

Vaccine matching and selection of vaccine strains for the control of foot-and-mouth disease in Kenya

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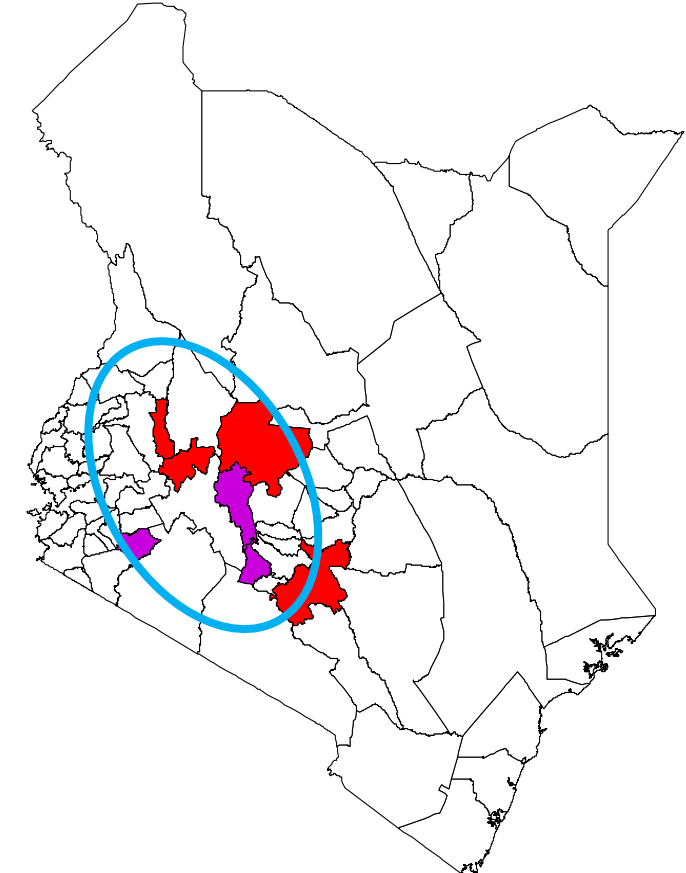
Introduction

- FMD is Endemic in Kenya
 - Yearly outbreaks (some not reported)
 - 5 serotypes recorded
 - O & A (1932)
 - SAT2 (1956)
 - C (1957)
 - SAT1 (1971)

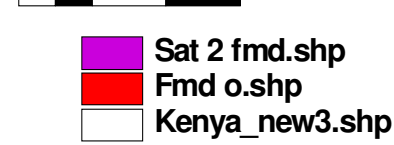
Introduction (2)

- Most reported outbreaks -
 - are those observed in cattle in dairy farming areas
- Role of small ruminants
 - largely ignored
 - Not included in vaccinations
 - Limited information on role in epidemiology
- Role of wildlife
 - not well studied
 - African buffalo known to harbour SATs

