

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

Genotyping Report

FMDV serotype: O
Country: Pakistan
Year: 2019
Batch: WRLFMD/2019/00028
No. of sequences: 10
Report date: 12th August 2019
Report generated by: Nick Knowles
Report checked by: Antonello Di Nardo



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Virus sample name:	PAK/1/2019
Sender reference:	1
Location of origin:	Attock, Punjab
Country of origin:	Pakistan
Date of collection:	02/01/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	Ind-2001
Sublineage:	e
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	30/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019

VIBASys IDs: sample 42474, genome 42475, sequence viba_42476, sequencing info 42477

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_42480	PAK/2/2019	cattle	100.0	0	O	ME-SA	Ind-2001	e
viba_36750	BHU/2/2018	cattle	99.1	0	O	ME-SA	Ind-2001	e
viba_36754	BHU/3/2018	cattle	99.1	0	O	ME-SA	Ind-2001	e
viba_41664	NEP/33/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41608	NEP/16/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41624	NEP/22/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41692	NEP/40/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41604	NEP/14/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41568	NEP/4/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41628	NEP/23/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_30238	MUR/19/2016	cattle	97.2	0	O	ME-SA	Ind-2001	e
viba_293	BHU/3/2009	cattle	93.4	0	O	ME-SA	Ind-2001	d
viba_541	OMN/7/2001	bovine	91.7	0	O	ME-SA	Ind-2001	b
viba_705	KUW/3/97	bovine	90.7	0	O	ME-SA	Ind-2001	a
viba_397	UAE/4/2008	gazelle	89.5	0	O	ME-SA	Ind-2001	c
viba_766	IRN/31/2009	cattle	88.5	0	O	ME-SA	PanAsia-2	FAR-09
viba_285	UKG/35/2001	porcine	88.3	0	O	ME-SA	PanAsia	
viba_354	PAK/16/2010	cattle	87.8	0	O	ME-SA	PanAsia-2	PUN-10
viba_617	IND/53/79	bovine	87.7	0	O	ME-SA		
viba_359	Manisa/TUR/69		87.7	0	O	ME-SA		

Virus sample name:	PAK/2/2019
Sender reference:	5
Location of origin:	Rawalpindi, Punjab
Country of origin:	Pakistan
Date of collection:	16/01/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	Ind-2001
Sublineage:	e
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	30/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019

VIBASys IDs: sample 42478, genome 42479, sequence viba_42480, sequencing info 42481

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_42476	PAK/1/2019	cattle	100.0	0	O	ME-SA	Ind-2001	e
viba_36750	BHU/2/2018	cattle	99.1	0	O	ME-SA	Ind-2001	e
viba_36754	BHU/3/2018	cattle	99.1	0	O	ME-SA	Ind-2001	e
viba_41664	NEP/33/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41608	NEP/16/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41624	NEP/22/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41692	NEP/40/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41604	NEP/14/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41568	NEP/4/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e
viba_41628	NEP/23/2018	cattle	98.9	0	O	ME-SA	Ind-2001	e

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_30238	MUR/19/2016	cattle	97.2	0	O	ME-SA	Ind-2001	e
viba_293	BHU/3/2009	cattle	93.4	0	O	ME-SA	Ind-2001	d
viba_541	OMN/7/2001	bovine	91.7	0	O	ME-SA	Ind-2001	b
viba_705	KUW/3/97	bovine	90.7	0	O	ME-SA	Ind-2001	a
viba_397	UAE/4/2008	gazelle	89.5	0	O	ME-SA	Ind-2001	c
viba_766	IRN/31/2009	cattle	88.5	0	O	ME-SA	PanAsia-2	FAR-09
viba_285	UKG/35/2001	porcine	88.3	0	O	ME-SA	PanAsia	
viba_354	PAK/16/2010	cattle	87.8	0	O	ME-SA	PanAsia-2	PUN-10
viba_617	IND/53/79	bovine	87.7	0	O	ME-SA		
viba_359	Manisa/TUR/69		87.7	0	O	ME-SA		

