

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

## Genotyping Report

FMDV serotype: SAT1  
Country: Botswana  
Year: 2015  
Batch: WRLFMD/2016/00019  
No. of sequences: 4  
Report date: 2nd August 2016  
Report generated by: Nick Knowles  
Report checked by: Kasia Bankowska

### Analysis Parameters

VP1 subsequence extractor: vp1\_SAT1  
Query sequence set: WRLFMD/2016/00019-Botswana-SAT1 (4 sequences)  
Sequence database set: !allseqs\_SAT1 (577 sequences)  
Prototype sequence set: !prototypes\_SAT1 (14 sequences)  
Number of related sequences reported: 10  
Minimal VP1 subsequence match length: 600  
VIBASys version: reflabs-1.0.3



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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:	BOT/4/2015
Sender reference:	BOT 12/15
Location of origin:	Kasane, Chobe district
Country of origin:	Botswana
Date of collection:	27/06/2015
Host species:	bovine
Serotype:	SAT1
Topotype:	III
Lineage:	
Sublineage:	
Sequence length:	657
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	01/07/2016
Primers:	SAT1U-OS/SAT-2B208R
Received for sequencing:	25/07/2016
Created:	26/07/2016
Last updated:	26/07/2016
VIBASys IDs: sample 29637, genome 29638, sequence viba_29639, sequencing info 29640	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_25574	BOT/2/2015	bovine	100.0	0	SAT1	III		
viba_25583	BOT/13/2015	cattle	99.8	1	SAT1	III		
viba_29643	BOT/5/2015	bovine	99.8	0	SAT1	III		
viba_25570	BOT/1/2015	bovine	99.8	0	SAT1	III		
viba_25579	BOT/11/2015	cattle	99.5	2	SAT1	III		
viba_5010	NMB/1/2000	bovine	94.1	0	SAT1	III		
viba_4981	BOT/P3/2000 NGO-2	african buffalo	93.5	0	SAT1	III		
viba_3381	ZIM/P45/91 MT-9	african buffalo	92.1	0	SAT1	III		
viba_3117	ZIM/P12/90 A-10	african buffalo	91.5	0	SAT1	III		
viba_9217	BOT/15/2006	cattle	91.3	0	SAT1	III		

### 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_509	BOT/1/77	bovine	87.1	0	SAT1	III		
viba_495	BOT/1/68	bovine	86.3	0	SAT1	III		
viba_212	BEC/1/48		85.5	0	SAT1	III		
viba_466	T155/71	cattle	76.2	0	SAT1	I		
viba_462	RV/11/37	greater kudu	76.0	0	SAT1	II		
viba_709	RHO/5/66	bovine	75.3	0	SAT1	II		
viba_243	ZIM/23/2003		74.0	0	SAT1	I		
viba_446	NIG/11/75	bovine	71.8	0	SAT1	V		
viba_514	UGA-BUFF/21/70	african buffalo	71.7	0	SAT1	IV		
viba_232	ETH/3/2007	cattle	71.3	0	SAT1	IX		

Virus sample name:	BOT/5/2015
Sender reference:	BOT 14/15
Location of origin:	Kasane, Chobe district
Country of origin:	Botswana
Date of collection:	27/06/2015
Host species:	bovine
Serotype:	SAT1
Topotype:	III
Lineage:	
Sublineage:	
Sequence length:	657
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	05/07/2016
Primers:	SAT1U-OS/SAT-2B208R
Received for sequencing:	25/07/2016
Created:	26/07/2016
Last updated:	26/07/2016
VIBASys IDs: sample 29641, genome 29642, sequence viba_29643, sequencing info 29644	

### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_29639	BOT/4/2015	bovine	99.8	0	SAT1	III		
viba_25574	BOT/2/2015	bovine	99.8	0	SAT1	III		
viba_25583	BOT/13/2015	cattle	99.7	1	SAT1	III		
viba_25570	BOT/1/2015	bovine	99.7	0	SAT1	III		
viba_25579	BOT/11/2015	cattle	99.4	2	SAT1	III		
viba_5010	NMB/1/2000	bovine	94.2	0	SAT1	III		
viba_4981	BOT/P3/2000 NGO-2	african buffalo	93.6	0	SAT1	III		
viba_3381	ZIM/P45/91 MT-9	african buffalo	92.2	0	SAT1	III		
viba_3117	ZIM/P12/90 A-10	african buffalo	91.6	0	SAT1	III		
viba_9217	BOT/15/2006	cattle	91.5	0	SAT1	III		

