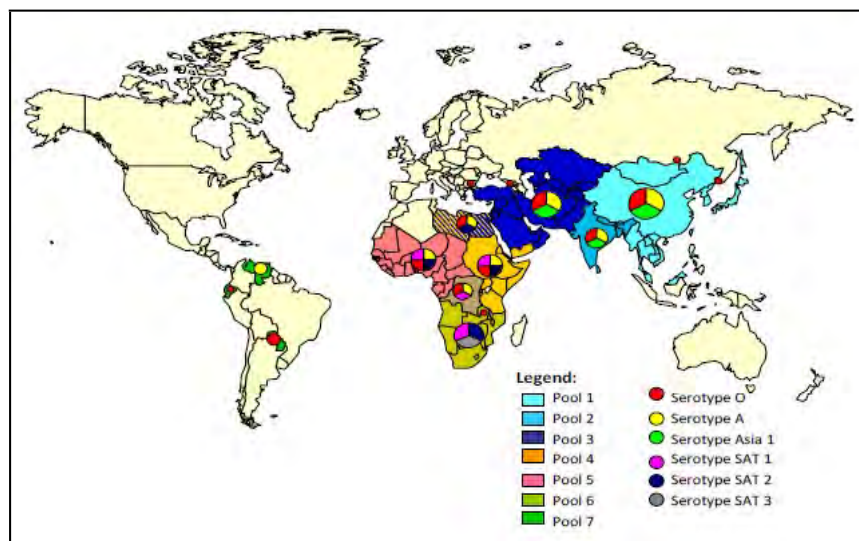


Unique features of foot and mouth disease in Southern Africa

Gavin Thomson

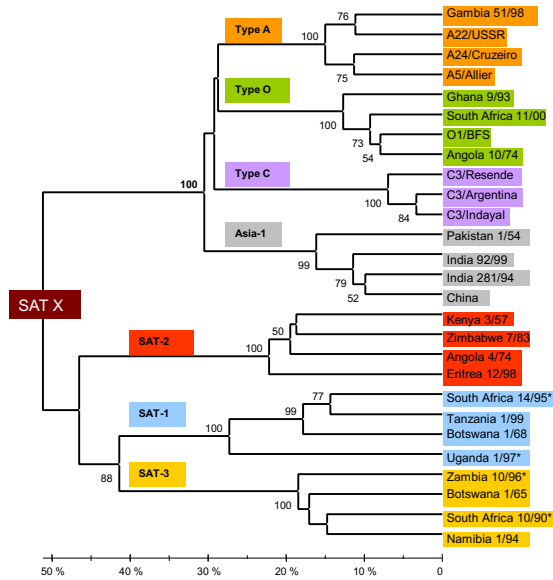
Commodity-based trade and enhanced market access: The vital role of the Department of Veterinary Services

Gaborone; 6-7 February 2018



Approximate distribution of endemic FMD in the world today

FMD virus family tree based on molecular phylogeny



Eurasian types (O, A, C & Asia 1) – evolved over last 500 years in domestic livestock. These viruses are infections of livestock

So FMDV genus has two distinct lineages that separated about 500 years ago

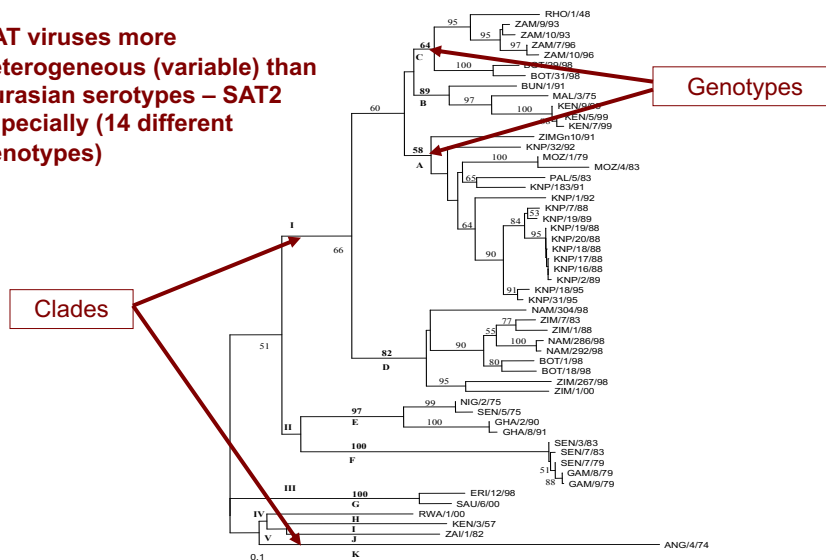


SAT X – Progenitor of all FMDV viruses; SAT types have co-evolved with African buffalo in sub-Saharan Africa buffalo for about 1000 years. SAT viruses are natural infections of buffalo

