



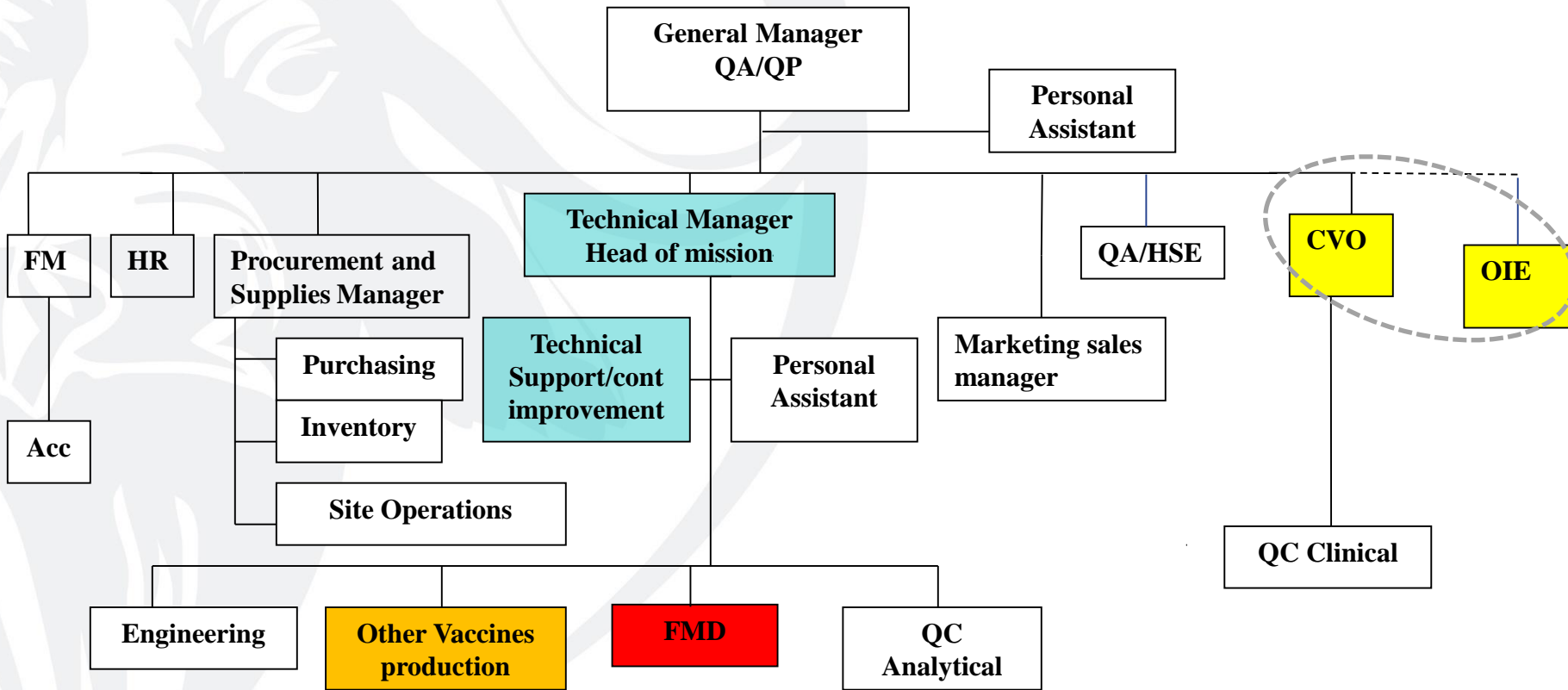
## Third GF-TADs Regional Roadmap Meeting for Eastern Africa – FMD PCP

Entebbe, Uganda: 3<sup>rd</sup> - 5<sup>th</sup> July 2018

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PROVIDING SUSTAINABLE ANIMAL HEALTH SOLUTIONS

# BVI Organization +100 Staff Complement



## **Mandate of BVI as OIE Reference laboratory for FMD**

- Provide timely confirmatory diagnosis of FMD suspects to Directors of Veterinary Services of sub-Saharan Africa
- Conduct research on FMD viruses (aetiology, epidemiology & control) to contribute to global surveillance (FMD Virus Pools)
- Provide FMD diagnostic reagents (e.g. antigens, antisera for ELISA tests) to countries of sub-Saharan Africa
- Provide laboratory technical support relating to the diagnosis of FMD (laboratory bench training)
- Collaborative studies with other Laboratories

