

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

Genotyping Report

FMDV serotype: SAT2
Country: Ethiopia
Year: 2019, 2020, 2022
Batch: WRLFMD/2022/000012
No. of sequences: 5
Report date: 9th August 2022
Report generated by: Nick Knowles
Report checked by: Jemma Wadsworth



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

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Virus sample name:	ETH/31/2019
Sender reference:	34486 (2)
Location of origin:	Mekeric, Southern Zone, Tigray
Country of origin:	Ethiopia
Date of collection:	22/11/2019
Host species:	bovine
Serotype:	SAT2
Topotype:	VII
Lineage:	Lib-12
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	18/06/2022
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	05/08/2022
Created:	09/08/2022
Last updated:	09/08/2022
VIBASys IDs: sample 51503, genome 51504, sequence viba_51505, sequencing info 51506	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_43753	ERI/5/2019	bovine	99.8	0	SAT2	VII	Lib-12	
viba_43757	ERI/6/2019	bovine	99.8	0	SAT2	VII	Lib-12	
viba_43777	ERI/16/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43769	ERI/13/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43789	ERI/19/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43793	ERI/20/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43765	ERI/12/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43773	ERI/15/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43745	ERI/1/2019	bovine	99.7	0	SAT2	VII	Lib-12	
viba_43749	ERI/2/2019	bovine	99.7	0	SAT2	VII	Lib-12	

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_742	CAR/8/2005	cattle	87.7	0	SAT2	VII		
viba_424	SAU/6/2000	bovine	87.5	1	SAT2	VII		
viba_127	KEN/3/57		74.8	0	SAT2	IX		
viba_369	UGA/51/75	bovine	74.7	0	SAT2	XII		
viba_470	KEN/2/84	bovine	74.4	0	SAT2	IX		
viba_724	ETH/2/91	bovine	74.0	0	SAT2	XIV		
viba_374	ZAI/1/74		73.9	0	SAT2	VIII		
viba_756	UGA/19/98		73.6	0	SAT2	X		
viba_273	ETH/1/90	bovine	73.2	0	SAT2	IV		
viba_189	RWA/1/2000		72.9	0	SAT2	VIII		

Virus sample name:	ETH/32/2019
Sender reference:	34480
Location of origin:	Semen, Mekele, Tigray
Country of origin:	Ethiopia
Date of collection:	22/11/2019
Host species:	bovine
Serotype:	SAT2
Topotype:	VII
Lineage:	Lib-12
Sublineage:	
Sequence length:	642
Ambiguities:	3
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	19/06/2022
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	05/08/2022
Created:	09/08/2022
Last updated:	09/08/2022
VIBASys IDs: sample 51507, genome 51508, sequence viba_51509, sequencing info 51510	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_51505	ETH/31/2019	bovine	99.5	0	SAT2	VII	Lib-12	
viba_43753	ERI/5/2019	bovine	99.4	0	SAT2	VII	Lib-12	
viba_43757	ERI/6/2019	bovine	99.4	0	SAT2	VII	Lib-12	
viba_43777	ERI/16/2019	bovine	99.2	0	SAT2	VII	Lib-12	
viba_43769	ERI/13/2019	bovine	99.2	0	SAT2	VII	Lib-12	
viba_43789	ERI/19/2019	bovine	99.2	0	SAT2	VII	Lib-12	
viba_43793	ERI/20/2019	bovine	99.2	0	SAT2	VII	Lib-12	
viba_43765	ERI/12/2019	bovine	99.2	0	SAT2	VII	Lib-12	
viba_43773	ERI/15/2019	bovine	99.2	0	SAT2	VII	Lib-12	
viba_43745	ERI/1/2019	bovine	99.2	0	SAT2	VII	Lib-12	

