

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

## Genotyping Report

FMDV serotype: A  
Country: Bhutan  
Year: 2017  
Batch: WRLFMD/2018/00017  
No. of sequences: 3  
Report date: 11th June 2018  
Report generated by: Nick Knowles  
Report checked by: Kasia Bankowska



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Virus sample name:	BHU/26/2017
Sender reference:	550-1
Location of origin:	Chazhi, Dungna, Chukha, RLDC, Tshimasham, Western
Country of origin:	Bhutan
Date of collection:	22/09/2017
Host species:	cattle
Serotype:	A
Topotype:	ASIA
Lineage:	G-VII
Sublineage:	
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy2
Harvest date of material:	24/05/2018
Primers:	A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R
Received for sequencing:	04/06/2018
Created:	11/06/2018
Last updated:	11/06/2018

VIBASys IDs: sample 36727, genome 36728, sequence viba\_36729, sequencing info 36730

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_36733	BHU/27/2017	cattle	100.0	0	A	ASIA	G-VII	
viba_36737	BHU/28/2017	cattle	99.7	0	A	ASIA	G-VII	
viba_34317	BHU/3/2017	cattle	97.9	0	A	ASIA	G-VII	
viba_34118	NEP/13/2017	cattle	97.9	0	A	ASIA	G-VII	
viba_34114	NEP/12/2017	cattle	97.9	0	A	ASIA	G-VII	
viba_34122	NEP/14/2017	cattle	97.8	0	A	ASIA	G-VII	
viba_25161	PD78/IND/2015		95.9	0	A	ASIA	G-VII	
viba_25967	SAU/15/2015	ovine	95.7	0	A	ASIA	G-VII	
viba_25971	SAU/16/2015	ovine	95.7	0	A	ASIA	G-VII	
viba_25247	SAU/5/2015	cattle	95.7	0	A	ASIA	G-VII	

#### Most Closely Related Prototype Sequences

see [http://www.wrlfmd.org/fmd\\_genotyping/prototypes.htm](http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_864	IND/40/2000	cattle	90.6	0	A	ASIA	G-VII	
viba_843	SAU/16/95		89.9	0	A	ASIA	G-VII	
viba_336	IRN/1/96	bovine	84.2	1	A	ASIA	Iran-96	
viba_677	IRQ/24/64	bovine	84.1	0	A	ASIA	A22	
viba_682	IRN/2/87	bovine	82.2	0	A	ASIA	Iran-87	
viba_475	IRN/22/99		81.5	0	A	ASIA	Iran-99	
viba_20943	IRN/27/2013	cattle	81.5	0	A	ASIA	Iran-05	SIS-13
viba_403	TUR/1/2008	cattle	81.3	0	A	ASIA	Iran-05	ARD-07
viba_589	Bangkok/TAI/60		81.3	0	A	ASIA	A15	
viba_630	TAI/118/87		81.1	0	A	ASIA	Thai-87	

Virus sample name:	BHU/27/2017
Sender reference:	550-2
Location of origin:	Chazhi, Dungna, Chukha, RLDC, Tshimasham, Western
Country of origin:	Bhutan
Date of collection:	22/09/2017
Host species:	cattle
Serotype:	A
Topotype:	ASIA
Lineage:	G-VII
Sublineage:	
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	23/05/2018
Primers:	A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R
Received for sequencing:	04/06/2018
Created:	11/06/2018
Last updated:	11/06/2018

VIBASys IDs: sample 36731, genome 36732, sequence viba\_36733, sequencing info 36734

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_36729	BHU/26/2017	cattle	100.0	0	A	ASIA	G-VII	
viba_36737	BHU/28/2017	cattle	99.7	0	A	ASIA	G-VII	
viba_34317	BHU/3/2017	cattle	97.9	0	A	ASIA	G-VII	
viba_34118	NEP/13/2017	cattle	97.9	0	A	ASIA	G-VII	
viba_34114	NEP/12/2017	cattle	97.9	0	A	ASIA	G-VII	
viba_34122	NEP/14/2017	cattle	97.8	0	A	ASIA	G-VII	
viba_25161	PD78/IND/2015		95.9	0	A	ASIA	G-VII	
viba_25967	SAU/15/2015	ovine	95.7	0	A	ASIA	G-VII	
viba_25971	SAU/16/2015	ovine	95.7	0	A	ASIA	G-VII	
viba_25247	SAU/5/2015	cattle	95.7	0	A	ASIA	G-VII	