Virus sample name:	PAK/6/2019
Sender reference:	26
Location of origin:	Karachi, Sindh
Country of origin:	Pakistan
Date of collection:	31/01/2019
Host species:	water buffalo
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	30/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42482, genome 42483, sequence viba_42484, sequencing info 42485	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_42500	PAK/16/2019	cattle	97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_39743	VRI/CAMB/Faislabad1/PUN/PAK	cattle	97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_39040	NIAB/PUN/PAK/205/2017	water buffalo	97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_33627	IRN/37/2016	cattle	97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_33623	IRN/36/2016	sheep	97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_33631	IRN/3/2017	sheep	97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_33635	IRN/5/2017	cattle	97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_39763	NIAB/PUN/PAK/218/2017		97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_40315	VRI/CAMB/Bhakar3/PUN/PAK/2018	cattle	97.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_39747	VRI/CAMB/Sahiwal1/PUN/PAK	cattle	97.2	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		93.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	91.2	0	O	ME-SA	PanAsia-2	FAR-09
viba_354	PAK/16/2010	cattle	91.0	0	O	ME-SA	PanAsia-2	PUN-10
viba_650	IRN/8/2005	ovine	90.7	0	O	ME-SA	PanAsia-2	
viba_491	TUR/257/2008		90.7	0	O	ME-SA	PanAsia-2	TER-08
viba_666	IRN/18/2010	cattle	90.4	0	O	ME-SA	PanAsia-2	BAL-09
viba_505	TUR/264/2009		90.0	0	O	ME-SA	PanAsia-2	SAN-09
viba_285	UKG/35/2001	porcine	89.4	0	O	ME-SA	PanAsia	
viba_860	IRN/6/2015	cattle	89.4	0	O	ME-SA	PanAsia-2	QOM-15
viba_850	NEP/1/2015	cattle	89.0	1	O	ME-SA	PanAsia-2	KAT-15

Virus sample name:	PAK/8/2019
Sender reference:	28
Location of origin:	Karachi, Sindh
Country of origin:	Pakistan
Date of collection:	01/02/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	30/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42486, genome 42487, sequence viba_42488, sequencing info 42489	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_39743	VRI/CAMB/Faisalabad1/PUN/PAK	cattle	97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_33639	IRN/8/2017	cattle	97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_39040	NIAB/PUN/PAK/205/2017	water buffalo	97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_33623	IRN/36/2016	sheep	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_34937	PAK/7/2016	cattle	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_33631	IRN/3/2017	sheep	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_33635	IRN/5/2017	cattle	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_39763	NIAB/PUN/PAK/218/2017		97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_39771	NIAB/PUN/PAK/222/2017		97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_40283	VRI/CAMB/Lodrah1/PUN/PAK/2017	cattle	97.5	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		94.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	92.3	0	O	ME-SA	PanAsia-2	FAR-09
viba_650	IRN/8/2005	ovine	92.1	0	O	ME-SA	PanAsia-2	
viba_491	TUR/257/2008		91.6	0	O	ME-SA	PanAsia-2	TER-08
viba_505	TUR/264/2009		91.3	0	O	ME-SA	PanAsia-2	SAN-09
viba_666	IRN/18/2010	cattle	91.3	0	O	ME-SA	PanAsia-2	BAL-09
viba_354	PAK/16/2010	cattle	91.2	0	O	ME-SA	PanAsia-2	PUN-10
viba_850	NEP/1/2015	cattle	90.9	1	O	ME-SA	PanAsia-2	KAT-15
viba_285	UKG/35/2001	porcine	90.7	0	O	ME-SA	PanAsia	
viba_293	BHU/3/2009	cattle	90.4	0	O	ME-SA	Ind-2001	d