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_742	CAR/8/2005	cattle	87.4	0	SAT2	VII		
viba_424	SAU/6/2000	bovine	87.2	1	SAT2	VII		
viba_369	UGA/51/75	bovine	74.7	0	SAT2	XII		
viba_127	KEN/3/57		74.5	0	SAT2	IX		
viba_470	KEN/2/84	bovine	74.3	0	SAT2	IX		
viba_374	ZAI/1/74		74.0	0	SAT2	VIII		
viba_724	ETH/2/91	bovine	73.7	0	SAT2	XIV		
viba_756	UGA/19/98		73.4	0	SAT2	X		
viba_273	ETH/1/90	bovine	72.9	0	SAT2	IV		
viba_189	RWA/1/2000		72.8	0	SAT2	VIII		

Virus sample name:	ETH/9/2020
Sender reference:	21525
Location of origin:	Jima Genete, Horu Guduru, Oromia
Country of origin:	Ethiopia
Date of collection:	09/05/2020
Host species:	bovine
Serotype:	SAT2
Topotype:	XIII
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	22/06/2022
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	05/08/2022
Created:	09/08/2022
Last updated:	09/08/2022
VIBASys IDs: sample 51487, genome 51511, sequence viba_51512, sequencing info 51513	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_13424	ETH/72/2009	porcine	100.0	0	SAT2	XIII		
viba_16713	ETH/23/2010	porcine	100.0	0	SAT2	XIII		
viba_13400	ETH/64/2009	cattle	100.0	0	SAT2	XIII		
viba_13420	ETH/70/2009	cattle	100.0	0	SAT2	XIII		
viba_13408	ETH/67/2009	cattle	100.0	0	SAT2	XIII		
viba_13428	ETH/73/2009	cattle	100.0	0	SAT2	XIII		
viba_13412	ETH/68/2009	cattle	100.0	0	SAT2	XIII		
viba_13432	ETH/74/2009	cattle	100.0	0	SAT2	XIII		
viba_13416	ETH/69/2009	cattle	100.0	0	SAT2	XIII		
viba_13404	ETH/65/2009	cattle	100.0	0	SAT2	XIII		

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_139	ETH/2/2007	cattle	97.8	0	SAT2	XIII		
viba_193	SUD/6/77		79.2	0	SAT2	XIII		
viba_724	ETH/2/91	bovine	77.8	0	SAT2	XIV		
viba_374	ZAI/1/74		76.2	0	SAT2	VIII		
viba_189	RWA/1/2000		76.0	0	SAT2	VIII		
viba_424	SAU/6/2000	bovine	74.2	1	SAT2	VII		
viba_470	KEN/2/84	bovine	73.7	0	SAT2	IX		
viba_756	UGA/19/98		73.2	0	SAT2	X		
viba_369	UGA/51/75	bovine	73.0	0	SAT2	XII		
viba_500	NIG/2/75	bovine	72.8	0	SAT2	V		

Virus sample name:	ETH/2/2022
Sender reference:	13634
Location of origin:	Sodo, Wolaita, SNNPR
Country of origin:	Ethiopia
Date of collection:	29/03/2022
Host species:	bovine
Serotype:	SAT2
Topotype:	XIV
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	07/07/2022
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	05/08/2022
Created:	09/08/2022
Last updated:	09/08/2022
VIBASys IDs: sample 51514, genome 51515, sequence viba_51516, sequencing info 51517	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_51520	ETH/3/2022	bovine	99.8	0	SAT2	XIV		
viba_3530	ETH/1/91		84.3	0	SAT2	XIV		
viba_724	ETH/2/91	bovine	84.3	0	SAT2	XIV		
viba_3537	ETH/3/91		84.3	0	SAT2	XIV		
viba_3533	ETH/2/91	bovine	84.3	0	SAT2	XIV		
viba_27119	KNP/7/88	African buffalo	76.1	1	SAT2	I		
viba_43105	BUL-215-P/UGA/2016	cattle	76.0	0	SAT2	VII		
viba_139	ETH/2/2007	cattle	75.8	0	SAT2	XIII		
viba_11306	SUD/2/2008	cattle	75.8	0	SAT2	XIII		
viba_43153	BUL-278-P/UGA/2016	cattle	75.7	0	SAT2	VII		

