

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

Genotyping Report

FMDV serotype: A
Country: Pakistan
Year: 2018, 2019
Batch: WRLFMD/2019/00028
No. of sequences: 2
Report date: 12th August 2019
Report generated by: Nick Knowles
Report checked by: Antonello Di Nardo



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

email: reporting@pirbright.ac.uk

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Virus sample name:	PAK/1/2018
Sender reference:	12
Location of origin:	Muzaffargarh, Punjab
Country of origin:	Pakistan
Date of collection:	31/01/2018
Host species:	cattle
Serotype:	A
Topotype:	ASIA
Lineage:	Iran-05
Sublineage:	SIS-13
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	30/07/2019
Primers:	A-1C562F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019

VIBASys IDs: sample 42518, genome 42519, sequence viba_42520, sequencing info 42521

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_36060	IRN/4/2018b	cattle	99.8	0	A	ASIA	Iran-05	SIS-13
viba_36571	AFG/60/2017	bovine	99.4	0	A	ASIA	Iran-05	SIS-13
viba_36559	AFG/50/2017	bovine	99.4	0	A	ASIA	Iran-05	SIS-13
viba_36032	IRN/6/2018	cattle	99.4	0	A	ASIA	Iran-05	SIS-13
viba_36056	IRN/4/2018a	cattle	99.2	0	A	ASIA	Iran-05	SIS-13
viba_36048	IRN/23/2018	cattle	98.9	0	A	ASIA	Iran-05	SIS-13
viba_36024	IRN/2/2018	cattle	98.4	0	A	ASIA	Iran-05	SIS-13
viba_42524	PAK/24/2019	cattle	98.1	0	A	ASIA	Iran-05	SIS-13
viba_34401	AFG/6/2017	cattle	96.7	0	A	ASIA	Iran-05	SIS-13
viba_34421	AFG/25/2017	cattle	96.5	0	A	ASIA	Iran-05	SIS-13

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_20943	IRN/27/2013	cattle	94.6	0	A	ASIA	Iran-05	SIS-13
viba_13615	IRN/134/2010	cattle	91.6	0	A	ASIA	Iran-05	HER-10
viba_636	IRN/78/2009		91.6	0	A	ASIA	Iran-05	FAR-09
viba_414	AFG/6/2007	bovine	91.5	0	A	ASIA	Iran-05	AFG-07
viba_34671	BAL/PAK/05/2011	cattle	91.0	0	A	ASIA	Iran-05	BAL-11
viba_10508	PAK/7/2008	water buffalo	90.8	0	A	ASIA	Iran-05	SIN-08
viba_557	IRN/15/2012	bovine	90.5	0	A	ASIA	Iran-05	SIS-12
viba_594	IRN/1/2011	bovine	90.5	0	A	ASIA	Iran-05	FAR-11
viba_34575	BAD/AFG/L2814/2009	cattle	90.3	0	A	ASIA	Iran-05	BAD-09
viba_319	BAR/6/2008	bovine	90.2	0	A	ASIA	Iran-05	BAR-08

Virus sample name:	PAK/24/2019
Sender reference:	33
Location of origin:	Karachi, Sindh
Country of origin:	Pakistan
Date of collection:	27/02/2019
Host species:	cattle
Serotype:	A
Topotype:	ASIA
Lineage:	Iran-05
Sublineage:	SIS-13
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy2
Harvest date of material:	03/08/2019
Primers:	A-1C562F/EUR-2B52R; FMD-3161F/FMD-4303R
Received for sequencing:	08/08/2019
Created:	12/08/2019
Last updated:	12/08/2019
VIBASys IDs: sample 42522, genome 42523, sequence viba_42524, sequencing info 42525	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_36571	AFG/60/2017	bovine	98.4	0	A	ASIA	Iran-05	SIS-13
viba_36559	AFG/50/2017	bovine	98.4	0	A	ASIA	Iran-05	SIS-13
viba_36032	IRN/6/2018	cattle	98.4	0	A	ASIA	Iran-05	SIS-13
viba_36056	IRN/4/2018a	cattle	98.3	0	A	ASIA	Iran-05	SIS-13
viba_36060	IRN/4/2018b	cattle	98.3	0	A	ASIA	Iran-05	SIS-13
viba_42520	PAK/1/2018	cattle	98.1	0	A	ASIA	Iran-05	SIS-13
viba_36048	IRN/23/2018	cattle	97.9	0	A	ASIA	Iran-05	SIS-13
viba_36024	IRN/2/2018	cattle	97.5	0	A	ASIA	Iran-05	SIS-13
viba_34401	AFG/6/2017	cattle	96.4	0	A	ASIA	Iran-05	SIS-13
viba_34421	AFG/25/2017	cattle	96.2	0	A	ASIA	Iran-05	SIS-13

