

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

Genotyping Report

FMDV serotype: SAT2
Country: Zambia
Year: 2019
Batch: WRLFMD/2019/00022
No. of sequences: 4
Report date: 3rd May 2019
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:	ZAM/9/2019
Sender reference:	CVRI 22/19
Location of origin:	n/a
Country of origin:	Zambia
Date of collection:	02/04/2019
Host species:	bovine
Serotype:	SAT2
Topotype:	I
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	BTy2
Harvest date of material:	27/04/2019
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	02/05/2019
Created:	03/05/2019
Last updated:	03/05/2019
VIBASys IDs: sample 41424, genome 41425, sequence viba_41426, sequencing info 41427	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_41430	ZAM/10/2019	bovine	99.4	0	SAT2	I		
viba_41434	ZAM/11/2019	bovine	97.8	0	SAT2	I		
viba_41438	ZAM/12/2019	bovine	97.8	0	SAT2	I		
viba_111	MAL/1/2003	bovine	91.8	0	SAT2	I		
viba_5819	MAL/2/2003	bovine	91.6	0	SAT2	I		
viba_11248	MAL/1/2008	cattle	89.1	0	SAT2	I		
viba_29090	ZIM/P7/94 MT-8		83.9	0	SAT2	I		
viba_3714	ZIM/P18/91 GN-5	African buffalo	81.6	0	SAT2	I		
viba_2026	U267/83		81.6	0	SAT2	IV		
viba_3718	ZIM/P18/91 GN-9	African buffalo	81.4	0	SAT2	I		

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_111	MAL/1/2003	bovine	91.8	0	SAT2	I		
viba_248	KEN/1/84	bovine	80.9	0	SAT2	IV		
viba_183	ZIM/14/2002	bovine	80.4	0	SAT2	I		
viba_380	RHO/1/48		80.2	0	SAT2	III		
viba_273	ETH/1/90	bovine	79.6	0	SAT2	IV		
viba_451	BOT/P3/98 VUM-29	African buffalo	79.3	1	SAT2	III		
viba_752	SA/106/59		79.2	0	SAT2	I		
viba_546	ZIM/5/81	bovine	75.6	0	SAT2	II		
viba_567	ZIM/7/83	bovine	75.5	0	SAT2	II		
viba_724	ETH/2/91	bovine	74.5	0	SAT2	XIV		

Virus sample name:	ZAM/10/2019
Sender reference:	CVRI 23/19
Location of origin:	n/a
Country of origin:	Zambia
Date of collection:	02/04/2019
Host species:	bovine
Serotype:	SAT2
Topotype:	I
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	25/04/2019
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	02/05/2019
Created:	03/05/2019
Last updated:	03/05/2019
VIBASys IDs: sample 41428, genome 41429, sequence viba_41430, sequencing info 41431	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_41426	ZAM/9/2019	bovine	99.4	0	SAT2	I		
viba_41434	ZAM/11/2019	bovine	97.5	0	SAT2	I		
viba_41438	ZAM/12/2019	bovine	97.5	0	SAT2	I		
viba_111	MAL/1/2003	bovine	91.1	0	SAT2	I		
viba_5819	MAL/2/2003	bovine	91.0	0	SAT2	I		
viba_11248	MAL/1/2008	cattle	88.8	0	SAT2	I		
viba_29090	ZIM/P7/94 MT-8		83.6	0	SAT2	I		
viba_3714	ZIM/P18/91 GN-5	African buffalo	81.6	0	SAT2	I		
viba_3718	ZIM/P18/91 GN-9	African buffalo	81.4	0	SAT2	I		
viba_3710	ZIM/P18/91 GN-3	African buffalo	81.3	0	SAT2	I		

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_111	MAL/1/2003	bovine	91.1	0	SAT2	I		
viba_248	KEN/1/84	bovine	80.5	0	SAT2	IV		
viba_380	RHO/1/48		80.1	0	SAT2	III		
viba_183	ZIM/14/2002	bovine	79.8	0	SAT2	I		
viba_451	BOT/P3/98 VUM-29	African buffalo	79.6	1	SAT2	III		
viba_752	SA/106/59		79.2	0	SAT2	I		
viba_273	ETH/1/90	bovine	79.1	0	SAT2	IV		
viba_546	ZIM/5/81	bovine	75.1	0	SAT2	II		
viba_567	ZIM/7/83	bovine	75.0	0	SAT2	II		
viba_724	ETH/2/91	bovine	74.4	0	SAT2	XIV		

