The Impact of wildlife in the epidemiology of RVF

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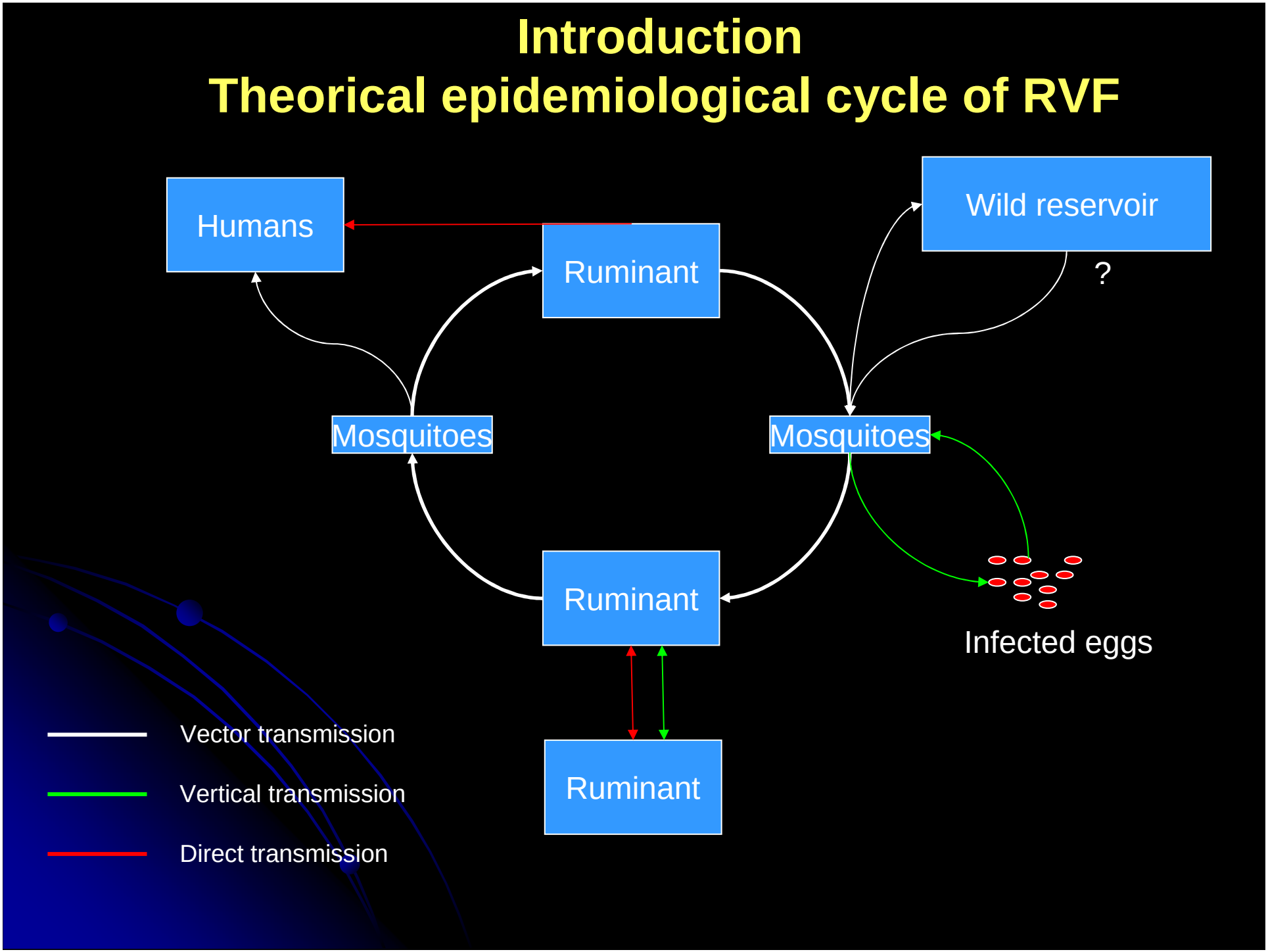
Introduction
Theorical epidemiological cycle of RVF



What is a reservoir ?

