



# Foot and mouth disease situation and control strategies in sub-Saharan Africa – the current situation

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# Introduction

- **FMD is widespread throughout Africa**
  - Endemic in many countries
  - Controlled in southern and northern countries
- **Attitudes to control differ based on various factors**
  - Access to export markets
  - Financial constraints and other priorities
  - Political will
  - Unrest
- **By 2010 Africa may account for nearly two-thirds of the undernourished people in the world (USDA study)**

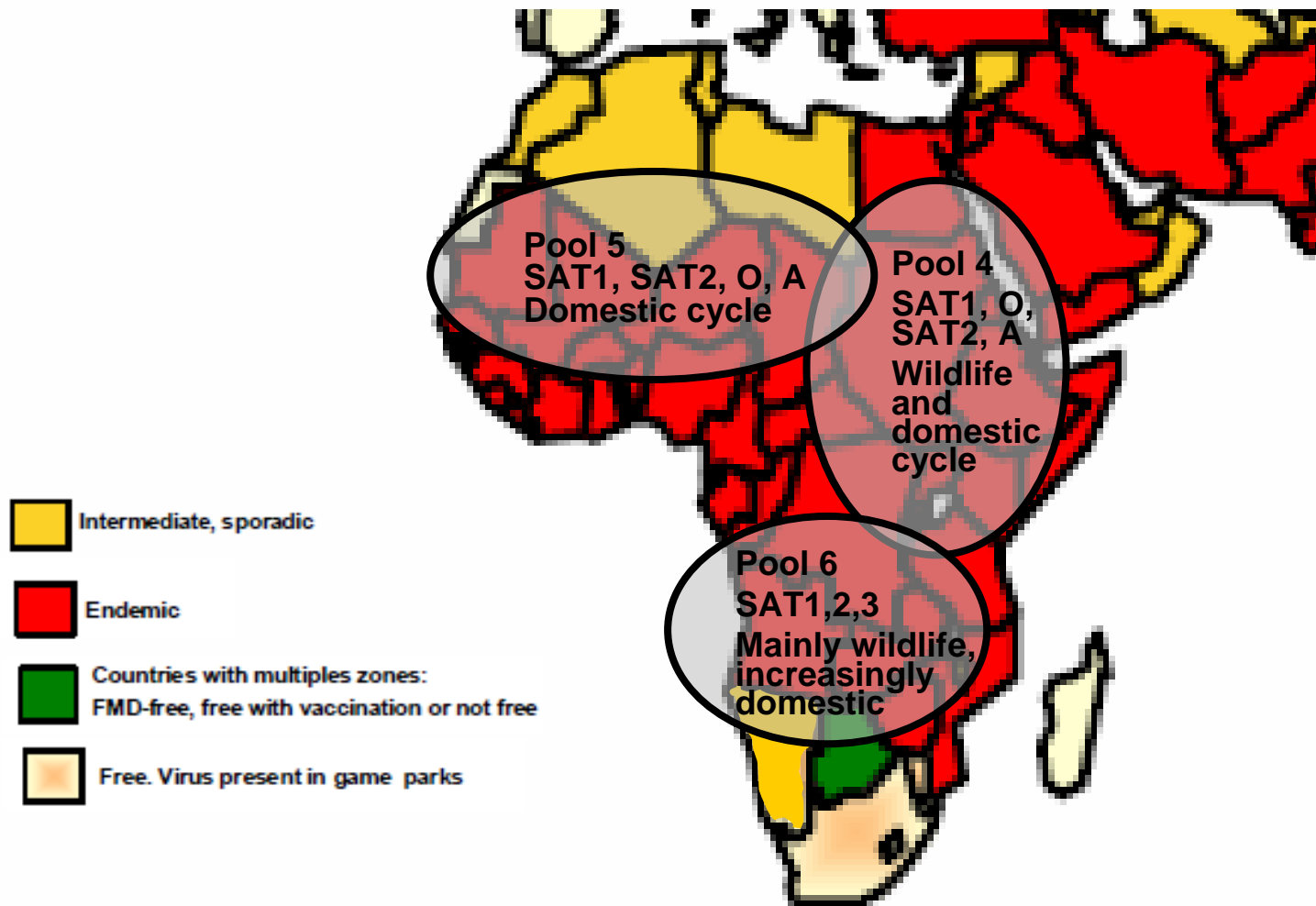


# Introduction

- **The 7 serotypes are defined due to lack of cross protection**
- **Based on epidemiology, Africa has its 'own FMDV'**
  - Unique SAT types
    - More genetic and antigenic variation
  - Wildlife maintenance hosts with apparent co-evolution
    - New genetic and antigenic FMDV variants are generated
  - Unclear role of other cloven-hoofed wildlife in spreading and maintaining the disease
  - Various epidemiological patterns
    - Involvement of wildlife
    - Primarily livestock involvement



