



## FMD Genotyping Report

Lab Reference WRL batch Number: WRLFMD/2022/00001

Sender Details:



Date Received: 04/02/2022

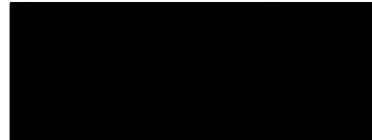
Country of Origin\*: PAKISTAN

Sequencing work has now been completed in respect of the samples you submitted and the details are as attached. Please note that all of our phylogenetic trees can be accessed via the internet at:  
<http://www.wrlfmd.org/>

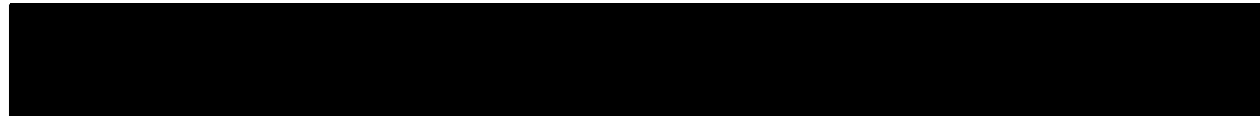
Results Approved By:



Official Stamp:



Date: 16/3/2022



To help us improve the quality of our service, please send any suggestions or requests to the Reference Laboratory by email ([reflabsfeedback@pirbright.ac.uk](mailto:reflabsfeedback@pirbright.ac.uk)).

\* Data supplied by the customer

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

## Genotyping Report

FMDV serotype: Asia1  
Country: Pakistan  
Year: 2021  
Batch: WRLFMD/2022/00001  
No. of sequences: 12  
Report date: 14th March 2022  
Report generated by: Nick Knowles  
Report checked by: Jemma Wadsworth



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www: <http://www.wrlfmd.org/>

email: [reporting@pirbright.ac.uk](mailto:reporting@pirbright.ac.uk)

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Virus sample name:	PAK/31/2021
Sender reference:	PK-31
Location of origin:	Matiari, Sindh
Country of origin:	Pakistan
Date of collection:	13/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	16/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50263, genome 50264, sequence viba_50265, sequencing info 50266	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50273	PAK/33/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.8	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.3	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.0	0	Asia1	ASIA	G-VIII	
viba_737	IND/18/80	bovine	85.5	0	Asia1	ASIA	G-V	
viba_146	Shamir/ISR/89	bovine	85.4	0	Asia1	ASIA		
viba_385	IND/762/2003	bovine	85.1	0	Asia1	ASIA	G-III	
viba_551	YNBS/CHA/58	bovine	84.5	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.4	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.4	0	Asia1	ASIA		
viba_297	IND/63/72		84.2	0	Asia1	ASIA		

Virus sample name:	PAK/32/2021
Sender reference:	PK-32
Location of origin:	Matiari, Sindh
Country of origin:	Pakistan
Date of collection:	13/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	17/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50267, genome 50268, sequence viba_50269, sequencing info 50270	

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50273	PAK/33/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.8	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.3	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.0	0	Asia1	ASIA	G-VIII	
viba_737	IND/18/80	bovine	85.5	0	Asia1	ASIA	G-V	
viba_146	Shamir/ISR/89	bovine	85.4	0	Asia1	ASIA		
viba_385	IND/762/2003	bovine	85.1	0	Asia1	ASIA	G-III	
viba_551	YNBS/CHA/58	bovine	84.5	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.4	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.4	0	Asia1	ASIA		
viba_297	IND/63/72		84.2	0	Asia1	ASIA		

Virus sample name:	PAK/33/2021
Sender reference:	PK-33
Location of origin:	Matiari, Sindh
Country of origin:	Pakistan
Date of collection:	15/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	16/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50271, genome 50272, sequence viba_50273, sequencing info 50274	

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50269	PAK/32/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.8	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.3	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.0	0	Asia1	ASIA	G-VIII	
viba_737	IND/18/80	bovine	85.5	0	Asia1	ASIA	G-V	
viba_146	Shamir/ISR/89	bovine	85.4	0	Asia1	ASIA		
viba_385	IND/762/2003	bovine	85.1	0	Asia1	ASIA	G-III	
viba_551	YNBS/CHA/58	bovine	84.5	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.4	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.4	0	Asia1	ASIA		
viba_297	IND/63/72		84.2	0	Asia1	ASIA		