Distribution of Reported FMD Events 2012

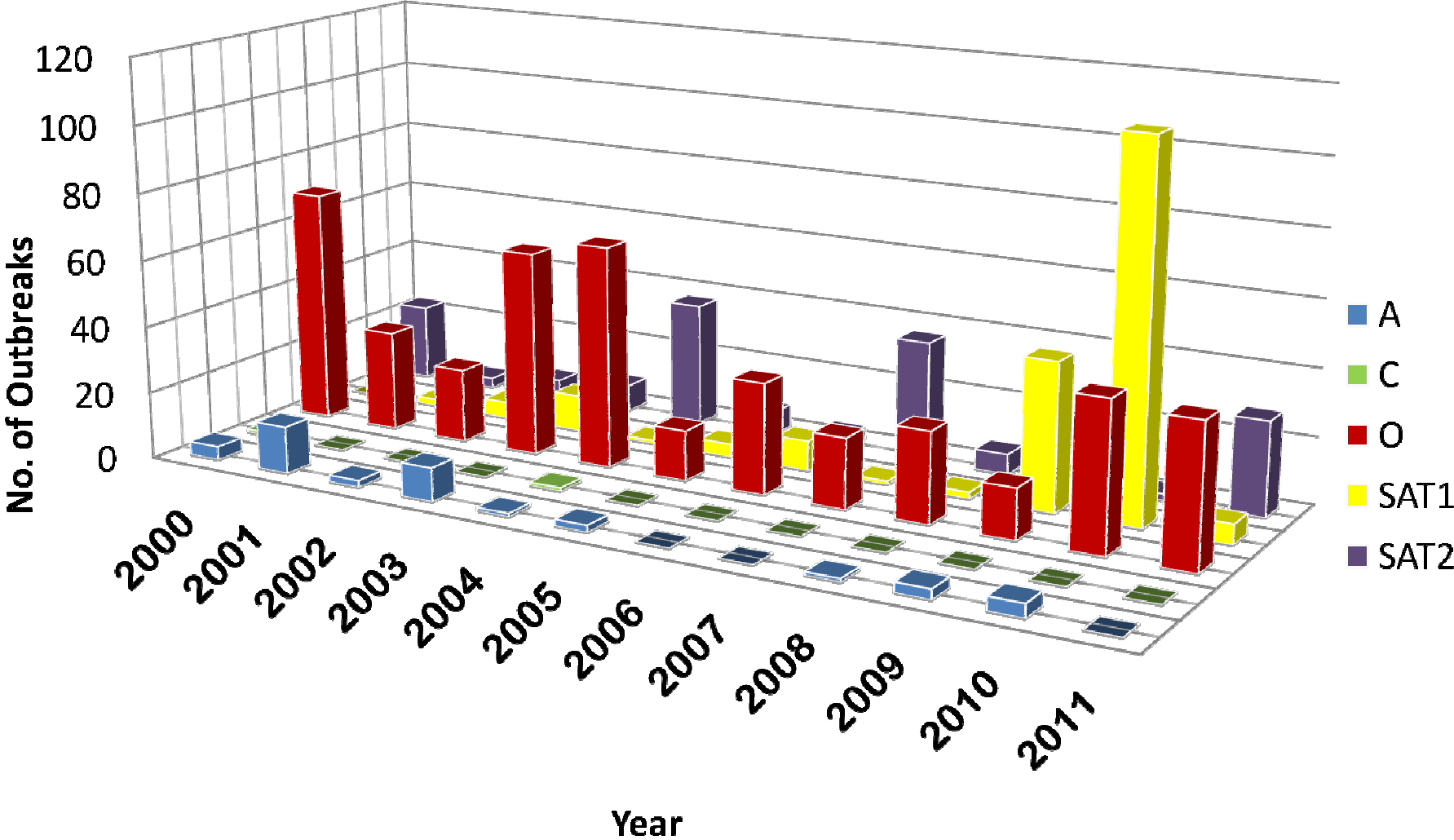


100 0 100 200 Kilometers



Introduction (3)

FMD outbreaks in Kenya: 2000-2011



FMD Control in Kenya

- FMD is a notifiable disease (Animal Diseases Act)
- Vaccination and Movement control
- Not very effective
 - Low vaccine coverage
 - Poor enforcement of movement controls

FMD Control Institutions

National reference laboratory
for FMD, Embakasi, Nairobi

- Established in 1957with the support of the Wellcome Trust as the Wellcome Institute for Research on FMD(WIRFMD)
- To Serotype & research on FMD in close collaboration with Pirbright, UK



FMD Control Institutions (2)

FMD lab

- Diagnostics – Virus Isolation, Antigen and antibody ELISAs, VNT, PCR
- Vaccine research & development
- Vaccine certification

FMD Control Institutions (3)

- Joint venture with Wellcome Trust in 1963 established the Vaccine Production Laboratory (VPL) now KEVEVAPI (1991)
 - Vaccine production commenced in 1964
 - Serotypes O, A, C, SAT1 and SAT2 produced
 - Inactivated aqueous vaccines (capacity for 50 million mono-equivalent doses)
 - Mono/Bi/Tri/Quadrivalent