Virus sample name:	ZAM/11/2019
Sender reference:	CVRI 20/19
Location of origin:	n/a
Country of origin:	Zambia
Date of collection:	03/04/2019
Host species:	bovine
Serotype:	SAT2
Topotype:	I
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	26/04/2019
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	02/05/2019
Created:	03/05/2019
Last updated:	03/05/2019
VIBASys IDs: sample 41432, genome 41433, sequence viba_41434, sequencing info 41435	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_41438	ZAM/12/2019	bovine	100.0	0	SAT2	I		
viba_41426	ZAM/9/2019	bovine	97.8	0	SAT2	I		
viba_41430	ZAM/10/2019	bovine	97.5	0	SAT2	I		
viba_111	MAL/1/2003	bovine	91.0	0	SAT2	I		
viba_5819	MAL/2/2003	bovine	90.8	0	SAT2	I		
viba_11248	MAL/1/2008	cattle	88.6	0	SAT2	I		
viba_29090	ZIM/P7/94 MT-8		83.1	0	SAT2	I		
viba_2026	U267/83		81.7	0	SAT2	IV		
viba_28859	K52/84		81.4	0	SAT2	IV		
viba_28849	K52/84		81.4	0	SAT2	IV		

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_111	MAL/1/2003	bovine	91.0	0	SAT2	I		
viba_248	KEN/1/84	bovine	81.1	0	SAT2	IV		
viba_183	ZIM/14/2002	bovine	80.2	0	SAT2	I		
viba_380	RHO/1/48		80.0	0	SAT2	III		
viba_451	BOT/P3/98 VUM-29	African buffalo	79.0	1	SAT2	III		
viba_273	ETH/1/90	bovine	78.9	0	SAT2	IV		
viba_752	SA/106/59		78.7	0	SAT2	I		
viba_546	ZIM/5/81	bovine	75.5	0	SAT2	II		
viba_724	ETH/2/91	bovine	74.8	0	SAT2	XIV		
viba_728	GHA/2/90	bovine	73.6	0	SAT2	V		

Virus sample name:	ZAM/12/2019
Sender reference:	CVRI 21/19
Location of origin:	n/a
Country of origin:	Zambia
Date of collection:	03/04/2019
Host species:	bovine
Serotype:	SAT2
Topotype:	I
Lineage:	
Sublineage:	
Sequence length:	642
Ambiguities:	0
Material submitted for sequencing:	BTy1
Harvest date of material:	25/04/2019
Primers:	SAT2-1C445F/SAT-2B208R; SAT2-P1-1223F/SAT-2B208R; FMD-3161F/FMD-4303R
Received for sequencing:	02/05/2019
Created:	03/05/2019
Last updated:	03/05/2019
VIBASys IDs: sample 41436, genome 41437, sequence viba_41438, sequencing info 41439	

Most Closely Related Sequences

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_41434	ZAM/11/2019	bovine	100.0	0	SAT2	I		
viba_41426	ZAM/9/2019	bovine	97.8	0	SAT2	I		
viba_41430	ZAM/10/2019	bovine	97.5	0	SAT2	I		
viba_111	MAL/1/2003	bovine	91.0	0	SAT2	I		
viba_5819	MAL/2/2003	bovine	90.8	0	SAT2	I		
viba_11248	MAL/1/2008	cattle	88.6	0	SAT2	I		
viba_29090	ZIM/P7/94 MT-8		83.1	0	SAT2	I		
viba_2026	U267/83		81.7	0	SAT2	IV		
viba_28859	K52/84		81.4	0	SAT2	IV		
viba_28849	K52/84		81.4	0	SAT2	IV		