Virus sample name:	PAK/12/2019
Sender reference:	9
Location of origin:	Chakwal, Punjab
Country of origin:	Pakistan
Date of collection:	06/02/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	31/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42490, genome 42491, sequence viba_42492, sequencing info 42493	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_42500	PAK/16/2019	cattle	98.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_39743	VRI/CAMB/Faisalabad1/PUN/PAK	cattle	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_39040	NIAB/PUN/PAK/205/2017	water buffalo	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_39763	NIAB/PUN/PAK/218/2017		97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_39771	NIAB/PUN/PAK/222/2017		97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_33615	IRN/31/2016	cattle	97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_39747	VRI/CAMB/Sahiwal1/PUN/PAK	cattle	97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_39775	NIAB/PUN/PAK/223/2017		97.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_33623	IRN/36/2016	sheep	97.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_34937	PAK/7/2016	cattle	97.2	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		93.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	91.3	0	O	ME-SA	PanAsia-2	FAR-09
viba_354	PAK/16/2010	cattle	91.0	0	O	ME-SA	PanAsia-2	PUN-10
viba_666	IRN/18/2010	cattle	90.5	0	O	ME-SA	PanAsia-2	BAL-09
viba_491	TUR/257/2008		90.5	0	O	ME-SA	PanAsia-2	TER-08
viba_650	IRN/8/2005	ovine	90.4	0	O	ME-SA	PanAsia-2	
viba_505	TUR/264/2009		89.9	0	O	ME-SA	PanAsia-2	SAN-09
viba_850	NEP/1/2015	cattle	89.4	1	O	ME-SA	PanAsia-2	KAT-15
viba_860	IRN/6/2015	cattle	89.3	0	O	ME-SA	PanAsia-2	QOM-15
viba_285	UKG/35/2001	porcine	89.1	0	O	ME-SA	PanAsia	

Virus sample name:	PAK/15/2019
Sender reference:	13
Location of origin:	Multan, Punjab
Country of origin:	Pakistan
Date of collection:	08/02/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	31/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019

VIBASys IDs: sample 42494, genome 42495, sequence viba_42496, sequencing info 42497

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_39743	VRI/CAMB/Faisalabad1/PUN/PAK	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_40315	VRI/CAMB/Bhakhar3/PUN/PAK/2018	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_39040	NIAB/PUN/PAK/205/2017	water buffalo	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_33623	IRN/36/2016	sheep	95.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_34937	PAK/7/2016	cattle	95.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_33631	IRN/3/2017	sheep	95.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_33635	IRN/5/2017	cattle	95.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_39763	NIAB/PUN/PAK/218/2017		95.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_39771	NIAB/PUN/PAK/222/2017		95.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_33615	IRN/31/2016	cattle	95.7	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		92.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	91.2	0	O	ME-SA	PanAsia-2	FAR-09
viba_666	IRN/18/2010	cattle	91.0	0	O	ME-SA	PanAsia-2	BAL-09
viba_650	IRN/8/2005	ovine	90.8	0	O	ME-SA	PanAsia-2	
viba_491	TUR/257/2008		90.2	0	O	ME-SA	PanAsia-2	TER-08
viba_860	IRN/6/2015	cattle	90.2	0	O	ME-SA	PanAsia-2	QOM-15
viba_354	PAK/16/2010	cattle	90.0	0	O	ME-SA	PanAsia-2	PUN-10
viba_285	UKG/35/2001	porcine	89.8	0	O	ME-SA	PanAsia	
viba_505	TUR/264/2009		89.6	0	O	ME-SA	PanAsia-2	SAN-09
viba_850	NEP/1/2015	cattle	88.9	1	O	ME-SA	PanAsia-2	KAT-15

Virus sample name:	PAK/16/2019
Sender reference:	3
Location of origin:	Attock, Punjab
Country of origin:	Pakistan
Date of collection:	14/02/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	31/07/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42498, genome 42499, sequence viba_42500, sequencing info 42501	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_42492	PAK/12/2019	cattle	98.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_39743	VRI/CAMB/Faisalabad1/PUN/PAK	cattle	98.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_39040	NIAB/PUN/PAK/205/2017	water buffalo	98.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_39763	NIAB/PUN/PAK/218/2017		97.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_39771	NIAB/PUN/PAK/222/2017		97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_39747	VRI/CAMB/Sahiwal1/PUN/PAK	cattle	97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_39775	NIAB/PUN/PAK/223/2017		97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_33623	IRN/36/2016	sheep	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_34937	PAK/7/2016	cattle	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_33631	IRN/3/2017	sheep	97.6	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		93.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	91.2	0	O	ME-SA	PanAsia-2	FAR-09
viba_354	PAK/16/2010	cattle	90.8	0	O	ME-SA	PanAsia-2	PUN-10
viba_491	TUR/257/2008		90.7	0	O	ME-SA	PanAsia-2	TER-08
viba_650	IRN/8/2005	ovine	90.5	0	O	ME-SA	PanAsia-2	
viba_666	IRN/18/2010	cattle	90.4	0	O	ME-SA	PanAsia-2	BAL-09
viba_505	TUR/264/2009		90.0	0	O	ME-SA	PanAsia-2	SAN-09
viba_850	NEP/1/2015	cattle	89.6	1	O	ME-SA	PanAsia-2	KAT-15
viba_285	UKG/35/2001	porcine	89.4	0	O	ME-SA	PanAsia	
viba_860	IRN/6/2015	cattle	89.4	0	O	ME-SA	PanAsia-2	QOM-15