# Summary of FMD status in Africa



# Outbreaks of FMD recorded since 2005

2005  
2006  
2007  
2008  
2009



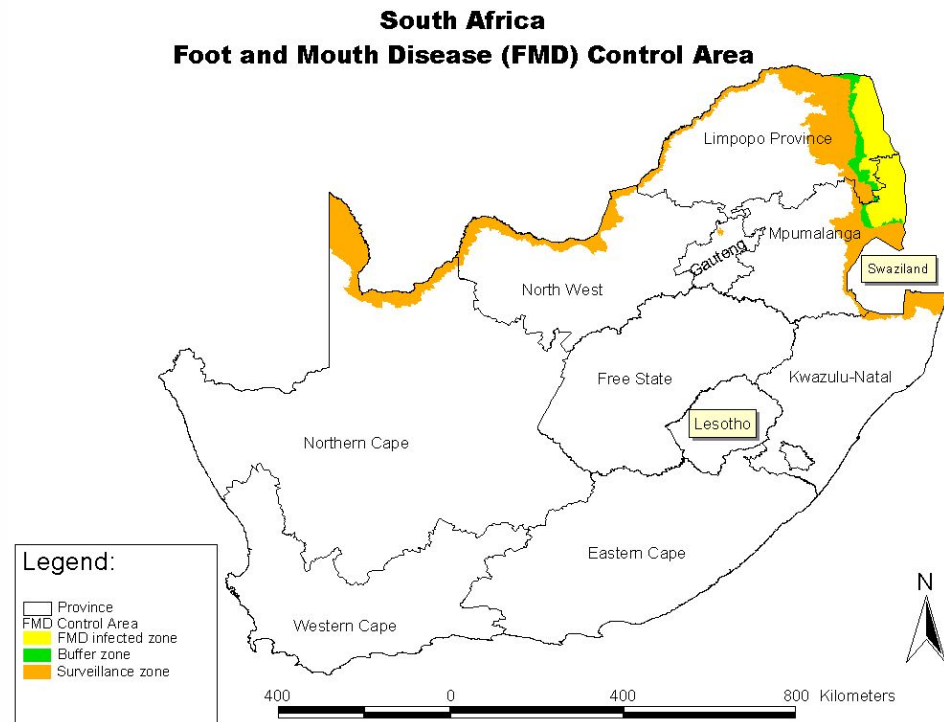
# Control actions in Africa

- **Endemic countries**
  - No actions
  - Limited vaccination
  - Limited movement control
- **Free countries**
  - Zoning
  - Vaccination (routine and emergency)
  - Movement control (permits, fencing)
  - Stamping out



# Evidence of increased number of FMD outbreaks

- Summary of outbreaks in South Africa since 2000
  - Previous outbreak in FMD-free region 1957 and in control zone 1983
  - Since 2000: 6 outbreaks in cattle
    - 2000 SAT-1 and O
    - 2001 SAT-2
    - 2003 SAT-2
    - 2004 SAT-2
    - 2006 SAT-3

