



WRLFMD Quarterly Report October-December 2011

Reference Laboratory Contract Report

1/24/2012

WRLFMD

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**Reference Laboratory Contract Report^{1,2}
October-December 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@iah.ac.uk.

1. PROVISION OF EXPERT CONSULTANCY TO:

1.1 Respond to FFG queries

Discussions relating to queries concerning vaccine bank and site biosecurity issues are ongoing.

1.2 Inform FFG of disease trends

Summary

ASIA

Israel

An outbreak of FMD type O occurred on 15/10/2011 in cattle at Tarshiha, Acco, Hazafon District (RT-PCR and virus isolation positive). No phylogenetic analyses have yet been reported.

Tajikistan

An outbreak of FMD due to type Asia 1 was reported to have occurred on 10/11/2011 in cattle, sheep and goats at Shurobod district, Khatlon. FMD was previously reported in Tajikistan in 2003-04.

P.R. China

Two new outbreaks were reported on 16/10/2011 in cattle at Shuangjing village, Haiyuan, Zhongwei, Ningxia and on 27/12/2011 in pigs at Badong, Badong, Enshi, Hubei. No phylogenetic analyses are currently available.

Taiwan POC

Four new outbreaks of FMD type O have occurred in pigs. On 19/10/2011 in Erlun Township, Yun-Lin (sub-clinical infection, no virus isolated), on 30/10/2011 in Makung City, P'eng-Hu (RT-PCR and virus isolation positive), on 07/12/2011 in Luchu township, T'ao-Yuan (RT-PCR and virus isolation positive); and on 19/12/2011 in Beimen District, T'ai-Nan (RT-PCR and sequencing performed). No phylogenetic analyses have yet been reported.

AFRICA

Namibia

Two outbreaks of FMD SAT 1 have occurred in cattle on 26/11/2011 (Masikili Village, Caprivi) and 19/12/2011 (Ihaha Crushpen, Caprivi). Contact with wild African buffalo (*Syncerus caffer*) was reported. No phylogenetic analysis is yet available.

SOUTH AMERICA

Paraguay

FMD type O was found in cattle on 17/09/2011 at Sargento Loma, San Pedro department. FMD previous occurred in July 2003. A sample was received and VP1 sequencing showed that the virus belonged to the EURO-SA topotypes and was most closely related to O/Corrientes/ARG/06 (4.85% nt difference). It was distinct from the vaccine strain, O₁/Campos/BRA/58 (16% nt difference). A second outbreak occurred in cattle on 30/12/2011 in the Aguaray Amistad district, San Pedro. No phylogenetic analysis is yet available.

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/2011.htm.

WRLFMD vaccine recommendations have not changed from the previous report (Annex 3). However, testing of the PanAsia 2 vaccine is continuing in WRLFMD vaccine matching assays and its ability to match current field strains has been carefully monitored.

A careful watch is still being maintained for further outbreaks of Asia 1 and any isolates obtained are 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 October and December 2011 is shown in Annex 1 Table A. A record of all samples received to IAH-Pirbright (October to December 2011) is shown in Annex 1 Table B.

Table 1: Status of sequencing of samples received by the WRLFMD from October to December 2011.

Batch	Date Recd.	Country	Serotype	No. of samples	No. of sequences	Status
WRLFMD/2011/00041*	29/09/2011	Turkey	O	3	3	Completed
WRLFMD/2011/00041*	29/09/2011	Turkey	A+O	1	2	Completed
WRLFMD/2011/00041*	29/09/2011	Turkey	A	17	17	Completed
WRLFMD/2011/00041*	29/09/2011	Turkey	Asia 1	3	3	Completed
WRLFMD/2011/00042*	29/09/2011	Dem. Rep. of the Congo	O	4	4	Completed
WRLFMD/2011/00042*	29/09/2011	Dem. Rep. of the Congo	A	7	7	Completed
WRLFMD/2011/00043	25/10/2011	Paraguay	O	1	1	Completed
WRLFMD/2011/00044	02/11/2011	Ethiopia	O	10	10	Completed
WRLFMD/2011/00045	03/11/2011	Bahrain	O	2	2	Completed
WRLFMD/2011/00045	03/11/2011	Bahrain	A	1	1	Completed
WRLFMD/2011/00046	21/11/2011	Mongolia	O†	0	0	-
WRLFMD/2011/00047	07/12/2011	Hong Kong SAR, PRC	O	2	2	Completed
WRLFMD/2011/00048	09/12/2011	Malaysia	O	1	1	Completed
WRLFMD/2011/00048	09/12/2011	Malaysia	A	6	6	Completed
WRLFMD/2011/00050	15/12/2011	Ethiopia	O	4	4	Completed
Total				62	63	

*, carried over from the last quarter

†, a single sample (from 2002) was positive on AgELISA but no virus could be isolated nor could a VP1 amplicon be obtained.

Detailed Analysis:**ASIA****Bahrain**

WRLFMD/2011/00045

(No locations given)