### 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_509	BOT/1/77	bovine	87.0	0	SAT1	III		
viba_495	BOT/1/68	bovine	86.5	0	SAT1	III		
viba_212	BEC/1/48		85.4	0	SAT1	III		
viba_466	T155/71	cattle	76.0	0	SAT1	I		
viba_462	RV/11/37	greater kudu	75.9	0	SAT1	II		
viba_709	RHO/5/66	bovine	75.1	0	SAT1	II		
viba_243	ZIM/23/2003		73.9	0	SAT1	I		
viba_446	NIG/11/75	bovine	71.7	0	SAT1	V		
viba_514	UGA-BUFF/21/70	african buffalo	71.6	0	SAT1	IV		
viba_232	ETH/3/2007	cattle	71.2	0	SAT1	IX		

Virus sample name:	BOT/7/2015
Sender reference:	BOT 20/15
Location of origin:	Maun, North-West district
Country of origin:	Botswana
Date of collection:	28/07/2015
Host species:	bovine
Serotype:	SAT1
Topotype:	III
Lineage:	
Sublineage:	
Sequence length:	657
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	05/07/2016
Primers:	SAT1U-OS/SAT-2B208R
Received for sequencing:	25/07/2016
Created:	26/07/2016
Last updated:	26/07/2016
VIBASys IDs: sample 29645, genome 29646, sequence viba_29647, sequencing info 29648	

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_29651	BOT/8/2015	bovine	99.8	0	SAT1	III		
viba_509	BOT/1/77	bovine	88.4	0	SAT1	III		
viba_26354	NMB/1/2015	bovine	88.3	0	SAT1	III		
viba_1373	BOT/24/77		88.1	0	SAT1	III		
viba_1369	BOT/17/77	greater kudu	88.1	0	SAT1	III		
viba_3117	ZIM/P12/90 A-10	african buffalo	86.6	0	SAT1	III		
viba_1977	SWA/2/89	african buffalo	86.3	0	SAT1	III		
viba_495	BOT/1/68	bovine	86.2	0	SAT1	III		
viba_1177	BOT/1/68	bovine	86.2	0	SAT1	III		
viba_1180	BOT/1/68	bovine	86.2	0	SAT1	III		

#### 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_509	BOT/1/77	bovine	88.4	0	SAT1	III		
viba_495	BOT/1/68	bovine	86.2	0	SAT1	III		
viba_212	BEC/1/48		84.9	0	SAT1	III		
viba_466	T155/71	cattle	76.3	0	SAT1	I		
viba_514	UGA-BUFF/21/70	african buffalo	76.1	0	SAT1	IV		
viba_709	RHO/5/66	bovine	75.3	0	SAT1	II		
viba_462	RV/11/37	greater kudu	74.3	0	SAT1	II		
viba_258	UGA/13/74	bovine	72.6	0	SAT1	VII		
viba_446	NIG/11/75	bovine	72.0	0	SAT1	V		
viba_232	ETH/3/2007	cattle	71.0	0	SAT1	IX		

Virus sample name:	BOT/8/2015
Sender reference:	BOT 21/15
Location of origin:	Maun, North-West district
Country of origin:	Botswana
Date of collection:	02/08/2015
Host species:	bovine
Serotype:	SAT1
Topotype:	III
Lineage:	
Sublineage:	
Sequence length:	657
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	05/07/2016
Primers:	SAT1-1C559F/SAT-2B208R; SAT1U-OS/SAT-2B208R
Received for sequencing:	25/07/2016
Created:	26/07/2016
Last updated:	26/07/2016
VIBASys IDs: sample 29649, genome 29650, sequence viba_29651, sequencing info 29652	

#### Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_29647	BOT/7/2015	bovine	99.8	0	SAT1	III		
viba_509	BOT/1/77	bovine	88.3	0	SAT1	III		
viba_26354	NMB/1/2015	bovine	88.1	0	SAT1	III		
viba_1373	BOT/24/77		88.0	0	SAT1	III		
viba_1369	BOT/17/77	greater kudu	88.0	0	SAT1	III		
viba_3117	ZIM/P12/90 A-10	african buffalo	86.5	0	SAT1	III		
viba_1977	SWA/2/89	african buffalo	86.2	0	SAT1	III		
viba_495	BOT/1/68	bovine	86.0	0	SAT1	III		
viba_1177	BOT/1/68	bovine	86.0	0	SAT1	III		
viba_1180	BOT/1/68	bovine	86.0	0	SAT1	III		