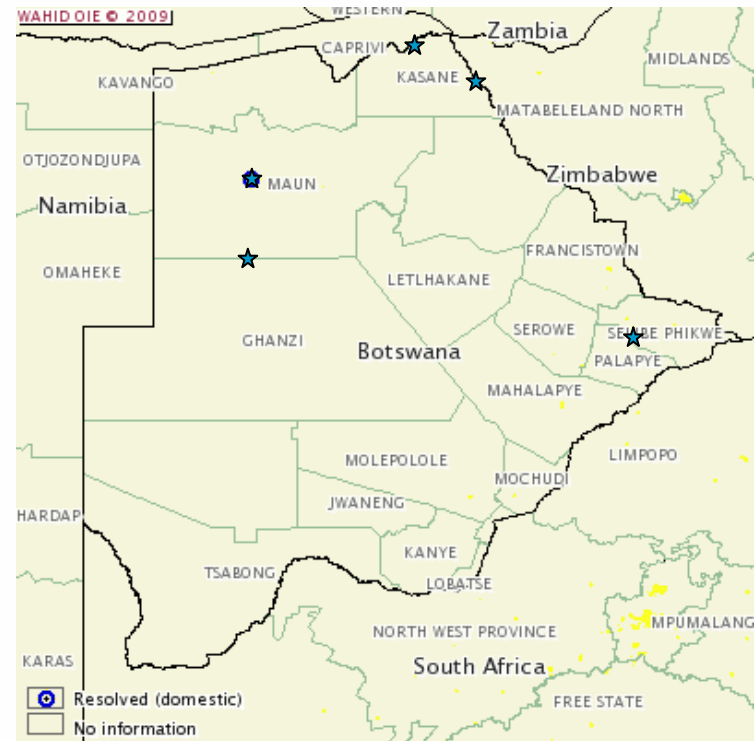


# Evidence of increased number of FMD outbreaks

- **Summary of outbreaks in Botswana**

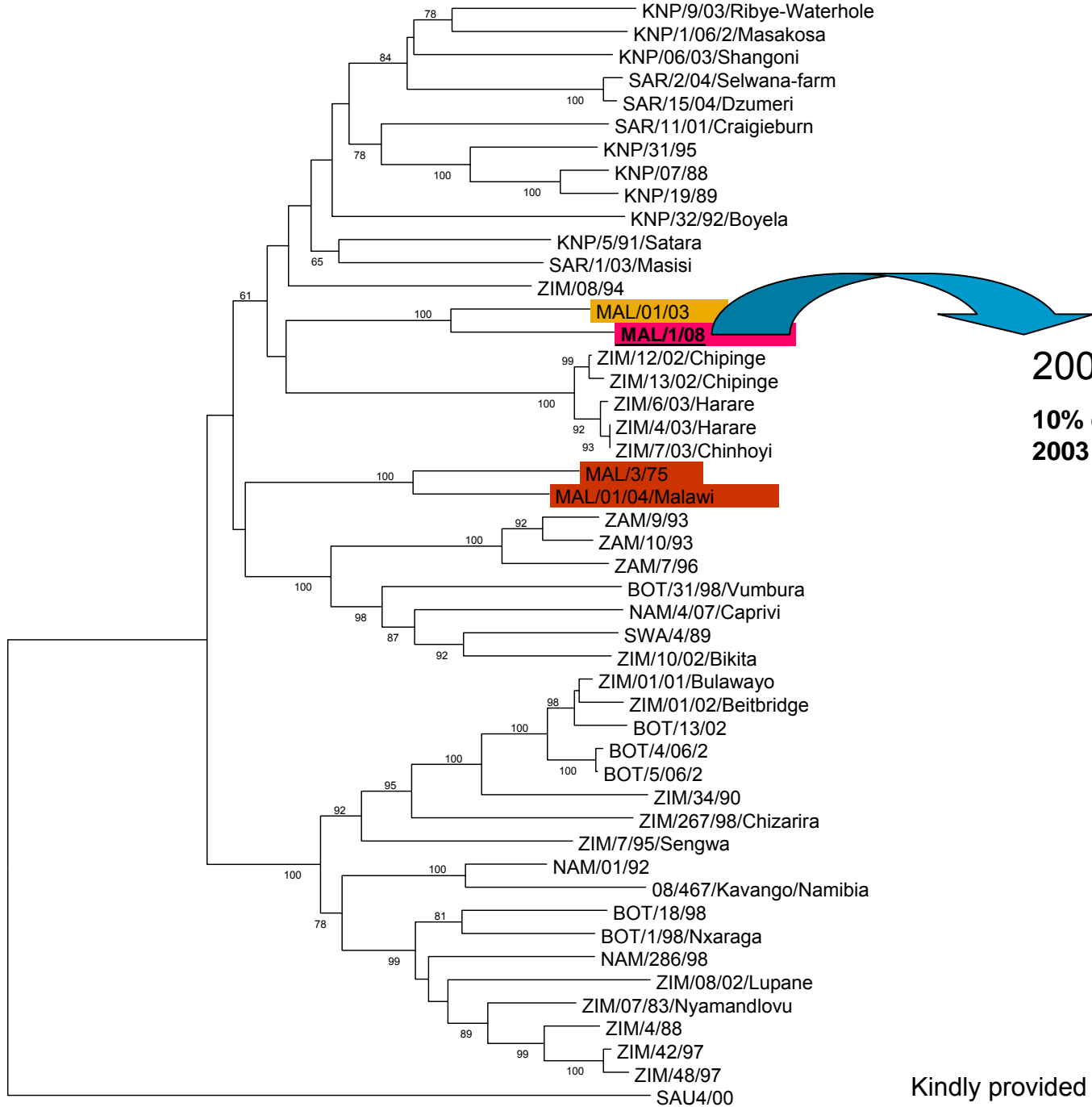
- 1948-1970 8 outbreaks
- 1977-1979 mixed SAT-1 and SAT-2 outbreaks
- 1980 SAT-2
- 2002 SAT-2
- 2003 SAT-1
- 2005 SAT-2
- 2007 SAT-2
- 2008 SAT-2