- Many different and often contradictory definitions (Haydon et.al, EID, 2002)
  - Pathogenic (WN and birds in US) / non pathogenic (WN and birds in EU)
  - 1 host (badger and M. Bovis in UK) / multi-host system (dog+jackal and rabie in Zim)
- Indicators to identify reservoirs
  - Evidence of associations
  - Quantitative data on risk factors: case control studies
  - Identifying natural infection : antibodies, virus
  - Experimental inoculation
  - Persistence of the virus in the reservoir population = longitudinal studies

Litterature review
Rodents

- Inoculation on *Apodemus sylvaticus, Microtus agrestis, Muscardinus avellanarius* (Daubney, 1931) => suspected of being reservoir
- Heavy mortality in *Arvicanthis abyssinicus* and *Rattus rattus* in an infected farm (Kenya, 1932)
- Wild field rat, *Arvicanthis Abyssinicus,* able to be infected by RVFV, developed viraemia without succumbing to the infection (Weinbren , Uganda, 1957),

Rodents : serological evidence

Ref year	Species	Location	Method	Confirmation test	%
1978	*A.Niloticus* *A.Cahirinus* ***Rattus rattus***	Egypt	HI	No	21.5 8.2 3.1
1982	*Gerbillus sp* *Meriones crassus*	Egypt	HI	PRN	19 5
1983	*Mastomys*	RCA	IFI	TDRP	3.6
1987	*Mastomys erythroleucus*	Senegal Mauritania	IFI	No	0.75 (n= 57)
1997	*Aethomys namaquensis*	South Africa	ELISA	NT	15 (n=312)
2000	***Rattus rattus*** *Mastomys huberti* *A.Niloticus* *M. erythroleucus*	Senegal	NT	ID	50 13;5 4;3 2;4
2001	***Rattus rattus***	Egypt	ELISA	No	29.3 (n= 300)

Rodents : virological evidence

Year	Location	Species	Test	% positive
1979 *	Egypt	*Rattus Rattus*	CF	12.5 (n=8)
2001**	Egypt	*Rattus Rattus*	RT-PCR	9.6 (n=300)

- Imam et al, 1979
- ** Youssef and Donia, 2001

Other species

- Antibodies in wild ruminants in Zimbabwe (IHA confirmed by ELISA)
  - African buffaloes (*Syncerus caffer*) 6.2% (n=541)
  - Waterbuck (*Kobus ellipsiprymnus*) 4.5% (n=179)
  - White rhino (*Ceratotherium simum*) 8.3% (n=84)
  - Black rhino (*Diceros bicornis*) 16% (n=110)
- Antibodies in African buffaloes in Kenya (1998) (Davis, 1975)
- Viraemia after experimental inoculation:
  - African buffaloes (*Syncerus caffer*) (Kenya, Daubney 1932) (Davies, 1981)
- Abortions in South Africa (Joubert, 1951)
  - Springboks (*Antidorcas marsupialis*)
  - Damaliscus (*Damaliscus albifrons*)
- Presence of antibodies in hippopotami and elephant, and abortions in springbok and blesbok during epidemics. (Bengis and Erasmus (1988)

Other species

- Bats
  - Two viral strains isolated from *Micropteropus pusillus* and *Hipposideros abae,* with positive serological test on humans and ruminants (, Boiro *et al.* (1987)) , Guinea
  - Isolation from organ pools of *Micropteropus pusillus*, *Miniopterus schreibersi*, and *Hipposideros caffer* (Konstantnov *et al.* (2006)), Guinea
- Monkeys
  - Serosurvey on 333 baboons Kenya (Davies et al, 1971)
  - Experimental inoculation => viraemia and antibodies)(Nilklasson et al, 1983)
- African carnivores species
- Warthog