Date received: 03/11/2011

No. of samples: 4

O: 2

Topotype: ME-SA

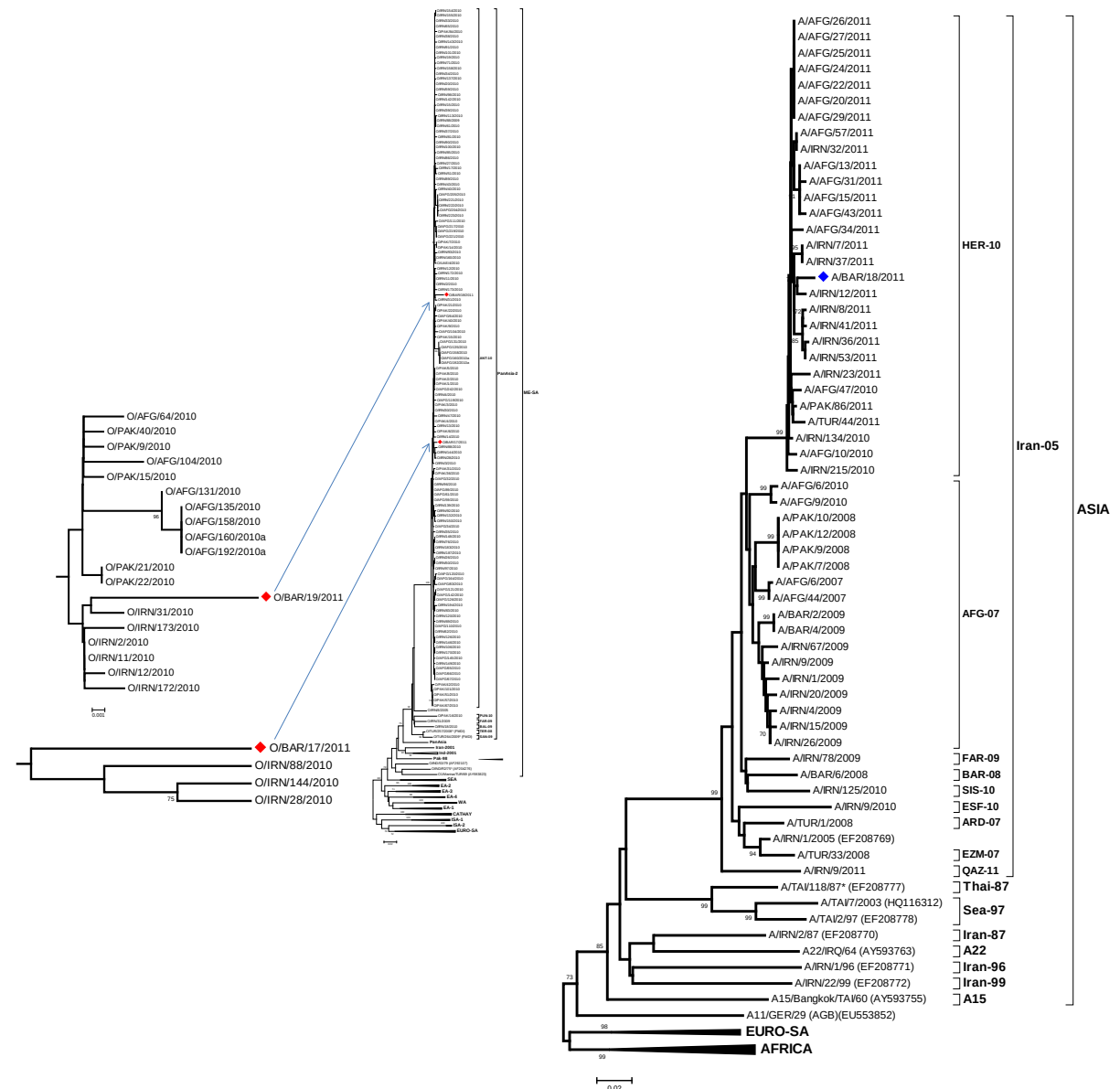
Lineage: PanAsia-2^{ANT-10}

A: 1

Topotype: ASIA

Lineage: Iran-05^{HER-10}

FMDV-GD: 1



Hong Kong SAR, P.R. China

WRLFMD/2011/00047

Date received: 07/12/2011

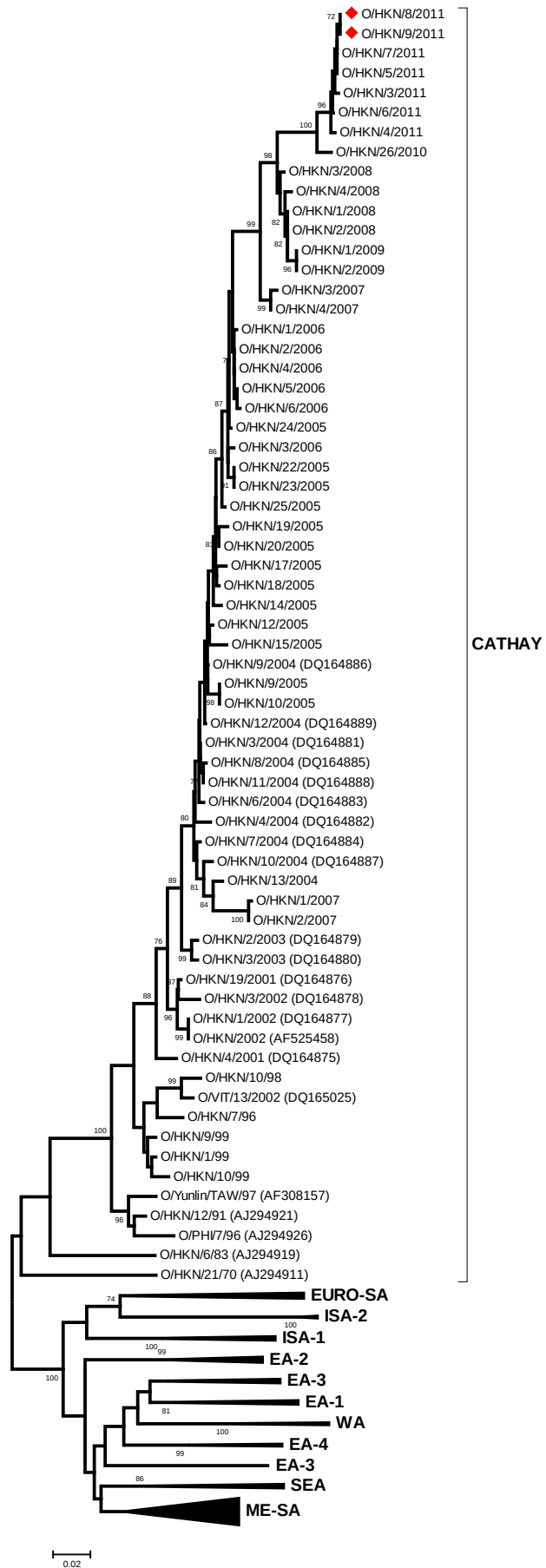
No. of samples: 2

O: 2

Topotype: CATHAY

Lineage: unnamed

(No locations given)