- **Recently a SAT-2 outbreak in Angola**





# Malawi SAT 2

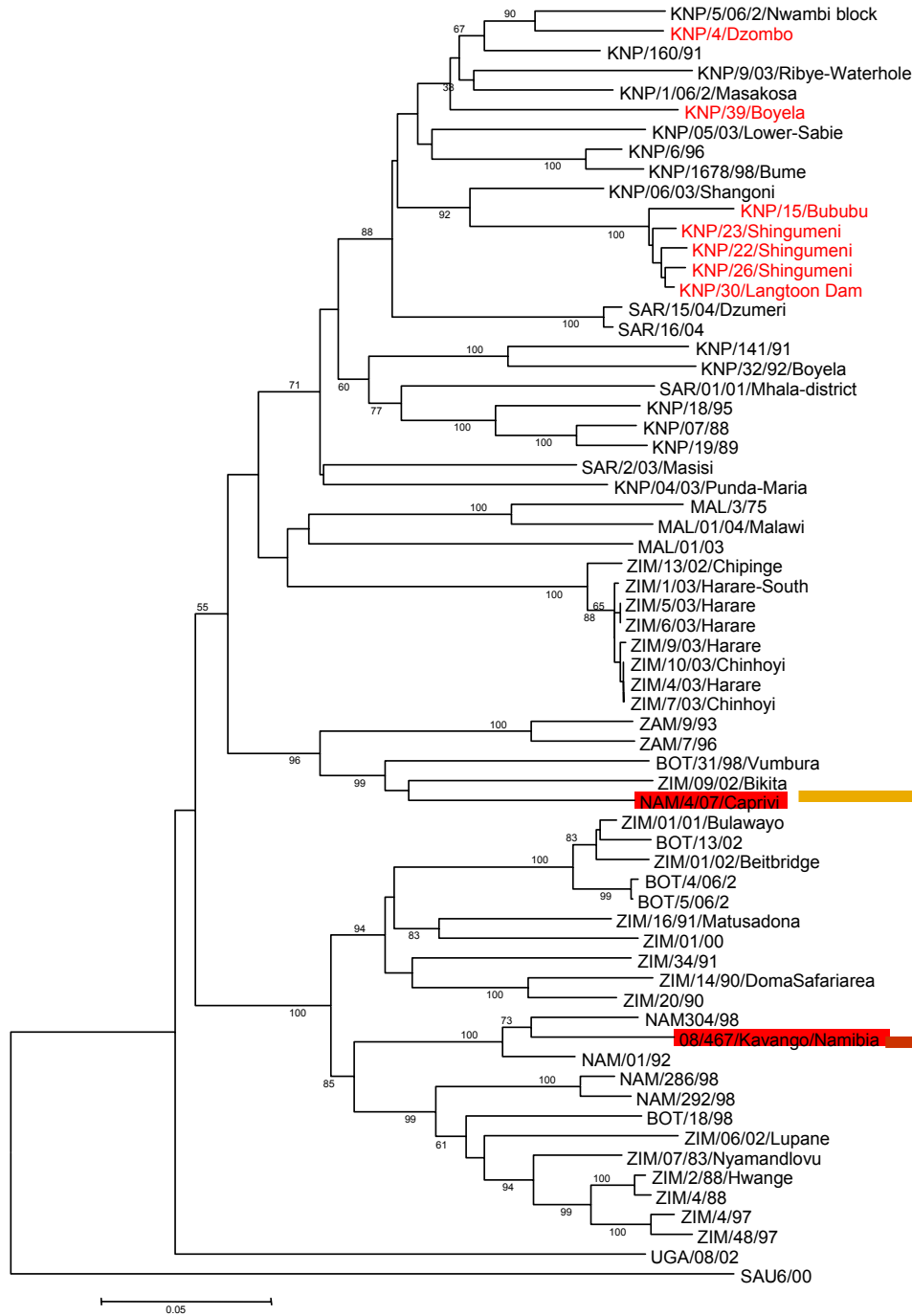


**2008 outbreak**  
**10% different from**  
**2003 strain**

Kindly provided by R. Dwarka, TADP, OVI

0.05

# Namibia SAT 2



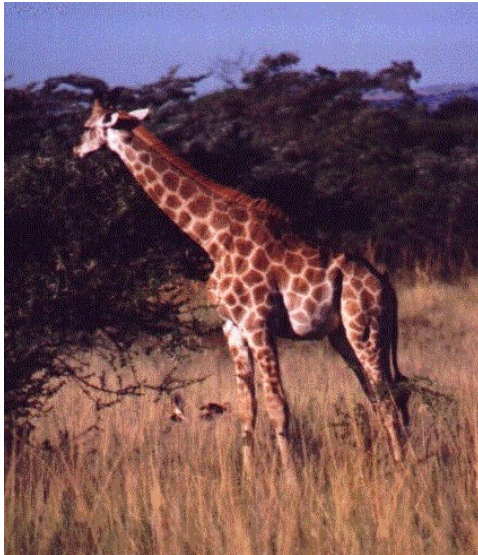
Dec 2007

28 % difference between outbreak strains

Aug 2008

Kindly provided by R. Dwarka, TADP, OVI

To control FMD in the face of increasing integration of land-use, we need to understand the behaviour of SAT viruses in domestic animals and wildlife and how FMD is transmitted from wildlife to livestock



