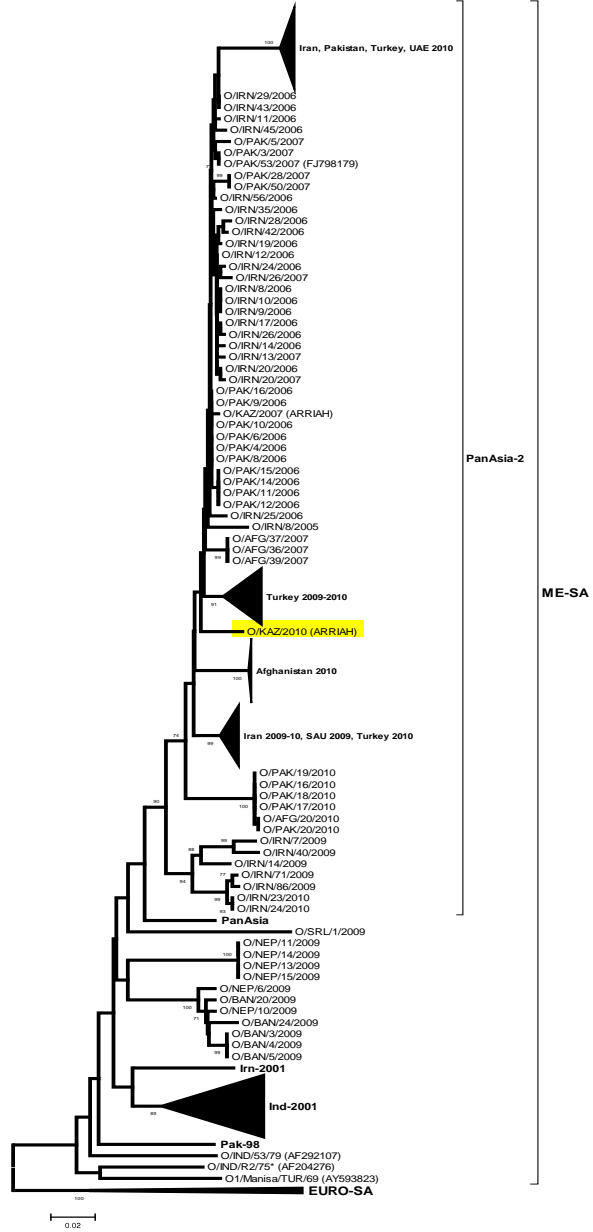
### Kazakhstan

Date received: 02/07/2010

No. sequences: 1

O: 1

VP1 sequence received from ARRIAH, Vladimir, Russian Federation.



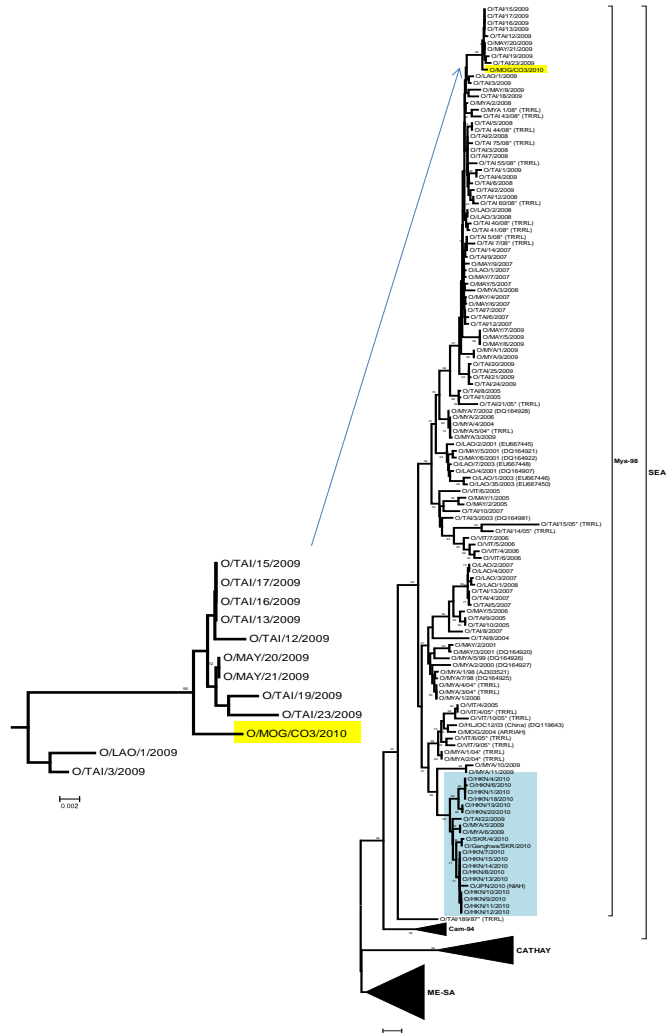
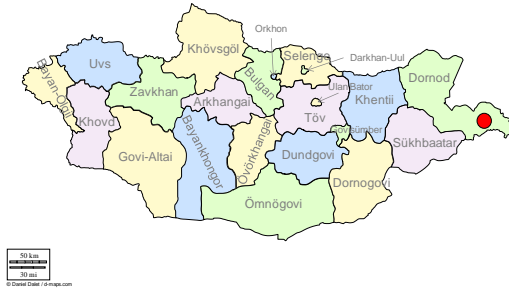
# Mongolia

Date received: 04/06/2010

No. sequences: 1

O: 1

VP1 sequence received from ARRIAH,  
Vladimir, Russian Federation.



**Pakistan**

WRLFMD/2010/00015

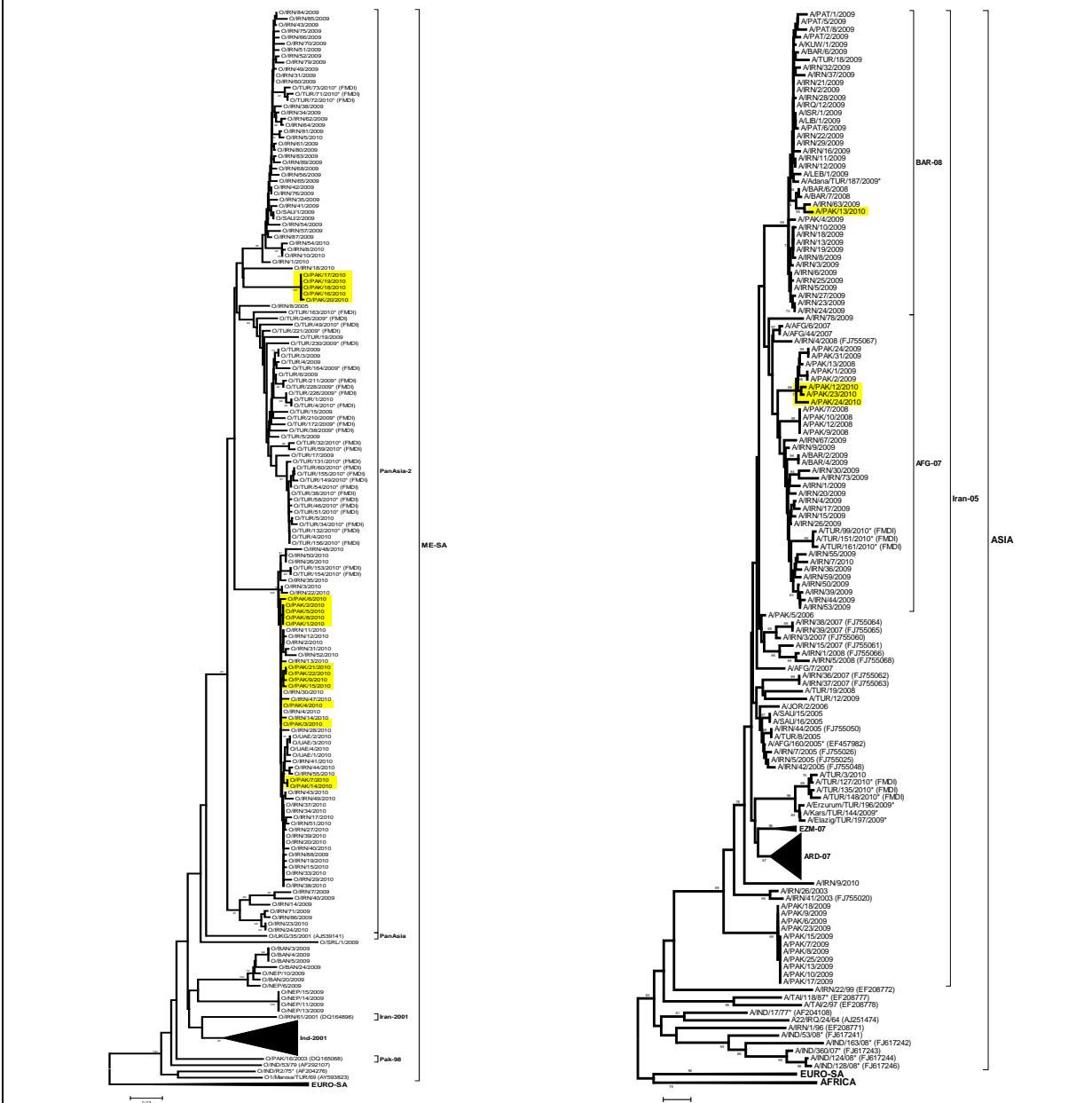
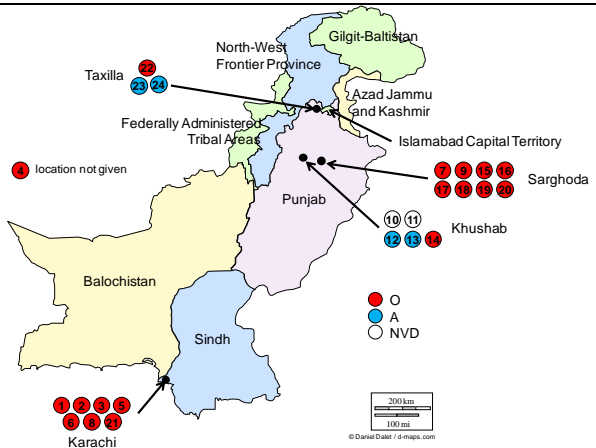
Date received: 09/04/2010

