

FAO World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD)

Genotyping Report

Report Date for this Batch: 14 March 2016

FMDV type O

Country: Pakistan

Period: 2015

No. of samples: 10

BATCH: WRLFMD/2015/00037



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FAO World Reference Laboratory for FMD Genotyping Report

IAH-P-EP-MEG-FOR-005-3

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/22/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK26/12/15	
Location: Kasur, Lahore, Pakistan	Topotype: ME-SA
Date collected: 03/04/2015	Genotype/strain: Pak-98
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-22.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTY1 19/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/VS524	PAKXX-AB	639	639	0	100.00	0.00	ME-SA	Pak-98
2	O/PAK/12/2003 (DQ165066)	PAK03-12	638	638	1	100.00	0.00	ME-SA	Pak-98
3	O/PAK/17/2003 (DQ165069)	PAK03-17	638	637	1	99.84	0.16	ME-SA	Pak-98
4	O/PAK/vaccine	PAKXX-AA	639	638	0	99.84	0.16	ME-SA	Pak-98
5	O/PAK/VS527	PAKXX-AC	639	638	0	99.84	0.16	ME-SA	Pak-98
6	O/PAK/73/2007	PAK07-73	639	637	0	99.69	0.31	ME-SA	Pak-98
7	O/PAK/16/2003 (DQ165068)	PAK03-16	639	635	0	99.37	0.63	ME-SA	Pak-98
8	O/PAK/73/2003 (DQ165070)	PAK03-73	639	635	0	99.37	0.63	ME-SA	Pak-98
9	O/PAK/14/2003 (DQ165067)	PAK03-14	638	633	1	99.22	0.78	ME-SA	Pak-98
10	O/YEM/4/80	YEM80-04	639	583	0	91.24	8.76	ME-SA	unnamed
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O1/Manisa/TUR/69 (AY593823)	TUR69--G	639	575	0	89.98	10.02	ME-SA	unnamed
2	O/IRN/31/2009	IRN09-31	639	572	0	89.51	10.49	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IND/R2/75* (AF204276)	IND75--A	639	571	0	89.36	10.64	ME-SA	unnamed
4	O/IRN/18/2010	IRN10-18	639	570	0	89.20	10.80	ME-SA	PanAsia-2 ^{BAL-09}
5	O/IND/53/79 (AF292107)	IND79A53	639	569	0	89.05	10.95	ME-SA	unnamed
6	O/IRN/88/2009	IRN09-88	639	569	0	89.05	10.95	ME-SA	PanAsia-2 ^{ANT-10}
7	O/OMN/7/2001 (DQ164941)	OMN01-07	639	569	0	89.05	10.95	ME-SA	Ind-2001b
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	569	0	89.05	10.95	ME-SA	PanAsia
9	O/TUR/257/2008* (FMDI)	TUR08-AD	639	568	0	88.89	11.11	ME-SA	PanAsia-2 ^{TER-08}
10	O/TUR/264/2009* (FMDI)	TUR09-AK	639	568	0	88.89	11.11	ME-SA	PanAsia-2 ^{SAN-09}