Malaysia

WRLFMD/2011/00048

Date received: 09/12/2011

No. of samples: 29

O: 1

Topotype: SEA

Lineage: Mya-98

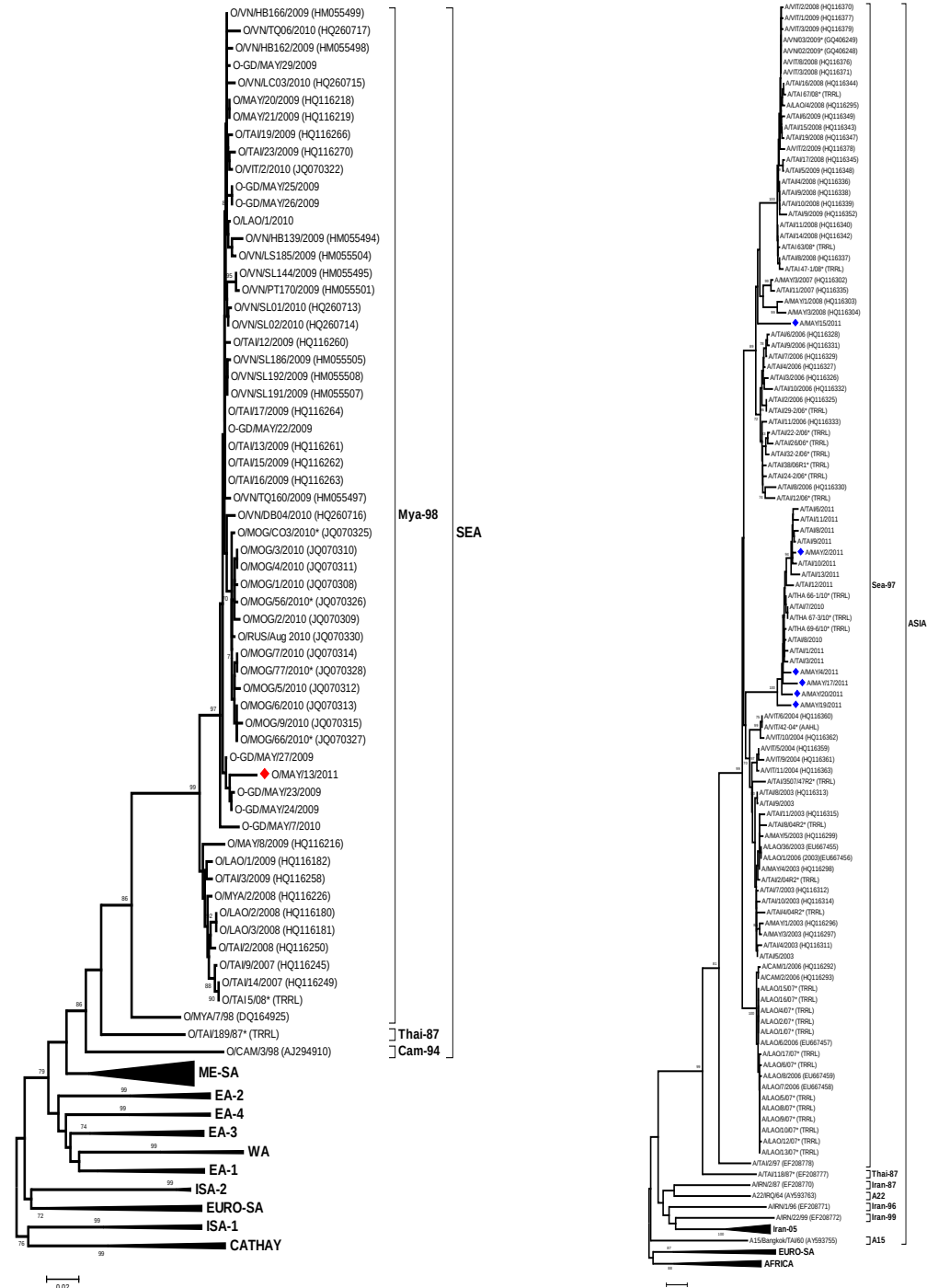
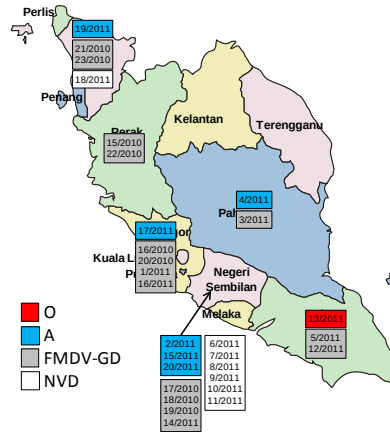
A: 6

Topotype: ASIA

Lineage: Sea-97

FMDV-GD: 15

NVD: 7



Turkey

WRLFMD/2011/00041

Date received: 29/09/2011

No. of samples: 38

O: 3

Topotype: ME-SA

Lineage: PanAsia-2^{ANT-10}

A: 17

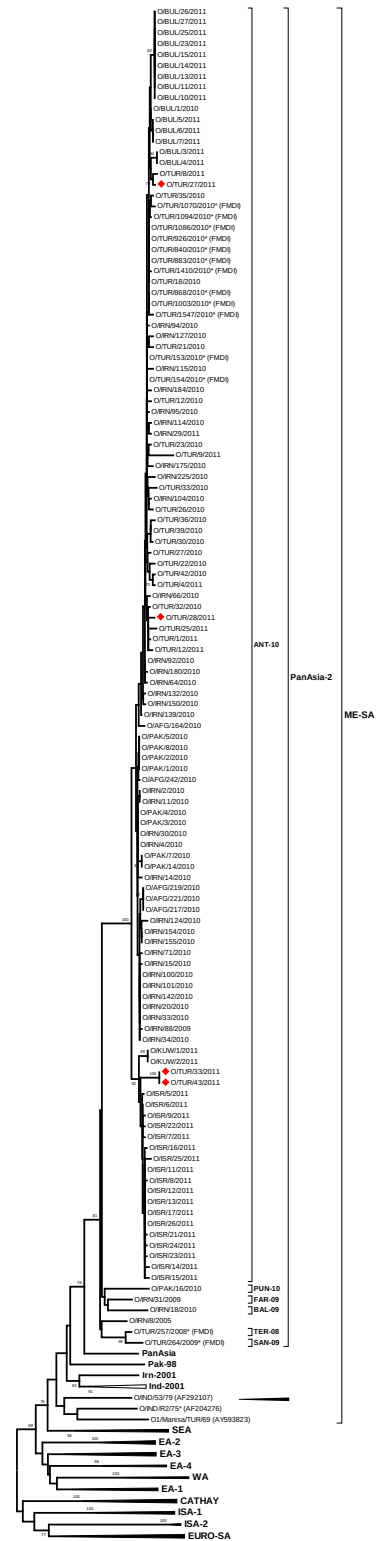
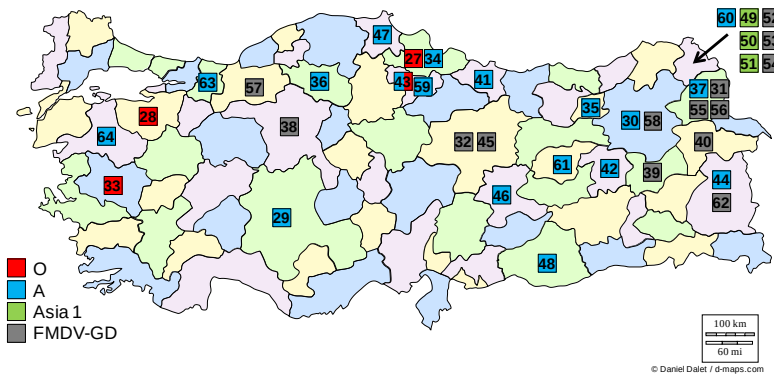
Topotype: ASIA