#### Most Closely Related Prototype Sequences

see [http://www.wrlfmd.org/fmd\\_genotyping/prototypes.htm](http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_864	IND/40/2000	cattle	90.6	0	A	ASIA	G-VII	
viba_843	SAU/16/95		89.9	0	A	ASIA	G-VII	
viba_336	IRN/1/96	bovine	84.2	1	A	ASIA	Iran-96	
viba_677	IRQ/24/64	bovine	84.1	0	A	ASIA	A22	
viba_682	IRN/2/87	bovine	82.2	0	A	ASIA	Iran-87	
viba_475	IRN/22/99		81.5	0	A	ASIA	Iran-99	
viba_20943	IRN/27/2013	cattle	81.5	0	A	ASIA	Iran-05	SIS-13
viba_403	TUR/1/2008	cattle	81.3	0	A	ASIA	Iran-05	ARD-07
viba_589	Bangkok/TAI/60		81.3	0	A	ASIA	A15	
viba_630	TAI/118/87		81.1	0	A	ASIA	Thai-87	

Virus sample name:	BHU/28/2017
Sender reference:	550-3
Location of origin:	Chazhi, Dungna, Chukha, RLDC, Tshimasham, Western
Country of origin:	Bhutan
Date of collection:	22/09/2017
Host species:	cattle
Serotype:	A
Topotype:	ASIA
Lineage:	G-VII
Sublineage:	
Sequence length:	633
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	23/05/2018
Primers:	A-1C562F/EUR-2B52R; A-1C612F/EUR-2B52R
Received for sequencing:	04/06/2018
Created:	11/06/2018
Last updated:	11/06/2018

VIBASys IDs: sample 36735, genome 36736, sequence viba\_36737, sequencing info 36738

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_36729	BHU/26/2017	cattle	99.7	0	A	ASIA	G-VII	
viba_36733	BHU/27/2017	cattle	99.7	0	A	ASIA	G-VII	
viba_34317	BHU/3/2017	cattle	97.6	0	A	ASIA	G-VII	
viba_34118	NEP/13/2017	cattle	97.6	0	A	ASIA	G-VII	
viba_34114	NEP/12/2017	cattle	97.6	0	A	ASIA	G-VII	
viba_34122	NEP/14/2017	cattle	97.5	0	A	ASIA	G-VII	
viba_25161	PD78/IND/2015		95.6	0	A	ASIA	G-VII	
viba_25967	SAU/15/2015	ovine	95.4	0	A	ASIA	G-VII	
viba_25971	SAU/16/2015	ovine	95.4	0	A	ASIA	G-VII	
viba_25247	SAU/5/2015	cattle	95.4	0	A	ASIA	G-VII	