No. samples: 24

O: 18

A: 4

FMDV-GD: 2



**South Korea**

WRLFMD/2010/00019

Date received: 17/05/2010

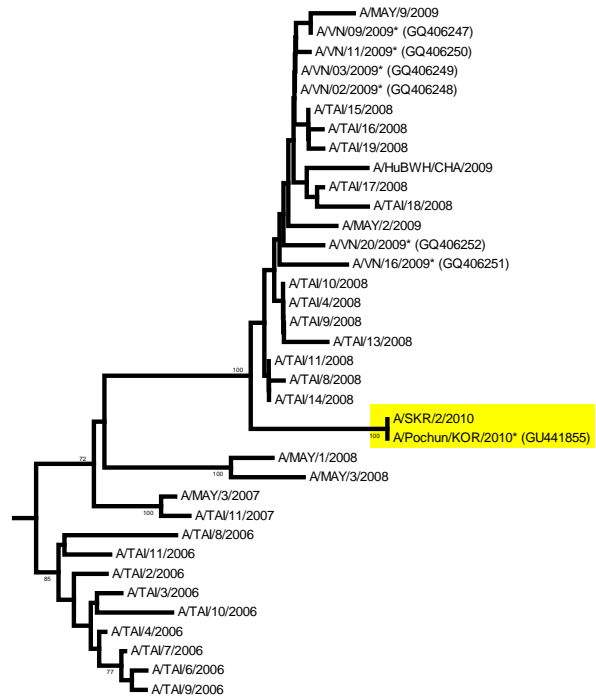
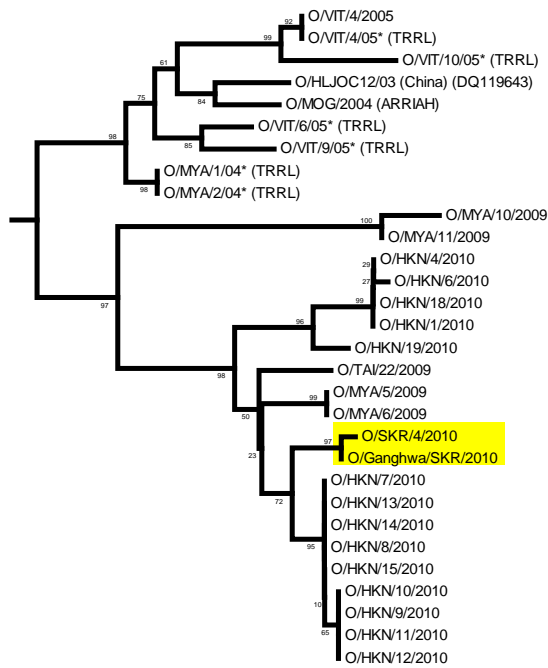
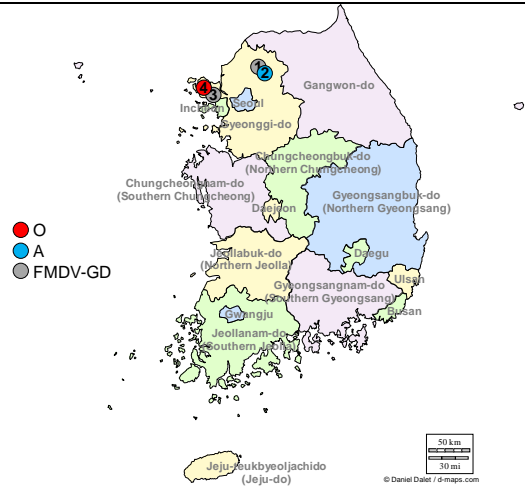
No. samples: 4

O: 1

A: 1

FMDV-GD: 2

Samples sent for further analyses; sequences reported in the first quarterly report of 2010.





AFRICA

Kenya

WRLFMD/2010/00021

Date received: 06/04/2010

No. samples: 85

O: 1

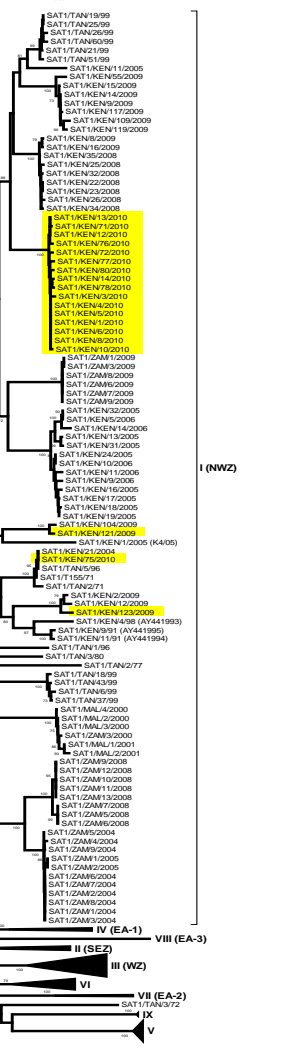
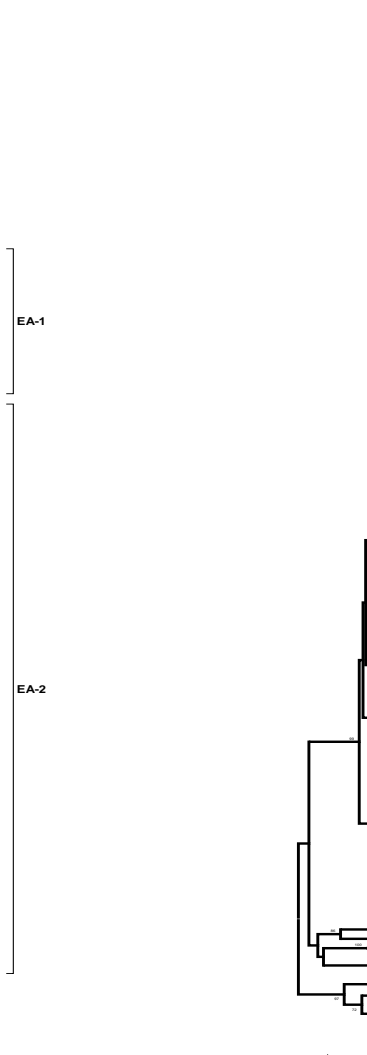
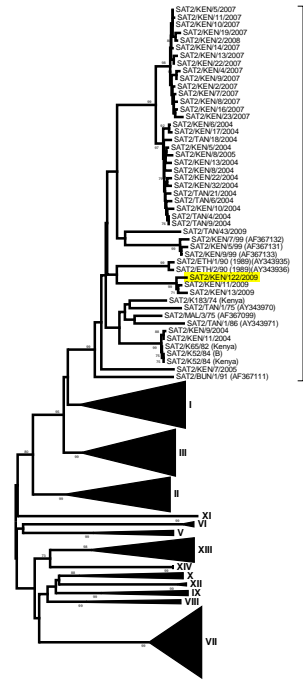
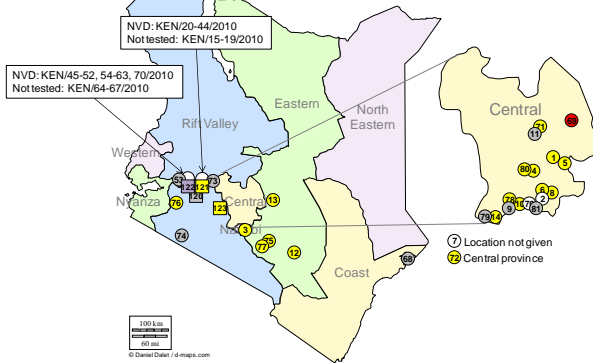
SAT1: 19

SAT2: 1

FMDV-GD: 9

NVD: 46

Not tested: 9 (serum)