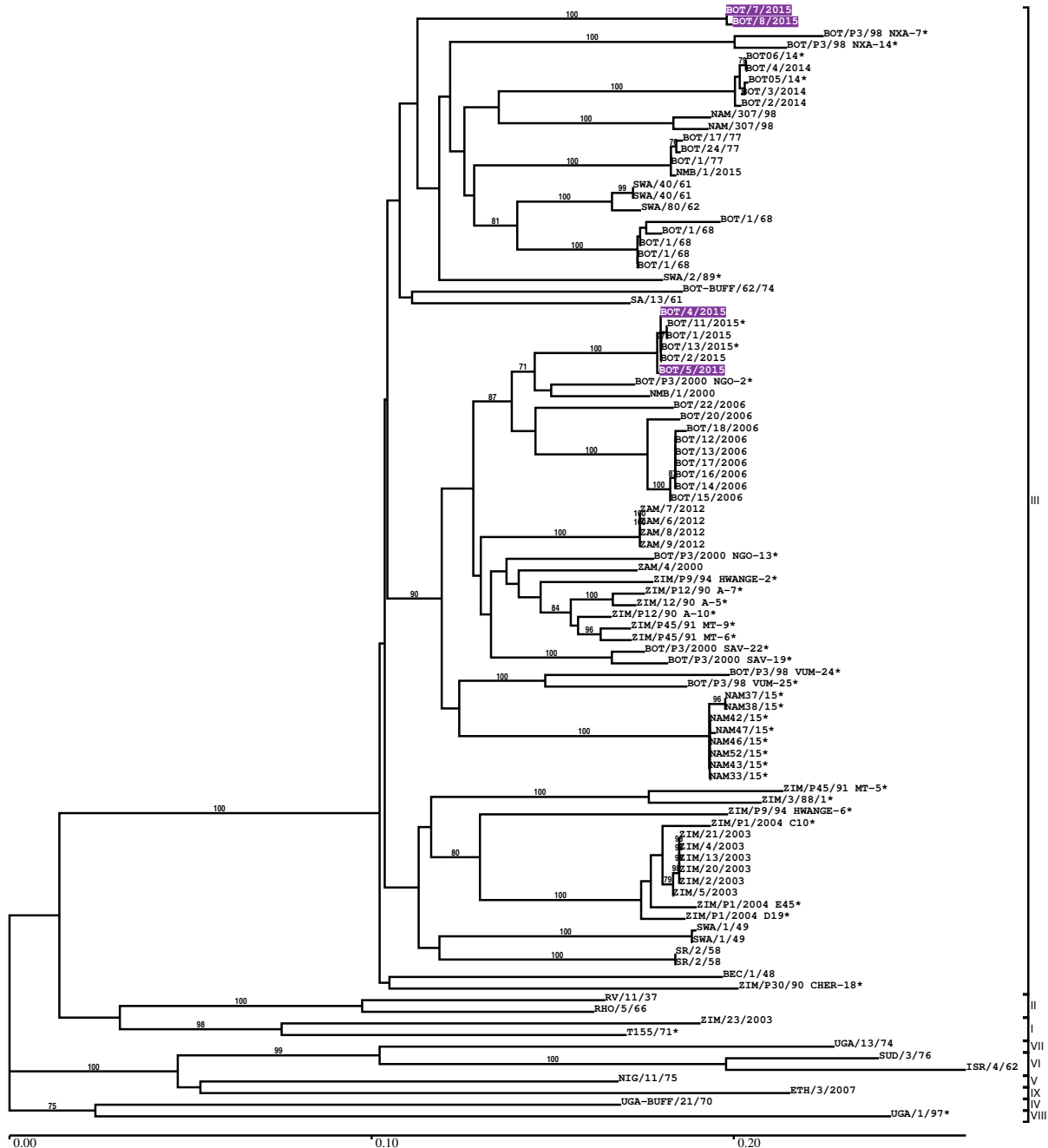
#### Most Closely Related Prototype Sequences