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_724	ETH/2/91	bovine	84.3	0	SAT2	XIV		
viba_139	ETH/2/2007	cattle	75.8	0	SAT2	XIII		
viba_470	KEN/2/84	bovine	75.4	0	SAT2	IX		
viba_500	NIG/2/75	bovine	74.9	0	SAT2	V		
viba_183	ZIM/14/2002	bovine	74.7	0	SAT2	I		
viba_193	SUD/6/77		74.4	0	SAT2	XIII		
viba_728	GHA/2/90	bovine	74.0	0	SAT2	V		
viba_111	MAL/1/2003	bovine	73.8	0	SAT2	I		
viba_380	RHO/1/48		73.7	0	SAT2	III		
viba_752	SA/106/59		73.7	0	SAT2	I		

Virus sample name:	ETH/3/2022
Sender reference:	13639
Location of origin:	Sodo, Wolaita, SNNPR
Country of origin:	Ethiopia
Date of collection:	29/03/2022
Host species:	bovine
Serotype:	SAT2
Topotype:	XIV
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	WRL-LFBK1
Harvest date of material:	07/07/2022
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	05/08/2022
Created:	09/08/2022
Last updated:	09/08/2022
VIBASys IDs: sample 51518, genome 51519, sequence viba_51520, sequencing info 51521	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_51516	ETH/2/2022	bovine	99.8	0	SAT2	XIV		
viba_3530	ETH/1/91		84.2	0	SAT2	XIV		
viba_724	ETH/2/91	bovine	84.2	0	SAT2	XIV		
viba_3537	ETH/3/91		84.2	0	SAT2	XIV		
viba_3533	ETH/2/91	bovine	84.2	0	SAT2	XIV		
viba_43105	BUL-215-P/UGA/2016	cattle	76.2	0	SAT2	VII		
viba_27119	KNP/7/88	African buffalo	76.0	1	SAT2	I		
viba_43153	BUL-278-P/UGA/2016	cattle	75.9	0	SAT2	VII		
viba_43085	BUL-224-P/UGA/2016	cattle	75.9	0	SAT2	VII		
viba_43137	BUL-285-P/UGA/2016	cattle	75.9	0	SAT2	VII		

