



**INSTITUTE FOR ANIMAL HEALTH**  
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## FMD Sequencing Report

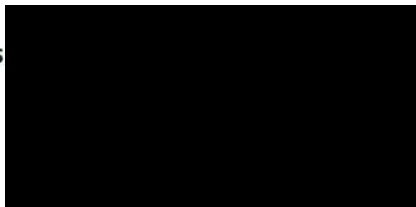
Lab Reference WRL Batch Number: WRLFMD/2009/00036

Sender Details:

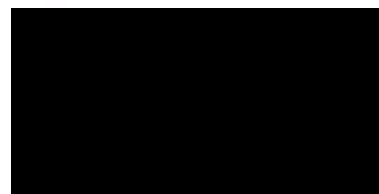


Date Received: 15 June 2009  
Country of Origin: Pakistan  
Date Reported: 9<sup>th</sup> September 2009

Results

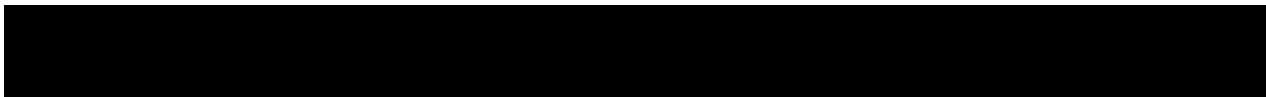


Official Stamp:



Date:

8/9/09



To help us improve the quality of our service, please send any suggestions or requests to the Reference Laboratory by fax (+44 (0) 1483 232621 or email: [elizabeth.byrom@bbsrc.ac.uk](mailto:elizabeth.byrom@bbsrc.ac.uk))

# Molecular Epidemiology Report Form

IAH-P-EP-MEG-FOR-005-1

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Serotype: A WRL Ref No: PAK/6/2009 Sender Ref: 11 Date collected: 04/04/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: BUFFALO Material used: BTy1 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-06.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days
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Comments:

### Ten Most Closely Related Viruses

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
1	A/PAK/18/2009	PAK09-18	639	639	0	100	0
2	A/PAK/9/2009	PAK09-09	639	639	0	100	0
3	A/PAK/10/2009	PAK09-10	639	638	0	99.84	0.16
4	A/PAK/13/2009	PAK09-13	639	638	0	99.84	0.16
5	A/PAK/15/2009	PAK09-15	639	638	0	99.84	0.16
6	A/PAK/17/2009	PAK09-17	639	638	0	99.84	0.16
7	A/PAK/7/2009	PAK09-07	639	638	0	99.84	0.16
8	A/PAK/8/2009	PAK09-08	639	638	0	99.84	0.16
9	A/IRN/26/2003	IRN03-26	600	561	2	93.5	6.5
10	A/IRN/41/2003	IRN03-41	637	594	2	93.25	6.75

### Relationships to Reference Virus Strains

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
1	A/IRN/1/2005 (EF208769)	IRN05-01	639	588	0	92.02	7.98
2	A/IRN/22/99 (EF208772)	IRN99-22	636	544	0	85.53	14.47
3	A/SAU/41/91	SAU91-41	636	543	0	85.38	14.62
4	A/TAI/118/87* (EF208777)	TAI87-AD	636	540	0	84.91	15.09
5	A/IRN/2/87 (EF208770)	IRN87-02	636	532	0	83.65	16.35
6	A/IRN/1/96 (EF208771)	IRN96-01	638	532	1	83.39	16.61
7	A/TAI/2/97 (EF208778)	TAI97-02	636	528	0	83.02	16.98
8	A/SAU/23/86 (EU414536)	SAU86-23	639	529	0	82.79	17.21
9	A22/IRQ/24/64 (AJ251474)	IRQ64-24	639	521	0	81.53	18.47
10	A24/Cruzeiro/BRA/55 (AJ251476)	BRA55--C	639	515	0	80.59	19.41

nt, nucleotides

\*, not a WRLFMD reference number

# Molecular Epidemiology Report Form

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Serotype: A WRL Ref No: PAK/7/2009 Sender Ref: 12 Date collected: 04/04/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: CATTLE Material used: BTy1 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-07.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days
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Comments:

### Ten Most Closely Related Viruses

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
1	A/PAK/10/2009	PAK09-10	639	639	0	100	0
2	A/PAK/13/2009	PAK09-13	639	639	0	100	0
3	A/PAK/15/2009	PAK09-15	639	639	0	100	0
4	A/PAK/17/2009	PAK09-17	639	639	0	100	0
5	A/PAK/8/2009	PAK09-08	639	639	0	100	0
6	A/PAK/18/2009	PAK09-18	639	638	0	99.84	0.16
7	A/PAK/6/2009	PAK09-06	639	638	0	99.84	0.16
8	A/PAK/9/2009	PAK09-09	639	638	0	99.84	0.16
9	A/IRN/26/2003	IRN03-26	600	562	2	93.67	6.33
10	A/IRN/41/2003	IRN03-41	637	595	2	93.41	6.59

### Relationships to Reference Virus Strains

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
1	A/IRN/1/2005 (EF208769)	IRN05-01	639	587	0	91.86	8.14
2	A/IRN/22/99 (EF208772)	IRN99-22	636	543	0	85.38	14.62
3	A/SAU/41/91	SAU91-41	636	542	0	85.22	14.78
4	A/TAI/118/87* (EF208777)	TAI87-AD	636	541	0	85.06	14.94
5	A/IRN/1/96 (EF208771)	IRN96-01	638	533	1	83.54	16.46
6	A/IRN/2/87 (EF208770)	IRN87-02	636	531	0	83.49	16.51
7	A/TAI/2/97 (EF208778)	TAI97-02	636	527	0	82.86	17.14
8	A/SAU/23/86 (EU414536)	SAU86-23	639	528	0	82.63	17.37
9	A22/IRQ/24/64 (AJ251474)	IRQ64-24	639	522	0	81.69	18.31
10	A24/Cruzeiro/BRA/55 (AJ251476)	BRA55--C	639	516	0	80.75	19.25

nt, nucleotides

\*, not a WRLFMD reference number

# Molecular Epidemiology Report Form

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Serotype: A WRL Ref No: PAK/8/2009 Sender Ref: 13 Date collected: 04/04/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: BUFFALO Material used: BTy1 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-08.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days
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Comments:

### Ten Most Closely Related Viruses

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
1	A/PAK/10/2009	PAK09-10	639	639	0	100	0
2	A/PAK/13/2009	PAK09-13	639	639	0	100	0
3	A/PAK/15/2009	PAK09-15	639	639	0	100	0
4	A/PAK/17/2009	PAK09-17	639	639	0	100	0
5	A/PAK/7/2009	PAK09-07	639	639	0	100	0
6	A/PAK/18/2009	PAK09-18	639	638	0	99.84	0.16
7	A/PAK/6/2009	PAK09-06	639	638	0	99.84	0.16
8	A/PAK/9/2009	PAK09-09	639	638	0	99.84	0.16
9	A/IRN/26/2003	IRN03-26	600	562	2	93.67	6.33
10	A/IRN/41/2003	IRN03-41	637	595	2	93.41	6.59

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1	A/IRN/1/2005 (EF208769)	IRN05-01	639	587	0	91.86	8.14
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3	A/SAU/41/91	SAU91-41	636	542	0	85.22	14.78
4	A/TAI/118/87* (EF208777)	TAI87-AD	636	541	0	85.06	14.94
5	A/IRN/1/96 (EF208771)	IRN96-01	638	533	1	83.54	16.46
6	A/IRN/2/87 (EF208770)	IRN87-02	636	531	0	83.49	16.51
7	A/TAI/2/97 (EF208778)	TAI97-02	636	527	0	82.86	17.14
8	A/SAU/23/86 (EU414536)	SAU86-23	639	528	0	82.63	17.37
9	A22/IRQ/24/64 (AJ251474)	IRQ64-24	639	522	0	81.69	18.31
10	A24/Cruzeiro/BRA/55 (AJ251476)	BRA55--C	639	516	0	80.75	19.25

nt, nucleotides

\*, not a WRLFMD reference number

# Molecular Epidemiology Report Form

IAH-P-EP-MEG-FOR-005-1

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Serotype: A WRL Ref No: PAK/9/2009 Sender Ref: 14 Date collected: 08/04/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: CATTLE Material used: BTy1 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-09.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days																																																																																								
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Serotype: A WRL Ref No: PAK/10/2009 Sender Ref: 15 Date collected: 08/04/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: BUFFALO Material used: BTy1 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-10.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days
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Comments:

### Ten Most Closely Related Viruses

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
1	A/PAK/13/2009	PAK09-13	639	639	0	100	0
2	A/PAK/15/2009	PAK09-15	639	639	0	100	0
3	A/PAK/17/2009	PAK09-17	639	639	0	100	0
4	A/PAK/7/2009	PAK09-07	639	639	0	100	0
5	A/PAK/8/2009	PAK09-08	639	639	0	100	0
6	A/PAK/18/2009	PAK09-18	639	638	0	99.84	0.16
7	A/PAK/6/2009	PAK09-06	639	638	0	99.84	0.16
8	A/PAK/9/2009	PAK09-09	639	638	0	99.84	0.16
9	A/IRN/26/2003	IRN03-26	600	562	2	93.67	6.33
10	A/IRN/41/2003	IRN03-41	637	595	2	93.41	6.59