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_509	BOT/1/77	bovine	88.3	0	SAT1	III		
viba_495	BOT/1/68	bovine	86.0	0	SAT1	III		
viba_212	BEC/1/48		84.7	0	SAT1	III		
viba_514	UGA-BUFF/21/70	african buffalo	76.1	0	SAT1	IV		
viba_466	T155/71	cattle	76.0	0	SAT1	I		
viba_709	RHO/5/66	bovine	75.2	0	SAT1	II		
viba_462	RV/11/37	greater kudu	74.2	0	SAT1	II		
viba_258	UGA/13/74	bovine	72.4	0	SAT1	VII		
viba_446	NIG/11/75	bovine	72.0	0	SAT1	V		
viba_243	ZIM/23/2003		71.0	0	SAT1	I		

Report on FMDV SAT1 in Botswana in 2015

Batch: WRLFMD/2016/00019



Sequence alignment method: muscle (default parameters)  
 Phylogeny reconstruction method: fdnadist, fneighbor  
 Number of bootstrap samples: 1000  
 Displaying bootstrap values above: 70.0%  
 Number of sequences in tree capped at: 100  
 \*, not a WRLFMD Reference Number

## Sequences in the Phylogenetic Tree

All sequences in the tree are in taxonomic group FMDV/SAT1

label	accession	host(s)	lab	country	taxonomic information
BOT/7/2015	n/a	bovine	WRLFMD	Botswana	III
BOT/8/2015	n/a	bovine	WRLFMD	Botswana	III
BOT/P3/98 NXA-7*	n/a	african buffalo	WRLFMD	Botswana	III
BOT/P3/98 NXA-14*	n/a	african buffalo	WRLFMD	Botswana	III
BOT06/14*	n/a	cattle	BVI	Botswana	III
BOT/4/2014	n/a	bovine	WRLFMD	Botswana	III
BOT05/14*	n/a	cattle	BVI	Botswana	III
BOT/3/2014	n/a	bovine	WRLFMD	Botswana	III
BOT/2/2014	n/a	bovine	WRLFMD	Botswana	III
NAM/307/98	DQ009717	african buffalo	OVI	Namibia	III
NAM/307/98	AY770519	african buffalo	OVI	Namibia	III
BOT/17/77	KF219687	greater kudu	WRLFMD	Botswana	III
BOT/24/77	KF219688	n/a	WRLFMD	Botswana	III
BOT/1/77	KF219686	bovine	WRLFMD	Botswana	III
NMB/1/2015	n/a	bovine	WRLFMD	Namibia	III
SWA/40/61	AY593843	n/a	PIADC	(NMB) South West	III
SWA/40/61	n/a	n/a	WRLFMD	Africa South West	III
SWA/80/62	n/a	n/a	WRLFMD	Africa South West	III
BOT/1/68	n/a	bovine	Wellcome	Botswana	III
BOT/1/68	Z98203	bovine	WRLFMD	Botswana	III
BOT/1/68	n/a	bovine	WRLFMD	Botswana	III
BOT/1/68	EF134950	bovine	IZSLE	Botswana	III
BOT/1/68	AY593845	bovine	PIADC	Botswana	III
SWA/2/89*	n/a	african buffalo	WRLFMD	South West	III
BOT-BUFF/62/74	n/a	african buffalo	WRLFMD	Africa Botswana	III
SA/13/61	AY593842	cattle	PIADC	South Africa (SA)	III
BOT/4/2015	n/a	bovine	WRLFMD	Botswana	III
BOT/11/2015*	n/a	cattle	BVI	Botswana	III
BOT/1/2015	n/a	bovine	WRLFMD	Botswana	III
BOT/13/2015*	n/a	cattle	BVI	Botswana	III
BOT/2/2015	n/a	bovine	WRLFMD	Botswana	III
BOT/5/2015	n/a	bovine	WRLFMD	Botswana	III
BOT/P3/2000 NGO-2*	n/a	african buffalo	WRLFMD	Botswana	III
NMB/1/2000	n/a	bovine	WRLFMD	Namibia (NMB)	III
BOT/22/2006	n/a	african buffalo	WRLFMD	Botswana	III
BOT/20/2006	n/a	african buffalo	WRLFMD	Botswana	III
BOT/18/2006	n/a	cattle	WRLFMD	Botswana	III
BOT/12/2006	n/a	cattle	WRLFMD	Botswana	III
BOT/13/2006	n/a	cattle	WRLFMD	Botswana	III
BOT/17/2006	n/a	cattle	WRLFMD	Botswana	III
BOT/16/2006	n/a	cattle	WRLFMD	Botswana	III
BOT/14/2006	n/a	cattle	WRLFMD	Botswana	III
BOT/15/2006	n/a	cattle	WRLFMD	Botswana	III
ZAM/7/2012	n/a	bovine	WRLFMD	Zambia	III
ZAM/6/2012	n/a	bovine	WRLFMD	Zambia	III
ZAM/8/2012	n/a	bovine	WRLFMD	Zambia	III
ZAM/9/2012	n/a	bovine	WRLFMD	Zambia	III
BOT/P3/2000 NGO-13*	n/a	african buffalo	WRLFMD	Botswana	III
ZAM/4/2000	n/a	bovine	WRLFMD	Zambia	III
ZIM/P9/94 HWANGE-2*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/P12/90 A-7*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/12/90 A-5*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/P12/90 A-10*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/P45/91 MT-9*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/P45/91 MT-6*	n/a	african buffalo	WRLFMD	Zimbabwe	III