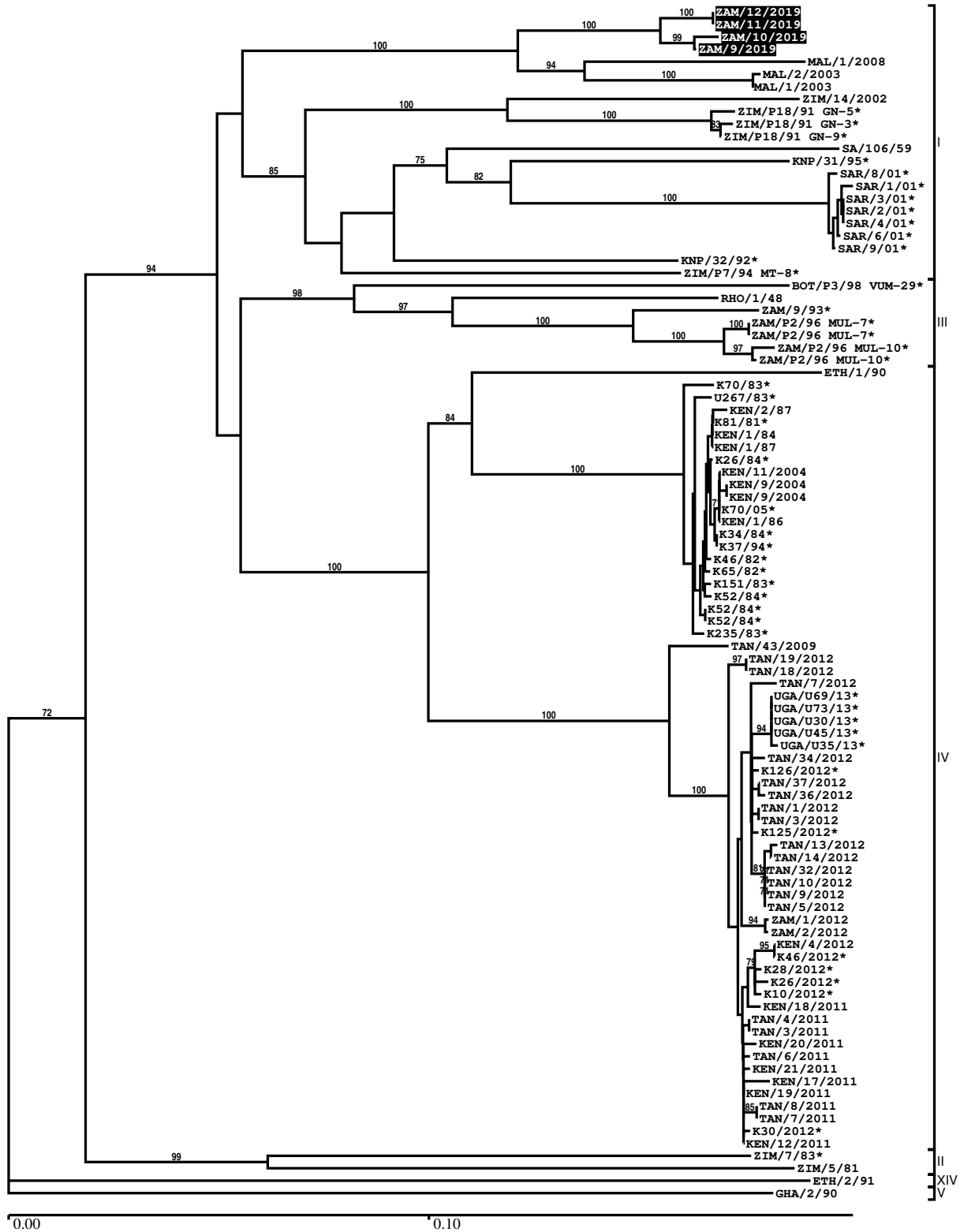
Most Closely Related Prototype Sequences

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

sequence	virus name	Host	% Id.	# Ambig.	serotype	topotype	lineage	sublineage
viba_111	MAL/1/2003	bovine	91.0	0	SAT2	I		
viba_248	KEN/1/84	bovine	81.1	0	SAT2	IV		
viba_183	ZIM/14/2002	bovine	80.2	0	SAT2	I		
viba_380	RHO/1/48		80.0	0	SAT2	III		
viba_451	BOT/P3/98 VUM-29	African buffalo	79.0	1	SAT2	III		
viba_273	ETH/1/90	bovine	78.9	0	SAT2	IV		
viba_752	SA/106/59		78.7	0	SAT2	I		
viba_546	ZIM/5/81	bovine	75.5	0	SAT2	II		
viba_724	ETH/2/91	bovine	74.8	0	SAT2	XIV		
viba_728	GHA/2/90	bovine	73.6	0	SAT2	V		