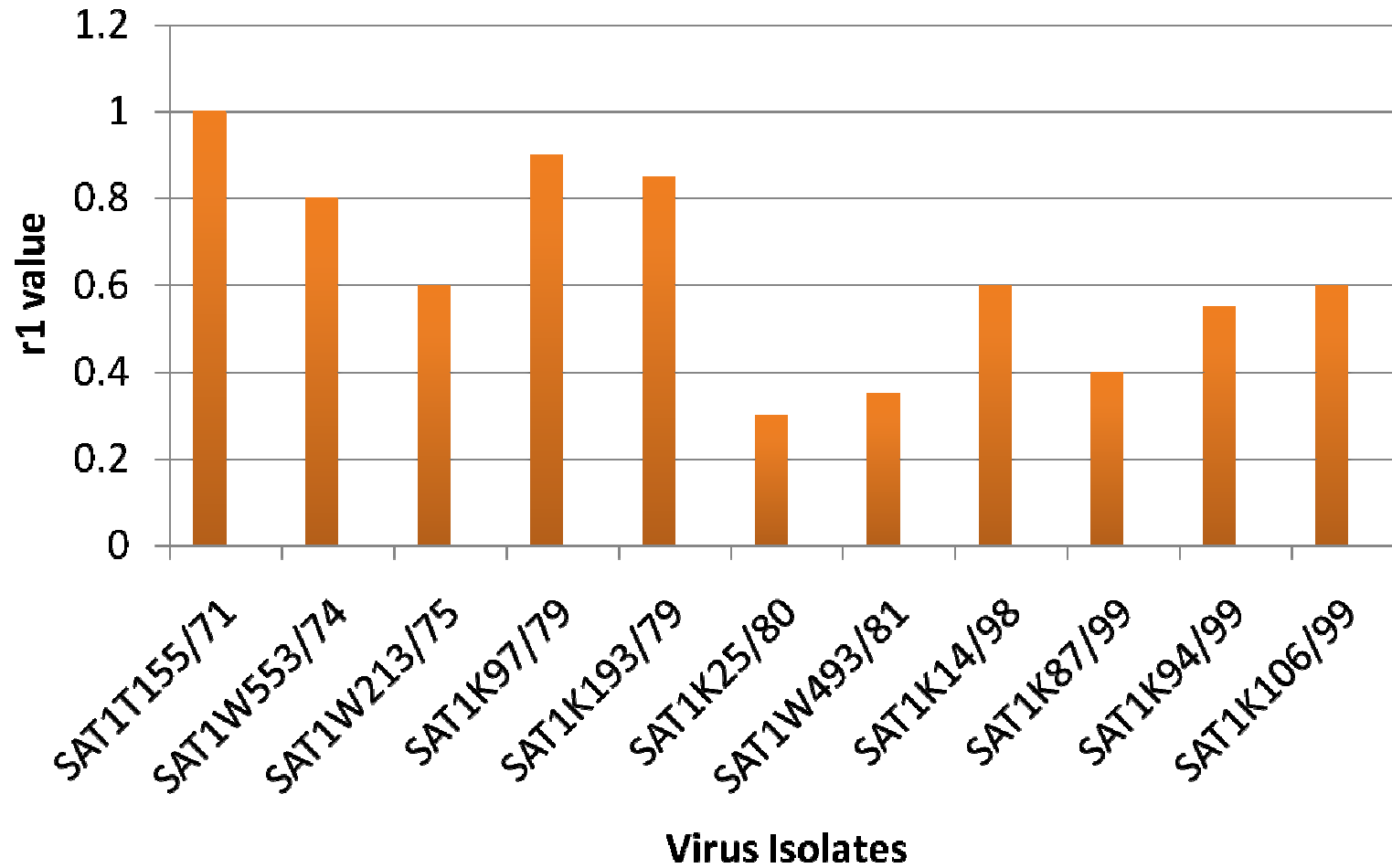
Vaccine performance

- Field
 - Outbreak investigations (post vaccination)
 - serological surveys
- Lab
 - Measuring antigenic match by serology
 - Serological methods – CFT, VNT, ELISA

Vaccine matching at Embakasi

- Subtyping
 - establishing the relationship between the field isolates and the vaccine strains
- Relationship (r) values between pairs of viruses
 - one way (r_1)
 - two way (r_2)
- The cross-serum neutralization ratio (r) and the cross-relationship value (R %) were determined