# FMD DIAGNOSTIC ASSAYS AT BVI



- **Virus isolation in lamb kidney primary cell cultures and typing by antigen ELISA and RT-PCR**
- **Virus Isolation in cell culture and typing by RT-PCR and sequencing**
- **Virus Genome detection by RT-PCR and sequencing**
- **Detection of FMD antibodies to NSPs by competition ELISA**
- **Detection of FMD antibodies to structural proteins by LPBE**
- **Detection of FMD antibodies to structural proteins by VNT**
- **Vaccine matching by two dimensional VNT**

## Distribution of FMD virus isolates by serotype in recent FMD outbreaks in the SADC region, 2014 – 2017



virus serotype	Number of observations per period			Total	RF <sup>1</sup> in percent (%)
	2014	2015	2016 – 2017		
Type SAT1	3	1	2	6	25.00
Type SAT2	3	10	2	15	62.50
Type SAT3	0	1	1	2	8.33
Type O	0	0	1	1	4.67
<b>Total observations</b>	<b>6</b>	<b>12</b>	<b>6</b>	<b>24</b>	

**Table 1: FMD Virus isolation and characterization results from Southern Africa 2014**



Submission	Country	Month	FMD Virus isolation <sup>1</sup> & characterization		
			Serotype <sup>2</sup>	Topotype <sup>3</sup>	Pool
1	Zimbabwe	February	SAT2	I	6
2	Zimbabwe	May	SAT2	II	6
3	Botswana	June	SAT1	III	6
4	Mozambique	August	SAT2	I	6
5	Botswana	October	SAT1	III	6
6	Namibia	December	SAT2	III	6

<sup>1</sup>In Lamb kidney primary cell culture; <sup>2</sup>Typing by antigen ELISA & genome detection & sequencing; <sup>3</sup>Genotyping at WRLFMD on sequences submitted by BVI



**Table 2: FMD Virus isolation and characterization results for Southern Africa in 2015**

Submission	Country	Month	FMD Virus isolation <sup>1</sup> & characterization		
			Serotype	Topotype	Pool
1	Botswana	March	SAT2	III	6
2	Zambia	April	SAT2	IV	4
3	Namibia	May	SAT2	III	6
4	Botswana	June	SAT1	III (WZ)	6
5	Mozambique	June	SAT2	I	6
6	Namibia	June	SAT2	III	6
7	Botswana	July	SAT2	III	6
8	Botswana	August	SAT2	III	6
9	Zimbabwe	August	SAT2	II	6
10	Namibia	August	SAT1	III (WZ)	6
11	Namibia	August	SAT2	III	6
12	Zambia	October	SAT3	II (WZ)	6

<sup>1</sup>In Lamb kidney primary cell culture; <sup>2</sup>Typing by antigen ELISA & genome detection & sequencing; <sup>3</sup>Genotyping at WRLFMD on sequences submitted by BVI

**Table 3: FMD Virus isolation and characterization results on bovine epithelial tissue samples received at OIE-SSARRLFMD, Botswana Vaccine Institute (BVI) from various SADC countries in 2016**



Submission	Country	Year	Month	FMD Virus isolation <sup>1</sup> & characterization		
				Serotype	Topotype	Pool
1	Malawi	2016	February	SAT1	NWZ	6
2	Zimbabwe	2016	August	SAT2	II	6
3	Mauritius	2016	August	O	ME-SA	2



**Table 4: FMD Virus isolation and characterization results for Southern Africa 2017**



Submission	Country	Month	FMD virus isolation <sup>1</sup> & characterization		
			Serotype <sup>2</sup>	Topotype <sup>3</sup>	Pool
1	Zimbabwe	April	SAT2	II	6
2	Zambia	May	SAT1	I	6
3	Zambia	May	SAT3	II	6
4	Namibia	August	SAT2	III	6
5	Zimbabwe	September	SAT1	III	6
6	Zimbabwe	September	SAT2	II	6
7	Namibia	September	SAT2	III	6
8	Botswana	September	SAT2	III	6
9	Mozambique	November	SAT3	I	6