Geographical distribution and persistence mechanisms

Enzootic circulation and/ or outbreaks

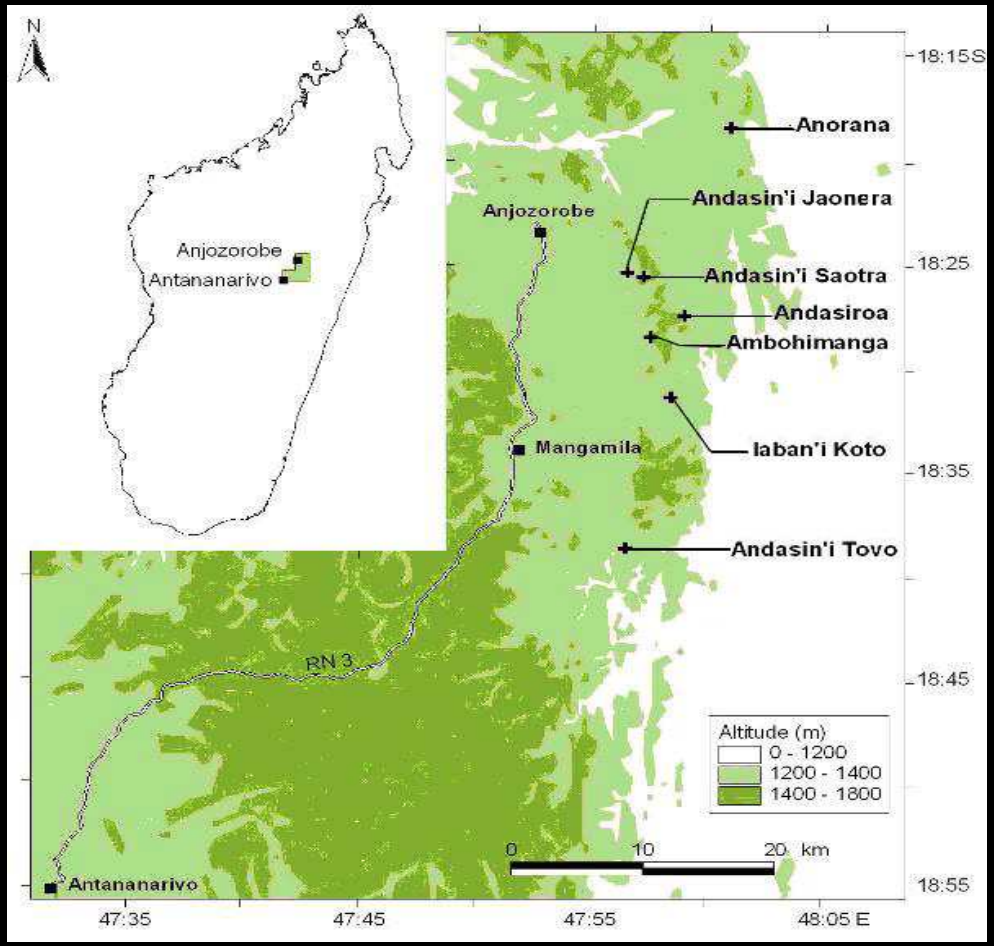
Sporadic cases and/or viral isolations and/or infection serological evidence

Research perspectives

- Contact between livestock and wildlife
  - RIFT-OI Madagascar
  - RP-PCP Zimbabwe
- Experimental infections
  - Viraemia level
  - Viraemia duration
- Mosquito feeding behaviour