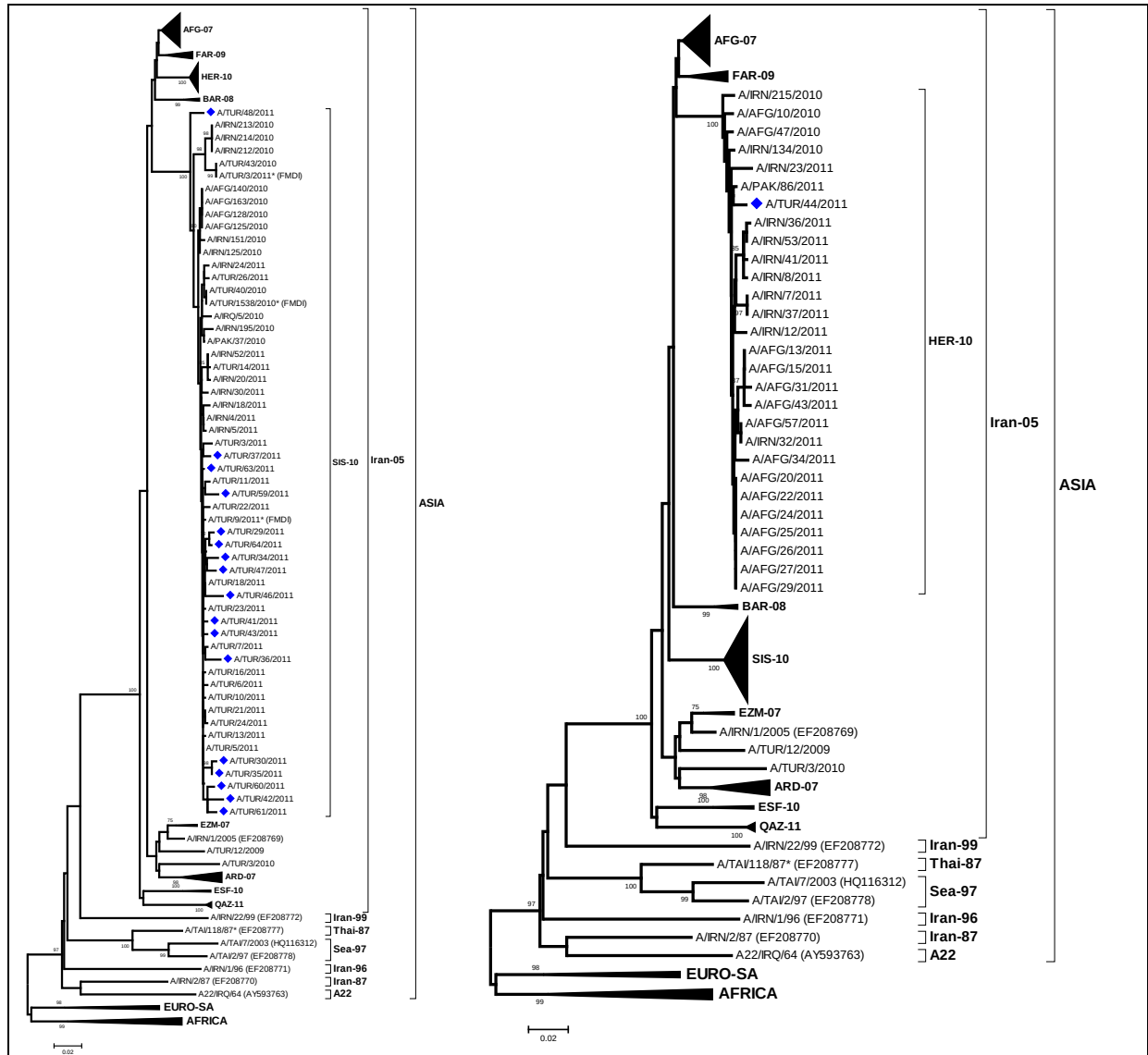
Lineage: Iran-05^{HER-10}(Note: the viruses now designated as Iran-05^{HER-10} and Iran-05^{SIS-10} were previously classified as Iran-05^{AFG-07})

A+O: 1 (only the type O component could be amplified by RT-PCR)

Asia 1: 3

FMDV-GD: 14







Democratic Republic of the Congo

WRLFMD/2011/00042

Date received: 29/09/2011

No. of samples: 20

O: 4

Topotype: EA-2

Lineage: unnamed

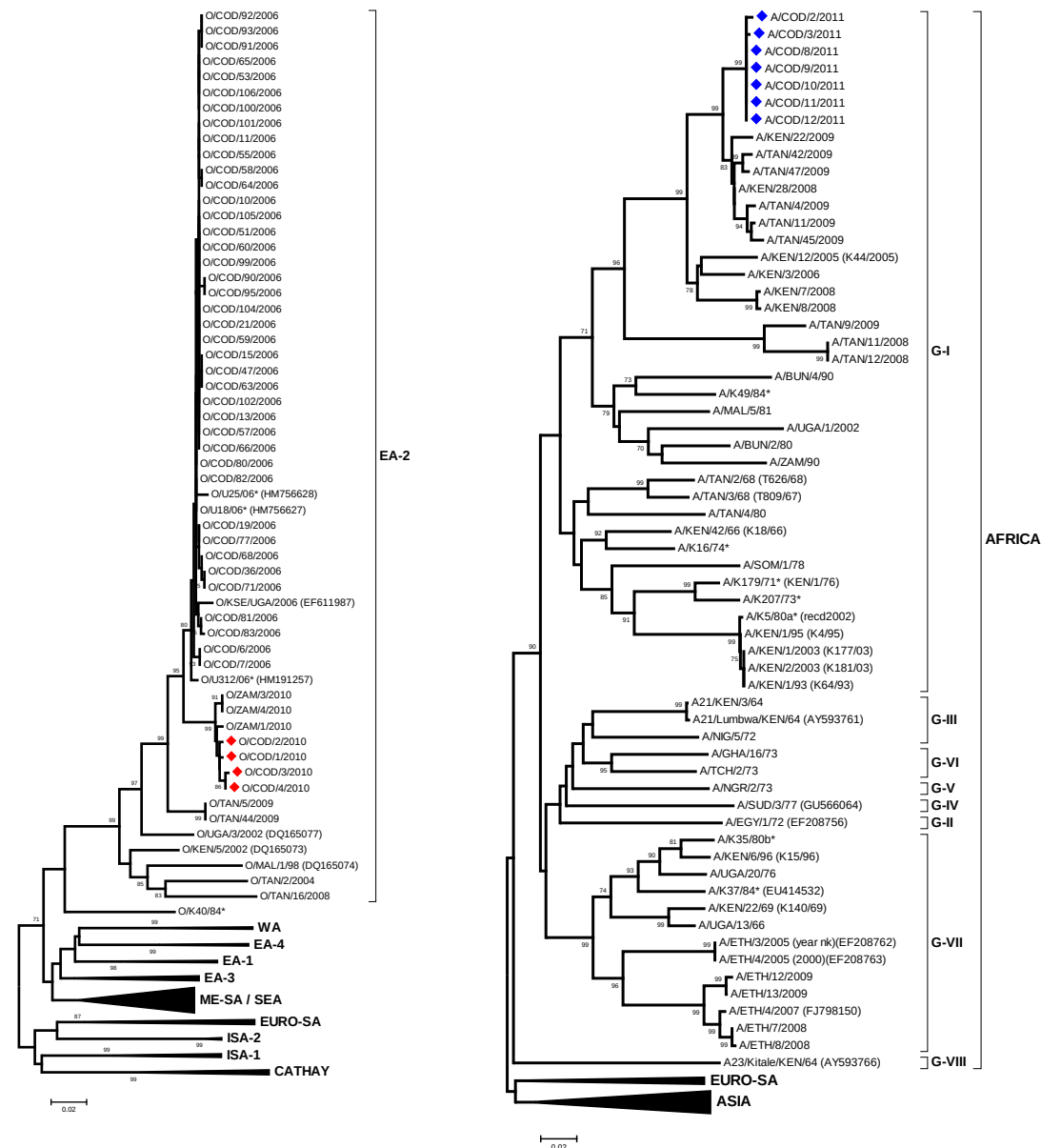
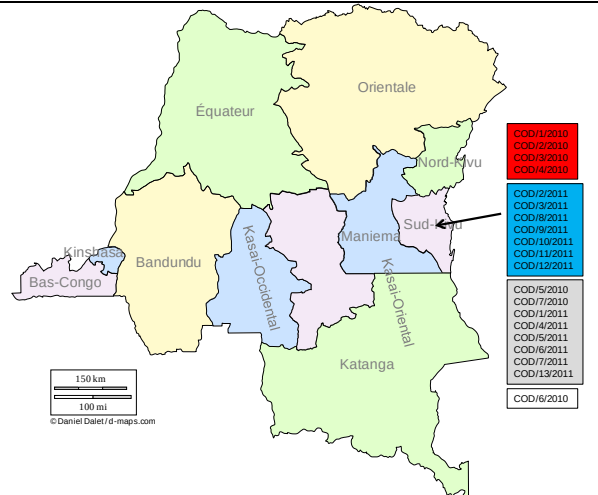
A: 7