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/30/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK13/12/15	
Location: Karachi, Sindh, Pakistan	Topotype: ME-SA
Date collected: 29/08/2015	Genotype/strain: PanAsia-2 ^{BAL-09}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-30.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTY1 18/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/32/2015	PAK15-32	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{BAL-09}
2	O/PAK/34/2015	PAK15-34	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{BAL-09}
3	O/IRN/6/2015	IRN15-06	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{BAL-09}
4	O/IRN/26/2015	IRN15-26	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{BAL-09}
5	O/IRN/15/2015	IRN15-15	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
6	O/IRN/16/2015	IRN15-16	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
7	O/KUW/1/2016	KUW16-01	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
8	O/KUW/2/2016	KUW16-02	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
9	O/KUW/4/2016	KUW16-04	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
10	O/AFG/109/2010	AFG10109	639	610	0	95.46	4.54	ME-SA	PanAsia-2 ^{BAL-09}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/18/2010	IRN10-18	639	608	0	95.15	4.85	ME-SA	PanAsia-2 ^{BAL-09}
2	O/IRN/31/2009	IRN09-31	639	595	0	93.11	6.89	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	590	0	92.33	7.67	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/88/2009	IRN09-88	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/16/2010	PAK10-16	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	578	0	90.45	9.55	ME-SA	PanAsia
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	572	0	89.51	10.49	ME-SA	Ind-2001a
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	562	0	87.95	12.05	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/32/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK22/12/15	
Location: Karachi, Sindh, Pakistan	Topotype: ME-SA
Date collected: 01/09/2015	Genotype/strain: PanAsia-2 ^{BAL-09}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-32.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Cattle	No. of Nt determined: 639
Material used: BTY1 18/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/30/2015	PAK15-30	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{BAL-09}
2	O/PAK/34/2015	PAK15-34	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{BAL-09}
3	O/IRN/6/2015	IRN15-06	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{BAL-09}
4	O/IRN/26/2015	IRN15-26	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{BAL-09}
5	O/IRN/15/2015	IRN15-15	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
6	O/IRN/16/2015	IRN15-16	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
7	O/KUW/1/2016	KUW16-01	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
8	O/KUW/2/2016	KUW16-02	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
9	O/KUW/4/2016	KUW16-04	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
10	O/AFG/109/2010	AFG10109	639	610	0	95.46	4.54	ME-SA	PanAsia-2 ^{BAL-09}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/18/2010	IRN10-18	639	608	0	95.15	4.85	ME-SA	PanAsia-2 ^{BAL-09}
2	O/IRN/31/2009	IRN09-31	639	595	0	93.11	6.89	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	590	0	92.33	7.67	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/88/2009	IRN09-88	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/16/2010	PAK10-16	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	578	0	90.45	9.55	ME-SA	PanAsia
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	572	0	89.51	10.49	ME-SA	Ind-2001a
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	562	0	87.95	12.05	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/34/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK15/12/15	
Location: Karachi, Sindh, Pakistan	Topotype: ME-SA
Date collected: 16/09/2015	Genotype/strain: PanAsia-2 ^{BAL-09}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-34.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Cattle	No. of Nt determined: 639
Material used: BTY1 18/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/30/2015	PAK15-30	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{BAL-09}
2	O/PAK/32/2015	PAK15-32	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{BAL-09}
3	O/IRN/6/2015	IRN15-06	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{BAL-09}
4	O/IRN/26/2015	IRN15-26	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{BAL-09}
5	O/IRN/15/2015	IRN15-15	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{BAL-09}
6	O/IRN/16/2015	IRN15-16	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{BAL-09}
7	O/KUW/1/2016	KUW16-01	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{BAL-09}
8	O/KUW/2/2016	KUW16-02	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{BAL-09}
9	O/KUW/4/2016	KUW16-04	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{BAL-09}
10	O/AFG/109/2010	AFG10109	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{BAL-09}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/18/2010	IRN10-18	639	607	0	94.99	5.01	ME-SA	PanAsia-2 ^{BAL-09}
2	O/IRN/31/2009	IRN09-31	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	589	0	92.18	7.82	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/88/2009	IRN09-88	639	586	0	91.71	8.29	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	577	0	90.30	9.70	ME-SA	PanAsia
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	571	0	89.36	10.64	ME-SA	Ind-2001a
10	O/BHU/3/2009 (KM921814)	BHU09-03	639	562	0	87.95	12.05	ME-SA	Ind-2001d

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/42/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK24/12/15	
Location: Karachi, Sindh, Pakistan	Topotype: ME-SA
Date collected: 05/10/2015	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-42.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Cattle	No. of Nt determined: 639
Material used: BTY1 23/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/44/2015	PAK15-44	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/45/2015	PAK15-45	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/51/2015	PAK15-51	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
4	O/AFG/23/2013	AFG13-23	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{ANT-10}
5	O/AFG/27/2013	AFG13-27	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{ANT-10}
6	O/AFG/9/2014	AFG14-09	639	631	0	98.75	1.25	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/23/2014	PAK14-23	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/58/2012	PAK12-58	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/12/2014	PAK14-12	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/2/2014	PAK14-02	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	602	0	94.21	5.79	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	584	0	91.39	8.61	ME-SA	PanAsia-2
5	O/TUR/264/2009* (FMDI)	TUR09-AK	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{SAN-09}
6	O/IRN/18/2010	IRN10-18	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{BAL-09}
7	O/PAK/16/2010	PAK10-16	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/OMN/7/2001 (DQ164941)	OMN01-07	639	570	0	89.20	10.80	ME-SA	Ind-2001b
10	O/UAE/4/2008 (KM921876)	UAE08-04	636	567	0	89.15	10.85	ME-SA	Ind-2001c