# Vaccine Matching

Relationship co-efficients (r-values) also provide an estimate of the likely cross-protection between a Vaccine Strain and a field isolate



Test used = 2dVNT

## Interpretation

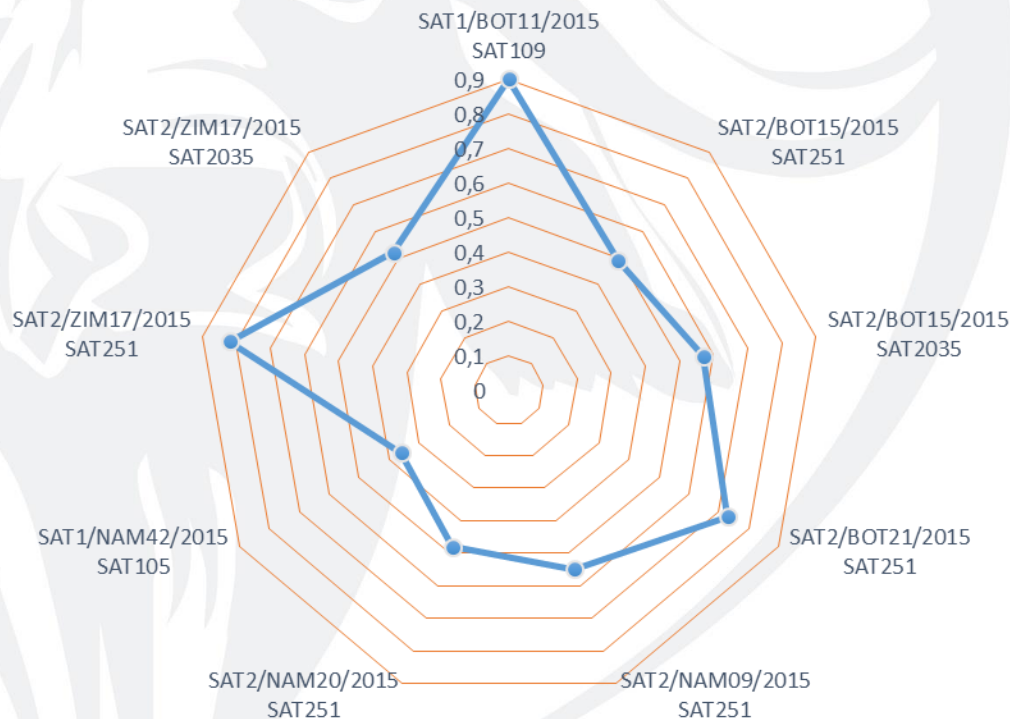
r-value >0.3

Close relationship between field isolate and vaccine strain

r-value < 0.3