Topotype: AFRICA

Lineage: G-I

FMDV-GD: 8

NVD: 1



Ethiopia

WRLFMD/2011/00044

Date received: 02/11/2011

No. of samples: 12

O: 10

Topotype: EA-3

Lineage: unnamed

FMDV-GD: 1

NVD: 1

WRLFMD/2011/00050

Date received: 15/12/2011

No. of samples: 16

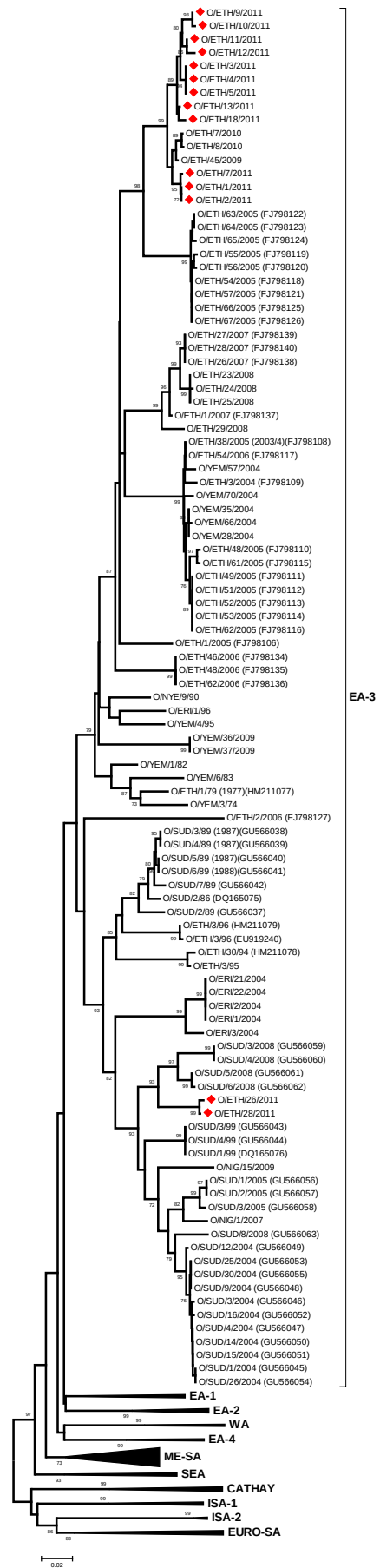
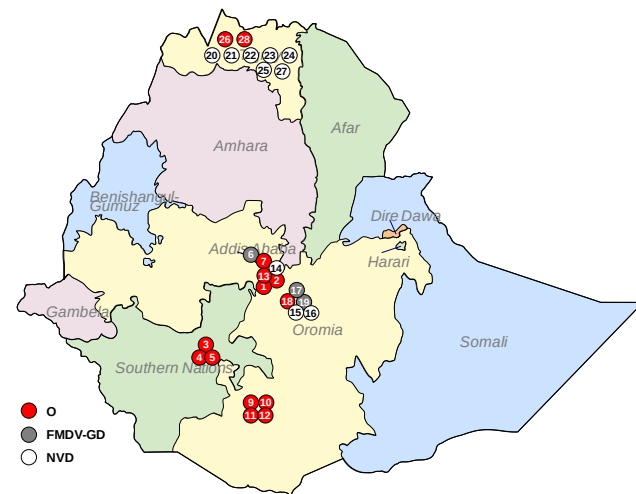
O: 4