# Nigeria

WRLFMD/2010/00022

Date received: 16/03/2010

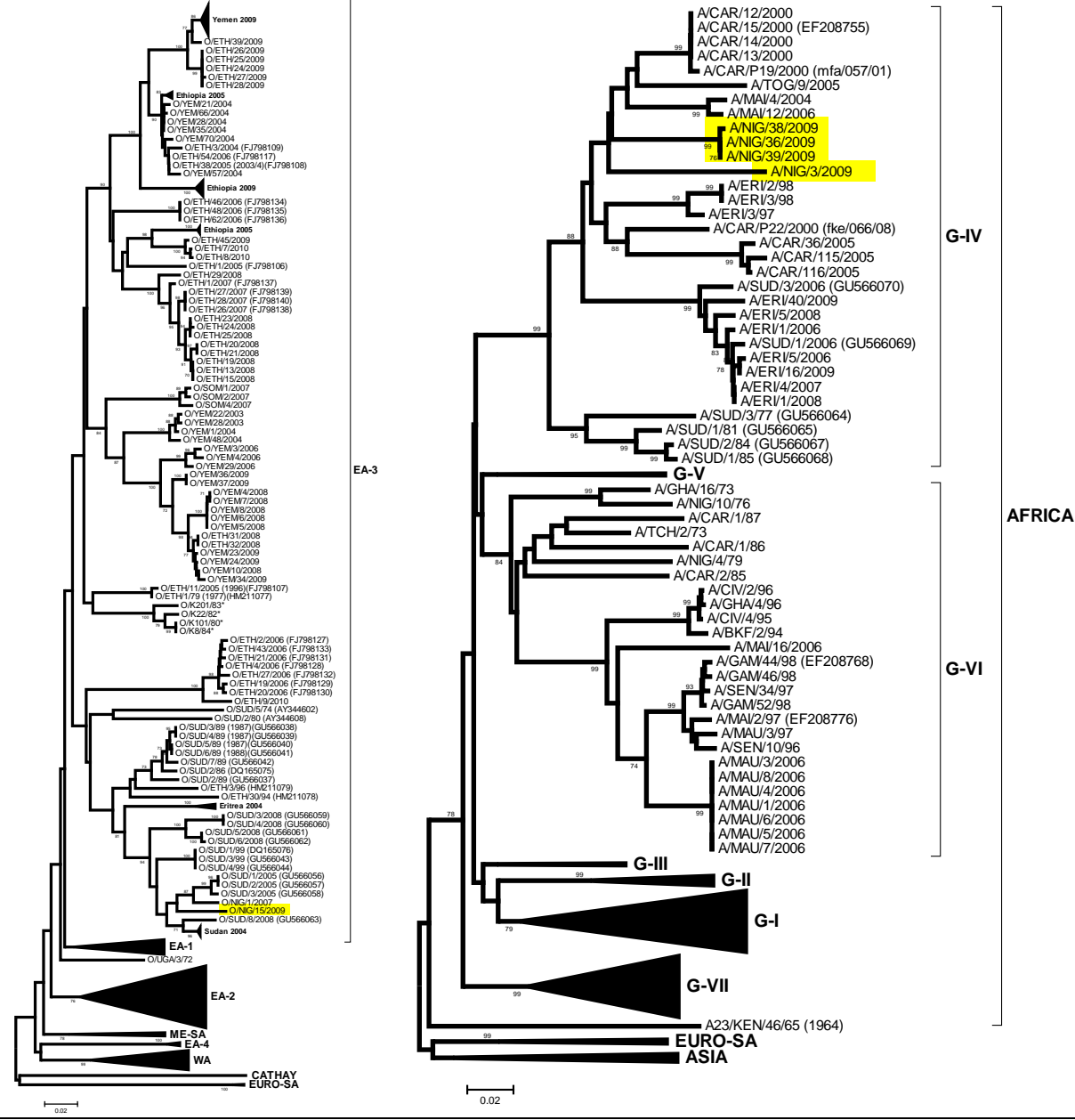
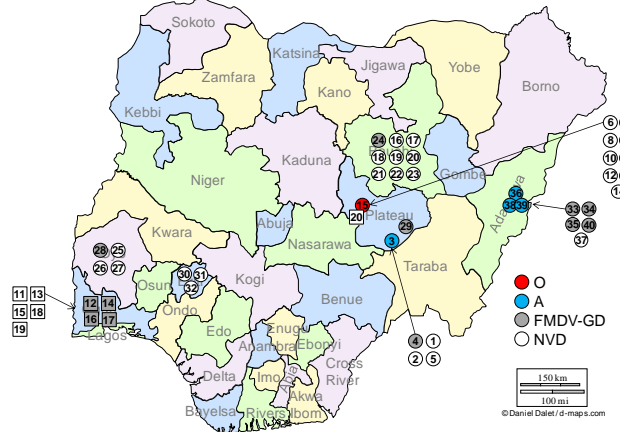
No. samples: 50

O: 1

A: 4

FMDV-GD: 12

NVD: 33





**Tanzania**

WRLFMD/2010/00014

Date received: 10/03/2010

No. samples: 82

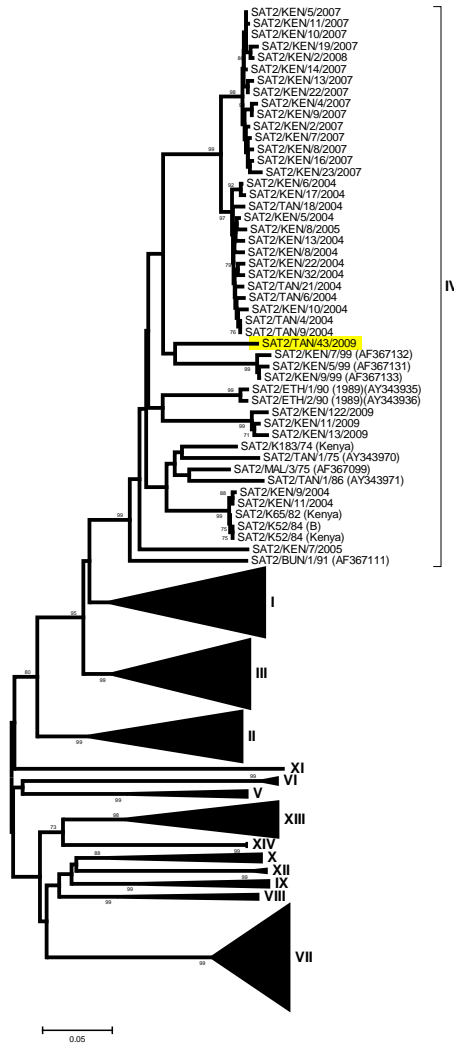
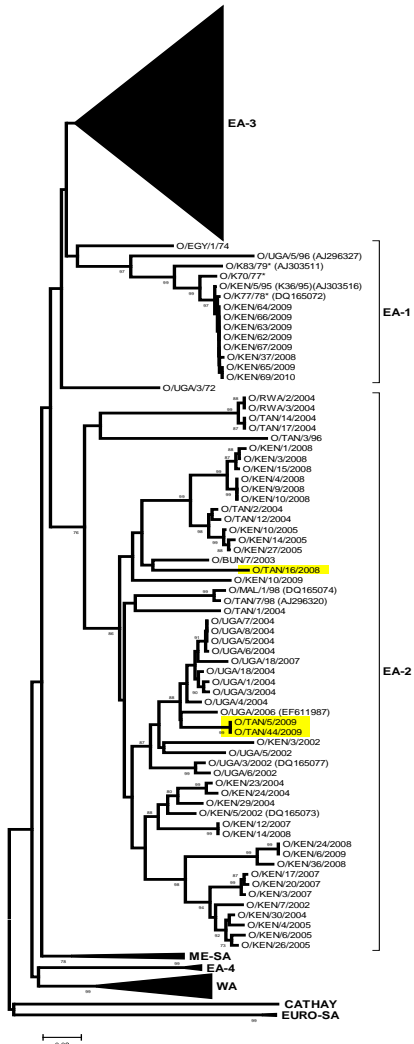
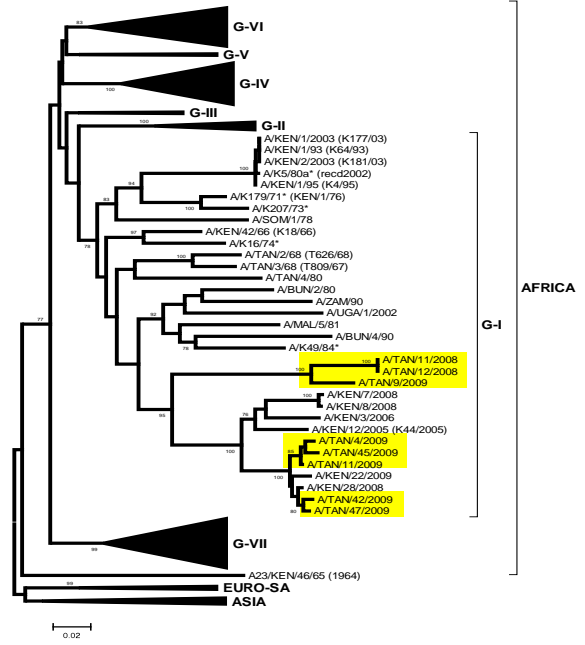
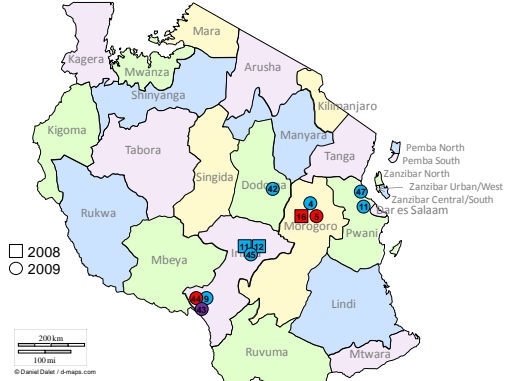
O: 3