The field strain is significantly different from the vaccine strain

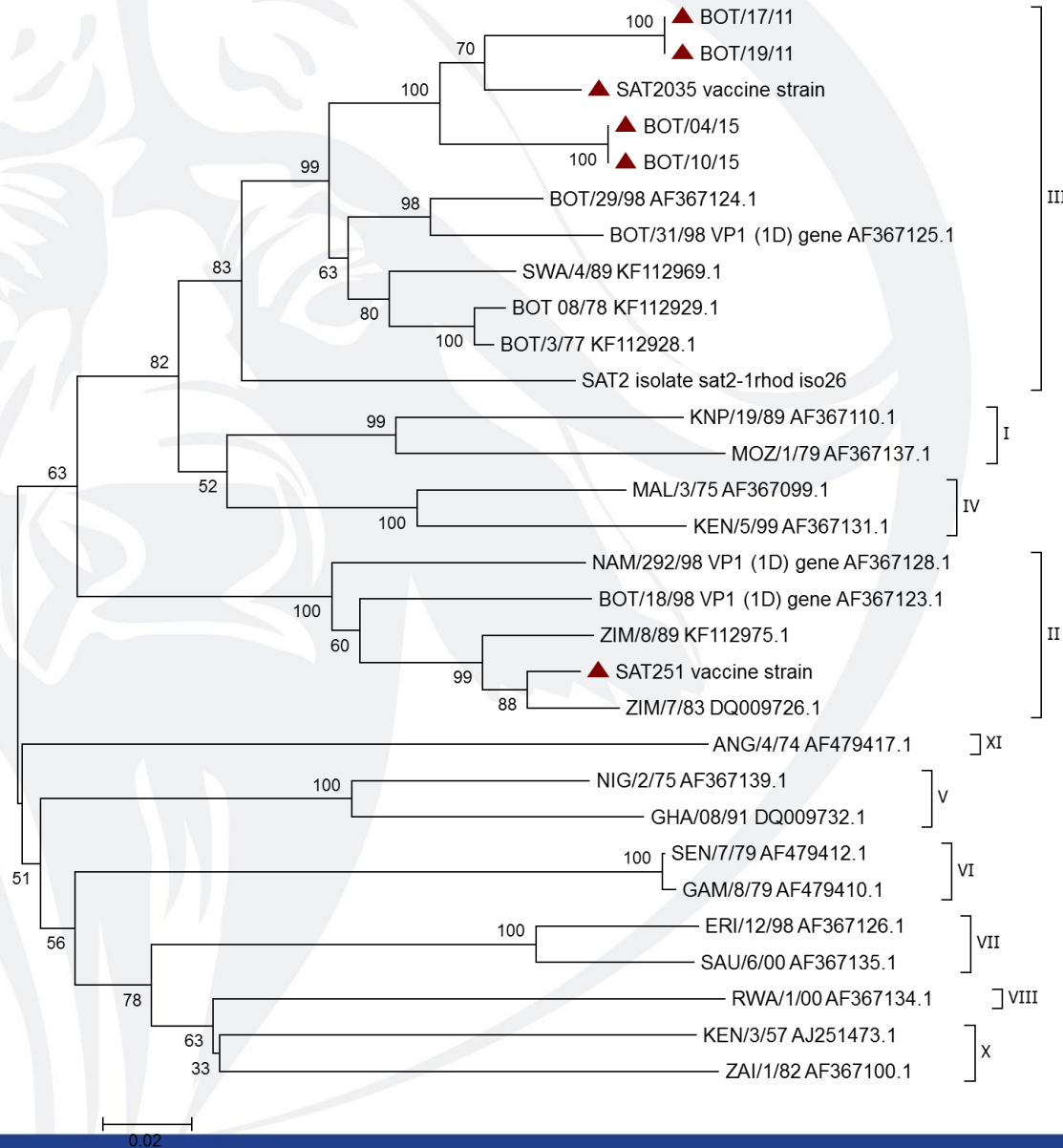
### r-values for 2015 isolates from Southern Africa



# Phylogenetic Analysis



**BVI**  
BOTSWANA VACCINE INSTITUTE



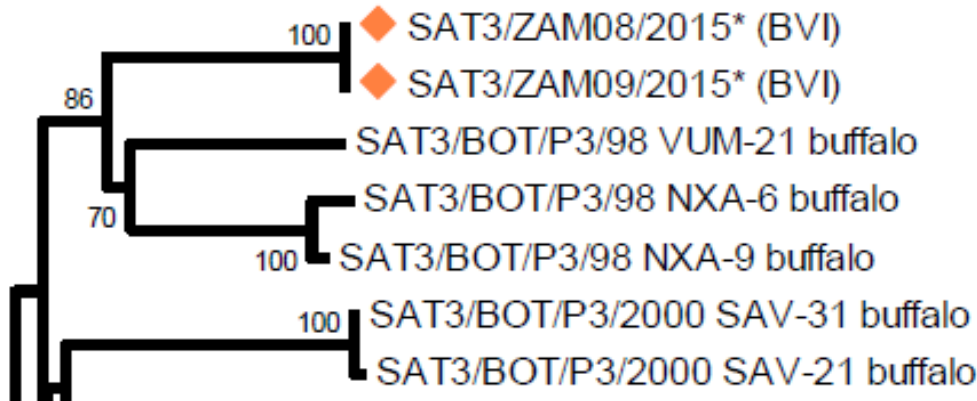
Nucleotide sequencing can provide an indication of how closely related the field isolate is to the vaccine strains.