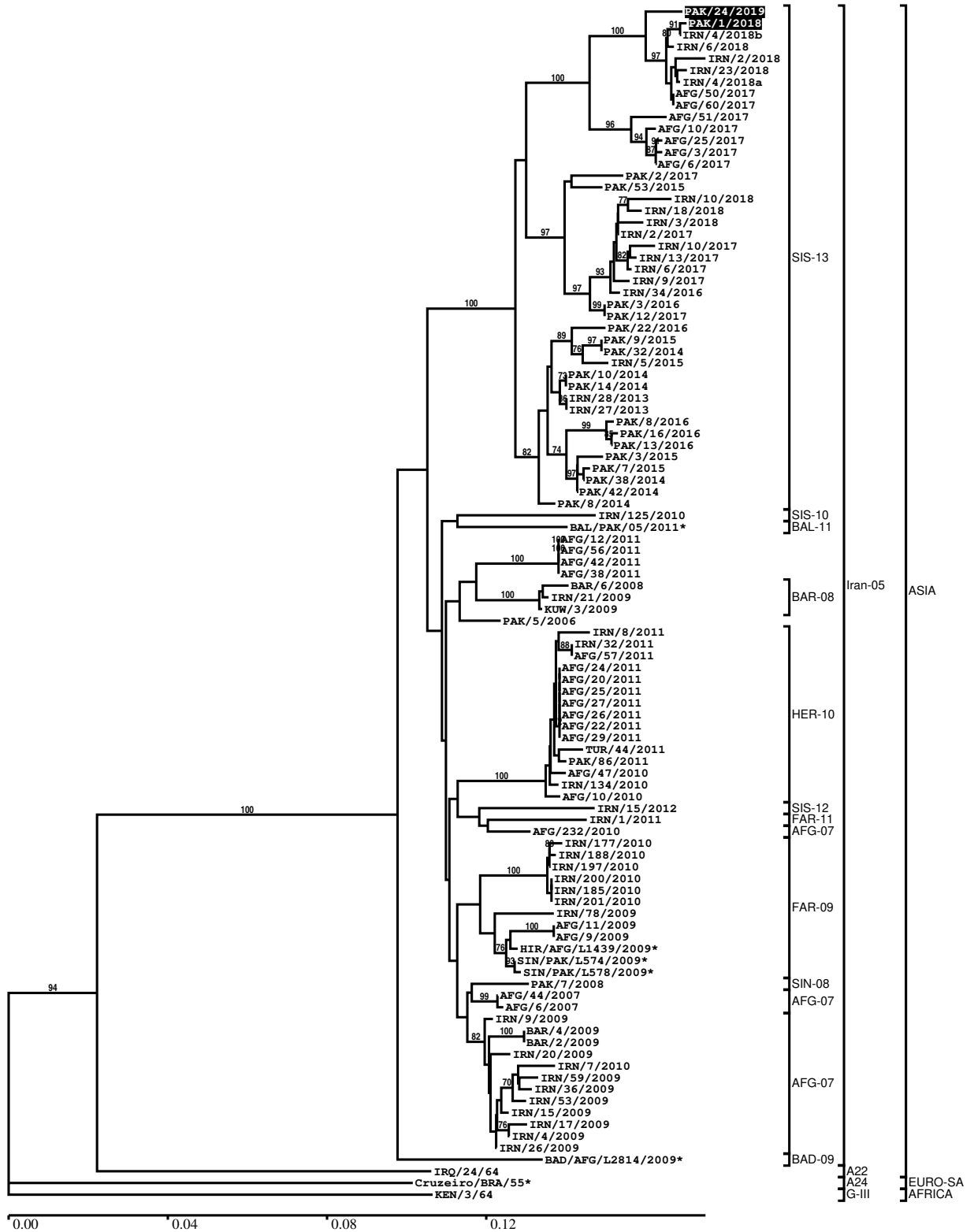
Most Closely Related Prototype Sequences