A: 8

SAT2: 1

FMDV-GD: 27

NVD: 43



**Ecuador**

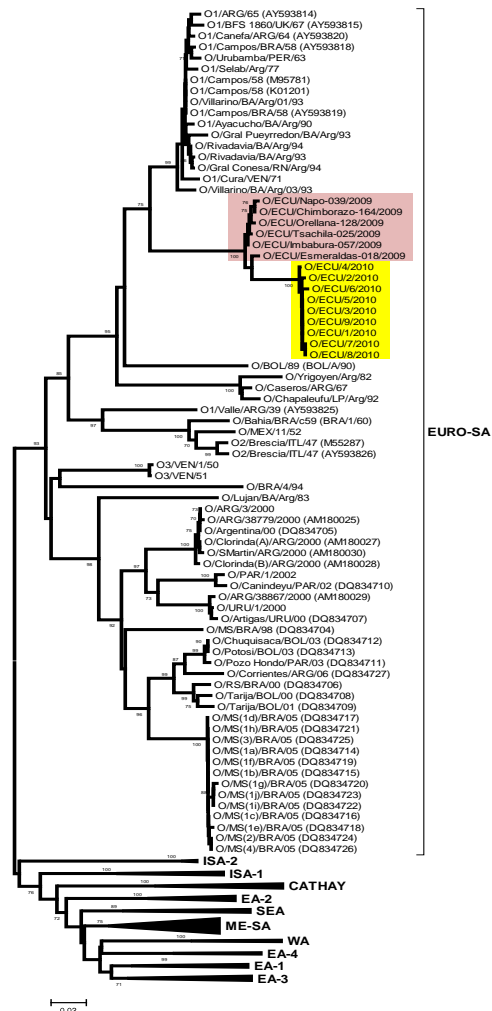
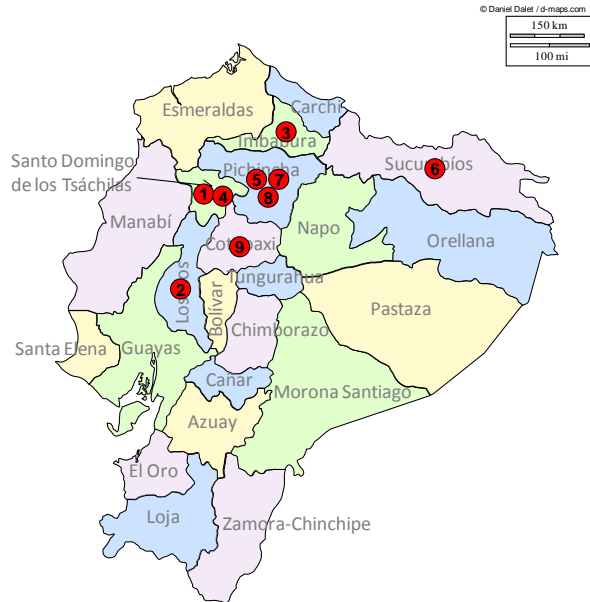
WRLFMD/2010/00025

Date received: 14/06/2010

No. samples: 9

O: 9

Additionally, 6 partial VP1 sequences from viruses isolated in 2009 from Ecuador were received from Panaftosa, Brazil for comparison.



**Vaccine matching**

Five FMDV type O isolates (See Table C Type O for the details) from Hong Kong SAR of China, Iran and South Korea (SKR) collected in 2009 and 2010 were analysed antigenically by two dimensional virus neutralisation test (2dmVNT) and/or LPBE. All isolates were matched with O Manisa, O IND R2/75 and O BFS by 2dmVNT. The isolate from SKR was also matched with O TAW 98 and O TAI 189/87 by VNT and LPBE, respectively. One isolate from Iran was antigenically close to O 4174 by LPBE (Table C).

Three FMDV type A viruses (see table C Type A for the details) from Iran and SKR collected in 2009 and 2010 were analysed for antigenic relationships with various vaccine strains by 2dmVNT and/or LPBE. Both isolates from Iran showed antigenic matches with A TUR 06, A IND 17/82, A Eri98 and A IRN 87 but not with A<sub>22</sub> Irq, A SAU 41/91, A IRN 96 and A IRN 99. The isolate from SKR showed matches with A Eri98, A May 97 and A IRN 99 with no antigenic matches to A<sub>22</sub> IRQ, A TUR06, A IND 17/82, A IRN87 and A IRN 96 (Table C).

## Annex 1.

TABLE A: Clinical sample diagnostics made by the WRL between April and June 2010

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		Final report
				VI/ELISA	RT-PCR	
AFGHANISTAN**	AFG 1/2009	NK	06.09.09	Not done	Negative	NVD
	AFG 2/2009	NK	06.09.09	Not done	Negative	NVD
	AFG 3/2009	NK	06.09.09	Not done	Negative	NVD
	AFG 4/2009	NK	06.09.09	Not done	Negative	NVD
	AFG 5/2009	NK	06.09.09	Not done	Positive	O
	AFG 6/2009	NK	06.09.09	Not done	Positive	FMDV GD
	AFG 7/2009	NK	07.09.09	Not done	Negative	NVD
	AFG 8/2009	NK	12.10.09	Not done	Positive	A
	AFG 9/2009	NK	12.10.09	Not done	Positive	A
	AFG 10/2009	NK	12.10.09	Not done	Positive	FMDV GD
	AFG 11/2009	NK	12.10.09	Not done	Positive	A
	AFG 12/2009	NK	12.10.09	Not done	Negative	NVD
	AFG 13/2009	NK	13.10.09	Not done	Positive	A
	AFG 14/2009	NK	13.10.09	Not done	Positive	A
	AFG 15/2009	NK	13.10.09	Not done	Positive	A
	AFG 16/2009	NK	16.11.09	Not done	Positive	A
	AFG 17/2009	NK	16.11.09	Not done	Positive	A
	AFG 18/2009	NK	16.11.09	Not done	Positive	FMDV GD
	AFG 19/2009	NK	24.11.09	Not done	Positive	O
	AFG 20/2009	NK	24.11.09	Not done	Positive	FMDV GD
	AFG 21/2009	NK	24.11.09	Not done	Positive	FMDV GD
	AFG 22/2009	NK	24.11.09	Not done	Positive	O
	AFG 23/2009	NK	24.11.09	Not done	Positive	O
	AFG 24/2009	NK	24.11.09	Not done	Positive	O
	AFG 25/2009	NK	24.11.09	Not done	Positive	O
	AFG 26/2009	NK	05.12.09	Not done	Negative	NVD
	AFG 27/2009	NK	07.12.09	Not done	Positive	O
	AFG 28/2009	NK	07.12.09	Not done	Positive	O
	AFG 29/2009	NK	07.12.09	Not done	Positive	O
	AFG 30/2009	NK	07.12.09	Not done	Positive	O
	AFG 31/2009	NK	07.12.09	Not done	Positive	O
	AFG 32/2009	NK	07.12.09	Not done	Positive	O
	AFG 33/2009	NK	07.12.09	Not done	Positive	O
	AFG 34/2009	NK	07.12.09	Not done	Positive	FMDV GD
	AFG 35/2009	NK	07.12.09	Not done	Positive	O
	AFG 36/2009	NK	07.12.09	Not done	Positive	O
	AFG 37/2009	NK	07.12.09	Not done	Positive	O
	AFG 38/2009	NK	08.12.09	Not done	Positive	O
	AFG 39/2009	NK	08.12.09	Not done	Positive	FMDV GD
	AFG 40/2009	NK	08.12.09	Not done	Positive	O
	AFG 41/2009	NK	08.12.09	Not done	Positive	A
	AFG 42/2009	NK	11.12.09	Not done	Positive	O
	AFG 43/2009	NK	11.12.09	Not done	Positive	O
	AFG 44/2009	NK	11.12.09	Not done	Positive	O
	AFG 45/2009	NK	11.12.09	Not done	Positive	O
	AFG 46/2009	NK	11.12.09	Not done	Positive	O
	AFG 47/2009	NK	13.12.09	Not done	Positive	FMDV GD