# PHYLOGENETIC ANALYSIS (2015/2016)

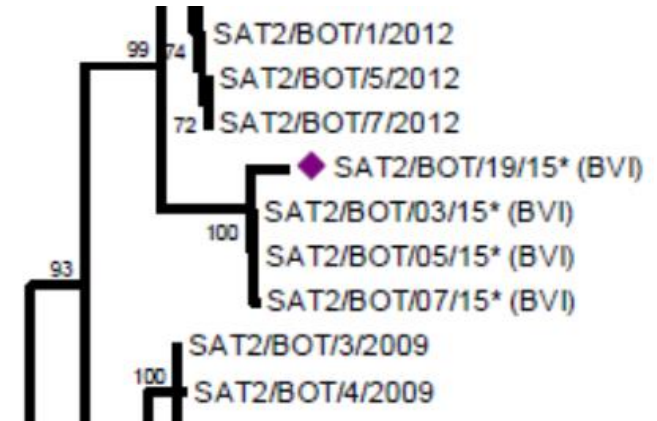


**BVI**  
BOTSWANA VACCINE INSTITUTE

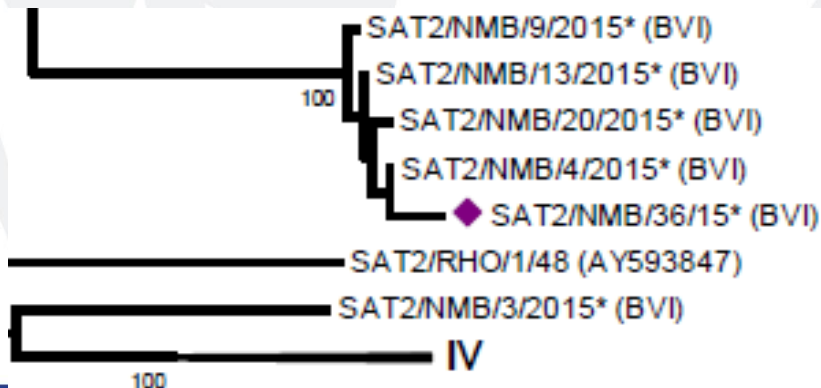
## ZAMBIA SAT 3 TOPOTYPE II



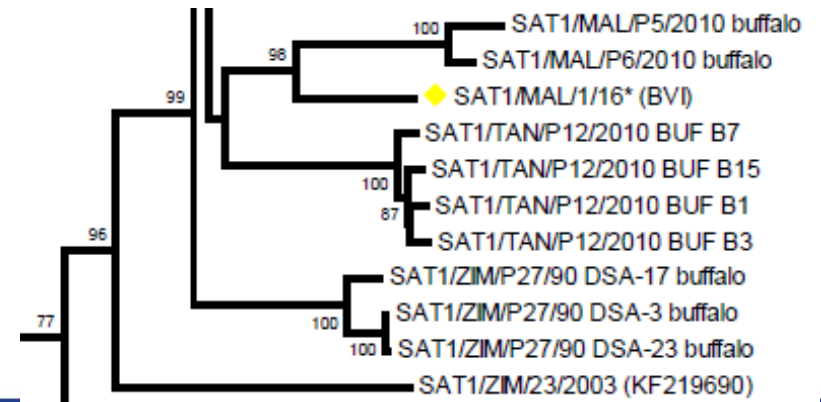
## BOTSWANA SAT 2 TOPOTYPE III



## NAMIBIA SAT 2 TOPOTYPE III



## MALAWI SAT 1 (2016) TOPOTYPE I



## FMD - FIELD INVESTIGATIONS: UGANDA



- Investigations carried out in 8 districts (Nakasongola, Masindi, **Bulisa**, Sembabule, Rakai, **Isingiro**, Kiruhura and Kween).
- Tissues, sera and probing samples collected in 6 of the districts
- The disease was present but at varying stages of progression
- Clinical disease was observed in herds with and without a history of previous vaccination (low coverage in vaccinated areas)
- Of the 21 tissue samples collected, virus isolation was successful in only two samples (Kiruhuru and Masindi)