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

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_20943	IRN/27/2013	cattle	94.3	0	A	ASIA	Iran-05	SIS-13
viba_636	IRN/78/2009		91.8	0	A	ASIA	Iran-05	FAR-09
viba_13615	IRN/134/2010	cattle	91.5	0	A	ASIA	Iran-05	HER-10
viba_414	AFG/6/2007	bovine	91.3	0	A	ASIA	Iran-05	AFG-07
viba_10508	PAK/7/2008	water buffalo	91.0	0	A	ASIA	Iran-05	SIN-08
viba_34671	BAL/PAK/05/2011	cattle	90.8	0	A	ASIA	Iran-05	BAL-11
viba_319	BAR/6/2008	bovine	90.7	0	A	ASIA	Iran-05	BAR-08
viba_594	IRN/1/2011	bovine	90.5	0	A	ASIA	Iran-05	FAR-11
viba_557	IRN/15/2012	bovine	90.4	0	A	ASIA	Iran-05	SIS-12
viba_791	IRN/125/2010	bovine	90.2	0	A	ASIA	Iran-05	SIS-10

Report on FMDV A in Pakistan in 2018, 2019

Batch: WRLFMD/2019/00028



*, not a WRLFMD Reference Number

Analysis Parameters

VP1 subsequence extractor:	vp1_A
Query sequence set:	WRLFMD/2019/00028-Pakistan-A (2 sequences)
Sequence database set:	allseqs_A (2034 sequences)
Prototype sequence set:	!prototypes_A (40 sequences)
Number of related sequences reported:	10
Minimal VP1 subsequence match length	600
Sequence alignment method:	muscle (default parameters)
Sequence alignment length:	633
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/A

label	accession	host(s)	lab	country	taxonomic information
PAK/24/2019	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/1/2018	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
IRN/4/2018b	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/6/2018	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/2/2018	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/23/2018	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/4/2018a	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
AFG/50/2017	n/a	bovine	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
AFG/60/2017	n/a	bovine	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
AFG/51/2017	n/a	bovine	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
AFG/10/2017	n/a	cattle	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
AFG/25/2017	n/a	cattle	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
AFG/3/2017	n/a	cattle	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
AFG/6/2017	n/a	cattle	WRLFMD	Afghanistan	ASIA/Iran-05/SIS-13
PAK/2/2017	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/53/2015	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
IRN/10/2018	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/18/2018	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/3/2018	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/2/2017	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/10/2017	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/13/2017	n/a	sheep	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/6/2017	n/a	sheep	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/9/2017	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/34/2016	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
PAK/3/2016	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/12/2017	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/22/2016	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/9/2015	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/32/2014	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
IRN/5/2015	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
PAK/10/2014	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/14/2014	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
IRN/28/2013	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
IRN/27/2013	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
PAK/8/2016	n/a	water buffalo	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13