Report on FMDV SAT2 in Zambia in 2019

Batch: WRLFMD/2019/00022



*, not a WRLFMD Reference Number

Analysis Parameters

VP1 subsequence extractor:	vp1_SAT2
Query sequence set:	WRLFMD/2019/00022-Zambia-SAT2 (4 sequences)
Sequence database set:	allseqs_SAT2 (907 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:	11
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
ZAM/12/2019	n/a	bovine	WRLFMD	Zambia	I
ZAM/11/2019	n/a	bovine	WRLFMD	Zambia	I
ZAM/10/2019	n/a	bovine	WRLFMD	Zambia	I
ZAM/9/2019	n/a	bovine	WRLFMD	Zambia	I
MAL/1/2008	n/a	cattle	WRLFMD	Malawi	I
MAL/2/2003	n/a	bovine	WRLFMD	Malawi	I
MAL/1/2003	n/a	bovine	WRLFMD	Malawi	I
ZIM/14/2002	KF219689	bovine	WRLFMD	Zimbabwe	I
ZIM/P18/91 GN-5*	n/a	African buffalo	WRLFMD	Zimbabwe	I
ZIM/P18/91 GN-3*	n/a	African buffalo	WRLFMD	Zimbabwe	I
ZIM/P18/91 GN-9*	n/a	African buffalo	WRLFMD	Zimbabwe	I
SA/106/59	AY593848	n/a	PIADC	South Africa	I
KNP/31/95*	AF367119	African buffalo	OVI	South Africa (SA)	I
SAR/8/01*	AY442910	n/a	OVI	South Africa (KNP)	I
SAR/1/01*	AY442903	n/a	OVI	Republic of South Africa	I
SAR/3/01*	AY442905	n/a	OVI	Republic of South Africa	I
SAR/2/01*	AY442904	n/a	OVI	Republic of South Africa	I
SAR/4/01*	AY442906	n/a	OVI	Republic of South Africa	I
SAR/6/01*	AY442908	n/a	OVI	Republic of South Africa	I
SAR/9/01*	AY442911	n/a	OVI	Republic of South Africa	I
KNP/32/92*	AF367115	African buffalo	OVI	South Africa (KNP)	I
ZIM/P7/94 MT-8*	n/a	n/a	WRLFMD	Zimbabwe	I
BOT/P3/98 VUM-29*	AF367124	African buffalo	OVI	Botswana	III
RHO/1/48	AY593847	n/a	PIADC	Rhodesia	III
ZAM/9/93*	AF367116	African buffalo	OVI	Zambia	III
ZAM/P2/96 MUL-7*	n/a	African buffalo	WRLFMD	Zambia	III
ZAM/P2/96 MUL-7*	AF367120	African buffalo	OVI	Zambia	III