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/44/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK34/12/15	
Location: Faisalabad, Lahore, Pakistan	Topotype: ME-SA
Date collected: 09/10/2015	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-44.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Cattle	No. of Nt determined: 639
Material used: BTY1 23/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/42/2015	PAK15-42	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/45/2015	PAK15-45	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/51/2015	PAK15-51	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
4	O/AFG/23/2013	AFG13-23	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
5	O/AFG/27/2013	AFG13-27	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
6	O/AFG/9/2014	AFG14-09	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/23/2014	PAK14-23	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/58/2012	PAK12-58	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/12/2014	PAK14-12	639	627	0	98.12	1.88	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/2/2014	PAK14-02	639	627	0	98.12	1.88	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	600	0	93.90	6.10	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	584	0	91.39	8.61	ME-SA	PanAsia-2
5	O/UKG/35/2001 (AJ539141)	UKG01-35	639	583	0	91.24	8.76	ME-SA	PanAsia
6	O/IRN/18/2010	IRN10-18	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{BAL-09}
7	O/PAK/16/2010	PAK10-16	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{PUN-10}
8	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	569	0	89.05	10.95	ME-SA	Ind-2001a
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	568	0	88.89	11.11	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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FAO World Reference Laboratory for FMD Genotyping Report

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/45/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK7/12/15	
Location: Multan, Punjab, Pakistan	Topotype: ME-SA
Date collected: 14/10/2015	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-45.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Cattle	No. of Nt determined: 639
Material used: BTY1 24/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/51/2015	PAK15-51	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/42/2015	PAK15-42	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/44/2015	PAK15-44	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
4	O/AFG/23/2013	AFG13-23	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
5	O/AFG/27/2013	AFG13-27	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
6	O/AFG/9/2014	AFG14-09	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/23/2014	PAK14-23	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/58/2012	PAK12-58	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/12/2014	PAK14-12	639	627	0	98.12	1.88	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/2/2014	PAK14-02	639	627	0	98.12	1.88	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	602	0	94.21	5.79	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	584	0	91.39	8.61	ME-SA	PanAsia-2
5	O/TUR/264/2009* (FMDI)	TUR09-AK	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{SAN-09}
6	O/UKG/35/2001 (AJ539141)	UKG01-35	639	583	0	91.24	8.76	ME-SA	PanAsia
7	O/IRN/18/2010	IRN10-18	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{BAL-09}
8	O/PAK/16/2010	PAK10-16	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{PUN-10}
9	O/OMN/7/2001 (DQ164941)	OMN01-07	639	568	0	88.89	11.11	ME-SA	Ind-2001b
10	O/KUW/3/97 (DQ164904)	KUW97-03	639	567	0	88.73	11.27	ME-SA	Ind-2001a