continued on next page

label	accession	host(s)	lab	country	taxonomic information
PAK/16/2016	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/13/2016	n/a	water buffalo	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/3/2015	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/7/2015	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/38/2014	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/42/2014	n/a	water buffalo	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
PAK/8/2014	n/a	water buffalo	WRLFMD	Pakistan	ASIA/Iran-05/SIS-13
IRN/125/2010	KY091296	bovine	WRLFMD	Iran	ASIA/Iran-05/SIS-10
BAL/PAK/05/2011*	KT832824	cattle	Univ Malakand	Pakistan	ASIA/Iran-05/BAL-11
AFG/12/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05
AFG/56/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05
AFG/42/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05
AFG/38/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05
BAR/6/2008	FJ755010	bovine	WRLFMD	Bahrain	ASIA/Iran-05/BAR-08
IRN/21/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/BAR-08
KUW/3/2009	n/a	cattle	WRLFMD	Kuwait	ASIA/Iran-05/BAR-08
PAK/5/2006	FJ755084	cattle	n/a	Pakistan	ASIA/Iran-05
IRN/8/2011	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/HER-10
IRN/32/2011	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/HER-10
AFG/57/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/24/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/20/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/25/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/27/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/26/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/22/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
AFG/29/2011	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
TUR/44/2011	n/a	cattle	WRLFMD	Turkey	ASIA/Iran-05/HER-10
PAK/86/2011	n/a	cattle	WRLFMD	Pakistan	ASIA/Iran-05/HER-10
AFG/47/2010	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
IRN/134/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/HER-10
AFG/10/2010	KY091293	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/HER-10
IRN/15/2012	KY091297	bovine	WRLFMD	Iran	ASIA/Iran-05/SIS-12
IRN/1/2011	KY091292	bovine	WRLFMD	Iran	ASIA/Iran-05/FAR-11
AFG/232/2010	n/a	cattle	WRLFMD	Afghanistan	ASIA/Iran-05/AFG-07
IRN/177/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/FAR-09
IRN/188/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/FAR-09
IRN/197/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/FAR-09
IRN/200/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/FAR-09
IRN/185/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/FAR-09
IRN/201/2010	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/FAR-09
IRN/78/2009	KY091291	n/a	WRLFMD	Iran	ASIA/Iran-05/FAR-09
AFG/11/2009	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/FAR-09
AFG/9/2009	n/a	n/a	WRLFMD	Afghanistan	ASIA/Iran-05/FAR-09
HIR/AFG/L1439/2009*	HQ439278	cattle	LINDHOLM	Afghanistan	ASIA/Iran-05/FAR-09
SIN/PAK/L574/2009*	HQ439244	cattle	LINDHOLM	Pakistan	ASIA/Iran-05/FAR-09
SIN/PAK/L578/2009*	HQ439245	cattle	LINDHOLM	Pakistan	ASIA/Iran-05/FAR-09
PAK/7/2008	MN276047	water buffalo	WRLFMD	Pakistan	ASIA/Iran-05/SIN-08
AFG/44/2007	FJ755009	cattle	WRLFMD	Afghanistan	ASIA/Iran-05/AFG-07
AFG/6/2007	FJ755007	bovine	WRLFMD	Afghanistan	ASIA/Iran-05/AFG-07
IRN/9/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
BAR/4/2009	n/a	cattle	WRLFMD	Bahrain	ASIA/Iran-05/AFG-07
BAR/2/2009	n/a	cattle	WRLFMD	Bahrain	ASIA/Iran-05/AFG-07
IRN/20/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/7/2010	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/59/2009	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/36/2009	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/53/2009	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/15/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/17/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/4/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
IRN/26/2009	n/a	n/a	WRLFMD	Iran	ASIA/Iran-05/AFG-07
BAD/AFG/L2814/2009*	HQ439296	cattle	LINDHOLM	Afghanistan	ASIA/Iran-05/BAD-09
IRQ/24/64	AY593763	bovine	PIADC	Iraq	ASIA/A22
Cruzeiro/BRA/55*	AY593768	bovine	PIADC	Brazil	EURO-SA/A24
KEN/3/64	AY593761	n/a	PIADC	Kenya	AFRICA/G-III

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