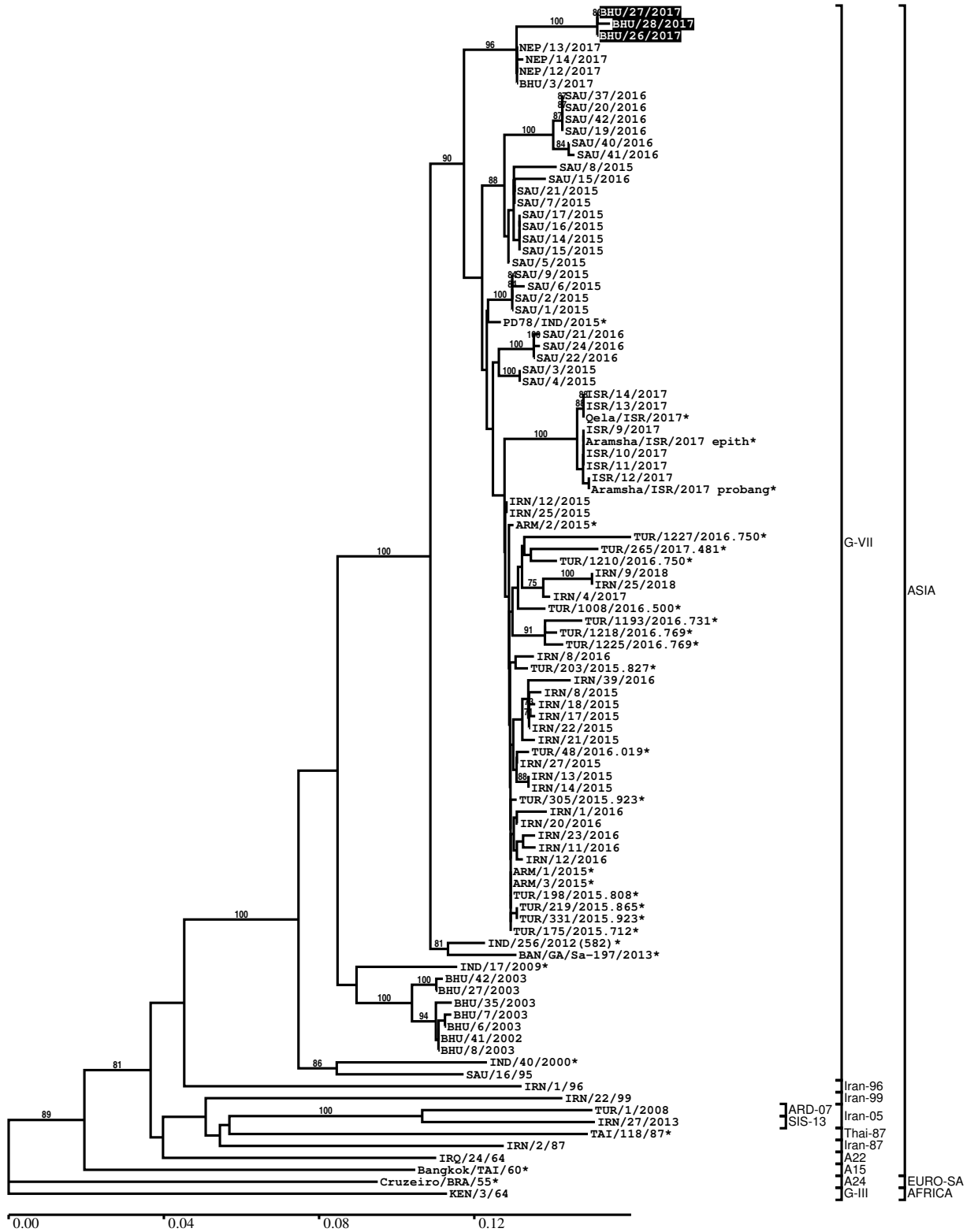
#### Most Closely Related Prototype Sequences

see [http://www.wrlfmd.org/fmd\\_genotyping/prototypes.htm](http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_864	IND/40/2000	cattle	90.2	0	A	ASIA	G-VII	
viba_843	SAU/16/95		89.9	0	A	ASIA	G-VII	
viba_336	IRN/1/96	bovine	84.2	1	A	ASIA	Iran-96	
viba_677	IRQ/24/64	bovine	84.1	0	A	ASIA	A22	
viba_682	IRN/2/87	bovine	82.2	0	A	ASIA	Iran-87	
viba_475	IRN/22/99		81.8	0	A	ASIA	Iran-99	
viba_403	TUR/1/2008	cattle	81.3	0	A	ASIA	Iran-05	ARD-07
viba_589	Bangkok/TAI/60		81.3	0	A	ASIA	A15	
viba_20943	IRN/27/2013	cattle	81.2	0	A	ASIA	Iran-05	SIS-13
viba_630	TAI/118/87		81.1	0	A	ASIA	Thai-87	