# FMD - FIELD INVESTIGATIONS: UGANDA

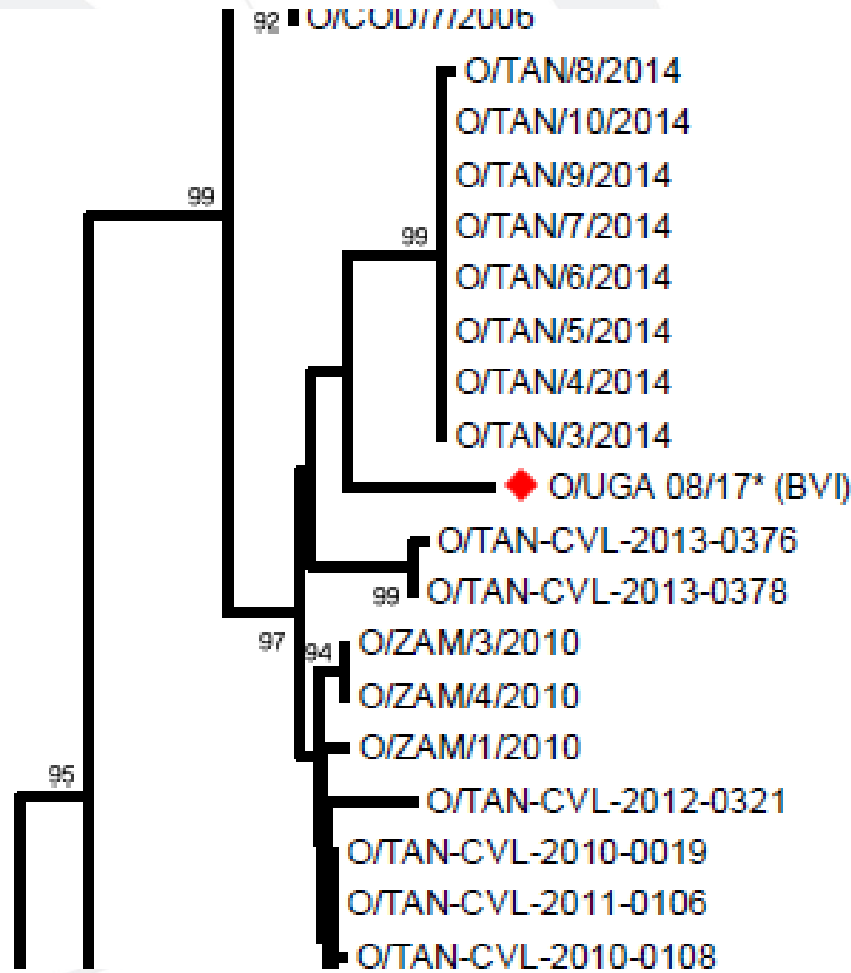


Masindi district - Uganda



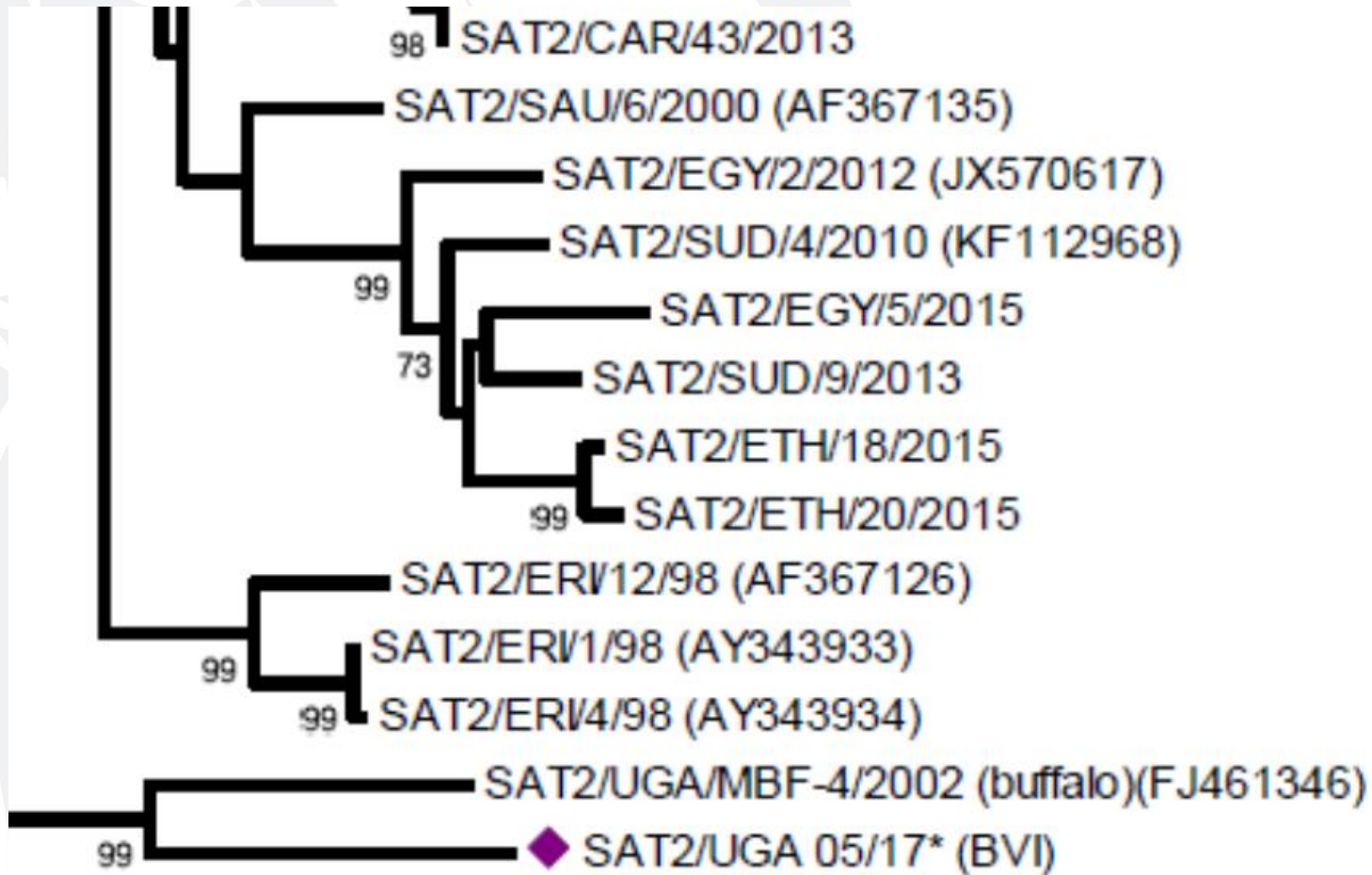


# Serotype O Isolate from Kiruhura district



EA-2

# SAT 2 Isolate from Masindi district



## O Strains: Identity rate between field strains and BVI vaccine strain (World Reference Laboratory Source)

*There are no data concerning Uganda, this table shows figures for neighbouring countries*

<b>Field strains</b>	<b>% Identity with O Manisa</b>
O SUD 1/05 (Sudan)	83.57
O SUD 2/05 (Sudan)	83.57
O SUD 3/05 (Sudan)	84.04
O KEN 26/05 (Kenya)	85.13
O KEN 27/05 (Kenya)	82.32
O ETH 46/06 (Ethiopia)	85.76
O ETH 48/06 (Ethiopia)	85.76
O COD 3/06 (DRC)	84.19
O COD 6/06 (DRC)	84.04
O COD 90/06 (DRC)	83.88