### Relationships to Reference Virus Strains

Pos.	Virus name	Filename	No. nt compared	No. nt matched	No. of ambiguities	% Identity	% Difference
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2	A/IRN/22/99 (EF208772)	IRN99-22	636	543	0	85.38	14.62
3	A/SAU/41/91	SAU91-41	636	542	0	85.22	14.78
4	A/TAI/118/87* (EF208777)	TAI87-AD	636	541	0	85.06	14.94
5	A/IRN/1/96 (EF208771)	IRN96-01	638	533	1	83.54	16.46
6	A/IRN/2/87 (EF208770)	IRN87-02	636	531	0	83.49	16.51
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nt, nucleotides

\*, not a WRLFMD reference number

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Serotype: A WRL Ref No: PAK/13/2009 Sender Ref: 18 Date collected: 08/04/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: CATTLE Material used: BTy1 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-13.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days																																																																																								
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5	A/IRN/1/96 (EF208771)	IRN96-01	638	533	1	83.54	16.46																																																																																		
6	A/IRN/2/87 (EF208770)	IRN87-02	636	531	0	83.49	16.51																																																																																		
7	A/TAI/2/97 (EF208778)	TAI97-02	636	527	0	82.86	17.14																																																																																		
8	A/SAU/23/86 (EU414536)	SAU86-23	639	528	0	82.63	17.37																																																																																		
9	A22/IRQ/24/64 (AJ251474)	IRQ64-24	639	522	0	81.69	18.31																																																																																		
10	A24/Cruzeiro/BRA/55 (AJ251476)	BRA55--C	639	516	0	80.75	19.25																																																																																		
nt, nucleotides *, not a WRLFMD reference number																																																																																									



# Molecular Epidemiology Report Form

IAH-P-EP-MEG-FOR-005-1

Page 1 of 1

Serotype: A WRL Ref No: PAK/17/2009 Sender Ref: 22 Date collected: 07/05/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: BUFFALO Material used: BTy2 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-17.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days																																																																																								
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3	A/PAK/15/2009	PAK09-15	639	639	0	100	0																																																																																		
4	A/PAK/7/2009	PAK09-07	639	639	0	100	0																																																																																		
5	A/PAK/8/2009	PAK09-08	639	639	0	100	0																																																																																		
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# Molecular Epidemiology Report Form

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Page 1 of 1

Serotype: A WRL Ref No: PAK/18/2009 Sender Ref: 23 Date collected: 07/05/2009 Date received by WRLFMD: 15/06/2009 Date received for sequencing: 08/07/2009 Species: BUFFALO Material used: BTy2 Region sequenced: VP1 RT-PCR primers: A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639	Report date: 02/09/2009 Reported by: N.J. Knowles Checked by: D.P. King  Topotype: ASIA Genotype/strain: Iran-05 Sequence filename: PAK09-18.SEQ Date sequence last updated: 17/07/2009 Total no. of comparisons: 1183 Min. no. of nt for comparison: 300 Total turn-around time: 79 days Sequencing time: 56 days																																																																																								
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# Report on FMDV A in Pakistan in 2009

Batch: WRLFMD/2009/00036

Software: MEGA 4.0  
No. of Taxa : 170  
Data File : n:\levd\meg\db\fmdv\A\IRN2009b.meg  
Data Title : A Pakistan 2009  
Data Type : Nucleotide (Coding)  
Analysis : Phylogeny reconstruction  
Tree Inference : =====  
->Method : Neighbor-Joining  
->Phylogeny Test and options : Bootstrap (1000 replicates;  
seed=64238)  
Include Sites : =====  
->Gaps/Missing Data : Pairwise Deletion  
->Codon Positions : 1st+2nd+3rd+Noncoding  
Substitution Model :  
=====  
->Model : Nucleotide: Kimura 2-parameter  
->Substitutions to Include : d: Transitions + Transversions  
->Pattern among Lineages : Same (Homogeneous)  
->Rates among sites : Uniform rates  
No. of Sites : 639  
No Of Bootstrap Reps = 1000  
Only bootstrap values of 70% and above are shown

\*, not a WRLFMD Ref. No.

N.J. Knowles & J. Wadsworth, 2 Sequence 2009