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label	accession	host(s)	lab	country	taxonomic information
ZAM/P2/96 MUL-10*	AF367121	African buffalo	OVI	Zambia	III
ZAM/P2/96 MUL-10*	n/a	African buffalo	WRLFMD	Zambia	III
ETH/1/90	AY343935	bovine	OVI	Ethiopia	IV
K70/83*	HM623681	n/a	Makerere University	Kenya	IV
U267/83*	HM623682	n/a	Makerere University, Uganda	Uganda	IV
KEN/2/87	AY343945	n/a	OVI	Kenya	IV
K81/81*	HM623678	n/a	Makerere University	Kenya	IV
KEN/1/84	AY344505	bovine	OVI	Kenya	IV
KEN/1/87	AY343944	n/a	OVI	Kenya	IV
K26/84*	n/a	n/a	WRLFMD	Kenya	IV
KEN/11/2004	n/a	cattle	WRLFMD	Kenya	IV
KEN/9/2004	n/a	cattle	WRLFMD	Kenya	IV
KEN/9/2004	n/a	cattle	WRLFMD	Kenya	IV
K70/05*	HM623701	n/a	n/a	Kenya	IV
KEN/1/86	AY343943	n/a	OVI	Kenya	IV
K34/84*	HM623684	n/a	Makerere University	Kenya	IV
K37/94*	HM623694	n/a	Makerere University	Kenya	IV
K46/82*	HM623679	n/a	Makerere University	Kenya	IV
K65/82*	n/a	n/a	WRLFMD	Kenya	IV
K151/83*	HM623683	n/a	Makerere University	Kenya	IV
K52/84*	HM623685	n/a	Makerere University	Kenya	IV
K52/84*	n/a	n/a	WRLFMD	Kenya	IV
K52/84*	n/a	n/a	WRLFMD	Kenya	IV
K235/83*	n/a	n/a	WRLFMD	Kenya	IV
TAN/43/2009	KF561727	cattle	WRLFMD	Tanzania	IV
TAN/19/2012	MF592615	cattle	WRLFMD	Tanzania	IV
TAN/18/2012	MF592614	cattle	WRLFMD	Tanzania	IV
TAN/7/2012	MF592605	cattle	WRLFMD	Tanzania	IV
UGA/U69/13*	KP089989	bovine	Makerere University	Uganda	IV
UGA/U73/13*	KP089990	bovine	Makerere University	Uganda	IV
UGA/U30/13*	KP089986	bovine	Makerere University	Uganda	IV
UGA/U45/13*	KP089988	bovine	Makerere University	Uganda	IV
UGA/U35/13*	KP089987	bovine	Makerere University	Uganda	IV
TAN/34/2012	MF592620	cattle	WRLFMD	Tanzania	IV
K126/2012*	KP263450	cattle	EMBAKASI	Kenya	IV
TAN/37/2012	MF592622	cattle	WRLFMD	Tanzania	IV
TAN/36/2012	MF592621	cattle	WRLFMD	Tanzania	IV
TAN/1/2012	MF592602	cattle	WRLFMD	Tanzania	IV
TAN/3/2012	MF592603	cattle	WRLFMD	Tanzania	IV
K125/2012*	KP263449	cattle	EMBAKASI	Kenya	IV
TAN/13/2012	MF592610	cattle	WRLFMD	Tanzania	IV
TAN/14/2012	MF592611	cattle	WRLFMD	Tanzania	IV
TAN/32/2012	MF592619	cattle	WRLFMD	Tanzania	IV
TAN/10/2012	MF592607	cattle	WRLFMD	Tanzania	IV
TAN/9/2012	MF592606	cattle	WRLFMD	Tanzania	IV
TAN/5/2012	MF592604	cattle	WRLFMD	Tanzania	IV
ZAM/1/2012	n/a	bovine	WRLFMD	Zambia	IV
ZAM/2/2012	n/a	bovine	WRLFMD	Zambia	IV
KEN/4/2012	n/a	bovine	WRLFMD	Kenya	IV
K46/2012*	KP263455	cattle	EMBAKASI	Kenya	IV
K28/2012*	KP263453	cattle	EMBAKASI	Kenya	IV
K26/2012*	KP263452	cattle	EMBAKASI	Kenya	IV
K10/2012*	KP263454	cattle	EMBAKASI	Kenya	IV
KEN/18/2011	n/a	cattle	WRLFMD	Kenya	IV

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label	accession	host(s)	lab	country	taxonomic information
TAN/4/2011	MF592598	cattle	WRLFMD	Tanzania	IV
TAN/3/2011	MF592597	cattle	WRLFMD	Tanzania	IV
KEN/20/2011	n/a	cattle	WRLFMD	Kenya	IV
TAN/6/2011	MF592599	cattle	WRLFMD	Tanzania	IV
KEN/21/2011	n/a	cattle	WRLFMD	Kenya	IV
KEN/17/2011	n/a	cattle	WRLFMD	Kenya	IV
KEN/19/2011	n/a	cattle	WRLFMD	Kenya	IV
TAN/8/2011	MF592601	cattle	WRLFMD	Tanzania	IV
TAN/7/2011	MF592600	cattle	WRLFMD	Tanzania	IV
K30/2012*	KP263457	cattle	EMBAKASI	Kenya	IV
KEN/12/2011	n/a	cattle	WRLFMD	Kenya	IV
ZIM/7/83*	AF136607	bovine	OVI	Zimbabwe	II
ZIM/5/81	EF134951	bovine	WRLFMD	Zimbabwe	II
ETH/2/91	AY343938	bovine	OVI	Ethiopia	XIV
GHA/2/90	AF479415	bovine	OVI	Ghana	V

*, not a WRLFMD Reference Number

n/a, not available