Virus sample name:	PAK/37/2021
Sender reference:	PK-34
Location of origin:	Karachi (Malir), Sindh
Country of origin:	Pakistan
Date of collection:	17/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	17/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50275, genome 50276, sequence viba_50277, sequencing info 50278	

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50309	PAK/50/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.8	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.3	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.0	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.4	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.2	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	85.1	0	Asia1	ASIA	G-III	
viba_775	IRN/10/2004	cattle	84.4	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.4	0	Asia1	ASIA		
viba_551	YNBS/CHA/58	bovine	84.2	0	Asia1	ASIA		
viba_297	IND/63/72		83.9	0	Asia1	ASIA		

Virus sample name:	PAK/38/2021
Sender reference:	PK-43
Location of origin:	Karachi, Sindh
Country of origin:	Pakistan
Date of collection:	18/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	17/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50279, genome 50280, sequence viba_50281, sequencing info 50282	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50309	PAK/50/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.7	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.1	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	85.9	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.3	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.0	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	84.9	0	Asia1	ASIA	G-III	
viba_161	IND/14/95	bovine	84.3	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.2	0	Asia1	ASIA	G-VIb	
viba_551	YNBS/CHA/58	bovine	84.1	0	Asia1	ASIA		
viba_297	IND/63/72		83.8	0	Asia1	ASIA		

Virus sample name:	PAK/39/2021
Sender reference:	PK-44
Location of origin:	Karachi, Sindh
Country of origin:	Pakistan
Date of collection:	19/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	17/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50283, genome 50284, sequence viba_50285, sequencing info 50286	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.7	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.1	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	85.9	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.3	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.0	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	84.9	0	Asia1	ASIA	G-III	
viba_161	IND/14/95	bovine	84.3	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.2	0	Asia1	ASIA	G-VIb	
viba_297	IND/63/72		84.1	0	Asia1	ASIA		
viba_551	YNBS/CHA/58	bovine	84.1	0	Asia1	ASIA		



Virus sample name:	PAK/42/2021
Sender reference:	PK-47
Location of origin:	Karachi (Malir), Sindh
Country of origin:	Pakistan
Date of collection:	19/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	17/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50287, genome 50288, sequence viba_50289, sequencing info 50290	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50309	PAK/50/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.7	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.1	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	85.9	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.3	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.0	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	84.9	0	Asia1	ASIA	G-III	
viba_161	IND/14/95	bovine	84.3	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.2	0	Asia1	ASIA	G-VIb	
viba_551	YNBS/CHA/58	bovine	84.1	0	Asia1	ASIA		
viba_297	IND/63/72		83.8	0	Asia1	ASIA		

Virus sample name:	PAK/45/2021
Sender reference:	PK-35
Location of origin:	Karachi, Sindh
Country of origin:	Pakistan
Date of collection:	24/11/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	17/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022

VIBASys IDs: sample 50291, genome 50292, sequence viba\_50293, sequencing info 50294

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50309	PAK/50/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.7	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.1	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	85.9	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.3	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.0	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	84.9	0	Asia1	ASIA	G-III	
viba_161	IND/14/95	bovine	84.3	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.2	0	Asia1	ASIA	G-VIb	
viba_551	YNBS/CHA/58	bovine	84.1	0	Asia1	ASIA		
viba_297	IND/63/72		83.8	0	Asia1	ASIA		

Virus sample name:	PAK/47/2021
Sender reference:	PK-36
Location of origin:	Rawalpindi, Punjab
Country of origin:	Pakistan
Date of collection:	20/12/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	25/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50295, genome 50296, sequence viba_50297, sequencing info 50298	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50305	PAK/49/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50301	PAK/48/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	93.0	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.4	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.2	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.6	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.4	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	85.2	0	Asia1	ASIA	G-III	
viba_775	IRN/10/2004	cattle	84.6	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.6	0	Asia1	ASIA		
viba_551	YNBS/CHA/58	bovine	84.4	0	Asia1	ASIA		
viba_297	IND/63/72		84.1	0	Asia1	ASIA		

Virus sample name:	PAK/48/2021
Sender reference:	PK-37
Location of origin:	Rawalpindi, Punjab
Country of origin:	Pakistan
Date of collection:	20/12/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	24/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022
VIBASys IDs: sample 50299, genome 50300, sequence viba_50301, sequencing info 50302	