SAT 1 r1 values by VNT - SAT1T155/71 Serum



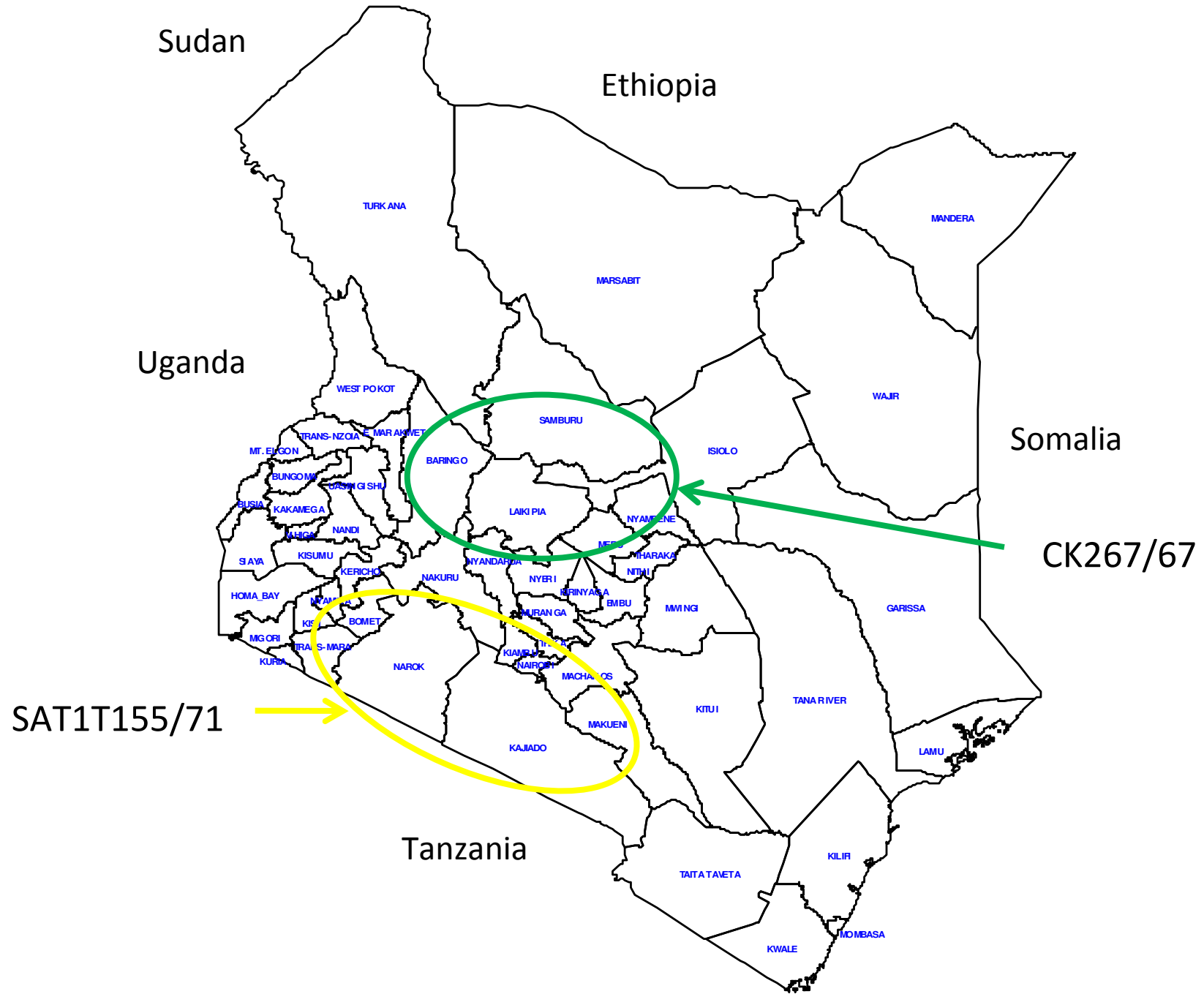
**CHRONOLOGICAL CHANGES IN KENYAN SAT1 AND TYPE C VACCINE
VIRUSES**

SEROTYPE	STRAIN DESIGNATION	YEAR OF ISOLATION	DATE INCORPORATED IN VACCINE
SAT1	SAT1 T155/71	1971	1971
C	CK267/67	1967	1967