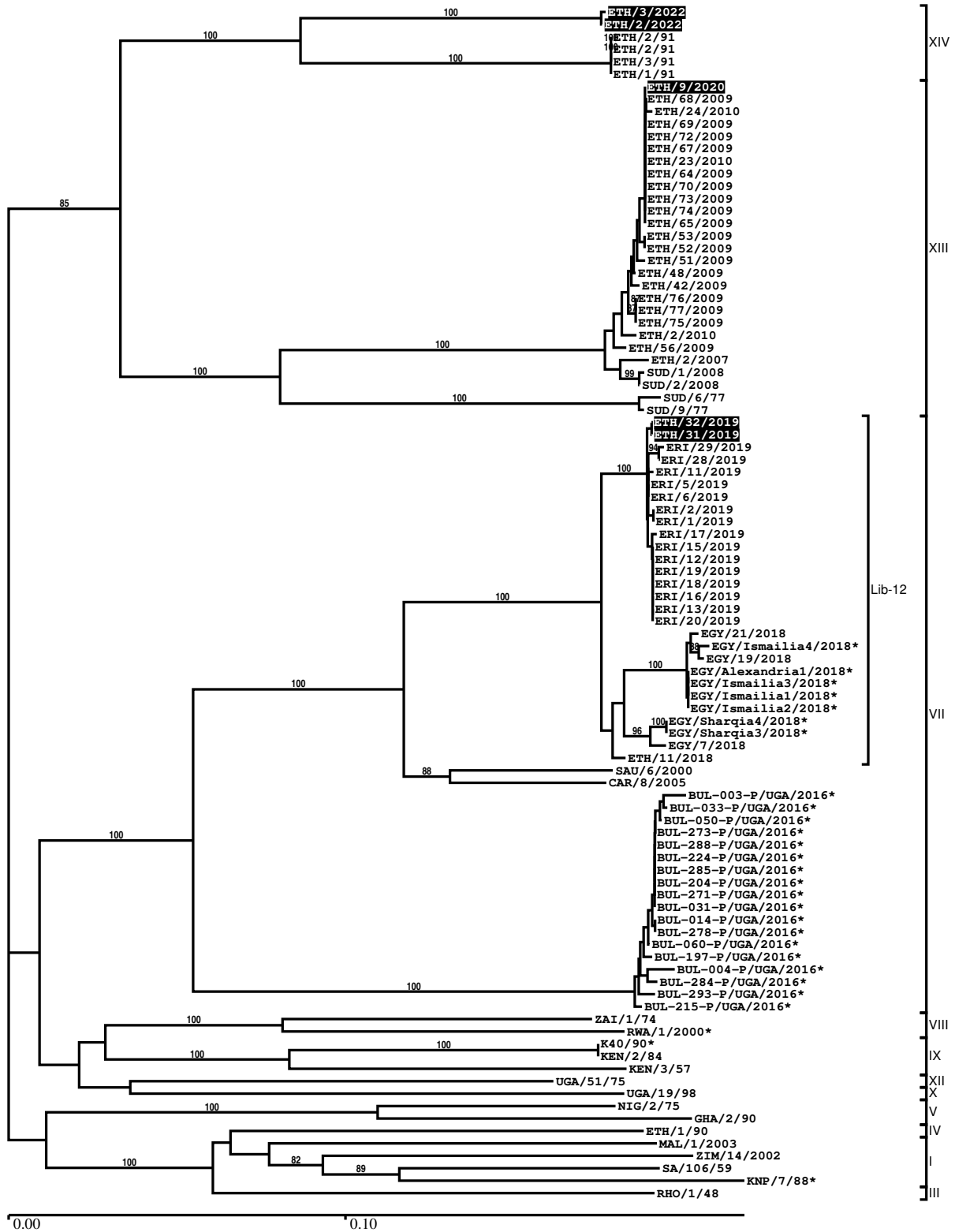
Most Closely Related Prototype Sequences

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

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_724	ETH/2/91	bovine	84.2	0	SAT2	XIV		
viba_139	ETH/2/2007	cattle	75.8	0	SAT2	XIII		
viba_470	KEN/2/84	bovine	75.5	0	SAT2	IX		
viba_500	NIG/2/75	bovine	74.9	0	SAT2	V		
viba_183	ZIM/14/2002	bovine	74.7	0	SAT2	I		
viba_193	SUD/6/77		74.2	0	SAT2	XIII		
viba_728	GHA/2/90	bovine	74.0	0	SAT2	V		
viba_752	SA/106/59		73.9	0	SAT2	I		
viba_111	MAL/1/2003	bovine	73.9	0	SAT2	I		
viba_380	RHO/1/48		73.6	0	SAT2	III		

Report on FMDV SAT2 in Ethiopia in 2019, 2020, 2022

Batch: WRLFMD/2022/000012



*, not a WRLFMD Reference Number

Analysis Parameters

VP1 subsequence extractor:	vp1_SAT2
Query sequence set:	WRLFMD/2022/000012-Ethiopia-SAT2 (5 sequences)
Sequence database set:	allseqs_SAT2 (1118 sequences)
Prototype sequence set:	!prototypes_SAT2 (25 sequences)
Number of related sequences reported:	10
Minimal VP1 subsequence match length	600
Sequence alignment method:	muscle (default parameters)
Sequence alignment length:	642
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:	18
VIBASys version:	reflabs-1.1.2