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50297	PAK/47/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.4	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.4	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	93.1	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.6	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.0	0	Asia1	ASIA	G-VIII	
viba_737	IND/18/80	bovine	85.5	0	Asia1	ASIA	G-V	
viba_146	Shamir/ISR/89	bovine	85.4	0	Asia1	ASIA		
viba_385	IND/762/2003	bovine	85.1	0	Asia1	ASIA	G-III	
viba_775	IRN/10/2004	cattle	84.6	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.4	0	Asia1	ASIA		
viba_551	YNBS/CHA/58	bovine	84.2	0	Asia1	ASIA		
viba_646	HKN/19/74	bovine	84.0	0	Asia1	ASIA		

Virus sample name:	PAK/49/2021
Sender reference:	PK-38
Location of origin:	Rawalpindi, Punjab
Country of origin:	Pakistan
Date of collection:	20/12/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	24/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022

VIBASys IDs: sample 50303, genome 50304, sequence viba\_50305, sequencing info 50306

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50297	PAK/47/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50301	PAK/48/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50309	PAK/50/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50293	PAK/45/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	93.0	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.4	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	86.2	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.6	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.4	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	85.2	0	Asia1	ASIA	G-III	
viba_775	IRN/10/2004	cattle	84.6	0	Asia1	ASIA	G-VIb	
viba_161	IND/14/95	bovine	84.6	0	Asia1	ASIA		
viba_551	YNBS/CHA/58	bovine	84.4	0	Asia1	ASIA		
viba_297	IND/63/72		84.1	0	Asia1	ASIA		

Virus sample name:	PAK/50/2021
Sender reference:	PK-39
Location of origin:	Rawalpindi, Punjab
Country of origin:	Pakistan
Date of collection:	21/12/2021
Host species:	cattle
Serotype:	Asia1
Topotype:	ASIA
Lineage:	Sindh-08
Sublineage:	
Sequence length:	627
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	24/02/2022
Primers:	As1-1C530F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	07/03/2022
Created:	13/03/2022
Last updated:	13/03/2022

VIBASys IDs: sample 50307, genome 50308, sequence viba\_50309, sequencing info 50310

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_50293	PAK/45/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50289	PAK/42/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50281	PAK/38/2021	cattle	100.0	0	Asia1	ASIA	Sindh-08	
viba_50277	PAK/37/2021	cattle	99.8	0	Asia1	ASIA	Sindh-08	
viba_50297	PAK/47/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50305	PAK/49/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50285	PAK/39/2021	cattle	99.7	0	Asia1	ASIA	Sindh-08	
viba_50273	PAK/33/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50269	PAK/32/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	
viba_50265	PAK/31/2021	cattle	99.5	0	Asia1	ASIA	Sindh-08	

#### Most Closely Related Prototype Sequences

see <http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains>

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_206	PAK/8/2008	water buffalo	92.7	0	Asia1	ASIA	Sindh-08	
viba_167	AFG/1/2001	bovine	90.1	0	Asia1	ASIA	G- I	
viba_12154	BAR/8/2009	cattle	85.9	0	Asia1	ASIA	G-VIII	
viba_146	Shamir/ISR/89	bovine	85.3	0	Asia1	ASIA		
viba_737	IND/18/80	bovine	85.0	0	Asia1	ASIA	G-V	
viba_385	IND/762/2003	bovine	84.9	0	Asia1	ASIA	G-III	
viba_161	IND/14/95	bovine	84.3	0	Asia1	ASIA		
viba_775	IRN/10/2004	cattle	84.2	0	Asia1	ASIA	G-VIb	
viba_551	YNBS/CHA/58	bovine	84.1	0	Asia1	ASIA		
viba_297	IND/63/72		83.8	0	Asia1	ASIA		

Report on FMDV Asia1 in Pakistan in 2021

Batch: WRLFMD/2022/00001



\*, not a WRLFMD Reference Number

## Analysis Parameters

VP1 subsequence extractor:	vp1_Asia1
Query sequence set:	WRLFMD/2022/00001-Pakistan-Asia1 (12 sequences)
Sequence database set:	allseqs_Asia1 (716 sequences)
Prototype sequence set:	!prototypes_Asia1 (13 sequences)
Number of related sequences reported:	10
Minimal VP1 subsequence match length	600
Sequence alignment method:	muscle (default parameters)
Sequence alignment length:	627
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:	11
VIBASys version:	reflabs-1.1.2