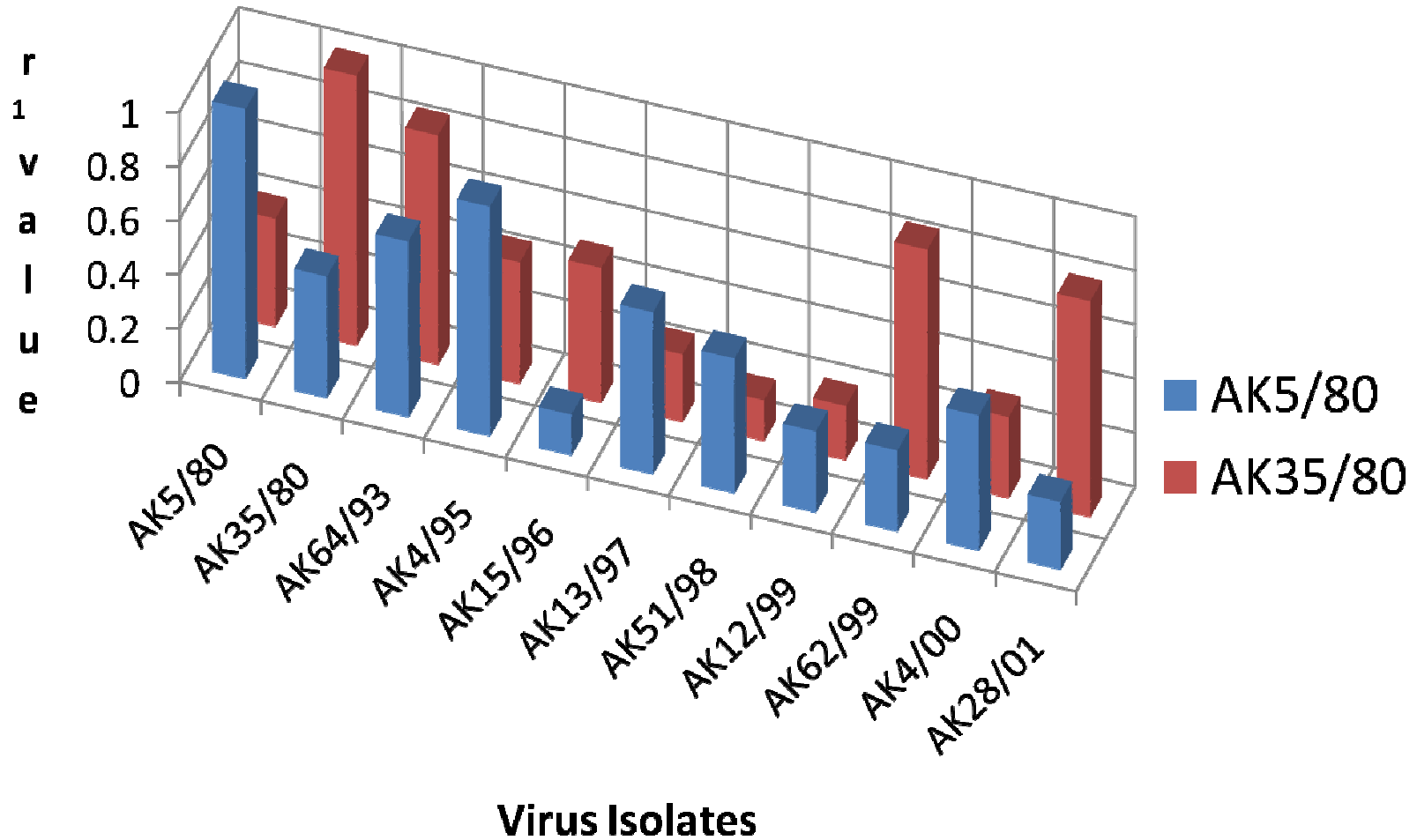
NB: No change

Origin of SAT1 Isolate – Arusha, Tanzania

Origin of C Isolate – Laikipia, Kenya



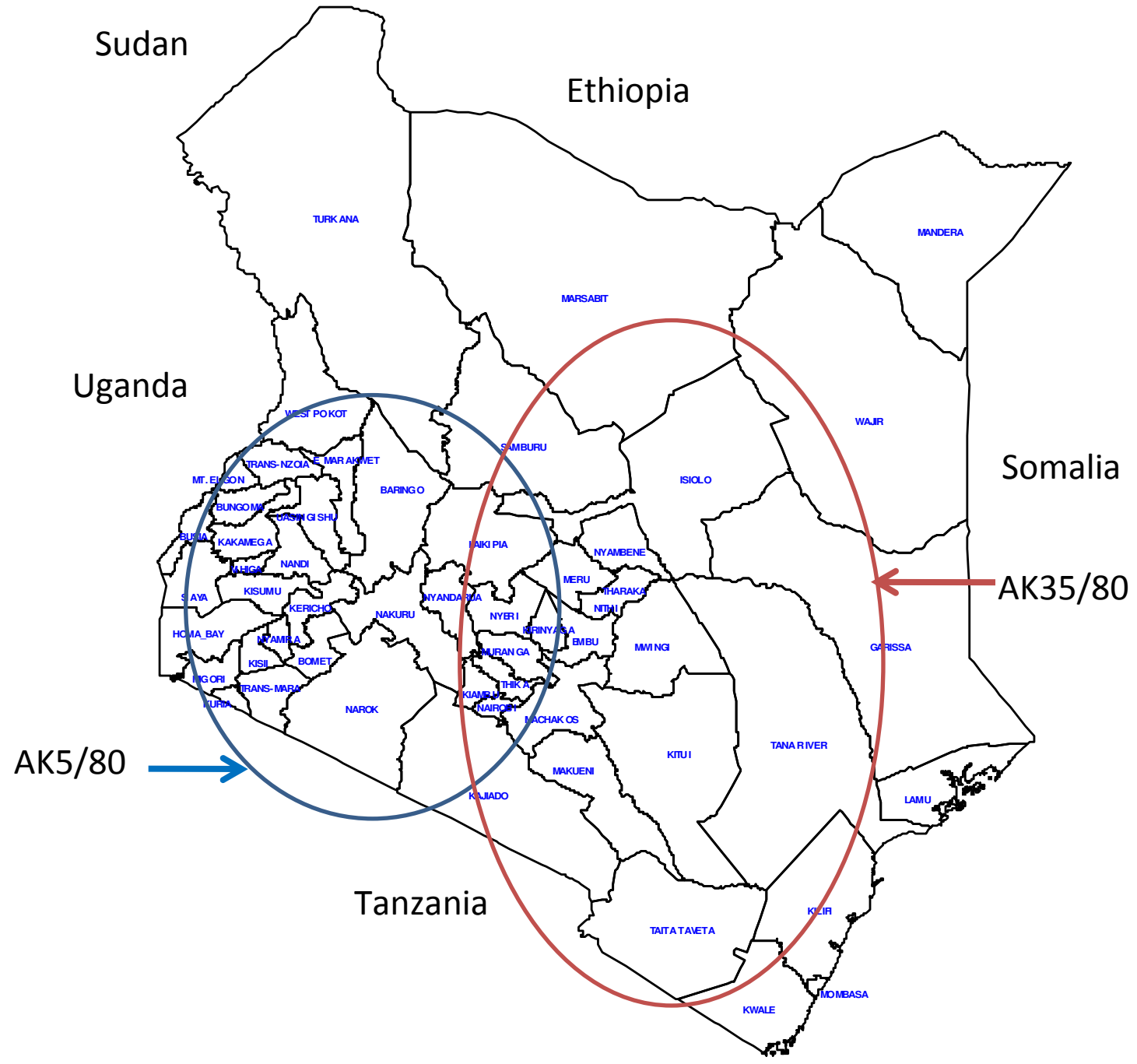
Type A r_1 values by VNT – AK5/80 and AK35/80 Sera