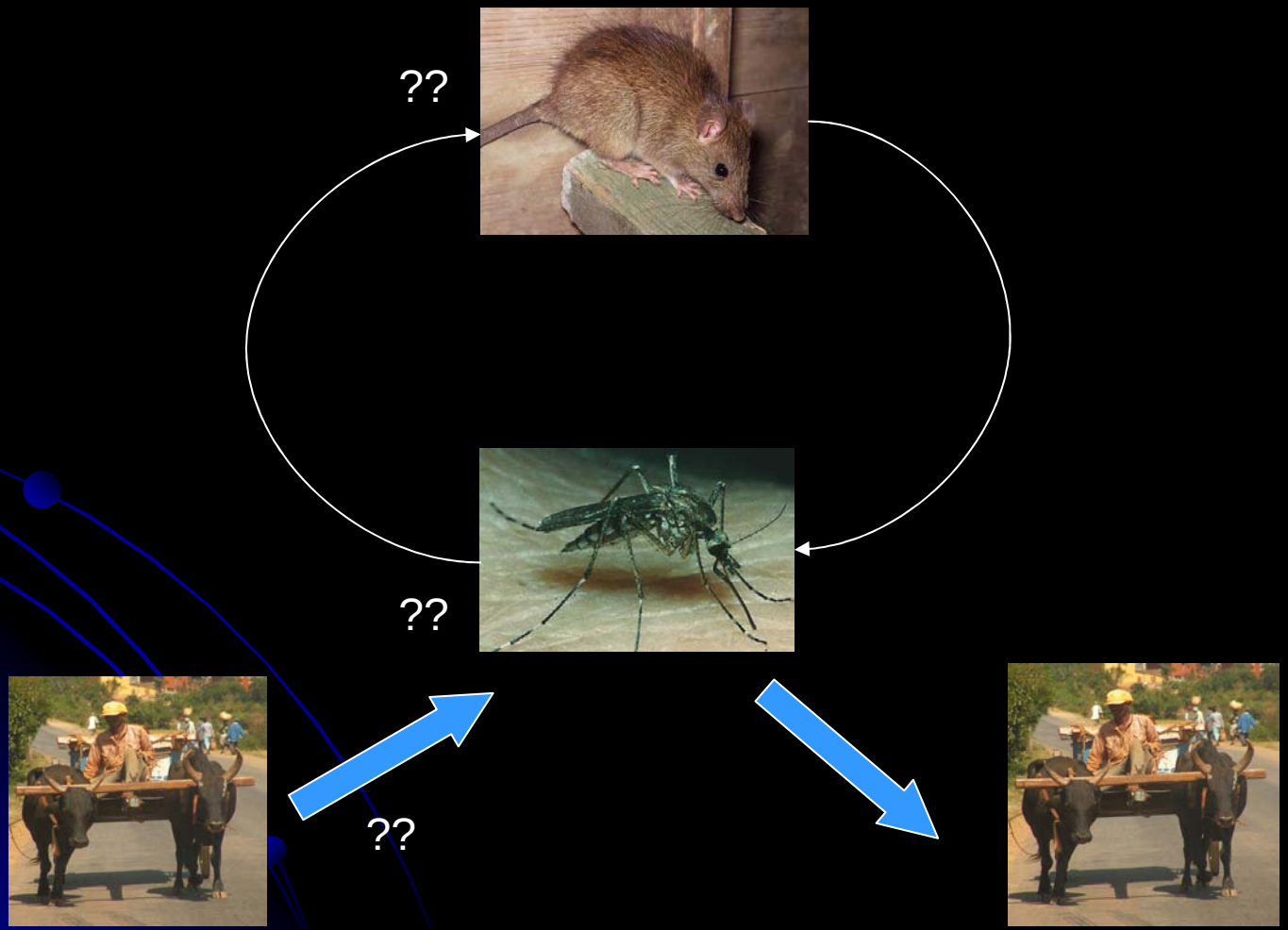
RIFT-OI project

- Estimation of the incidence on livestock and risk factors
- Identification of potential vectors and population dynamic
- Identification of potential reservoir and population dynamic