	AFG 48/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 49/2009	NK	14.12.09	Not done	Positive	O
	AFG 50/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 51/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 52/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 53/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 54/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 55/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 56/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 57/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 58/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 59/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 60/2009	NK	14.12.09	Not done	Positive	FMDV GD
	AFG 61/2009	NK	14.12.09	Not done	Negative	NVD
	AFG 62/2009	NK	14.12.09	Not done	Negative	NVD
	AFG 63/2009	NK	20.12.09	Not done	Positive	FMDV GD
	AFG 64/2009	NK	20.12.09	Not done	Positive	FMDV GD
	AFG 65/2009	NK	20.12.09	Not done	Positive	O
	AFG 66/2009	NK	23.12.09	Not done	Positive	O
	AFG 67/2009	NK	23.12.09	Not done	Positive	O
	AFG 1/2010	NK	08.01.10	Not done	Positive	O
	AFG 2/2010	NK	08.01.10	Not done	Positive	O
	AFG 3/2010	NK	08.01.10	Not done	Positive	A
	AFG 4/2010	NK	08.01.10	Not done	Positive	O
	AFG 5/2010	NK	08.01.10	Not done	Positive	O
	AFG 6/2010	NK	08.01.10	Not done	Positive	A
	AFG 7/2010	NK	08.01.10	Not done	Positive	FMDV GD
	AFG 8/2010	NK	08.01.10	Not done	Positive	FMDV GD
	AFG 9/2010	NK	08.01.10	Not done	Positive	A
	AFG 10/2010	NK	08.01.10	Not done	Positive	A
	AFG 11/2010	NK	09.01.10	Not done	Positive	O
	AFG 12/2010	NK	09.01.10	Not done	Positive	O
	AFG 13/2010	NK	09.01.10	Not done	Positive	O
	AFG 14/2010	NK	09.01.10	Not done	Positive	FMDV GD
	AFG 15/2010	NK	22.01.10	Not done	Positive	A
	AFG 16/2010	NK	22.01.10	Not done	Positive	A
	AFG 17/2010	NK	22.01.10	Not done	Positive	A
	AFG 18/2010	NK	22.01.10	Not done	Positive	A
	AFG 19/2010	NK	23.01.10	Not done	Positive	O
	AFG 20/2010	NK	23.01.10	Not done	Positive	O
	AFG 21/2010	NK	23.01.10	Not done	Positive	O
	AFG 22/2010	NK	23.01.10	Not done	Positive	O
	AFG 23/2010	NK	23.01.10	Not done	Positive	O
	AFG 24/2010	NK	26.01.10	Not done	Positive	O
	AFG 25/2010	NK	26.01.10	Not done	Positive	O
	AFG 26/2010	NK	26.01.10	Not done	Positive	O
	AFG 27/2010	NK	26.01.10	Not done	Positive	O
	AFG 28/2010	NK	01.02.10	Not done	Negative	NVD
ECUADOR	ECU 1/2010	Cattle	18.05.10	O	Positive	O
	ECU 2/2010	Cattle	27.05.10	O	Positive	O
	ECU 3/2010	Cattle	30.05.10	O	Positive	O
	ECU 4/2010	Cattle	30.05.10	O	Positive	O
	ECU 5/2010	Cattle	31.05.10	O	Positive	O
	ECU 6/2010	Cattle	31.05.10	O	Positive	O

	ECU 7/2010	Cattle	01.06.10	O	Positive	O
	ECU 8/2010	Cattle	01.06.10	O	Positive	O
	ECU 9/2010	Cattle	01.06.10	O	Positive	O
IRAN*	IRN 32/2010	Sheep	12.03.10	NVD	Negative	NVD
	IRN 33/2010	Cattle	15.03.10	O	Positive	O
	IRN 34/2010	Cattle	15.03.10	O	Positive	O
	IRN 35/2010	Cattle	17.03.10	O	Positive	O
	IRN 36/2010	Cattle	27.03.10	A	Positive	A
	IRN 37/2010	Sheep	27.03.10	O	Positive	O
	IRN 38/2010	Sheep	27.03.10	O	Positive	O
	IRN 39/2010	Sheep	27.03.10	O	Positive	O
	IRN 40/2010	Cattle	27.03.10	O	Positive	O
	IRN 41/2010	Sheep	28.03.10	O	Positive	O
	IRN 42/2010	Cattle	28.03.10	NVD	Positive	FMDV GD
	IRN 43/2010	Goat	30.03.10	O	Positive	O
	IRN 44/2010	Sheep	30.03.10	O	Positive	O
	IRN 45/2010	Cattle	30.03.10	NVD	Positive	FMDV GD
	IRN 46/2010	Cattle	30.03.10	NVD	Positive	FMDV GD
	IRN 47/2010	Sheep/Goat	03.04.10	O	Positive	O
	IRN 48/2010	Cattle	03.04.10	O	Positive	O
	IRN 49/2010	Cattle	03.04.10	O	Positive	O
	IRN 50/2010	Cattle	03.04.10	O	Positive	O
	IRN 51/2010	Cattle	03.04.10	O	Positive	O
	IRN 52/2010	Cattle	03.04.10	O	Positive	O
	IRN 53/2010	Cattle	04.04.10	NVD	Positive	FMDV GD
	IRN 54/2010	Cattle	04.04.10	O	Positive	O
	IRN 55/2010	Cattle	04.04.10	O	Positive	O
	IRN 56/2010	Goat	27.03.10	NVD	Positive	FMDV GD
	IRN 57/2010	Cattle	22.03.10	NVD	Positive	FMDV GD
	IRN 58/2010	Cattle	25.03.10	NVD	Positive	FMDV GD
	IRN 59/2010	Sheep	27.03.10	O	Positive	O
	IRN 60/2010	Sheep	01.04.10	O	Positive	O
	IRN 61/2010	Cattle	02.04.10	O	Positive	O
	IRN 62/2010	Sheep	03.04.10	O	Positive	O
	IRN 63/2010	Cattle	04.04.10	NVD	Positive	FMDV GD
	IRN 64/2010	Cattle	04.04.10	O	Positive	O
	IRN 65/2010	Cattle	05.04.10	O	Positive	O
	IRN 66/2010	Cattle	05.04.10	O	Positive	O
	IRN 67/2010	Cattle	05.04.10	O	Positive	O
	IRN 68/2010	Cattle	06.04.10	O	Positive	O
	IRN 69/2010	Cattle	06.04.10	O	Positive	O
	IRN 70/2010	Goat	07.04.10	NVD	Negative	NVD
	IRN 71/2010	Cattle	08.04.10	O	Positive	O
	IRN 72/2010	Goat	09.04.10	NVD	Negative	NVD
	IRN 73/2010	Cattle	09.04.10	A	Positive	A
	IRN 74/2010	Sheep	10.04.10	NVD	Positive	FMDV GD
	IRN 75/2010	Cattle	10.04.10	O	Positive	O
	IRN 76/2010	Cattle	10.04.10	O	Positive	O
	IRN 77/2010	Cattle	10.04.10	NVD	Positive	FMDV GD
	IRN 78/2010	Cattle	10.04.10	O	Positive	O
	IRN 79/2010	Sheep	10.04.10	O	Positive	O
	IRN 80/2010	Cattle	11.04.10	A	Positive	A
	IRN 81/2010	Cattle	11.04.10	O	Positive	O
	IRN 82/2010	Cattle	12.04.10	O	Positive	O