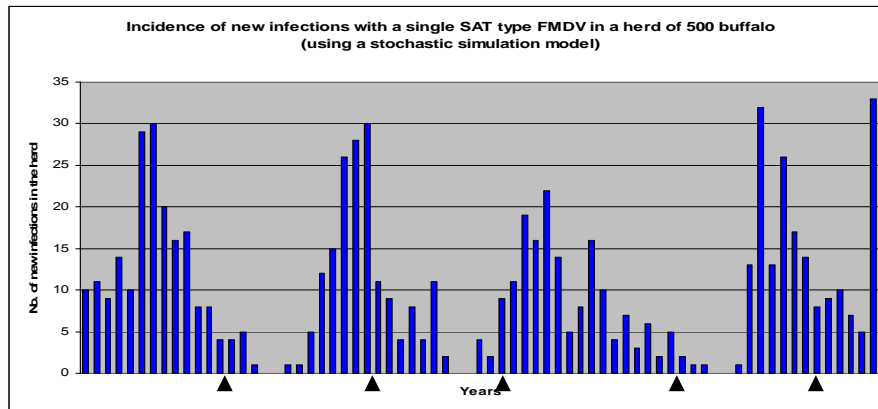
# Role of African buffalo in the epidemiology of FMD in southern Africa

- The 3 SAT serotypes are maintained by African buffalo (*Syncerus caffer*) that can be a source of infection for susceptible livestock in close proximity
- Buffalo can maintain FMDV for up to 5 years in a single animal
- FMD viruses change during persistent infection and may give rise to new antigenic variants



# Features of the interaction between buffalo and the SAT type viruses

- **Mode of transmission between buffalo and susceptible animals is not known, but there are 2 theories**
  - childhood infection in young calves
  - sexual transmission
- **Evidence of sexual transmission from persistently infected buffalo is tenuous**