Virus sample name:	PAK/17/2019
Sender reference:	10
Location of origin:	Chakwal, Punjab
Country of origin:	Pakistan
Date of collection:	14/02/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	01/08/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42502, genome 42503, sequence viba_42504, sequencing info 42505	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_23050	PAK/12/2014	cattle	96.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_23085	PAK/27/2014	cattle	96.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_23054	PAK/13/2014	cattle	96.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_23022	PAK/3/2014	cattle	96.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_21940	PAK/27/2013	water buffalo	96.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_22709	AFG/3/2014	cattle	96.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_23077	PAK/23/2014	water buffalo	96.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_23100	PAK/33/2014	cattle	96.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_22701	AFG/1/2014	cattle	96.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_23046	PAK/11/2014	cattle	96.5	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		95.3	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	93.7	0	O	ME-SA	PanAsia-2	FAR-09
viba_650	IRN/8/2005	ovine	92.7	0	O	ME-SA	PanAsia-2	
viba_491	TUR/257/2008		92.3	0	O	ME-SA	PanAsia-2	TER-08
viba_354	PAK/16/2010	cattle	92.3	0	O	ME-SA	PanAsia-2	PUN-10
viba_666	IRN/18/2010	cattle	92.1	0	O	ME-SA	PanAsia-2	BAL-09
viba_505	TUR/264/2009		92.0	0	O	ME-SA	PanAsia-2	SAN-09
viba_860	IRN/6/2015	cattle	90.7	0	O	ME-SA	PanAsia-2	QOM-15
viba_285	UKG/35/2001	porcine	90.2	0	O	ME-SA	PanAsia	
viba_850	NEP/1/2015	cattle	89.7	1	O	ME-SA	PanAsia-2	KAT-15

Virus sample name:	PAK/23/2019
Sender reference:	14
Location of origin:	Multan, Punjan
Country of origin:	Pakistan
Date of collection:	27/02/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	01/08/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42506, genome 42507, sequence viba_42508, sequencing info 42509	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_23030	PAK/5/2014	cattle	96.4	0	O	ME-SA	PanAsia-2	ANT-10
viba_23018	PAK/2/2014	water buffalo	96.4	0	O	ME-SA	PanAsia-2	ANT-10
viba_23077	PAK/23/2014	water buffalo	96.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_20089	PAK/58/2012	cattle	96.2	0	O	ME-SA	PanAsia-2	ANT-10
viba_23050	PAK/12/2014	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_25537	PAK/8/2015	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_22729	AFG/9/2014	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_21539	AFG/27/2013	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_21536	AFG/23/2013	cattle	96.1	0	O	ME-SA	PanAsia-2	ANT-10
viba_23122	PAK/44/2014	water buffalo	96.1	0	O	ME-SA	PanAsia-2	ANT-10

Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		92.7	0	O	ME-SA	PanAsia-2	ANT-10
viba_666	IRN/18/2010	cattle	90.8	0	O	ME-SA	PanAsia-2	BAL-09
viba_766	IRN/31/2009	cattle	90.8	0	O	ME-SA	PanAsia-2	FAR-09
viba_285	UKG/35/2001	porcine	90.4	0	O	ME-SA	PanAsia	
viba_650	IRN/8/2005	ovine	90.2	0	O	ME-SA	PanAsia-2	
viba_491	TUR/257/2008		89.9	0	O	ME-SA	PanAsia-2	TER-08
viba_505	TUR/264/2009		89.6	0	O	ME-SA	PanAsia-2	SAN-09
viba_860	IRN/6/2015	cattle	89.6	0	O	ME-SA	PanAsia-2	QOM-15
viba_850	NEP/1/2015	cattle	89.4	1	O	ME-SA	PanAsia-2	KAT-15
viba_354	PAK/16/2010	cattle	89.1	0	O	ME-SA	PanAsia-2	PUN-10