*continued on next page*

label	accession	host(s)	lab	country	taxonomic information
BOT/P3/2000 SAV-22*	n/a	african buffalo	WRLFMD	Botswana	III
BOT/P3/2000 SAV-19*	n/a	african buffalo	WRLFMD	Botswana	III
BOT/P3/98 VUM-24*	n/a	african buffalo	WRLFMD	Botswana	III
BOT/P3/98 VUM-25*	n/a	african buffalo	WRLFMD	Botswana	III
NAM37/15*	n/a	cattle	BVI	Namibia	III
NAM38/15*	n/a	cattle	BVI	Namibia	III
NAM42/15*	n/a	cattle	BVI	Namibia	III
NAM47/15*	n/a	cattle	BVI	Namibia	III
NAM46/15*	n/a	cattle	BVI	Namibia	III
NAM52/15*	n/a	cattle	BVI	Namibia	III
NAM43/15*	n/a	cattle	BVI	Namibia	III
NAM33/15*	n/a	cattle	BVI	Namibia	III
ZIM/P45/91 MT-5*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/3/88/1*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/P9/94 HWANGE-6*	n/a	african buffalo	WRLFMD	Zimbabwe	III
ZIM/P1/2004 C10*	n/a	cattle	WRLFMD	Zimbabwe	III
ZIM/21/2003	n/a	n/a	WRLFMD	Zimbabwe	III
ZIM/4/2003	n/a	n/a	WRLFMD	Zimbabwe	III
ZIM/13/2003	n/a	n/a	WRLFMD	Zimbabwe	III
ZIM/20/2003	n/a	n/a	WRLFMD	Zimbabwe	III
ZIM/2/2003	n/a	n/a	WRLFMD	Zimbabwe	III
ZIM/5/2003	n/a	n/a	WRLFMD	Zimbabwe	III
ZIM/P1/2004 E45*	n/a	cattle	WRLFMD	Zimbabwe	III
ZIM/P1/2004 D19*	n/a	cattle	WRLFMD	Zimbabwe	III
SWA/1/49	AY593840	n/a	PIADC	South West Africa	III
SWA/1/49	n/a	n/a	WRLFMD	South West Africa	III
SR/2/58	n/a	n/a	WRLFMD	Rhodesia (SR)	III
SR/2/58	AY593841	n/a	PIADC	Rhodesia (SR)	III
BEC/1/48	AY593838	n/a	PIADC	Bechuanaland	III
ZIM/P30/90 CHER-18*	n/a	african buffalo	WRLFMD	Zimbabwe	III
RV/11/37	AY593839	greater kudu	PIADC	Rhodesia (RV)	II
RHO/5/66	AY593846	bovine	PIADC	Rhodesia	II
ZIM/23/2003	KF219690	n/a	WRLFMD	Zimbabwe	I
T155/71*	KF561706	cattle	WRLFMD	Tanzania	I
UGA/13/74	AY442010	bovine	OVI	Uganda	VII
SUD/3/76	DQ009725	n/a	OVI	Sudan	VI
ISR/4/62	AY593844	n/a	PIADC	Israel	VI
NIG/11/75	AF431711	bovine	OVI	Nigeria	V
ETH/3/2007	FJ798154	cattle	WRLFMD	Ethiopia	IX
UGA-BUFF/21/70	KF219682	african buffalo	WRLFMD	Uganda	IV
UGA/1/97*	AY442012	african buffalo	OVI	Uganda	VIII

\*, not a WRLFMD Reference Number

n/a, not available