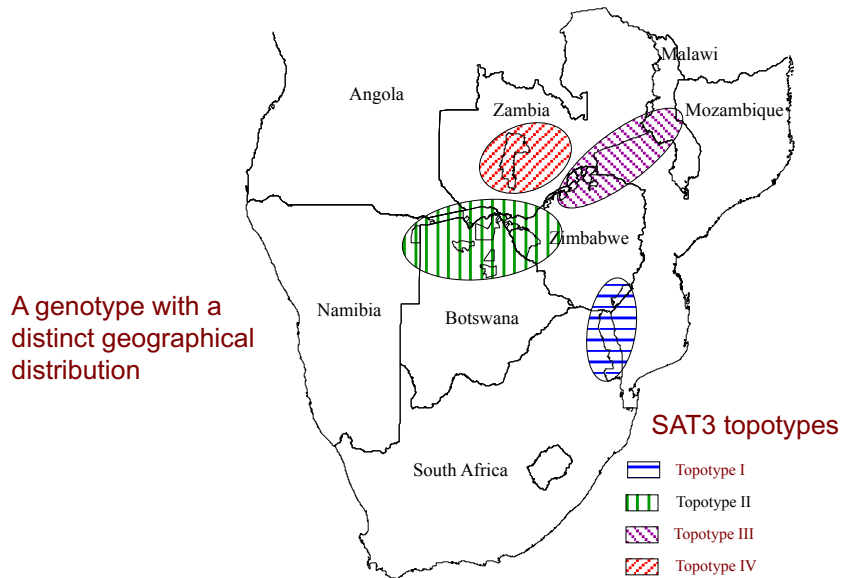
Acknowledgement: N J Knowles, Pirbright, UK

SAT 2 family tree

SAT viruses more heterogeneous (variable) than Eurasian serotypes – SAT2 especially (14 different genotypes)



The toptype issue



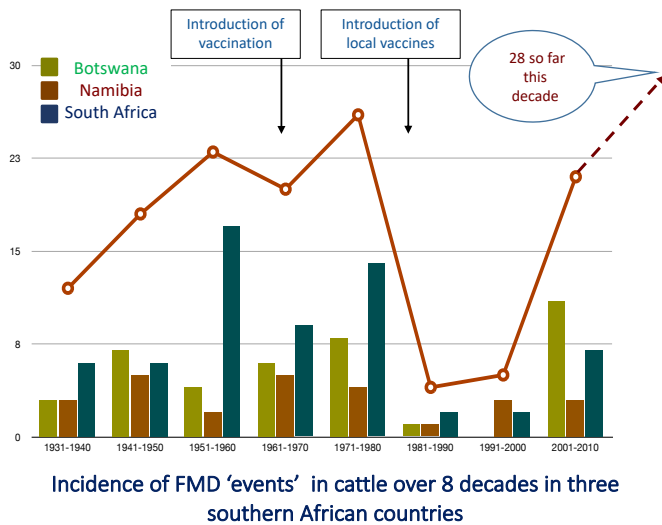
The fundamental conundrum

- Management of all diseases, whether plant or animal, only possible with good understanding of their epidemiologies and features of the infectious agent concerned
- The epidemiologies of SAT- & Eurasian type FMD differ significantly (Vosloo & Thomson, 2017)
- Unlike Eurasian serotype FMD in livestock, SAT viruses in locations where African buffalo occur, is not eradicable (Thomson, Fosgate & Penrith, 2017)
- Current international standards & recommendations for the control of FMD are based on Eurasian-type FMD
- Consequently, sub-Saharan Africa – where SAT-type FMD is endemic – is saddled with trying to fit square pegs into round holes!
- Nowhere else in the world has this problem, so we will have to come up with the solution!
- Management of SAT-type FMD has been a major problem in southern Africa, particularly over the last 17-18 years
- Clearly, things need to change

Major differences between the two lineages of FMD virus

Factor	SAT-type FMD viruses	Eurasian-type FMD viruses
Relationship with wildlife	Evolved in and maintained naturally by African buffalo populations	Evolved in livestock; not maintained by <u>any</u> wildlife population
Pathogenicity	Generally a mild or unapparent disease in both livestock & wildlife	Generally a serious disease in cattle, pigs & wildlife
Natural rate of transmission	Commonly slow and inefficient in endemic areas of southern Africa	Commonly rapid and efficient
Antigenic variation	<ul style="list-style-type: none"> • Vaccine efficacy compromised by exceptional antigenic diversity • Lack of clear subtypes → difficulty in matching vaccine and field viruses	<ul style="list-style-type: none"> • Less antigenic diversity • Favoured by existence of clear subtypes → enables effective 'matching' of field and vaccine viruses

Apparent deterioration of FMD control in Southern Africa



At face value, vaccination against FMD was excellent for 20 years but less so since 2000

However, this is a multifactorial issue; simple conclusions potentially dangerous

Conclusion

- SAT- & Eurasian-type FMD are two very different forms of the disease; they differ in their evolution, the way they behave in the field and also amenability to control by vaccination
- Despite the struggle against SAT-type FMD in southern Africa for >80 years, local realities still not widely understood (including by vets)
- This situation is complicated by international standards & recommendations being founded almost exclusively on Eurasian-type FMD
- We need to change this state of affairs, but the question is how?