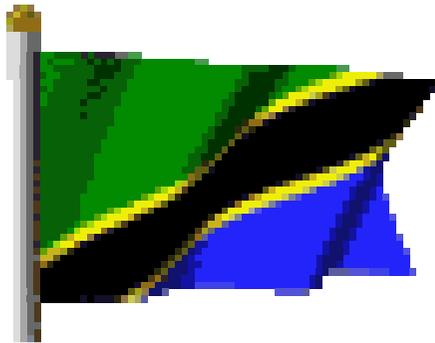


# Surveillance of foot-and-mouth disease virus in different ecosystems of wildlife in Tanzania: achievements and challenges



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# Background on FMD research initiative in Tanzania

- **December 2009:** BBSRC-CIDLID projects awarded (two projects [Cleaveland and Parida])
- **January 2010:** Kick-off meeting of SACIDS project [Rweyemamu et al] in Arusha
- **2010:** Commencement of SADC FMD project in Southern Africa.
- *Critical mass* of research capability for FMD in Tanzania and neighbouring countries
- Many common goals
- Sharing of research resources
- Open communication

# Research program partners

- **Tanzania: (4 main players)**
  - – *Central Veterinary Laboratory (CVL)*
  - – *Sokoine University of Agriculture (SUA)*
  - – *Tanzania Wildlife Research Institute (TAWIRI)*
  - – *National Epidemiology Unit (NEU)*
- **Zambia:**
  - – *University of Zambia (UNZA)*
  - – *Central Veterinary Research Institute (CVRI)*
- **SADC Secretariat: SADC-TADs Regional Project**
- **Republic of South Africa: ARC-Onderstepoort Veterinary Institute (OVI)**
- **Botswana: Botswana Vaccine Institute (BVI)**
- **United Kingdom:**
  - – *Royal Veterinary College, London*
  - – *University of Glasgow*
  - – *World Reference Laboratory for FMD, Pirbright (IAH)*
  - – *University of Edinburgh (Professor Brian Perry)*
- **India: Indian Immunologicals Ltd.**
- **Uganda: Ministry of Agriculture?**

# Principal Objectives

- **FMD dynamics in an endemic region**
  - Spatio-temp distribution
  - Molecular Epidemiology
  - Wildlife/Livestock interactions
  - Correlates of cross-protection
  - Generation of Antigenic diversity
  - Determine the role of carriers
- **Generation of models describing FMD endemicity**
  - Establish the risk factors
  - In-silico testing of improved local and national control strategies
  - Develop Field tools
- **Capacity building/ national strategy**
  - Tailored vaccines
  - Diagnostic Capability
  - Research skills
  - Evidence base for control strategies

# Wildlife Conservation in Tanzania

- Tanzania has the highest wildlife population in Africa
- Tz is a third country in Africa for cattle population (16 million) after Ethiopia and Sudan
- Tanzania has reserved 40% of its land cover for conservation purposes (including NPs, GRs, NCA, GCAs, FRs & WMA)
- Long international boundary=3861km (bordering 8 countries).



# Estimated size of Protected Areas

- National Parks (15 NPs)=50,000km<sup>2</sup>
- Ngorongoro Conservation Area (NCA)  
=8,300km<sup>2</sup>
- Game Reserves (31 GRs) =>142,000km<sup>2</sup>
- Game Controlled Areas (38 GCA) =>75,000km<sup>2</sup>
- Selous Niassa Wildlife Corridor (SNWC)=  
>5,000km<sup>2</sup>
- Forest Reserves (FRs)=>89700km<sup>2</sup>
- Wildlife Management Areas (16 WMAs) =?



# Buffalo population in different PAs (2009-2011 Censuses)

- Selous-Mikumi ecosystem • 108,830
- Serengeti ecosystem • 66,284
- Manyara-Tarangire ecosystem • 15,678
- Ugalla GR • 2,167
- Wamimbiki WMA • 618
- Saadani np • 276
- Ruaha-Rungwa ecosystem • 17,514
- Moyowosi-Kigosi ecosystem • 16,663
- Katavi-Rukwa ecosystem • 10,717
- Burigi-Biharamulo GRs • 1790
- Mkomazi np\* • 175

# Prevalence of FMD virus in Tanzania

- Historically Tz was believed to have serotypes A, O, SAT1 & 2.
- In 2002 sero-survey in buffalo in SNP revealed SAT1,2 & 3
- Detection or isolation of the virus has never been performed
- Mapping of the distribution of serotypes has never been performed
- Livestock vaccination is not based on known circulating serotypes

# **FMD virus surveillance in wildlife in Tanzania**

- Systematic surveillance has not been done previously in wildlife
- Currently, FMD Surveillance in buffalo is conducted by SADC-TADs and BBSRC-CIDLID projects
- SADC-TADs is prioritizing on PAs close to international borders
- BBSRC-CIDLID is focussing in northern zone of Tz (SE, Manyara-Tarangire ecosystem, Arusha-Kilimanjaro ecosystem)

# Achievements: SADC-TADs FMD Surveillance project

- **Katavi National Park**
  - 31 buffaloes-2010
- **Ruaha np**
  - 30 buffaloes-2011
- **Mikumi np**
  - 30 buffaloes-2011
- **Mkomazi np**
  - 30 buffaloes-2011
- **Samples from Ruaha, Mikumi and Mkomazi NP have not been analysed**