IRN 83/2010	Cattle	12.04.10	O	Positive	O
IRN 84/2010	Cattle	12.04.10	NVD	Positive	FMDV GD
IRN 85/2010	Cattle	12.04.10	O	Positive	O
IRN 86/2010	Cattle	13.04.10	O	Positive	O
IRN 87/2010	Sheep	13.04.10	NVD	Positive	FMDV GD
IRN 88/2010	Cattle	13.04.10	O	Positive	O
IRN 89/2010	Sheep	13.04.10	O	Positive	O
IRN 90/2010	Cattle	14.04.10	O	Positive	O
IRN 91/2010	Cattle	14.04.10	O	Positive	O
IRN 92/2010	Cattle	14.04.10	O	Positive	O
IRN 93/2010	Cattle	14.04.10	O	Positive	O
IRN 94/2010	Cattle	15.04.10	O	Positive	O
IRN 95/2010	Cattle	15.04.10	O	Positive	O
IRN 96/2010	Cattle	16.04.10	O	Positive	O
IRN 97/2010	Sheep	16.04.10	O	Positive	O
IRN 98/2010	Cattle	16.04.10	O	Positive	O
IRN 99/2010	Sheep	17.04.10	O	Positive	O
IRN 100/2010	Cattle	17.04.10	O	Positive	O
IRN 101/2010	Cattle	17.04.10	O	Positive	O
IRN 102/2010	Sheep	17.04.10	O		O
IRN 103/2010	Sheep	17.04.10	NVD		
IRN 104/2010	Cattle	17.04.10	O		O
IRN 105/2010	Cattle	17.04.10	O		O
IRN 106/2010	Sheep	17.04.10	O		O
IRN 107/2010	Cattle	18.04.10	NVD		
IRN 108/2010	Cattle	18.04.10			
IRN 109/2010	Cattle	19.04.10	O		O
IRN 110/2010	Cattle	19.04.10			
IRN 111/2010	Sheep	19.04.10			
IRN 112/2010	Cattle	19.04.10			
IRN 113/2010	Cattle	19.04.10			
IRN 114/2010	Sheep	19.04.10			
IRN 115/2010	Sheep	19.04.10			
IRN 116/2010	Sheep	19.04.10			
IRN 117/2010	Cattle	19.04.10			
IRN 118/2010	Sheep	19.04.10			
IRN 119/2010	Cattle	20.04.10			
IRN 120/2010	Cattle	20.04.10			
IRN 121/2010	Cattle	20.04.10			
IRN 122/2010	Cattle	20.04.10			
IRN 123/2010	Cattle	21.04.10			
IRN 124/2010	Sheep	21.04.10			
IRN 125/2010	Cattle	21.04.10			
IRN 126/2010	Cattle	21.04.10			
IRN 127/2010	Cattle	22.04.10			
IRN 128/2010	Cattle	22.04.10			
IRN 129/2010	Cattle	22.04.10			
IRN 130/2010	Cattle	22.04.10			
IRN 131/2010	Cattle	22.04.10			
IRN 132/2010	Cattle	22.04.10			
IRN 133/2010	Sheep	23.04.10			
IRN 134/2010	Cattle	23.04.10			
IRN 135/2010	Cattle	24.04.10			
IRN 136/2010	Cattle	24.04.10			
IRN 137/2010	Cattle	24.04.10			

	IRN 138/2010	Sheep	24.04.10			
	IRN 139/2010	Sheep	25.04.10			
	IRN 140/2010	Cattle	25.04.10			
	IRN 141/2010	Goat	25.04.10			
	IRN 142/2010	Cattle	26.04.10			
	IRN 143/2010	Sheep	26.04.10			
	IRN 144/2010	Goat	26.04.10			
	IRN 145/2010	Goat	26.04.10			
	IRN 146/2010	Cattle	26.04.10			
	IRN 147/2010	Cattle	26.04.10			
	IRN 148/2010	Sheep	27.04.10			
	IRN 149/2010	Cattle	27.04.10			
	IRN 150/2010	Cattle	27.04.10			
	IRN 151/2010	Cattle	27.04.10			
	IRN 152/2010	Sheep	27.04.10			
	IRN 153/2010	Sheep	27.04.10			
	IRN 154/2010	Cattle	30.04.10			
	IRN 155/2010	Cattle	09.05.10			
	IRN 156/2010	Cattle	09.05.10			
	IRN 157/2010	Cattle	11.05.10			
	IRN 158/2010	Cattle	13.05.10			
	IRN 159/2010	NK	00.00.10			
	IRN 160/2010	NK	00.00.10			
	IRN 161/2010	NK	00.00.10			
	IRN 162/2010	NK	00.00.10			
	IRN 163/2010	NK	00.00.10			
	IRN 164/2010	NK	00.00.10			
	IRN 165/2010	NK	00.00.10			
	IRN 166/2010	NK	00.00.10			
	IRN 167/2010	NK	00.00.10			
	IRN 168/2010	NK	00.00.10			
	IRN 169/2010	NK	00.00.10			
	IRN 170/2010	NK	00.00.10			
	IRN 171/2010	NK	00.00.10			
	IRN 172/2010	NK	00.00.10	O	Positive	O
	IRN 173/2010	NK	00.00.10	O	Positive	O
KENYA*	KEN 120/2009	Cattle	14.10.09	NVD	Positive	FMDV GD
	KEN 121/2009	Cattle	30.10.09	SAT 1	Positive	SAT 1
	KEN 122/2009	Cattle	00.00.09	SAT 2	Positive	SAT 2
	KEN 123/2009	Cattle	00.00.09	SAT 1	Positive	SAT 1
	KEN 124/2009	Cattle	17.09.09			
	KEN 125/2009	Cattle	17.09.09			
	KEN 1/2010	Cattle	04.01.10	SAT 1	Positive	SAT 1
	KEN 2/2010	Cattle	08.01.10	NVD	Negative	NVD
	KEN 3/2010	Cattle	12.01.10	SAT 1	Positive	SAT 1
	KEN 4/2010	Heartbeast	15.01.10	SAT 1	Positive	SAT 1
	KEN 5/2010	Cattle	15.01.10	SAT 1	Positive	SAT 1
	KEN 6/2010	Cattle	15.01.10	SAT 1	Positive	SAT 1
	KEN 7/2010	Sheep	18.01.10	NVD	Negative	NVD
	KEN 8/2010	Cattle	18.01.10	SAT 1	Positive	SAT 1
	KEN 9/2010	Cattle	20.01.10	NVD	Positive	FMDV GD
	KEN 10/2010	Cattle	19.01.10	SAT 1	Positive	SAT 1
	KEN 11/2010	Cattle	26.01.10	NVD	Positive	FMDV GD
	KEN 12/2010	Cattle	19.01.10	SAT 1	Positive	SAT 1



KEN 13/2010	Cattle	30.01.10	SAT 1	Positive	SAT 1
KEN 14/2010	Cattle	05.02.10	SAT 1	Positive	SAT 1
KEN 15/2010	Cattle	09.02.10	Not tested	Not tested	Not tested
KEN 16/2010	Cattle	09.02.10	Not tested	Not tested	Not tested
KEN 17/2010	Cattle	09.02.10	Not tested	Not tested	Not tested
KEN 18/2010	Cattle	09.02.10	Not tested	Not tested	Not tested
KEN 19/2010	Cattle	09.02.10	Not tested	Not tested	Not tested
KEN 20/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 21/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 22/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 23/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 24/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 25/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 26/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 27/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 28/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 29/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 30/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 31/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 32/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 33/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 34/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 35/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 36/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 37/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 38/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 39/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 40/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 41/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 42/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 43/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 44/2010	Cattle	09.02.10	NVD	Negative	NVD
KEN 45/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 46/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 47/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 48/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 49/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 50/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 51/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 52/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 53/2010	Cattle	10.02.10	NVD	Positive	FMDV GD
KEN 54/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 55/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 56/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 57/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 58/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 59/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 60/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 61/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 62/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 63/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 64/2010	Cattle	10.02.10	Not tested	Not tested	Not tested
KEN 65/2010	Cattle	10.02.10	Not tested	Not tested	Not tested
KEN 66/2010	Cattle	10.02.10	Not tested	Not tested	Not tested
KEN 67/2010	Cattle	10.02.10	Not tested	Not tested	Not tested



KEN 68/2010	Cattle	12.02.10	NVD	Positive	FMDV GD
KEN 69/2010	Cattle	07.02.10	O	Positive	O
KEN 70/2010	Cattle	10.02.10	NVD	Negative	NVD
KEN 71/2010	Cattle	21.02.10	SAT 1	Positive	SAT 1
KEN 72/2010	Cattle	24.02.10	SAT 1	Positive	SAT 1
KEN 73/2010	Cattle	25.02.10	NVD	Positive	FMDV GD
KEN 74/2010	Cattle	28.02.10	NVD	Positive	FMDV GD
KEN 75/2010	Cattle	04.03.10	SAT 1	Positive	SAT 1
KEN 76/2010	Cattle	04.03.10	SAT 1	Positive	SAT 1
KEN 77/2010	Cattle	10.03.10	SAT 1	Positive	SAT 1
KEN 78/2010	Cattle	11.03.10	SAT 1	Positive	SAT 1
KEN 79/2010	Cattle	15.03.10	NVD	Positive	FMDV GD
KEN 80/2010	Cattle	15.03.10	SAT 1	Positive	SAT 1
KEN 81/2010	Cattle	15.03.10	NVD	Positive	FMDV GD
KEN 82/2010	Cattle	18.03.10			
KEN 83/2010	Cattle	18.03.10			
KEN 84/2010	Cattle	18.03.10			
KEN 85/2010	Cattle	24.03.10			
KEN 86/2010	Cattle	26.03.10			
KEN 87/2010	Cattle	26.03.10			
KEN 88/2010	Cattle	26.03.10			
KEN 89/2010	Cattle	26.03.10			
KEN 90/2010	Cattle	26.03.10			
KEN 91/2010	Cattle	26.03.10			
KEN 92/2010	Cattle	06.04.10			
KEN 93/2010	Cattle	09.04.10			
KEN 94/2010	Cattle	10.04.10			
KEN 95/2010	Cattle	17.04.10			
KEN 96/2010	Cattle	20.04.10			
KEN 97/2010	Cattle	21.04.10			
KEN 98/2010	Cattle	21.04.10			
KEN 99/2010	Cattle	21.04.10			
KEN 100/2010	Cattle	28.04.10			
KEN 101/2010	Cattle	03.05.10			
KEN 102/2010	Cattle	06.05.10			
KEN 103/2010	Cattle	07.05.10			
KEN 104/2010	Cattle	07.05.10			
KEN 105/2010	Cattle	07.05.10			
KEN 106/2010	Cattle	07.05.10			
KEN 107/2010	Cattle	07.05.10			
KEN 108/2010	Cattle	07.05.10			
KEN 109/2010	Cattle	12.05.10			
KEN 110/2010	Cattle	12.05.10			
KEN 111/2010	Cattle	13.05.10			
KEN 112/2010	Cattle	14.05.10			
KEN 113/2010	Cattle	14.05.10			
KEN 114/2010	Cattle	14.05.10			
KEN 115/2010	Cattle	14.05.10			
KEN 116/2010	Cattle	18.05.10			
KEN 117/2010	Cattle	18.05.10			
KEN 118/2010	Cattle	19.05.10			
KEN 119/2010	Cattle	19.05.10			
KEN 120/2010	Cattle	19.05.10			
KEN 121/2010	Cattle	19.05.10			
KEN 122/2010	Cattle	19.05.10			