Virus sample name:	PAK/32/2019
Sender reference:	11
Location of origin:	Okara, Punjab
Country of origin:	Pakistan
Date of collection:	22/03/2019
Host species:	cattle
Serotype:	O
Topotype:	ME-SA
Lineage:	PanAsia-2
Sublineage:	ANT-10
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	01/08/2019
Primers:	O-1C244F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42510, genome 42511, sequence viba_42512, sequencing info 42513	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_39743	VRI/CAMB/Faisalabad1/PUN/PAK	cattle	97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_39040	NIAB/PUN/PAK/205/2017	water buffalo	97.8	0	O	ME-SA	PanAsia-2	ANT-10
viba_33623	IRN/36/2016	sheep	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_34937	PAK/7/2016	cattle	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_36587	AFG/54/2017	bovine	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_33631	IRN/3/2017	sheep	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_33635	IRN/5/2017	cattle	97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_39763	NIAB/PUN/PAK/218/2017		97.6	0	O	ME-SA	PanAsia-2	ANT-10
viba_39771	NIAB/PUN/PAK/222/2017		97.5	0	O	ME-SA	PanAsia-2	ANT-10
viba_33615	IRN/31/2016	cattle	97.5	0	O	ME-SA	PanAsia-2	ANT-10

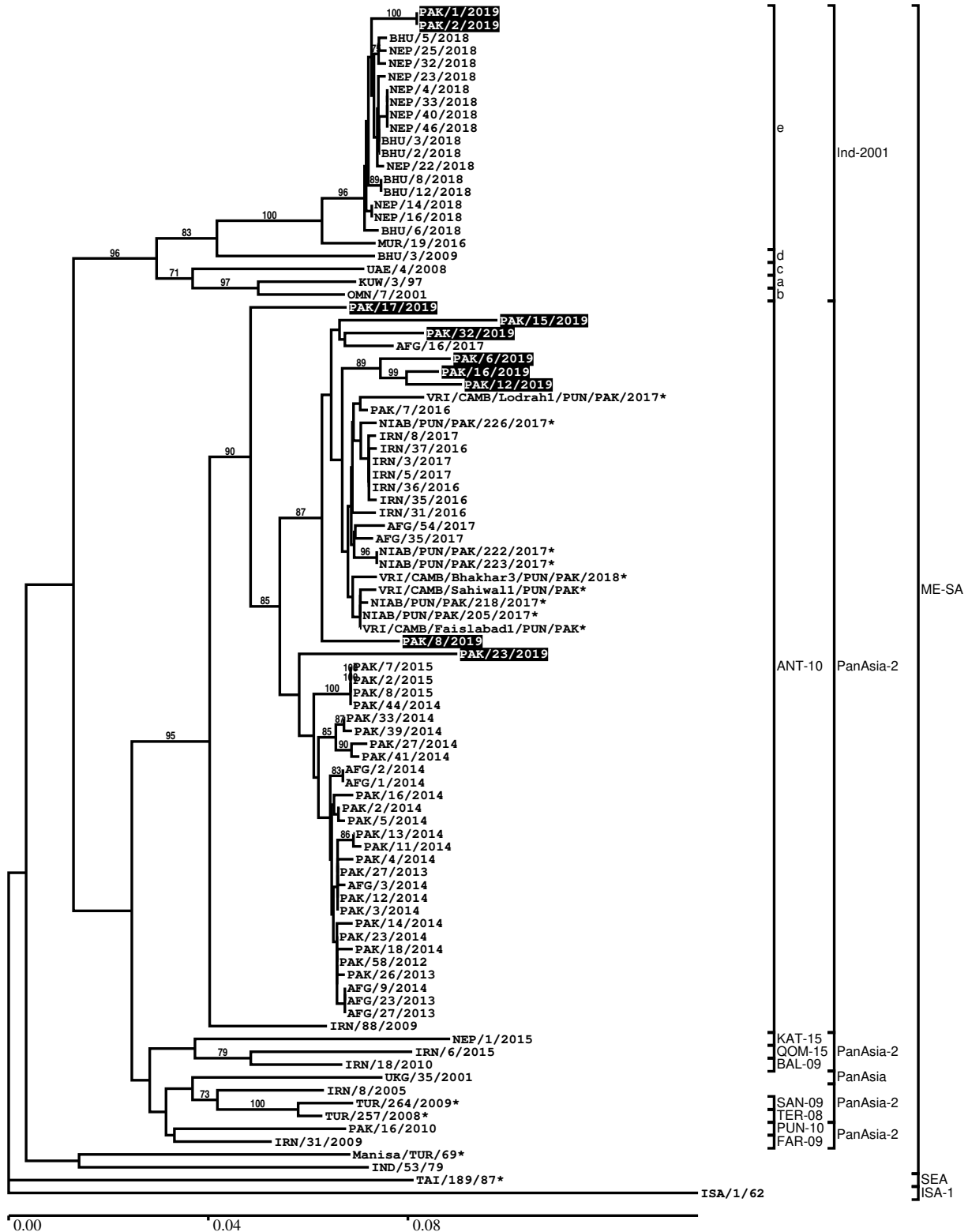
Most Closely Related Prototype Sequences