Report on FMDV A in Bhutan in 2017

Batch: WRLFMD/2018/00017



\*, not a WRLFMD Reference Number

## Analysis Parameters

VP1 subsequence extractor:	vp1_A
Query sequence set:	WRLFMD/2018/00017-Bhutan-A (3 sequences)
Sequence database set:	allseqs_A (1854 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:	10
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
BHU/27/2017	n/a	cattle	WRLFMD	Bhutan	ASIA/G-VII
BHU/28/2017	n/a	cattle	WRLFMD	Bhutan	ASIA/G-VII
BHU/26/2017	n/a	cattle	WRLFMD	Bhutan	ASIA/G-VII
NEP/13/2017	n/a	cattle	WRLFMD	Nepal	ASIA/G-VII
NEP/14/2017	n/a	cattle	WRLFMD	Nepal	ASIA/G-VII
NEP/12/2017	n/a	cattle	WRLFMD	Nepal	ASIA/G-VII
BHU/3/2017	n/a	cattle	WRLFMD	Bhutan	ASIA/G-VII
SAU/37/2016	KY982317	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/20/2016	KY982313	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/42/2016	KY982320	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/19/2016	KY982312	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/40/2016	KY982318	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/41/2016	KY982319	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/8/2015	KY982304	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/15/2016	KY982311	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/21/2015	KY982310	bovine	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/7/2015	KY982303	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/17/2015	KY982309	ovine	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/16/2015	KY982308	ovine	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/14/2015	KY982306	ovine	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/15/2015	KY982307	ovine	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/5/2015	KY982301	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/9/2015	KY982305	bovine	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/6/2015	KY982302	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/2/2015	KY982298	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/1/2015	KU127247	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
PD78/IND/2015*	n/a	n/a	PD-FMD	India	ASIA/G-VII
SAU/21/2016	KY982314	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/24/2016	KY982316	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/22/2016	KY982315	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/3/2015	KY982299	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
SAU/4/2015	KY982300	cattle	WRLFMD	Saudi Arabia	ASIA/G-VII
ISR/14/2017	n/a	cattle	WRLFMD	Israel	ASIA/G-VII
ISR/13/2017	n/a	cattle	WRLFMD	Israel	ASIA/G-VII
Qela/ISR/2017*	n/a	cattle	KVI	Israel	ASIA/G-VII
ISR/9/2017	n/a	cattle	WRLFMD	Israel	ASIA/G-VII