Topotype: EA-3

Lineage: unnamed

FMDV-GD: 2

NVD: 10



SOUTH AMERICA

Paraguay

WRLFMD/2011/00043

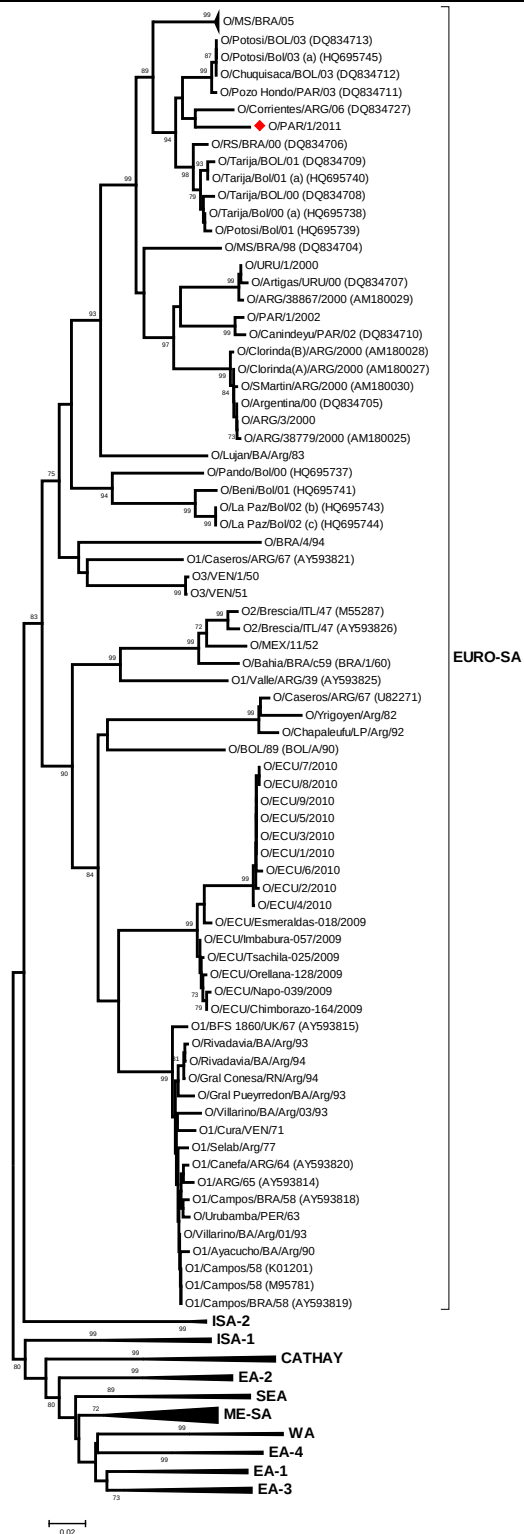
Date received: 25/10/2011

No. of samples: 1

O: 1

Topotype: EURO-SA

Lineage: unnamed

**Vaccine matching**

Three FMDV type O isolates (See Table C, Type O for details) from Turkey and Pakistan collected in 2011 were analysed antigenically by the two dimensional virus neutralisation test (2dmVNT). All isolates were antigenically matched with the testing vaccine strains O 4625, O Campos , O Manisa and O TUR 5/09, in addition, O TUR 33/2011 showed a close match with O TUR 07 (Table C).

Five FMDV type A viruses (see table C, Type A for details) from Turkey, Democratic Republic of Congo and Bahrain collected in 2011 were analysed antigenically by the two dimensional virus neutralisation test (2dmVNT). All isolates except A TUR 29/2011 showed antigenic match with the A TUR 06 vaccine strain. Viruses from Congo were also matched with A IRN 2005 and A₂₂ Iraq (Table C).

Two FMDV type Asia 1 viruses (see table C, Type Asia 1 for details) from Turkey showed no antigenic matching with vaccine strains Asia 1 Shamir, Asia 1 IND 8/79 and Asia 1 WBN (Table C).

1.3 Provide expert advice to national and international committees

International Meetings

Dr Jef Hammond - Head World Reference Laboratory for FMD (WRLFMD), Head Vesicular Disease Reference Laboratories, Head EU Reference Laboratories for FMD and SVD.

- 7/11/11 -11/11/11; With Dr Yanmin Li, Organised and hosted FMD OIE/FAO FMD reference laboratory network vaccine matching workshop at IAH, Pirbright.
- 14/11/11-16/11/11 Organised, hosted and chaired OIE/FAO FMD Reference Laboratories network meeting at IAH, Pirbright.
- 17/11/11-18/11/11 Participant at OIE Expert meeting on FMD vaccine matching in Ecuador at OIE HQ Paris, France. Chaired by Professor Caporale.
- 29/11/11-2/12/11 Invited to Japan by Japanese Government to present plenary lecture and take part in panel discussions on FMD situation in South Asia
- 6/12/11 Attended European CVOs meeting, Brussels. Presented a personal profile on my suitability to be elected as UK representative for SCAD.
- 14/12/11 Hosted visit by Australian CVO
- 16/12/11 attended EU Commission reference laboratory meeting in Brussels.

National Meetings

Dr Jef Hammond

- 7/9/11 Hosted Dr Sharon Turner Director, Biosecurity Strategy Office of the Chief Veterinary Officer Biosecurity Services Group, Department of Agriculture, Fisheries & Forestry Australia
- 9/9/11 Invited to Defra for discussions on FMD preparedness with staff from DAFF Australia.
- 13/9/11 Attended AHVLA conference
- 23/6/11 Hosted Korean delegation and Intervet and Merial representatives- gave a presentation entitled 'Current Situation and Future Status of FMD'
- 30/9/11 Hosted Mr Chris Morrissey from the Australian Animal Health Laboratory to discuss diagnostics for FMD and supply of reagents to Australia.

Molecular characterisation and diagnostics (MCD) group

- Begoña Valdazo-Gonzalez (14/11/11): talk – Use of Full genome sequencing to reconstruct transmission routes during the 2011 FMD outbreaks in Bulgaria. FMD Laboratory Network Meeting, Pirbright.
- Don King (1/11/11): Lecture at Cambridge University (*FMDV diagnostics and control*) – Undergraduate students - Natural Science Tripos.
- Don King (25/11/11): Seminar at Indian Vaccine Research Institute (IVRI, Bangalore). *FMDV diagnostics: opportunities for India*.

1.4 Carry out risk assessments as requested by FFG

Nil

1.5 Provide appropriate input into the CVO's report for the previous year

Nil

1.6. Provide a quarterly report of relevant test results to FFG

In this report –see sections 1.2 and 6.2.

1.7 Provide training on diseases to FFG and provide input to online versions

Dr Hammond continues to review and contribute to the update of the Surveillance Profiles Database for FMDV for Defra.

2. RETENTION OF EXPERTISE**2.1 Keeping up to date with relevant literature**

FMD papers in this reporting period (October-December 2011) cited by PubMed are listed in Annex 2.

2.2 Attending and participating in relevant conferences

See 1.3

2.3 Maintaining contacts with experts elsewhere

Ongoing through collaborative efforts and International conferences.

2.4 Hosting visitors on behalf of FFG

Nil

2.5 Writing review papers

Nil this period

2.6 Training new experts

Professor Wataru Yamazaki from the University of Miyazaki, Japan is visited the IAH for 3 months (Aug/2011-Oct/2011) to participate in a collaborative project to develop LAMP assays for FMDV.

Training is ongoing through regular visits of laboratory staff from around the world.

3. RESPONSES TO EMERGENCY

No samples were received for vesicular disease diagnosis during this reporting period

3.1 Maintaining and deploying suitably trained staff and an adequate stock of reagents

Ongoing.

3.2 Providing on-call rotas

An exotic diseases duty officer has been continuously available via a dedicated transferable phone number (DIN110). Rotas have been maintained as specified in desk instructions (DIN110)

3.3 Participating in training of field staff

Nil

4. PROVIDING REFERENCE LABORATORY FACILITIES

4.1 Participation as a national laboratory in EU quality assessment exercises

Material for the 2011 PTS has been dispatched. Many results have also been received already from a number of participants.

4.2 Representation at meetings of EU National Laboratories, FAO and the OIE

See 1.3

4.3 Production, maintenance and supply of virus culture collections, reference sera and antibody panels

For the period October to December, viruses, diagnostic reagents, antigen or antibody detection ELISA kits have been sent to Czech Republic, Poland, Bhutan, Brasil, Canada, Israel, Japan, Malaysia, Singapore, Taiwan, Uganda and Vietnam.