# SAT2 Strains: Identity rate between field strains and vaccine strains (World Reference Laboratory Source)



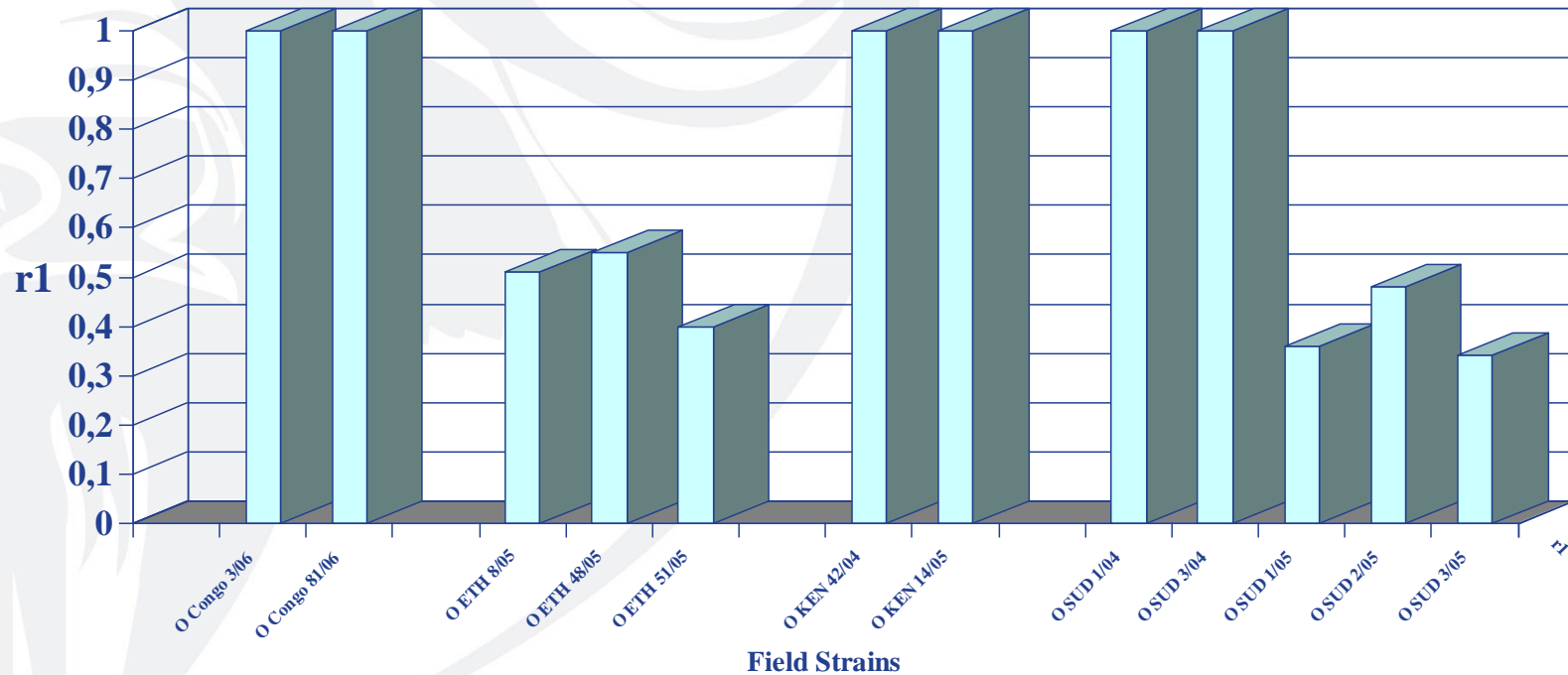
*There are no data concerning Uganda, this table shows figures for neighbouring countries*

<b>Field strains</b>	<b>% Identity with SAT2 BVI vaccine strain</b>
SAT2 KEN 32/04	75
SAT2 SUD 1/07	69.91



## Congo, Ethiopia, Kenya, Sudan: FMD Field Strains Type O

Diagram shows the different r1 values between field strains and O Manisa BVI vaccine strain



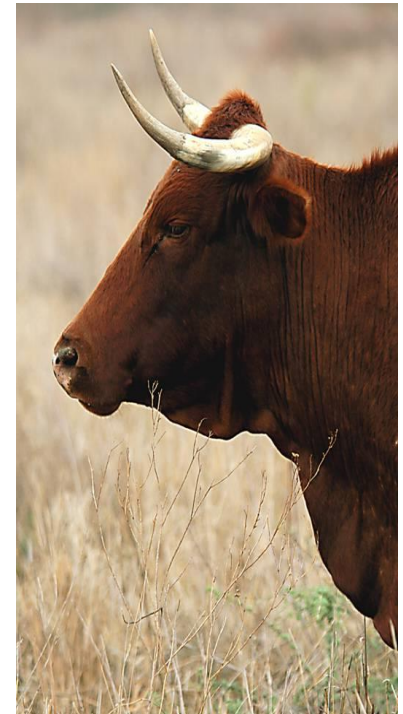
## Conclusions

- There has been very low submission rate of samples from eastern (& western) Africa.
- Continuous submission of samples for isolation and characterisation will assist in development of future antigen banks.
- BVI is willing to provide technical support in the investigation, collection and shipment of samples.
- Regional reference laboratories should continue to be integrated into the regional PCP roadmaps in order to provide technical support where needed.
- AU-IBAR to invite OIE regional reference laboratories to preparatory meetings prior to the OIE general session





**THANK YOU  
FOR  
YOUR ATTENTION**



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