Expected results

- Assumptions on the Anjozorobe ecosystem functioning



Methodology

Pitfall traps

Sherman traps

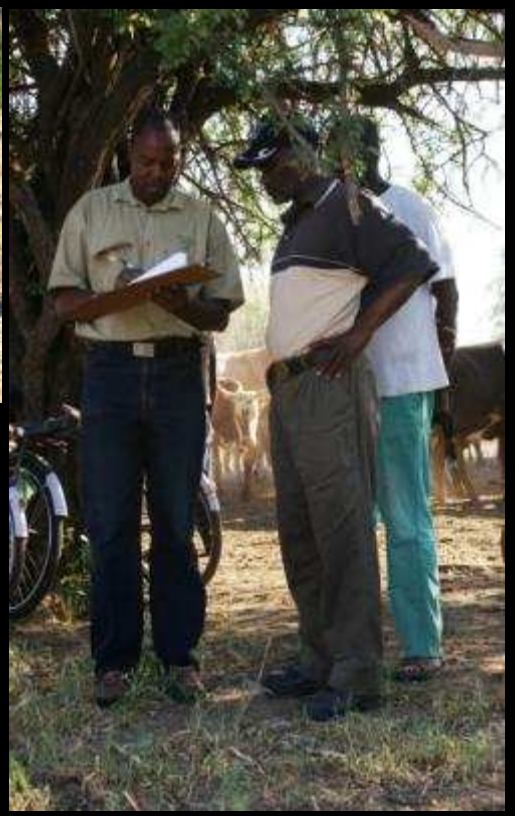
Methodology

1. Standard mesures (sex, weight …)
2. Tissues samples in EDTA,
3. Organs and sera
4. Serological and virological tests





Overview of ongoing RP-PCP studies in the SEL of Zimbabwe



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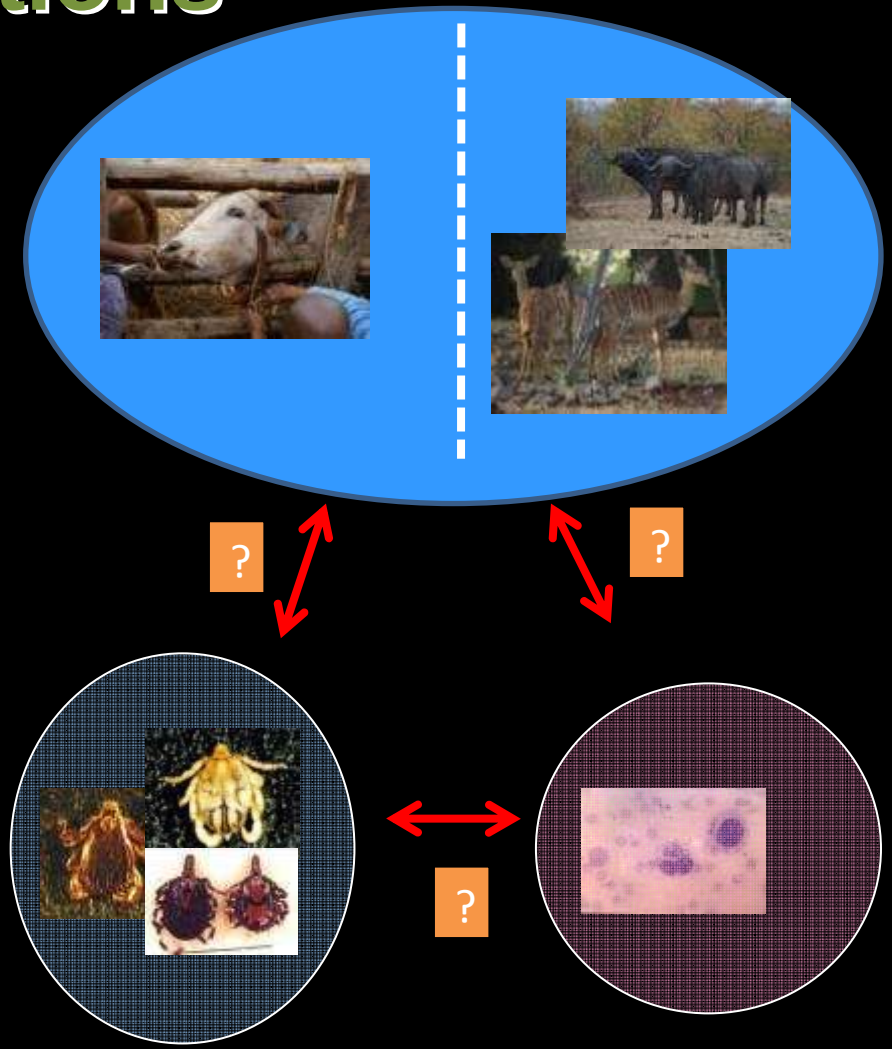
M. de Garine-Wichatitsky, A. Caron, et al.