see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_719	IRN/88/2009		92.9	0	O	ME-SA	PanAsia-2	ANT-10
viba_766	IRN/31/2009	cattle	91.0	0	O	ME-SA	PanAsia-2	FAR-09
viba_491	TUR/257/2008		90.5	0	O	ME-SA	PanAsia-2	TER-08
viba_354	PAK/16/2010	cattle	90.4	0	O	ME-SA	PanAsia-2	PUN-10
viba_650	IRN/8/2005	ovine	90.2	0	O	ME-SA	PanAsia-2	
viba_666	IRN/18/2010	cattle	90.2	0	O	ME-SA	PanAsia-2	BAL-09
viba_505	TUR/264/2009		89.9	0	O	ME-SA	PanAsia-2	SAN-09
viba_285	UKG/35/2001	porcine	89.8	0	O	ME-SA	PanAsia	
viba_860	IRN/6/2015	cattle	89.6	0	O	ME-SA	PanAsia-2	QOM-15
viba_850	NEP/1/2015	cattle	89.4	1	O	ME-SA	PanAsia-2	KAT-15

Report on FMDV O in Pakistan in 2019

Batch: WRLFMD/2019/00028



*, not a WRLFMD Reference Number

Analysis Parameters

VP1 subsequence extractor:	vp1_O
Query sequence set:	WRLFMD/2019/00028-Pakistan-O (10 sequences)
Sequence database set:	allseqs_O (4600 sequences)
Prototype sequence set:	!prototypes_O (49 sequences)
Number of related sequences reported:	10
Minimal VP1 subsequence match length	600
Sequence alignment method:	muscle (default parameters)
Sequence alignment length:	636
Phylogeny reconstruction method:	fdnadist, fneighbor
Number of bootstrap samples:	1000
Random seed for bootstrapping:	1
Displaying bootstrap values above:	70.0%
Number of sequences in tree capped at:	100
Number of prototype sequences in tree:	17
VIBASys version:	reflabs-1.1.2

Sequences in the Phylogenetic Tree

All sequences in the tree are in taxonomic group FMDV/O

label	accession	host(s)	lab	country	taxonomic information
PAK/1/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/Ind-2001/e
PAK/2/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/Ind-2001/e
BHU/5/2018	n/a	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/e
NEP/25/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/32/2018	n/a	porcine	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/23/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/4/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/33/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/40/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/46/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
BHU/3/2018	n/a	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/e
BHU/2/2018	n/a	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/e
NEP/22/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
BHU/8/2018	n/a	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/e
BHU/12/2018	n/a	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/e
NEP/14/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
NEP/16/2018	n/a	cattle	WRLFMD	Nepal	ME-SA/Ind-2001/e
BHU/6/2018	n/a	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/e
MUR/19/2016	MG972510	cattle	WRLFMD	Mauritius	ME-SA/Ind-2001/e
BHU/3/2009	KM921814	cattle	WRLFMD	Bhutan	ME-SA/Ind-2001/d
UAE/4/2008	KM921876	gazelle	WRLFMD	United Arab Emirates	ME-SA/Ind-2001/c
KUW/3/97	DQ164904	bovine	WRLFMD	Kuwait	ME-SA/Ind-2001/a
OMN/7/2001	DQ164941	bovine	WRLFMD	Oman	ME-SA/Ind-2001/b
PAK/17/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/15/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/32/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
AFG/16/2017	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
PAK/6/2019	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/16/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10