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/49/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK2/12/15	
Location: Bhakkar, Punjab, Pakistan	Topotype: ME-SA
Date collected: 21/10/2015	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-49.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTY1 24/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/12/2014	PAK14-12	639	623	0	97.50	2.50	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/2/2014	PAK14-02	639	623	0	97.50	2.50	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/27/2013	PAK13-27	639	623	0	97.50	2.50	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/3/2014	PAK14-03	639	623	0	97.50	2.50	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/5/2014	PAK14-05	639	623	0	97.50	2.50	ME-SA	PanAsia-2 ^{ANT-10}
6	O/AFG/1/2014	AFG14-01	639	622	0	97.34	2.66	ME-SA	PanAsia-2 ^{ANT-10}
7	O/AFG/2/2014	AFG14-02	639	622	0	97.34	2.66	ME-SA	PanAsia-2 ^{ANT-10}
8	O/AFG/3/2014	AFG14-03	639	622	0	97.34	2.66	ME-SA	PanAsia-2 ^{ANT-10}
9	O/AFG/7/2014	AFG14-07	639	622	0	97.34	2.66	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/23/2014	PAK14-23	639	622	0	97.34	2.66	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	600	0	93.90	6.10	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	580	0	90.77	9.23	ME-SA	PanAsia-2
5	O/PAK/16/2010	PAK10-16	639	579	0	90.61	9.39	ME-SA	PanAsia-2 ^{PUN-10}
6	O/IRN/18/2010	IRN10-18	639	578	0	90.45	9.55	ME-SA	PanAsia-2 ^{BAL-09}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	578	0	90.45	9.55	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	577	0	90.30	9.70	ME-SA	PanAsia
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	566	0	88.58	11.42	ME-SA	Ind-2001a
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	566	0	88.58	11.42	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/51/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK3/12/15	
Location: Multan, Punjab, Pakistan	Topotype: ME-SA
Date collected: 28/10/2015	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-51.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTY1 24/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/45/2015	PAK15-45	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/42/2015	PAK15-42	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/44/2015	PAK15-44	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
4	O/AFG/23/2013	AFG13-23	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
5	O/AFG/27/2013	AFG13-27	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
6	O/AFG/9/2014	AFG14-09	639	628	0	98.28	1.72	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/23/2014	PAK14-23	639	627	0	98.12	1.88	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/58/2012	PAK12-58	639	627	0	98.12	1.88	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/12/2014	PAK14-12	639	626	0	97.97	2.03	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/2/2014	PAK14-02	639	626	0	97.97	2.03	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	601	0	94.05	5.95	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	586	0	91.71	8.29	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	581	0	90.92	9.08	ME-SA	PanAsia-2
5	O/TUR/264/2009* (FMDI)	TUR09-AK	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{SAN-09}
6	O/UKG/35/2001 (AJ539141)	UKG01-35	639	580	0	90.77	9.23	ME-SA	PanAsia
7	O/IRN/18/2010	IRN10-18	639	579	0	90.61	9.39	ME-SA	PanAsia-2 ^{BAL-09}
8	O/PAK/16/2010	PAK10-16	639	578	0	90.45	9.55	ME-SA	PanAsia-2 ^{PUN-10}
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	566	0	88.58	11.42	ME-SA	Ind-2001a
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	565	0	88.42	11.58	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 12/03/2016
WRLFMD Ref No: PAK/52/2015	Reported by: N.J. Knowles
Batch No: WRLFMD/2015/00037	Checked by: K. Bachanek-Bankowska
Sender Ref: PK9/12/15	
Location: Muzaffarabad, AJK, Pakistan	Topotype: ME-SA
Date collected: 01/11/2015	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 17/12/2015	Sequence filename: PAK15-52.SEQ
Date received for sequencing: 08/03/2016	Date sequence last updated: 10/03/2016
Species: Cattle	No. of Nt determined: 639
Material used: BTY1 25/02/2016	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 4261
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 86 days
	Sequencing time: 4 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/58/2012	PAK12-58	639	630	0	98.59	1.41	ME-SA	PanAsia-2 ^{ANT-10}
3	O/AFG/23/2013	AFG13-23	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
4	O/AFG/27/2013	AFG13-27	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
5	O/AFG/9/2014	AFG14-09	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/12/2014	PAK14-12	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/2/2014	PAK14-02	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/26/2013	PAK13-26	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/27/2013	PAK13-27	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/3/2014	PAK14-03	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	604	0	94.52	5.48	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/8/2005	IRN05-08	639	582	0	91.08	8.92	ME-SA	PanAsia-2
6	O/PAK/16/2010	PAK10-16	639	579	0	90.61	9.39	ME-SA	PanAsia-2 ^{PUN-10}
7	O/UKG/35/2001 (AJ539141)	UKG01-35	639	579	0	90.61	9.39	ME-SA	PanAsia
8	O/TUR/264/2009* (FMDI)	TUR09-AK	639	578	0	90.45	9.55	ME-SA	PanAsia-2 ^{SAN-09}
9	O/UAE/4/2008 (KM921876)	UAE08-04	636	565	0	88.84	11.16	ME-SA	Ind-2001c
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	567	0	88.73	11.27	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Report on FMDV O in Pakistan in 2015

Batch: WRLFMD/2015/00037

◆ indicates viruses in this batch

Software: MEGA 6.06

Analysis

Analysis ----- Phylogeny Reconstruction

Scope ----- All Selected Taxa

Statistical Method ----- Neighbor-joining

Phylogeny Test

Test of Phylogeny ----- Bootstrap method

No. of Bootstrap Replications ----- 1000

Substitution Model

Substitutions Type ----- Nucleotide

Model/Method ----- Kimura 2-parameter model

Substitutions to Include ----- d: Transitions + Transversions

Rates and Patterns

Rates among Sites ----- Uniform rates

Pattern among Lineages ----- Same (Homogeneous)

Data Subset to Use

Gaps/Missing Data Treatment ----- Pairwise deletion

Codons Included ----- 1st+2nd+3rd+Non-Coding

No. of Sites : 642

No Of Bootstrap Reps = 1000

Only bootstrap values of 70% and above are shown

*, not a WRLFMD Ref. No.

N.J. Knowles, J. Wadsworth & K. Bachanek-Bankowska,
14 March 2016

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