## Sequences in the Phylogenetic Tree

All sequences in the tree are in taxonomic group FMDV/Asia1/ASIA

label	accession	host(s)	lab	country	taxonomic information
PAK/31/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/33/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/32/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/42/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/50/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/45/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/38/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/39/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/37/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/49/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/47/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/48/2021	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/14/2016	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/3/2017	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/13/2016	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
AFG/21/2016	n/a	bovine	WRLFMD	Afghanistan	Sindh-08
AFG/10/2016	n/a	bovine	WRLFMD	Afghanistan	Sindh-08
PAK/18/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/1/2017	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
AFG/6/2016	n/a	bovine	WRLFMD	Afghanistan	Sindh-08
NIAB/PUN/PAK/190/2016*	MF140438	water buffalo	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/148/2016*	MF115988	cattle	NIAB	Pakistan	Sindh-08
PAK/26/2014	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/39/2014	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/9/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/15/2017	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/5/2017	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
VRI/CAMB/Kasur1/PUN/PAK*	MK241888	cattle	VRI-CAMB	Pakistan	Sindh-08
NIAB/PUN/PAK/181/2016*	MF140441	cattle	NIAB	Pakistan	Sindh-08
PAK/54/2015	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/8/2016	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/23/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/48/2015	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/37/2014	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/35/2014	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/27/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08

*continued on next page*



label	accession	host(s)	lab	country	taxonomic information
PAK/37/2015	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/38/2015	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/33/2015	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/29/2015	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
NIAB/PUN/PAK/197/2016*	MF167435	dromedary	NIAB	Pakistan	Sindh-08
PAK/11/2017	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/29/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/1/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/6/2017	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/16/2017	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/17/2016	n/a	cattle	WRLFMD	Pakistan	Sindh-08
NIAB/PUN/PAK/160/2016*	MF140439	water buffalo	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/152/2016*	MF115989	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/156/2016*	MF115991	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/144/2016*	KY659570	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/149/2016*	KY659574	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/145/2016*	KY659571	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/147/2016*	KY659573	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/195/2016*	MF140443	dromedary	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/146/2016*	KY659572	cattle	NIAB	Pakistan	Sindh-08
NIAB/PUN/PAK/154/2016*	KY659575	cattle	NIAB	Pakistan	Sindh-08
PAK/67/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
Pak/SGD-30/11*	KU365790	cattle	PIADC	Pakistan	Sindh-08
PAK/55/2011	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/53/2011	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/50/2011	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
Pak/KCH-37/11*	KU365805	water buffalo	PIADC	Pakistan	Sindh-08
PAK/68/2011	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
Pak/SGD-29/11*	KU365789	cattle	PIADC	Pakistan	Sindh-08
PAK/51/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
Pak/KCH-36/11*	KU380332	water buffalo	PIADC	Pakistan	Sindh-08
PAK/49/2011	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/57/2011	n/a	water buffalo	WRLFMD	Pakistan	Sindh-08
PAK/52/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/61/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/11/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/60/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/13/2011	n/a	cattle	WRLFMD	Pakistan	Sindh-08
PAK/108/2010	n/a	cattle	WRLFMD	Pakistan	Sindh-08
Pak/SGD-171/12*	KU365820	cattle	PIADC	Pakistan	Sindh-08
Pak/SGD-170/12*	KU365819	cattle	PIADC	Pakistan	Sindh-08
PAK/8/2008	KY091304	water buffalo	WRLFMD	Pakistan	Sindh-08
AFG/1/2001	DQ121109	bovine	WRLFMD	Afghanistan	G- I
Shamir/ISR/89*	n/a	bovine	BFAV	Israel	
BAR/8/2009	MG603264	cattle	WRLFMD	Bahrain	G-VIII
IND/762/2003*	DQ101240	bovine	PD-FMD	India	G-III
IRN/10/2004	DQ121119	cattle	WRLFMD	Iran	G-VIb
IND/14/95*	AF390678	bovine	PD-FMD	India	
YNBS/CHA/58*	AY390432	bovine	LVRI	China	
IND/63/72*	AY304994	n/a	IVRI- Bangalore	India	
IND/18/80	DQ121116	bovine	WRLFMD	India	G-V
HKN/19/74	n/a	bovine	WRLFMD	Hong Kong SAR	

\*, not a WRLFMD Reference Number  
n/a, not available