	KEN 123/2010	Cattle	21.05.10			
	KEN 124/2010	Cattle	24.05.10			
	KEN 125/2010	Cattle	24.05.10			
	KEN 126/2010	Cattle	24.05.10			
	KEN 127/2010	Cattle	25.05.10			
	KEN 128/2010	Cattle	26.05.10			
	KEN 129/2010	Cattle	27.05.10			
	KEN 130/2010	Cattle	27.05.10			
	KEN 131/2010	Cattle	27.05.10			
	KEN 132/2010	Cattle	27.05.10			
	KEN 133/2010	Cattle	06.06.10			
PAKISTAN	PAK 1/2010	Cattle	15.02.10	O	Positive	O
	PAK 2/2010	Cattle	15.02.10	O	Positive	O
	PAK 3/2010	Cattle	15.02.10	O	Positive	O
	PAK 4/2010	Cattle	15.02.10	O	Positive	O
	PAK 5/2010	Cattle	15.02.10	O	Positive	O
	PAK 6/2010	Cattle	15.02.10	O	Positive	O
	PAK 7/2010	Cattle	17.02.10	O	Positive	O
	PAK 8/2010	Cattle	22.02.10	O	Positive	O
	PAK 9/2010	Cattle	25.02.10	O	Positive	O
	PAK 10/2010	Buffalo	26.02.10	NVD	Positive	FMDV GD
	PAK 11/2010	Cattle	26.02.10	NVD	Positive	FMDV GD
	PAK 12/2010	Buffalo	26.02.10	A	Positive	A
	PAK 13/2010	Buffalo	26.02.10	A	Positive	A
	PAK 14/2010	Cattle	26.02.10	O	Positive	O
	PAK 15/2010	Cattle	10.03.10	O	Positive	O
	PAK 16/2010	Cattle	12.03.10	O	Positive	O
	PAK 17/2010	Cattle	12.03.10	O	Positive	O
	PAK 18/2010	Cattle	12.03.10	O	Positive	O
	PAK 19/2010	Cattle	12.03.10	O	Positive	O
	PAK 20/2010	Cattle	12.03.10	O	Positive	O
	PAK 21/2010	Buffalo	22.03.10	O	Positive	O
	PAK 22/2010	Cattle	22.03.10	O	Positive	O
	PAK 23/2010	Buffalo	22.03.10	A	Positive	A
	PAK 24/2010	Buffalo	22.03.10	A	Positive	A
QATAR	QTR 1/2010	Cattle	05.05.10	NVD	Negative	NVD
	QTR 2/2010	Cattle	05.05.10	NVD	Negative	NVD
	QTR 3/2010	Cattle	05.05.10	NVD	Negative	NVD
	QTR 4/2010	Cattle	05.05.10	NVD	Negative	NVD
	QTR 5/2010	Cattle	05.05.10	NVD	Negative	NVD
	QTR 6/2010	Cattle	05.05.10	NVD	Negative	NVD
	QTR 7/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 8/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 9/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 10/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 11/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 12/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 13/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 14/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 15/2010	Sheep	06.05.10	NVD	Negative	NVD
	QTR 16/2010	Sheep	17.05.10	NVD	Negative	NVD
	QTR 17/2010	Sheep	17.05.10	NVD	Negative	NVD

SOUTH KOREA	SKR 1/2010	Cattle	07.01.10	NVD	Positive	FMDV GD
	SKR 2/2010	Cattle	07.01.10	A	Positive	A
	SKR 3/2010	Cattle	07.04.10	NVD	Positive	FMDV GD
	SKR 4/2010	Cattle	07.04.10	O	Positive	O
TURKEY***	TUR 32/2007	Cattle	00.00.07	Not done	Not done	O
	TUR 33/2007	Cattle	00.00.07	Not done	Not done	O
	TUR 34/2007	Cattle	00.00.07	Not done	Not done	O
	TUR 35/2007	Cattle	00.00.07	Not done	Not done	O
	TUR 36/2007	Cattle	00.00.07	Not done	Not done	O
	TUR 41/2008	Cattle	00.00.08	Not done	Not done	O
	TUR 42/2008	Cattle	00.00.08	Not done	Not done	O
	TUR 44/2008	Cattle	00.00.08	Not done	Not done	O
UNITED ARAB EMIRATES	UAE 1/2010	Gazelle	29.03.10	O	Positive	O
	UAE 2/2010	Gazelle	29.03.10	O	Positive	O
	UAE 3/2010	Gazelle	29.03.10	O	Positive	O
	UAE 4/2010	Gazelle	29.03.10	O	Positive	O
	UAE 5/2010	Antelope	14.04.10	NVD	Negative	NVD
	UAE 6/2010	Sheep	15.04.10	NVD	Negative	NVD
	UAE 7/2010	Gazelle	18.04.10	NVD	Negative	NVD

TOTAL : 445

\* **Note:** At time of report, analysis of some samples was not complete.

\*\* all samples from Afghanistan were supplied in RNA later for PCR analysis and serotypes were defined by sequencing

\*\*\* 8 type O samples from Turkey submitted for full length genome sequencing

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 (April-June 2010)**

Country	No. of samples	FMD virus serotypes									
		O	A	C	SAT 1	SAT 2	SAT 3	Asia 1	NVD	Positive	Negative
AFGHANISTAN*	95	43	17	-	-	-	-	-	-	85	10
ECUADOR	9	9	-	-	-	-	-	-	-	9	-
IRAN*	142	59	3	-	-	-	-	-	3	74	3
KENYA*	85	1	-	-	19	1	-	-	46	30	44
REPUBLIC OF KOREA	4	1	1	-	-	-	-	-	2	4	-
PAKISTAN	24	18	3	-	-	-	-	-	-	24	-
QATAR	17	-	-	-	-	-	-	-	17	-	17
TURKEY	8	8	-	-	-	-	-	-	-	8	-
UNITED ARAB EMIRATES	7	4	-	-	-	-	-	-	3	4	3
	<b>391</b>	<b>100</b>	<b>24</b>	<b>-</b>	<b>19</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>71</b>	<b>238</b>	<b>77</b>

\* **Note:** At time of report, analysis of some samples was not complete.

\*\* all samples from Afghanistan were supplied in RNA later for PCR analysis and serotypes were defined by sequencing

\*\*\* 8 type O samples from Turkey submitted for full length genome sequencing

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 C: Antigenic characterisation of FMD field isolates by matching with vaccine strains by VNT and/or LPBE – r1 value data from 1<sup>st</sup> April to 30<sup>th</sup> June 2010**

Type O:

r1 values by 2dmVNT and LPBE for serotype O virus									
Vaccine strains	O Manisa		O Ind R2/75	O BFS		O Taw98	O Tai 189/87	O 4174	O Hkn 6/83
Field isolates	LPBE	VNT	VNT	LPBE	VNT	VNT	LPBE	LPBE	LPBE
HKN 01/2010		0.50	>1.0		0.51	0.72			
IRN 80/2009	0.50	0.39	>1.0		0.47				
IRN 01/2010	0.75	0.31	>1.0	0.25	0.36			0.13	
IRN 30/2010	0.59	0.41	>0.95	0.36	0.78			0.62	
SKR 4/2010	0.42	0.57	0.71	0.06	0.36	0.48	1.00		0.15

Type A:

r1 values by 2dmVNT and LPBE for serotype A virus												
Vaccine strains	A22 Irg		A Tur06	A Ind 17/82	SAU 41/91	Eri98	Im 87	IRN96	May-97		IRN99	
Field isolates	LPBE	VNT	VNT	VNT	VNT	LPBE	LPBE	VNT	VNT	LPBE	VNT	LPBE
A IRN 78/2009	0.05	0.23	0.43	0.45	0.11	0.38	0.26	0.32	0.28			0.21
A IRN 09/2010		0.13	0.34	0.44	0.13	0.36	0.29	0.21	0.16			0.05
A SKR 2/2010	0.1	0.13	0.28	0.17		0.29		0.16	0.10	0.42	0.44	0.25