Sequences in the Phylogenetic Tree

All sequences in the tree are in taxonomic group FMDV/SAT2

label	accession	host(s)	lab	country	taxonomic information
ETH/3/2022	n/a	bovine	WRLFMD	Ethiopia	XIV
ETH/2/2022	n/a	bovine	WRLFMD	Ethiopia	XIV
ETH/2/91	AY343938	bovine	OVI	Ethiopia	XIV
ETH/2/91	FJ798159	bovine	WRLFMD	Ethiopia	XIV
ETH/3/91	FJ798160	n/a	WRLFMD	Ethiopia	XIV
ETH/1/91	FJ798158	n/a	WRLFMD	Ethiopia	XIV
ETH/9/2020	n/a	bovine	WRLFMD	Ethiopia	XIII
ETH/68/2009	KF112947	cattle	WRLFMD	Ethiopia	XIII
ETH/24/2010	MN987544	porcine	WRLFMD	Ethiopia	XIII
ETH/69/2009	KF112948	cattle	WRLFMD	Ethiopia	XIII
ETH/72/2009	KF112950	porcine	WRLFMD	Ethiopia	XIII
ETH/67/2009	KF112946	cattle	WRLFMD	Ethiopia	XIII
ETH/23/2010	MN987543	porcine	WRLFMD	Ethiopia	XIII
ETH/64/2009	KF112944	cattle	WRLFMD	Ethiopia	XIII
ETH/70/2009	KF112949	cattle	WRLFMD	Ethiopia	XIII
ETH/73/2009	KF112951	cattle	WRLFMD	Ethiopia	XIII
ETH/74/2009	KF112952	cattle	WRLFMD	Ethiopia	XIII
ETH/65/2009	KF112945	cattle	WRLFMD	Ethiopia	XIII
ETH/53/2009	KF112942	cattle	WRLFMD	Ethiopia	XIII
ETH/52/2009	KF112941	cattle	WRLFMD	Ethiopia	XIII
ETH/51/2009	KF112940	cattle	WRLFMD	Ethiopia	XIII
ETH/48/2009	KF112939	n/a	WRLFMD	Ethiopia	XIII
ETH/42/2009	KF112938	n/a	WRLFMD	Ethiopia	XIII
ETH/76/2009	KF112954	cattle	WRLFMD	Ethiopia	XIII
ETH/77/2009	KF112955	cattle	WRLFMD	Ethiopia	XIII
ETH/75/2009	KF112953	cattle	WRLFMD	Ethiopia	XIII
ETH/2/2010	KF112956	cattle	WRLFMD	Ethiopia	XIII
ETH/56/2009	KF112943	cattle	WRLFMD	Ethiopia	XIII
ETH/2/2007	FJ798161	cattle	WRLFMD	Ethiopia	XIII
SUD/1/2008	GU566072	cattle	WRLFMD	Sudan	XIII
SUD/2/2008	GU566073	cattle	WRLFMD	Sudan	XIII
SUD/6/77	AY343939	n/a	OVI	Sudan	XIII
SUD/9/77	AY442014	n/a	OVI	Sudan	XIII
ETH/32/2019	n/a	bovine	WRLFMD	Ethiopia	VII/Lib-12
ETH/31/2019	n/a	bovine	WRLFMD	Ethiopia	VII/Lib-12
ERI/29/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12