*continued on next page*

label	accession	host(s)	lab	country	taxonomic information
Aramsha/ISR/2017 epith*	n/a	cattle	KVI	Israel	ASIA/G-VII
ISR/10/2017	n/a	cattle	WRLFMD	Israel	ASIA/G-VII
ISR/11/2017	n/a	cattle	WRLFMD	Israel	ASIA/G-VII
ISR/12/2017	n/a	cattle	WRLFMD	Israel	ASIA/G-VII
Aramsha/ISR/2017 probang*	n/a	cattle	KVI	Israel	ASIA/G-VII
IRN/12/2015	KY982283	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/25/2015	KY982290	cattle	WRLFMD	Iran	ASIA/G-VII
ARM/2/2015*	KY982280	cattle	ARRIAH	Armenia	ASIA/G-VII
TUR/1227/2016.750*	KY982333	cattle	FMDI	Turkey	ASIA/G-VII
TUR/265/2017.481*	n/a	n/a	FMDI	Turkey	ASIA/G-VII
TUR/1210/2016.750*	KY982330	cattle	FMDI	Turkey	ASIA/G-VII
IRN/9/2018	n/a	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/25/2018	n/a	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/4/2017	n/a	cattle	WRLFMD	Iran	ASIA/G-VII
TUR/1008/2016.500*	KY982328	cattle	FMDI	Turkey	ASIA/G-VII
TUR/1193/2016.731*	KY982329	cattle	FMDI	Turkey	ASIA/G-VII
TUR/1218/2016.769*	KY982331	cattle	FMDI	Turkey	ASIA/G-VII
TUR/1225/2016.769*	KY982332	cattle	FMDI	Turkey	ASIA/G-VII
IRN/8/2016	KY982293	cattle	WRLFMD	Iran	ASIA/G-VII
TUR/203/2015.827*	KY982323	cattle	FMDI	Turkey	ASIA/G-VII
IRN/39/2016	n/a	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/8/2015	KY982282	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/18/2015	KY982287	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/17/2015	KY982286	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/22/2015	KY982289	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/21/2015	KY982288	cattle	WRLFMD	Iran	ASIA/G-VII
TUR/48/2016.019*	KY982327	sheep	FMDI	Turkey	ASIA/G-VII
IRN/27/2015	KY982291	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/13/2015	KY982284	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/14/2015	KY982285	cattle	WRLFMD	Iran	ASIA/G-VII
TUR/305/2015.923*	KY982325	cattle	FMDI	Turkey	ASIA/G-VII
IRN/1/2016	KY982292	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/20/2016	KY982296	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/23/2016	KY982297	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/11/2016	KY982294	cattle	WRLFMD	Iran	ASIA/G-VII
IRN/12/2016	KY982295	cattle	WRLFMD	Iran	ASIA/G-VII
ARM/1/2015*	KY982279	cattle	ARRIAH	Armenia	ASIA/G-VII
ARM/3/2015*	KY982281	cattle	ARRIAH	Armenia	ASIA/G-VII
TUR/198/2015.808*	KY982322	cattle	FMDI	Turkey	ASIA/G-VII
TUR/219/2015.865*	KY982324	cattle	FMDI	Turkey	ASIA/G-VII
TUR/331/2015.923*	KY982326	cattle	FMDI	Turkey	ASIA/G-VII
TUR/175/2015.712*	KY982321	cattle	FMDI	Turkey	ASIA/G-VII
IND/256/2012(582)*	n/a	n/a	PD-FMD	India	ASIA/G-VII
BAN/GA/Sa-197/2013*	KJ754939	cattle	University of Dhaka	Bangladesh	ASIA/G-VII
IND/17/2009*	HQ127719	cattle	PD-FMD	India	ASIA/G-VII
BHU/42/2003	n/a	n/a	WRLFMD	Bhutan	ASIA/G-VII
BHU/27/2003	FJ755013	cattle	WRLFMD	Bhutan	ASIA/G-VII
BHU/35/2003	n/a	n/a	WRLFMD	Bhutan	ASIA/G-VII
BHU/7/2003	FJ755012	cattle	WRLFMD	Bhutan	ASIA/G-VII
BHU/6/2003	n/a	n/a	WRLFMD	Bhutan	ASIA/G-VII
BHU/41/2002	EU414525	bovine	WRLFMD	Bhutan	ASIA/G-VII
BHU/8/2003	n/a	n/a	WRLFMD	Bhutan	ASIA/G-VII
IND/40/2000*	AF390646	cattle	PD-FMD	India	ASIA/G-VII
SAU/16/95	EU553874	n/a	WRLFMD	Saudi Arabia	ASIA/G-VII
IRN/1/96	EF208771	bovine	WRLFMD	Iran	ASIA/Iran-96
IRN/22/99	EF208772	n/a	WRLFMD	Iran	ASIA/Iran-99
TUR/1/2008	FJ755133	cattle	WRLFMD	Turkey	ASIA/Iran-05/ARD-07
IRN/27/2013	n/a	cattle	WRLFMD	Iran	ASIA/Iran-05/SIS-13
TAI/118/87*	EF208777	n/a	WRLFMD	Thailand	ASIA/Thai-87
IRN/2/87	EF208770	bovine	WRLFMD	Iran	ASIA/Iran-87
IRQ/24/64	AY593763	bovine	PIADC	Iraq	ASIA/A22
Bangkok/TAI/60*	AY593755	n/a	PIADC	Thailand	ASIA/A15
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