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label	accession	host(s)	lab	country	taxonomic information
PAK/12/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
VRI/CAMB/Lodrah1/PUN/PAK/2017*	MK342179	cattle	VRI-CAMB	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/7/2016	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
NIAB/PUN/PAK/226/2017*	MH085208	n/a	NIAB	Pakistan	ME-SA/PanAsia-2/ANT-10
IRN/8/2017	n/a	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
IRN/37/2016	n/a	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
IRN/3/2017	n/a	sheep	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
IRN/5/2017	n/a	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
IRN/36/2016	n/a	sheep	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
IRN/35/2016	n/a	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
IRN/31/2016	n/a	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
AFG/54/2017	n/a	bovine	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
AFG/35/2017	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
NIAB/PUN/PAK/222/2017*	MH085206	n/a	NIAB	Pakistan	ME-SA/PanAsia-2/ANT-10
NIAB/PUN/PAK/223/2017*	MH085207	n/a	NIAB	Pakistan	ME-SA/PanAsia-2/ANT-10
VRI/CAMB/Bhakhar3/PUN/PAK/2018*	MK342186	cattle	VRI-CAMB	Pakistan	ME-SA/PanAsia-2/ANT-10
VRI/CAMB/Sahiwal1/PUN/PAK*	MK292143	cattle	VRI-CAMB	Pakistan	ME-SA/PanAsia-2/ANT-10
NIAB/PUN/PAK/218/2017*	MH085204	n/a	NIAB	Pakistan	ME-SA/PanAsia-2/ANT-10
NIAB/PUN/PAK/205/2017*	MF140436	water buffalo	NIAB	Pakistan	ME-SA/PanAsia-2/ANT-10
VRI/CAMB/Faislabad1/PUN/PAK*	MK292142	cattle	VRI-CAMB	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/8/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/23/2019	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/7/2015	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/2/2015	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/8/2015	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/44/2014	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/33/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/39/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/27/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/41/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
AFG/2/2014	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
AFG/1/2014	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
PAK/16/2014	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/2/2014	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/5/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10

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label	accession	host(s)	lab	country	taxonomic information
PAK/13/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/11/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/4/2014	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/27/2013	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
AFG/3/2014	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
PAK/12/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/3/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/14/2014	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/23/2014	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/18/2014	n/a	water buffalo	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/58/2012	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
PAK/26/2013	n/a	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/ANT-10
AFG/9/2014	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
AFG/23/2013	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
AFG/27/2013	n/a	cattle	WRLFMD	Afghanistan	ME-SA/PanAsia-2/ANT-10
IRN/88/2009	KY091282	n/a	WRLFMD	Iran	ME-SA/PanAsia-2/ANT-10
NEP/1/2015	MN276045	cattle	WRLFMD	Nepal	ME-SA/PanAsia-2/KAT-15
IRN/6/2015	MN276044	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/QOM-15
IRN/18/2010	KY091283	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/BAL-09
UKG/35/2001	AJ539141	porcine	PIADC	United Kingdom	ME-SA/PanAsia
IRN/8/2005	KY091281	ovine	WRLFMD	Iran	ME-SA/PanAsia-2
TUR/264/2009*	n/a	n/a	FMDI-Ankara	Turkey	ME-SA/PanAsia-2/SAN-09
TUR/257/2008*	n/a	n/a	FMDI-Ankara	Turkey	ME-SA/PanAsia-2/TER-08
PAK/16/2010	KY091285	cattle	WRLFMD	Pakistan	ME-SA/PanAsia-2/PUN-10
IRN/31/2009	KY091284	cattle	WRLFMD	Iran	ME-SA/PanAsia-2/FAR-09
Manisa/TUR/69*	AY593823	n/a	PIADC	Turkey	ME-SA
IND/53/79	AF292107	bovine	PD-FMD	India	ME-SA
TAI/189/87*	KY091288	bovine	TRRL	Thailand	SEA
ISA/1/62	AJ303500	n/a	WRLFMD	Indonesia	ISA-1

*, not a WRLFMD Reference Number

n/a, not available