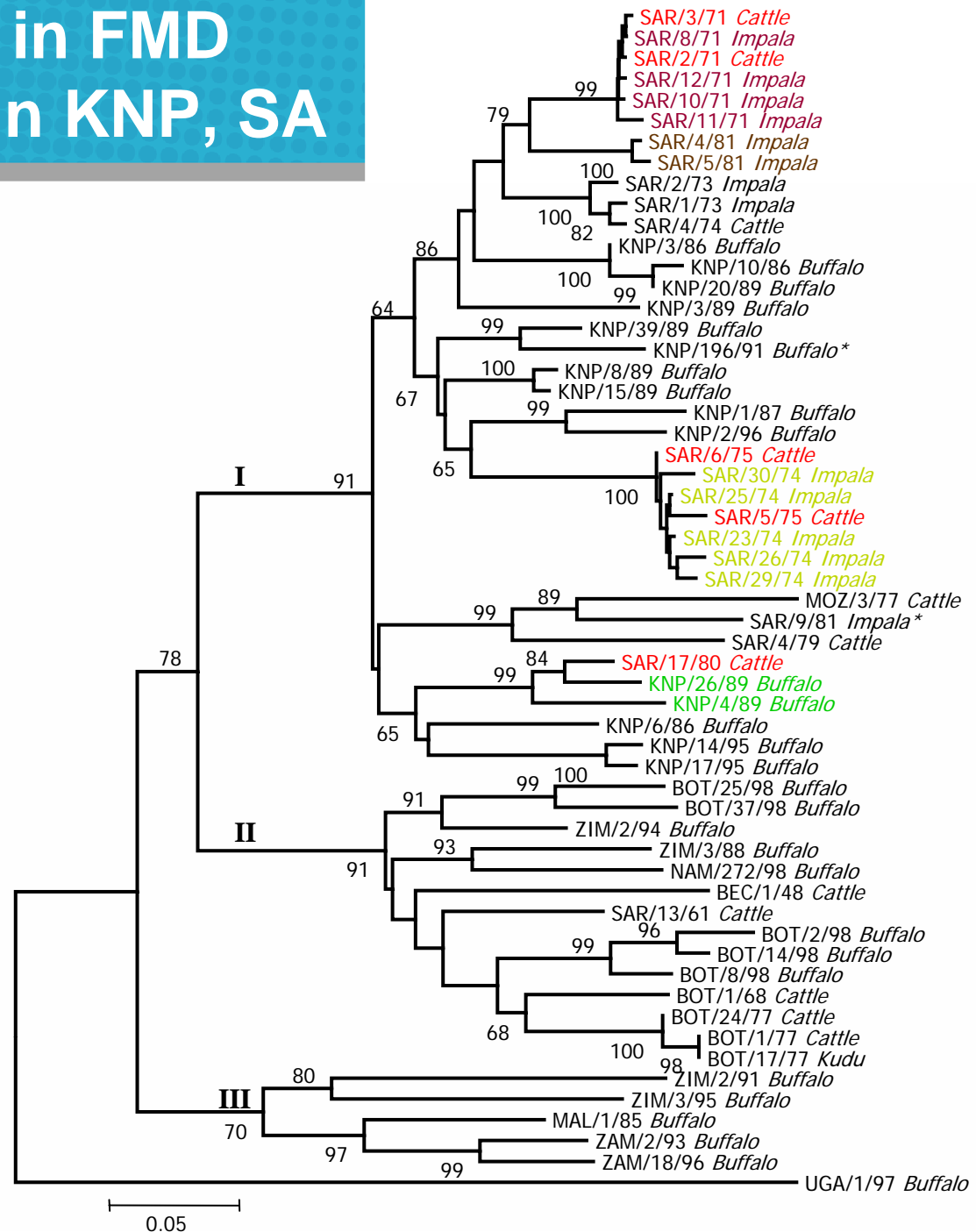


# Role of other wildlife species in FMD persistence and spread

Species/animal	Duration of viral persistence
<b><i>Domestic animals:</i></b>	
Cattle	2.5 to 3.5 years
Sheep	9-12 months
Goats	2-3 months
<b><i>Wildlife:</i></b>	
Wildebeest ( <i>Connochaetes taurinus</i> )	28 days
Sable ( <i>Hippotragus niger</i> )	28 days
Eland ( <i>Taurotragus oryx</i> )	32 days
Fallow deer ( <i>Dama dama</i> )	63 days
Kudu ( <i>Tragelaphus strepiceros</i> )	104-160 days
Water buffalo ( <i>Bubalis bubalis</i> )	2-24 months
African buffalo ( <i>Syncerus caffer</i> )	5 years

# Role of impala in FMD epidemiology in KNP, SA

- Outbreaks in impala are derived from buffalo herds
- Impala can be a source of infection to domestic animals
- Serological survey indicated sub-clinical infection



# Factors that impact on FMD prevalence in impala

- **Risk factors**

- Summer and autumn were highest risk factors for seropositivity, but clinical infection were mostly observed at the end of the dry season
- More females and adults were sero-positive

- **Animal and herd behaviour**

- Herds remain as relatively stable, discrete entities
- Although their home ranges may overlap to some extent, contact occurs most frequently at focal drinking points (if the herds occur away from perennial water) and not during grazing
- Impala are a sedentary species with small home ranges, and contact with other herds of impala on the rangeland is infrequent
- Breeding herds groom, male groups don't
- Disease spread relatively slowly in contrast with intensively farmed livestock



# Factors that impact on FMD prevalence in impala

- **Ecological factors**

- Suitable grazing
- Water points (rivers versus drinking points)