# Results of FMD surveillance in buffaloes in Katavi np-2010 (SADC-TADs); Source: DVS

Type of sample	No. of samples	Serotypes	No. of samples tested positive	% positivity	Remarks
<b>Sera</b>	<b>31</b>	<b>Type 0</b>	<b>0</b>	<b>0%</b>	<b>Indicating exposure to FMD virus</b>
		<b>SAT1</b>	<b>28</b>	<b>90.3%</b>	
		<b>SAT2</b>	<b>28</b>	<b>90.3%</b>	
		<b>SAT3</b>	<b>30</b>	<b>96.8%</b>	
<b>Probangs</b>	<b>30</b>	<b>Type0</b>	<b>0</b>	<b>0%</b>	<b>Indicating active infection</b>
		<b>SAT1</b>	<b>4</b>	<b>13.3%</b>	
		<b>SAT2</b>	<b>0</b>	<b>0%</b>	
		<b>SAT3</b>	<b>0</b>	<b>0%</b>	

# Some fundamental facts on FMD

- Buffalo is increminated as the 'witch, bad guy or a villain' when it comes to FMD in many countries.
- We have no concrete evidence in Tanzania to conclude that outbreaks that occur in livestock are associated with wildlife.
- Therefore, more work is required to establish whether the outbreaks in cattle are derived from a buffalo/wildlife source.
- We have seen outbreaks of FMD in livestock in areas where there is no wildlife per se; an indication that livestock movement might be an important factor in the spread of FMD.

# Achievements: BBSRC-CIDLID FMD Surveillance Project

- **Serengeti NP**
  - 35 buffaloes-2011
- **Ngorongoro Crater**
  - 125 buffaloes-2011/12
- **Tarangire np**
  - 25 buffaloes-2011
- **Arusha np**
  - 25 buffaloes-2012

Analyses of all samples is in progress

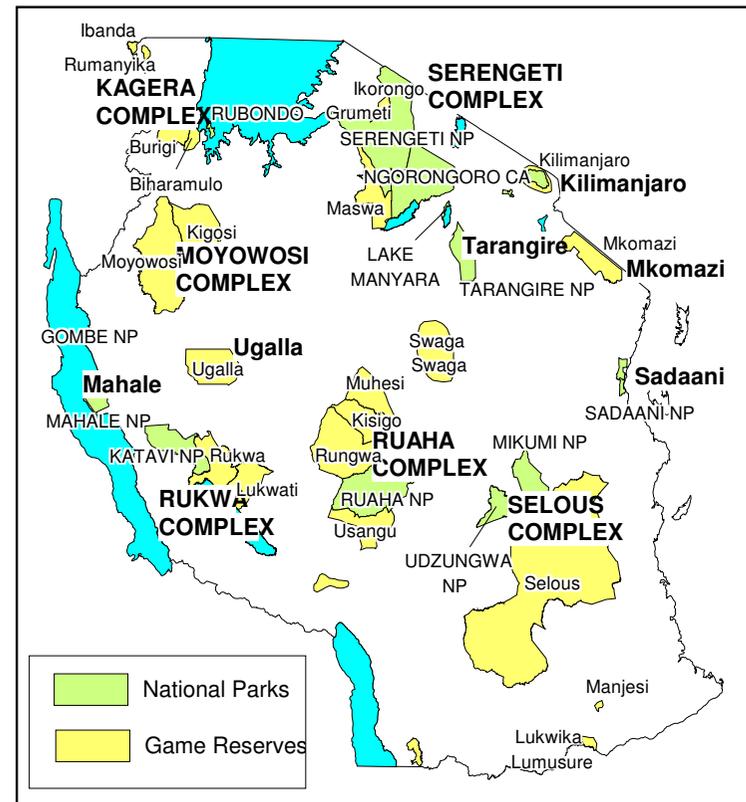


# Challenges

- Large wildlife populations in free ranging systems (no fences)
- Extensive protected areas (40% of land cover) and remoteness of many of the protected areas
- Few trained wildlife vets to undertake surveillance in wildlife
- Lack of equipment and finance to deploy several surveillance teams
- Many buffaloes are in Game Reserves where trophy hunting is practised. Therefore, difficult to immobilize without a helicopter.
- Seasonal migration of wildlife spp.

# Future sampling plan

- Moyowosi ecosystem (Moyowosi; Kigosi; Ugalla GRs)
- Burigi-Biharamulo GRs
- Selous GR (incl. S-Niassa Corridor)
- Longitudinal sampling in PAs where there is outbreak in livestock



# CONCLUSIONS

- There is a very high exposure of buffaloes to FMD virus as shown in preliminary result from Katavi national park.
- There is still paucity of information in Tanzania on the spatial and temporal distribution of various serotypes and topotypes in buffalo populations.
- Currently the relationship between viruses recovered from cattle outbreaks with those maintained by buffalo populations in different ecosystems is not known.
- There is a need for more systematic surveillance, capacity building at all levels (incl.regional, national, inter-sectoral); and cross sectoral collaboration on FMD research.

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