**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. Ayebazibwe C, Mwiine FN, Balinda SN, Tjørnehøj K, Masembe C, Muwanika VB, Okurut AR, Siegismund HR, Alexandersen S. Antibodies Against Foot-and-mouth Disease (FMD) Virus in African Buffalos (*Syncerus caffer*) in Selected National Parks in Uganda (2001-2003). *Transbound Emerg Dis.* 2010 Jun 18. [Epub ahead of print] PubMed PMID: 20561289.
2. Cong W, Cui S, Chen J, Zuo X, Lu Y, Yan W, Zheng Z. Construction of a multiple targeting RNAi plasmid that inhibits target gene expression and FMDV replication in BHK-21 cells and suckling mice. *Vet Res Commun.* 2010 Apr;34(4):335-46. Epub 2010 May 7. PubMed PMID: 20446035.
3. Ghoneim NH, Abdel-Karim AK, El-Shehawly L, Abdel-Moein KA. Foot and mouth disease in animals in Sharkia governorate - Egypt. *Transbound Emerg Dis.* 2010 Apr;57(1-2):19-21. PubMed PMID: 20537095.
4. Jamal SM, Ahmed S, Hussain M, Ali Q. Status of foot-and-mouth disease in Pakistan. *Arch Virol.* 2010 Jun 23. [Epub ahead of print] PubMed PMID: 20571838.
5. Kim SM, Lee KN, Lee SJ, Ko YJ, Lee HS, Kweon CH, Kim HS, Park JH. Multiple shRNAs Driven by U6 and CMV Promoter Show Enhanced of Antiviral Effects against Foot-and-Mouth Disease Virus. *Antiviral Res.* 2010 Jun 15. [Epub ahead of print] PubMed PMID: 20561543.
6. Kreienbrock L, Willms H, Selhorst T, Ovelhey A, Haas L, Moennig V, Kramer M. [Transmission risk for foot-and-mouth-disease in an animal-densed region in Germany--results from an expert survey]. *Berl Munch Tierarztl Wochenschr.* 2010 Mar-Apr;123(3-4):89-95. German. PubMed PMID: 20329640.
7. Le VP, Nguyen T, Park JH, Kim SM, Ko YJ, Lee HS, Nguyen VC, Mai TD, Do TH, Cho IS, Lee KN. Heterogeneity and genetic variations of serotypes O and Asia 1 foot-and-mouth disease viruses isolated in Vietnam. *Vet Microbiol.* 2010 Apr 18. [Epub ahead of print] PubMed PMID: 20478669.
8. Li D, Liu ZX, Sun P, Li YL, Lu ZJ, Tian MN, Chen YL, Xie BX, Bao HF, Fu YF, Cao YM, Li PH, Bai XW, Sun JC, Guo JH, Liu XT, Xie QG. The efficacy of FMD vaccine reduced non-structural proteins with a mAb against 3B protein. *Vet Res Commun.* 2010 Jun;34(5):445-57. Epub 2010 May 30. PubMed PMID: 20512625.
9. 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.* 2010 Jun 9. [Epub ahead of print] PubMed PMID: 20541234.
10. Paton DJ, Sinclair M, Rodríguez R. Qualitative Assessment of the Commodity Risk for Spread of Foot-and-Mouth Disease Associated with International Trade in Deboned Beef. *Transbound Emerg Dis.* 2010 Jun;57(3):115-34. PubMed PMID: 20569417.
11. Reid SM, Pierce KE, Mistry R, Bharya S, Dukes JP, Volpe C, Wangh LJ, King DP. Pan-serotypic detection of foot-and-mouth disease virus by RT linear-after-the-exponential PCR. *Mol Cell Probes.* 2010 Apr 28. [Epub ahead of print] PubMed PMID: 20433917.
12. Rodríguez-Calvo T, Ojosnegros S, Sanz-Ramos M, García-Arriaza J, Escarmís C, Domingo E, Sevilla N. New vaccine design based on defective genomes that combines features of attenuated and inactivated vaccines. *PLoS One.* 2010 Apr 29;5(4):e10414. PubMed PMID: 20454676; PubMed Central PMCID: PMC2861626.
13. Sammin D, Ryan E, Ferris NP, King DP, Zientara S, Haas B, Yadin H, Alexandersen S, Sumption K, Paton DJ. Options for Decentralized Testing of Suspected Secondary Outbreaks of Foot-and-mouth Disease. *Transbound Emerg Dis.* 2010 Jun 1. [Epub ahead of print] PubMed PMID: 20545909.
14. Yang S, Yang J, Zhang G, Wang X, Qiao S, Zhao D, Zhi Y, Li X, Xing G, Luo J, Fan J, Bao D. Development of an immunochromatographic strip for the detection of antibodies against foot-and-

mouth disease virus serotype O. J Virol Methods. 2010 May;165(2):139-44. Epub 2010 Jan 25.  
PubMed PMID: 20100515.

### Additional Submission to Promed

1. \*Submission to Promed mail (Archive number: 20100514.1578) 14/05/2010: Sequence submission to Promed mail: **Full genome sequence of serotype O virus from Hong Kong.** [Byline: Nor Faizah Abdul Hamid, Jemma Wadsworth, Nick Knowles, Jef Hammond and Donald King, OIE/FAO Reference Laboratory for FMD (WRLFMD) Institute for Animal Health Pirbright United Kingdom]

**\*The full submission and Promed response is shown below.**

A full genome sequence Date: Fri 14 May 2010 From: Donald king (IAH-P) <donald.king@bbsrc.ac.uk>

Foot & mouth disease - Far East (P.R. China [including Hong Kong SAR], Republic of Korea and Japan)

-----  
The FAO/OIE Reference Laboratory for FMD at the Institute for Animal Health (UK) have determined the full genome sequence for a representative serotype O isolate recovered from the recent outbreaks of FMD that have occurred in the Far East. Since February this year, outbreaks due to the southeast Asia topotype (Mya-98 lineage) of serotype O have been confirmed in PR China (including Hong Kong SAR), Republic of Korea and Japan. VPI sequence analysis undertaken at the IAH shows that viruses from Japan, Republic of Korea and Hong Kong SAR are closely related to each other (sharing nucleotide identities >97 percent; <[http://www.wrlfmd.org/fmd\\_genotyping/](http://www.wrlfmd.org/fmd_genotyping/)>).

A full genome sequence (8123 nucleotides) was generated from an isolate obtained from a pig with epithelial lesions that was sampled in Hong Kong SAR on 3 Mar 2010. This sequence (draft GenBank submission) is attached to the end of this bulletin or can be found at <[http://www.wrlfmd.org/fmd\\_genotyping/far\\_east\\_2010.htm](http://www.wrlfmd.org/fmd_genotyping/far_east_2010.htm)>. During previous FMD outbreaks in the UK (2001 and 2007), full genome sequence data has been used to reconstruct transmission pathways at the farm-to-farm level: for examples see Cottam et al., 2006, and Cottam et al., 2008. This approach could be used now to support epidemiological investigations that are being conducted to understand the regional and local spread of the virus in Asia.

This sequence can also be used to check the suitability of molecular tests used for the diagnosis of FMD in the region.

Further information, including detailed laboratory RT-PCR protocols used to generate this sequence, can be obtained from WRLFMD: <[faizah.hamid@bbsrc.ac.uk](mailto:faizah.hamid@bbsrc.ac.uk)>, <[jef.hammond@bbsrc.ac.uk](mailto:jef.hammond@bbsrc.ac.uk)> or <[donald.king@bbsrc.ac.uk](mailto:donald.king@bbsrc.ac.uk)>.

### References:

Cottam et al., (2006) Molecular Epidemiology of Foot-and-mouth disease virus outbreak in the United Kingdom. J. Virol. 80: 11274. Cottam et al., (2008) Transmission pathways of foot-and-mouth disease virus in the United Kingdom in 2007. PLoS Pathogens 4: e1000050.

### Response from Promed

**[The authors are gratefully acknowledged for the above 1st-hand information, an exemplary expression of international scientific cooperation. Hopefully, this will lead to the elucidation of the epidemiological history of the epizootic and assist in its early eradication. - Mod.AS]**

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

### High Priority

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

(not in order of importance)

### Medium Priority

A Eritrea  
 A Iran '96  
 SAT 2 Zimbabwe  
 A Iran 87 or A Saudi Arabia 23/86 (*or equivalent*)  
 SAT 1 South Africa  
 A Malaysia 97 (*or Thai equivalent such as A/NPT/TAI/86*)  
 A Argentina 2001  
 O Taiwan 97 (*pig-adapted strain or Philippine equivalent*)  
 A Iran '99

(not in order of importance)

### Low Priority

A15 Bangkok related strain  
 A87 Argentina related strain  
 C Noville  
 SAT 2 Kenya  
 SAT 1 Kenya  
 SAT 3 Zimbabwe  
 A Kenya

(not in order of importance)