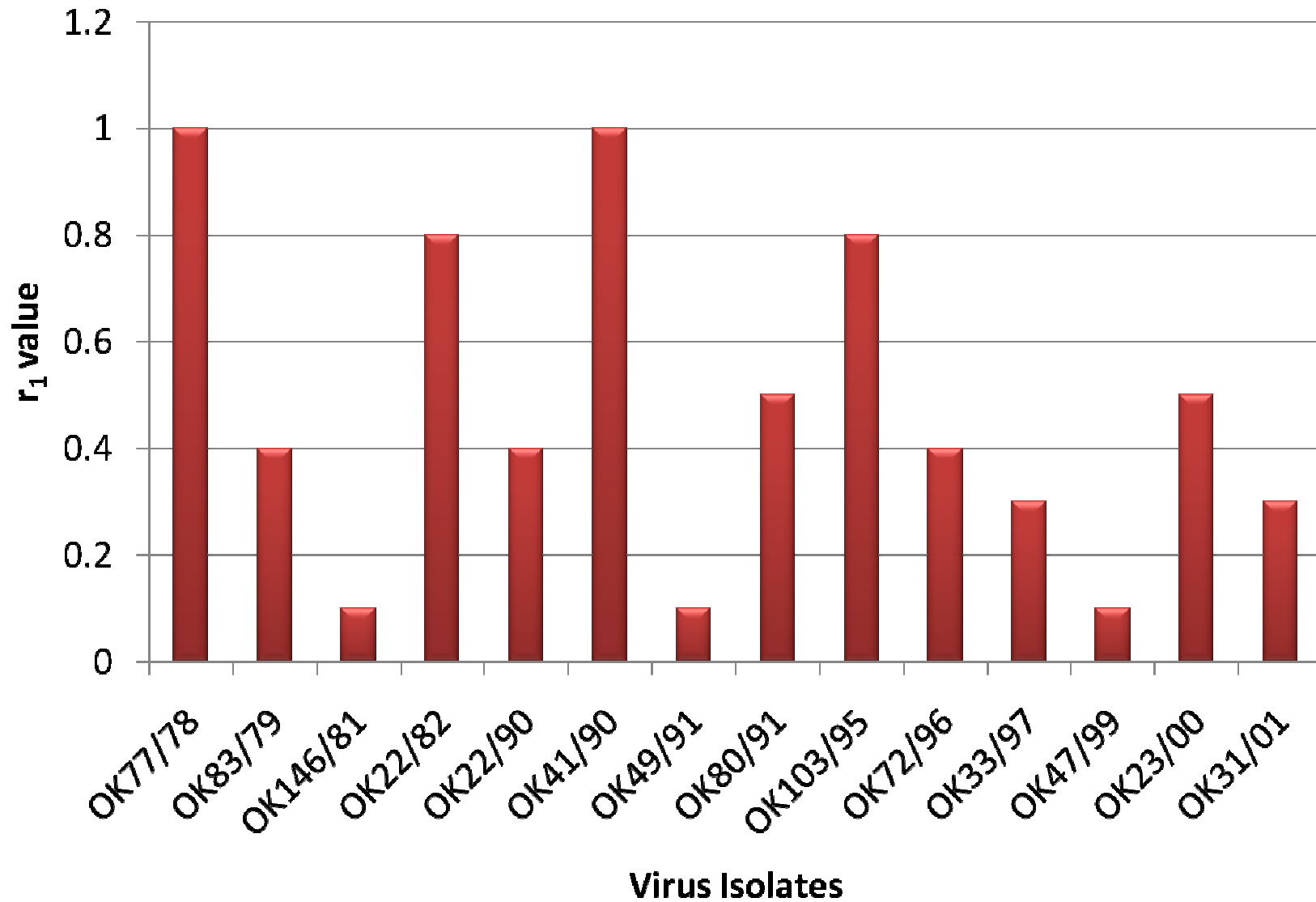
CHRONOLOGICAL CHANGES IN KENYAN TYPE A VACCINE
VIRUSES

SEROTYPE	STRAIN DESIGNATION	YEAR OF ISOLATION	DATE INCORPORATED IN VACCINE
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A	AK 18/66	1966	1967
	AK 179/71	1971	1972
	AK 5/80	1980	1982
	AK 35/80	1980	1982