continued on next page

label	accession	host(s)	lab	country	taxonomic information
ERI/28/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/11/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/5/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/6/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/2/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/1/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/17/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/15/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/12/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/19/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/18/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/16/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/13/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
ERI/20/2019	n/a	bovine	WRLFMD	Eritrea	VII/Lib-12
EGY/21/2018	n/a	cattle	WRLFMD	Egypt	VII/Lib-12
EGY/Ismailia4/2018*	MK493344	n/a	MEVAC	Egypt	VII/Lib-12
EGY/19/2018	n/a	cattle	WRLFMD	Egypt	VII/Lib-12
EGY/Alexandria1/2018*	MK493345	n/a	MEVAC	Egypt	VII/Lib-12
EGY/Ismailia3/2018*	MK493343	n/a	MEVAC	Egypt	VII/Lib-12
EGY/Ismailia1/2018*	MK493341	n/a	MEVAC	Egypt	VII/Lib-12
EGY/Ismailia2/2018*	MK493342	n/a	MEVAC	Egypt	VII/Lib-12
EGY/Sharqia4/2018*	MK493340	n/a	MEVAC	Egypt	VII/Lib-12
EGY/Sharqia3/2018*	MK493339	n/a	MEVAC	Egypt	VII/Lib-12
EGY/7/2018	n/a	cattle	WRLFMD	Egypt	VII/Lib-12
ETH/11/2018	MN987552	cattle	WRLFMD	Ethiopia	VII/Lib-12
SAU/6/2000	AF367135	bovine	OVI	Saudi Arabia	VII
CAR/8/2005	JX570616	cattle	WRLFMD	Cameroon	VII
BUL-003-P/UGA/2016*	MH367445	cattle	PIADC	Uganda	VII
BUL-033-P/UGA/2016*	MH367450	cattle	PIADC	Uganda	VII
BUL-050-P/UGA/2016*	MH367446	cattle	PIADC	Uganda	VII
BUL-273-P/UGA/2016*	MH367463	cattle	PIADC	Uganda	VII
BUL-288-P/UGA/2016*	MH367461	cattle	PIADC	Uganda	VII
BUL-224-P/UGA/2016*	MH367447	cattle	PIADC	Uganda	VII
BUL-285-P/UGA/2016*	MH367460	cattle	PIADC	Uganda	VII
BUL-204-P/UGA/2016*	MH367453	cattle	PIADC	Uganda	VII
BUL-271-P/UGA/2016*	MH367466	cattle	PIADC	Uganda	VII
BUL-031-P/UGA/2016*	MH367444	cattle	PIADC	Uganda	VII
BUL-014-P/UGA/2016*	MH367448	cattle	PIADC	Uganda	VII
BUL-278-P/UGA/2016*	MH367464	cattle	PIADC	Uganda	VII
BUL-060-P/UGA/2016*	MH367458	cattle	PIADC	Uganda	VII
BUL-197-P/UGA/2016*	MH367451	cattle	PIADC	Uganda	VII
BUL-004-P/UGA/2016*	MH367457	cattle	PIADC	Uganda	VII
BUL-284-P/UGA/2016*	MH367462	cattle	PIADC	Uganda	VII
BUL-293-P/UGA/2016*	MH367454	cattle	PIADC	Uganda	VII
BUL-215-P/UGA/2016*	MH367452	cattle	PIADC	Uganda	VII
ZAI/1/74	DQ009737	n/a	OVI	Zaire	VIII
RWA/1/2000*	AF367134	n/a	OVI	Rwanda	VIII
K40/90*	HM623688	n/a	Makerere University	Kenya	IX
KEN/2/84	AY343941	bovine	OVI	Kenya	IX
KEN/3/57	AJ251473	n/a	WRLFMD	Kenya	IX
UGA/51/75	AY343963	bovine	OVI	Uganda	XII
UGA/19/98	AY343969	n/a	OVI	Uganda	X
NIG/2/75	AF367139	bovine	OVI	Nigeria	V
GHA/2/90	AF479415	bovine	OVI	Ghana	V
ETH/1/90	AY343935	bovine	OVI	Ethiopia	IV
MAL/1/2003	n/a	bovine	WRLFMD	Malawi	I
ZIM/14/2002	KF219689	bovine	WRLFMD	Zimbabwe	I
SA/106/59	AY593848	n/a	PIADC	South Africa (SA)	I
KNP/7/88*	AF367103	African buffalo	OVI	South Africa (KNP)	I
RHO/1/48	AY593847	n/a	PIADC	Rhodesia	III

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