- **Impala:buffalo densities**

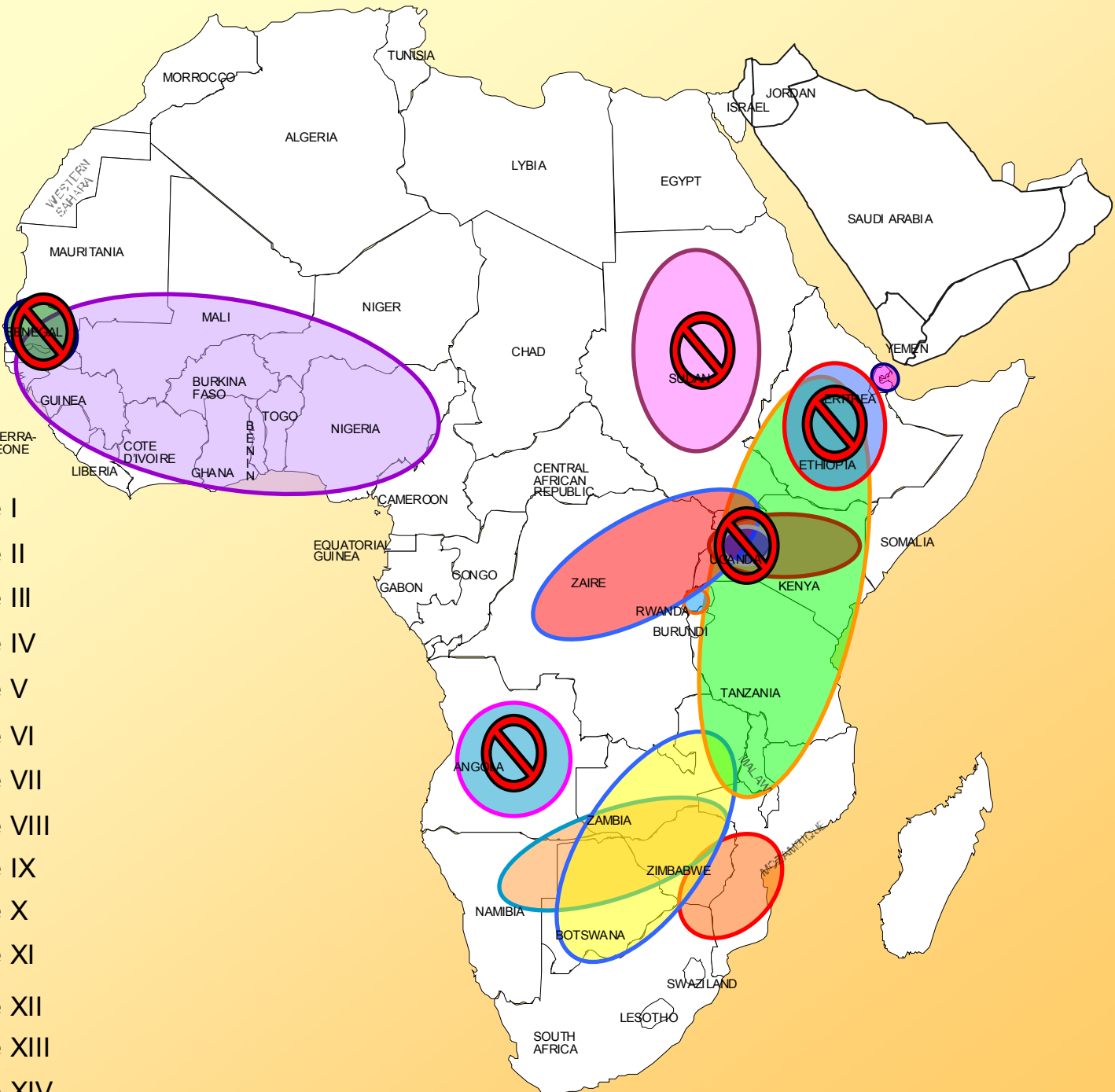
- > ratio the more likely contact would be
- Factors influencing contact will impact on transmission

- **Models would be needed for different ecological regions and for different wildlife species**



# Molecular epidemiology of FMD in Africa

- **For all serotypes occurring in Africa, geographically distinct genotypes / topotypes occur**
- **SAT-2 demonstrates the most genetic variation with numerous topotypes**
- **Viruses evolve in distinct genotypes when no animal movement occurs**
- **Phylogenetic relationships indicate movement between various regions of Africa**
- **The genetic and antigenic variation have implications for vaccination policies**