4.4 Responses to technical queries

A number of technical queries from a variety of overseas sources were dealt within the reporting period

4.5 Writing and reviewing texts for laboratory manuals

Nil

5 INVESTIGATION OF SUSPECT CLINICAL CASES

5.1 Advice on test selection

Nil

5.2 Laboratory testing for virus, viral nucleic acid, antigens or antibody

Nil for National cases

5.3 Typing of isolates to confirm diagnosis and assist epidemiological tracing

Nil for National Cases

5.4 Where necessary, inoculation of sample materials into susceptible animals to confirm the aetiology and study the transmission.

Nil

6. SEROLOGICAL TESTS OF THE FOLLOWING CATEGORIES

6.1 Post outbreak serosurveillance testing

Nil samples were tested for FMD post outbreak serosurveillance.

6.2 Post import or export testing

2 VNT tests were carried out for in support of equine import (see Table 2).

Table 2: Importation and exportation of animals: number of serological tests performed to detect antibodies against FMDV/SVDV or VSV between October and December 2011

Country	Import/export	Number of tests performed to detect FMDV/VSV antibodies	Tests	Species
Mauritius	Import	2	VSV VNT	EQUINE

6.3 Other statutory testing e.g. of stock in Artificial Insemination centres

Nil

6.4 International Serological Testing

By VNT, LPBE and NSP ELISA, 3855 serological tests were performed to detect antibodies against FMDV and 42 to detect antibodies against VSV. These tests were performed at the request of Bulgaria, Bahrain, Estonia, India, Mongolia, Namibia/Italy, Paraguay, USA and Zambia for FMDV and Netherlands for VSV, respectively (Table 3).

Table 3. Number of serological tests performed internationally for FMDV and VSV between October and December 2011

FMDV

Country	Number of tests performed to detect FMDV antibodies	Tests	Species
Zambia	1735	VNT/NSP ELISA	Bovine
Namibia/Italy	750	VNT	Springbok/wild beast
Paraguay	26	VNT/LPBE	Bovine
USA	44	LPBE/VNT	Bovine
India	30	LPBE	Bovine
Bahrain	3	VNT	Bovine
Mongolia	1225	VNT	Camels
Bulgaria	34	VNT	Wild boar
Estonia	8	VNT	Ovine

VSV

Country	Number of tests performed to detect VSV antibodies (Indiana and New Jersey)	Tests	Species
NETHERLANDS	42	VNT	UNKNOWN

7. CONSULTANCY, INVESTIGATIONS AND TESTING IN SUPPORT OF DEFRA REQUIREMENTS UNDER THE SPECIFIED ANIMAL PATHOGENS ORDER (SAPO)

Nil in this period.

8. PUBLICATION OF DATA TO THE SCIENTIFIC COMMUNITY AND THE INDUSTRY

FMD papers published in the reporting period from the Pirbright Laboratory (Pirbright authors underlined):

1. Ferris NP, Clavijo A, Yang M, Velazquez-Salinas L, Nordengrahn A, Hutchings, GH, Kristersson T, Merza M. Development and laboratory evaluation of two lateral flow devices for the detection of

vesicular stomatitis virus in clinical samples. J Virol Methods. 2011 Dec 29. [Epub ahead of print] PubMed PMID: 22230813.

2. Mahapatra M, Hamblin P, Paton D. FMD virus epitope dominance in the antibody response of vaccinated animals. J Gen Virol. 2011 Dec 7. [Epub ahead of print] PubMed PMID: 22158876.
3. Madi M, Hamilton A, Squirrell D, Mioulet V, Evans P, Lee M, King DP. Rapid detection of foot-and-mouth disease virus using a field-portable nucleic acid extraction and real-time PCR amplification platform. Vet J. 2011 Nov 22. [Epub ahead of print] PubMed PMID: 22115952.
4. Windsor MA, Carr BV, Bankowski B, Gibson D, Reid E, Hamblin P, Gubbins S, Juleff N, Charleston B. Cattle remain immunocompetent during the acute phase of foot-and-mouth disease virus infection. Vet Res. 2011 Oct 20;42(1):108. PubMed PMID: 22014145; PubMed Central PMCID: PMC3207891.
5. Ko YJ, Lee HS, Park JH, Lee KN, Kim SM, Cho IS, Joo HD, Paik SG, Paton DJ, Parida S. Field application of a recombinant protein-based ELISA during the 2010 outbreak of foot-and-mouth disease type A in South Korea. J Virol Methods. 2012 Jan;179(1):265-8. Epub 2011 Oct 5. PubMed PMID: 22001272.

Annex 1.

TABLE A: Clinical sample diagnostics made by the WRL between October-December 2011

Country	WRL for FMD Sample Identification	Animal	Date of Collection	Results		
				VI/ELISA	RT-PCR	Final report
BAHRAIN	BAR 16/2011	Cattle	12.10.11	NVD	Positive	FMDV GD
	BAR 17/2011	Cattle	12.10.11	O	Positive	O
	BAR 18/2011	Cattle	12.10.11	A	Positive	A
	BAR 19/2011	Cattle	13.10.11	O	Positive	O
ESTONIA	EST 1/2011	Sheep	12.12.11	NVD	Negative	NVD
ETHIOPIA	ETH 1/2011	Pig	28.07.11	O	Positive	O
	ETH 2/2011	Pig	28.07.11	O	Positive	O
	ETH 3/2011	Cattle	05.10.11	O	Negative	O
	ETH 4/2011	Cattle	05.10.11	O	Positive	O
	ETH 5/2011	Cattle	05.10.11	O	Positive	O
	ETH 6/2011	Cattle	13.10.11	NVD	Positive	FMDV GD
	ETH 7/2011	Cattle	13.10.11	O	Negative	O
	ETH 8/2011	Cattle	20.10.11	NVD	Negative	NVD
	ETH 9/2011	Cattle	20.10.11	O	Positive	O
	ETH 10/2011	Cattle	20.10.11	O	Positive	O
	ETH 11/2011	Cattle	26.10.11	O	Positive	O
	ETH 12/2011	Cattle	26.10.11	O	Positive	O
	ETH 13/2001	Cattle	31.10.11	O	Positive	O
	ETH 14/2011	Cattle	31.10.11	NVD	Negative	NVD
	ETH 15/2011	Cattle	07.11.11	NVD	Negative	NVD
	ETH 16/2011	Cattle	07.11.11	NVD	Negative	NVD
	ETH 17/2011	Cattle	08.11.11	NVD	Positive	FMDV GD
	ETH 18/2011	Cattle	08.11.11	O	Positive	O
	ETH 19/2011	Cattle	08.11.11	NVD	Positive	FMDV GD
	ETH 20/2011	Goat	10.11.11	NVD	Negative	NVD