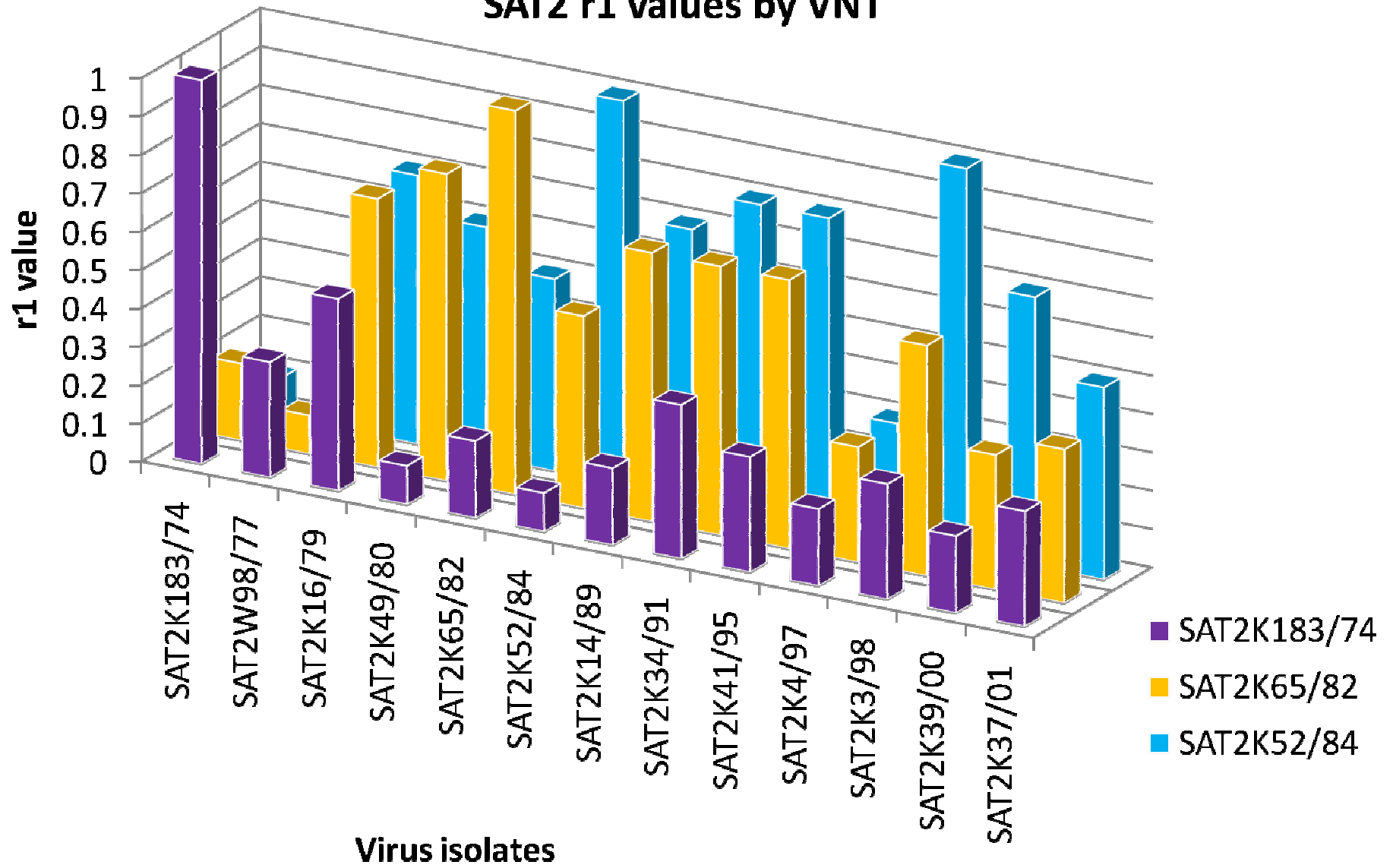
Type O r_1 values by VNT – OK77/78 serum



CHRONOLOGICAL CHANGES IN KENYAN TYPE O VACCINE
VIRUSES

SEROTYPE	STRAIN DESIGNATION	YEAR OF ISOLATION	DATE INCORPORATED IN VACCINE
O	OK 120/64	1964	1965
	OK 83/79	1979	1980
	OK 77/78	1978	1981
	OK 82/98	2000	2000

SAT2 r1 values by VNT



CHRONOLOGICAL CHANGES IN KENYAN SAT2 VACCINE VIRUSES

SEROTYPE	STRAIN DESIGNATION	YEAR OF ISOLATION	DATE INCORPORATED IN VACCINE
SAT2	SAT2 KEN3/57	1957	1969
	SAT2 TAN5/68	1968	1970
	SAT2 K183/74	1974	1976
	SAT2 R1215	1976	1980
	SAT2 K183/74	1974	1981 (Second time)
	SAT2 K65/82	1982	1983
	SAT2 K52/84	1984	1994

Challenges

- Vaccination
 - Not very effective
 - Low coverage
 - Mono/Bi/Tri/quadrivalent inactivated vaccines (O/A/C/S1/S2)
 - Only cattle vaccinated
 - Vaccine performance monitoring

FMD Vaccine used in 2010 countrywide

FMDV SEROTYPE	STRAIN DESIGNATION	Doses Used (2010)
A	AK 5/80	303,000 (Bi/Tri/Quadri – A/O/S1/S2)
O	OK77/78	918,000 (Bi/Tri/Quadri – O/A/S1/S2)
SAT1	SAT1 T155/71	755,000 (Mono/Tri/Quadri – S1/O/A/S2)
SAT2	SAT2 K52/84	841,000 (Tri/Quadri – O/A/S1/S2)

FMD susceptible livestock population (2009 census)

	Cattle	Sheep	Goats	Pigs
KENYA	17,467,774	17,129,606	27,740,153	334,689

Challenges

- Lab capacity
 - Very low funding
 - Inadequate Research & networks

Way forward

- We welcome
 - Research collaboration and networks
 - Diagnostics
 - epidemiology
 - Vaccine performance improvement
 - Other FMD research

Acknowledgement

☐ GFRA

☐ Embakasi lab team/KEVEVAPI