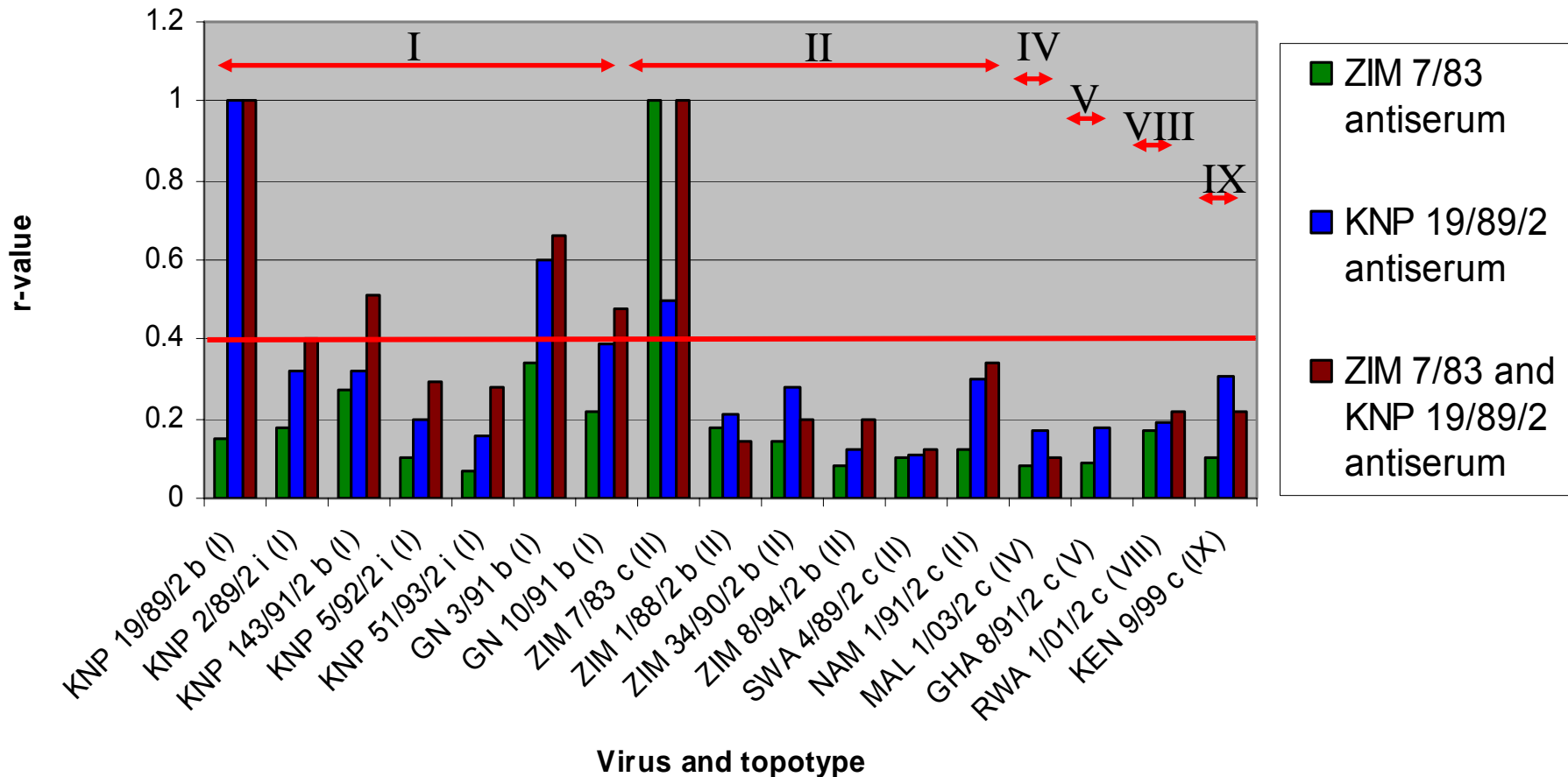


SAT-2:

- Topotype I
- Topotype II
- Topotype III
- Topotype IV
- Topotype V
- Topotype VI
- Topotype VII
- Topotype VIII
- Topotype IX
- Topotype X
- Topotype XI
- Topotype XII
- Topotype XIII
- Topotype XIV

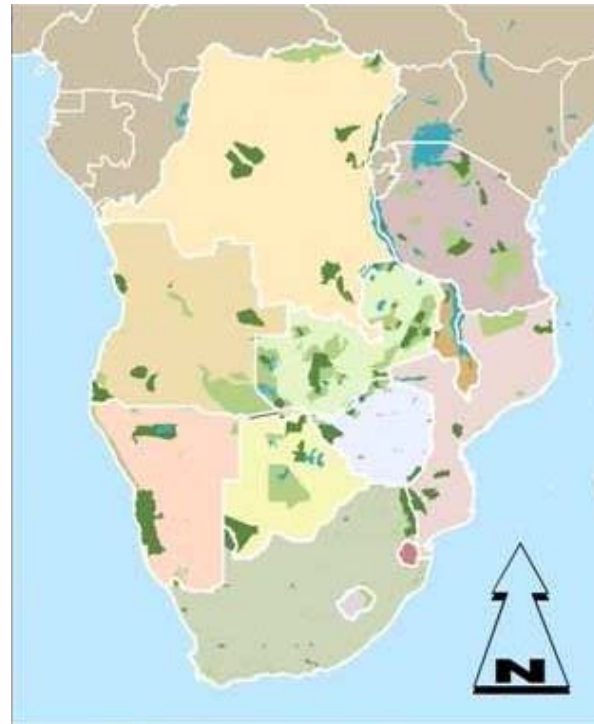
# Within and between topotype variation indicates the need for various vaccine strains

Chart to indicate the r-values of various SAT-2 isolates



# Potential impact on FMD control by Transfrontier Conservation Areas

- **The establishment of TFCAs**
  - Pressure to remove fences
  - Human encroachment into wildlife areas
  - Increased wildlife migration
  - Introduction of novel FMD virus topotypes and impact on vaccines



# Conclusions

- **Challenges for FMD control remain and are on the increase**
- **Regional collaboration is increasingly important**
- **Improved vaccines will be the mainstay for control**
  - Vaccination of wildlife species
- **Other options to improve exports should be investigated**
  - Commodity based trade
  - Certification schemes
- **Epidemiology of FMD in wildlife species need in depth investigation**
- **Role of small stock should be clarified**

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