	ETH 21/2011	Goat	10.11.11	NVD	Negative	NVD
	ETH 22/2011	Sheep	10.11.11	NVD	Negative	NVD
	ETH 23/2011	Cattle	10.11.11	NVD	Negative	NVD
	ETH 24/2011	Cattle	10.11.11	NVD	Negative	NVD
	ETH 25/2011	Cattle	10.11.11	NVD	Negative	NVD
	ETH 26/2011	Cattle	10.11.11	O	Positive	O
	ETH 27/2011	Cattle	10.11.11	NVD	Negative	NVD
	ETH 28/2011	Cattle	15.11.11	O	Positive	O
HONG KONG	HKN 8/2011	Pig	14.11.11	O	Positive	O
	HKN 9/2011	Pig	14.11.11	O	Positive	O
MALAYSIA	MAY 15/2010**	Cattle	21.12.10	Not tested	Positive	FMDV GD
	MAY 16/2010**	Cattle	22.12.10	Not tested	Positive	FMDV GD
	MAY 17/2010**	Cattle	23.12.10	Not tested	Positive	FMDV GD
	MAY 18/2010**	Cattle	23.12.10	Not tested	Positive	FMDV GD
	MAY 19/2010**	Cattle	23.12.10	Not tested	Positive	FMDV GD
	MAY 20/2010**	Cattle	24.12.10	Not tested	Positive	FMDV GD
	MAY 21/2010**	Cattle	27.12.10	Not tested	Positive	FMDV GD
	MAY 22/2010	Cattle	29.12.10	NVD	Positive	FMDV GD
	MAY 23/2010**	Cattle	30.12.10	Not tested	Positive	FMDV GD
	MAY 1/2011**	Cattle	28.01.11	Not tested	Positive	FMDV GD
	MAY 2/2011	Cattle	03.05.11	A	Positive	A
	MAY 3/2011**	Cattle	23.05.11	Not tested	Positive	FMDV GD
	MAY 4/2011	Cattle	23.05.11	A	Positive	A
	MAY 5/2011**	Cattle	07.06.11	Not tested	Positive	FMDV GD
	MAY 6/2011**	Cattle	22.06.11	Not tested	Negative	NVD
	MAY 7/2011**	Cattle	22.06.11	Not tested	Negative	NVD
	MAY 8/2011**	Cattle	22.06.11	Not tested	Negative	NVD
	MAY 9/2011**	Cattle	22.06.11	Not tested	Negative	NVD
	MAY 10/2011**	Cattle	22.06.11	Not tested	Negative	NVD
	MAY 11/2011**	Cattle	22.06.11	Not tested	Negative	NVD
	MAY 12/2011**	Cattle	07.07.11	Not tested	Positive	FMDV GD
	MAY 13/2011	Cattle	07.07.11	O	Positive	O
	MAY 14/2011**	Cattle	27.07.11	Not tested	Positive	FMDV GD
	MAY 15/2011	Cattle	27.07.11	A	Positive	A
	MAY 16/2011**	Cattle	09.08.11	Not tested	Positive	FMDV GD
	MAY 17/2011	Cattle	09.08.11	A	Positive	A
	MAY 18/2011**	Cattle	26.10.11	Not tested	Negative	NVD
	MAY 19/2011	Cattle	26.10.11	A	Positive	A
	MAY 20/2011	Cattle	05.10.11	A	Negative	A
MONGOLIA	MOG 1/2002	Camel	00.00.02	NVD	Positive	FMDV GD
	MOG 2/2002	Camel	00.00.02	O	Positive	O
	MOG 19/2010	Camel	00.00.10	NVD	Negative	NVD
	MOG 20/2010	Camel	00.00.10	NVD	Negative	NVD
PARAGUAY	PAR 1/2011	NK	NK	O	Positive	O
ZAMBIA	ZAM 14/2008	Cattle	00.00.08	NVD	Positive	FMDV GD
	ZAM 15/2008	Cattle	00.00.08	NVD	Positive	FMDV GD

TOTAL : 71

*

Institute for Animal Health, Pirbright Laboratory, Woking, Surrey GU24 0NF

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 (or SVD) viral genome
NVD	no foot-and-mouth disease, swine vesicular disease or vesicular stomatitis virus detected
**	21 samples from Malaysia were supplied in Trizol for PCR analysis

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

Country	No. of samples	Virus isolation in cell culture/ELISA								SVD virus	NVD	NT	RT-PCR for FMD (or SVD) virus (where appropriate)	
		FMD virus serotypes							Positive				Negative	
		O	A	C	SAT 1	SAT 2	SAT 3	Asia 1						
BAHRAIN	4	2	1	-	-	-	-	-	-	1	-	4	-	
ESTONIA	1	-	-	-	-	-	-	-	-	1	-	-	1	
ETHIOPIA	28	14	-	-	-	-	-	-	-	14	-	15	13	
HONG KONG	2	2	-	-	-	-	-	-	-	-	-	2	-	
MALAYSIA**	29	1	6	-	-	-	-	-	-	1	21	21	8	
MONGOLIA	4	1	-	-	-	-	-	-	-	3	-	2	2	
PARAGUAY	1	1	-	-	-	-	-	-	-	-	-	1	-	
ZAMBIA	2	-	-	-	-	-	-	-	-	2	-	2	-	
TOTAL	71	21	7	-	-	-	-	-	-	22	21	47	24	

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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
RT-PCR	reverse transcription polymerase chain reaction for FMD (or SVD) viral genome
**	21 samples from Malaysia were supplied in Trizol for PCR analysis

TABLE C: Antigenic characterisation of FMD field isolates by matching with vaccine strains by VNT from 1st October to 31st December 2011**Type O:**

Vaccine matching studies for type O FMDV by VNT-WRL FMD					
WRL SAMPLE REF	O 4625	O Campos	O Manisa	O Tur 5/09	O Tur 07
TUR 28/2011	M	M	M	M	NT
TUR 33/2011	M	M	M	M	M
PAR 1/2011	M	M	M	M	NT

Type A:

Vaccine matching studies for type Asia 1 FMDV by VNT-WRL FMD			
WRL SAMPLE REF	A Iran 2005	A TUR 06	A22 IRQ
TUR 29/2011	N	N	N
TUR 64/2011	N	M	N
COD 12/2011	M	M	M
COD 2/2011	M	M	M
BAR 18/2011	N	M	N

Type Asia 1:

Vaccine matching studies for type Asia 1 FMDV by VNT-WRL FMD			
WRL SAMPLE REF	Asia1 IND 8/79	Asia1 Shamir	Asia1 WBN 117/85
TUR 49/2011	N	N	N
TUR 51/2011	N	N	N

M: the isolate was antigenically matched with the vaccine strain

N: the isolate showed no antigenic match with the vaccine strain

NT: Not tested.

Annex 2. Recent FMD Publications cited by PubMed

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