To understand Host-Pathogen Interactions

- At the community level:
  - Multi-hosts
  - Multi-pathogens
- At the wildlife/livestock interface



■ Research activities 2008

- **Prevalence of main diseases and parasites in wild ungulates**
  40 buffalo, 25 kudu, 40 impala

- **Prevalence of main diseases and parasites in domestic ungulates**
  120 cattle x 3 seasons 3 sites x 60 cattle/goats/sheep

- Zoonosis:

Brucellosis

BTB

-Ticks and TBD:

Theileria spp

Boophilus spp/Babesia spp

Amblyomma spp/E.ruminantium

- FMD

- Other viral diseases:

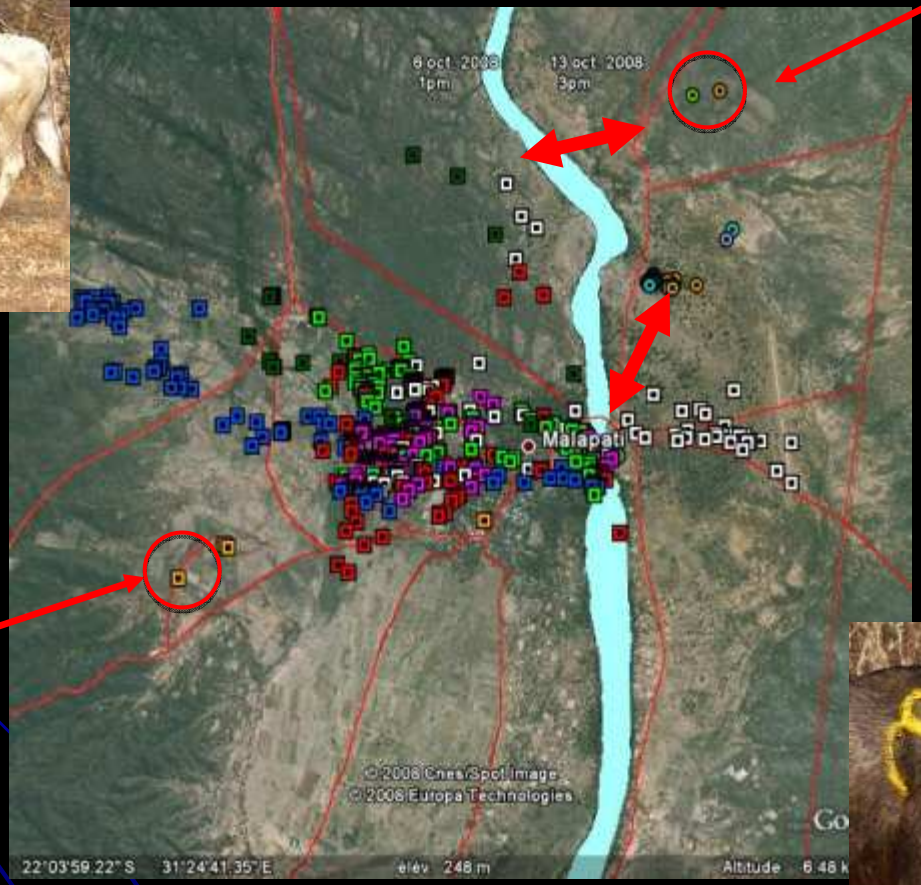
RVF, LSD, PPR ...

EU-PARSEL

■ Research activities in 2008

- **Characterisation of the wildlife/livestock interface**

Buffalo



Cattle

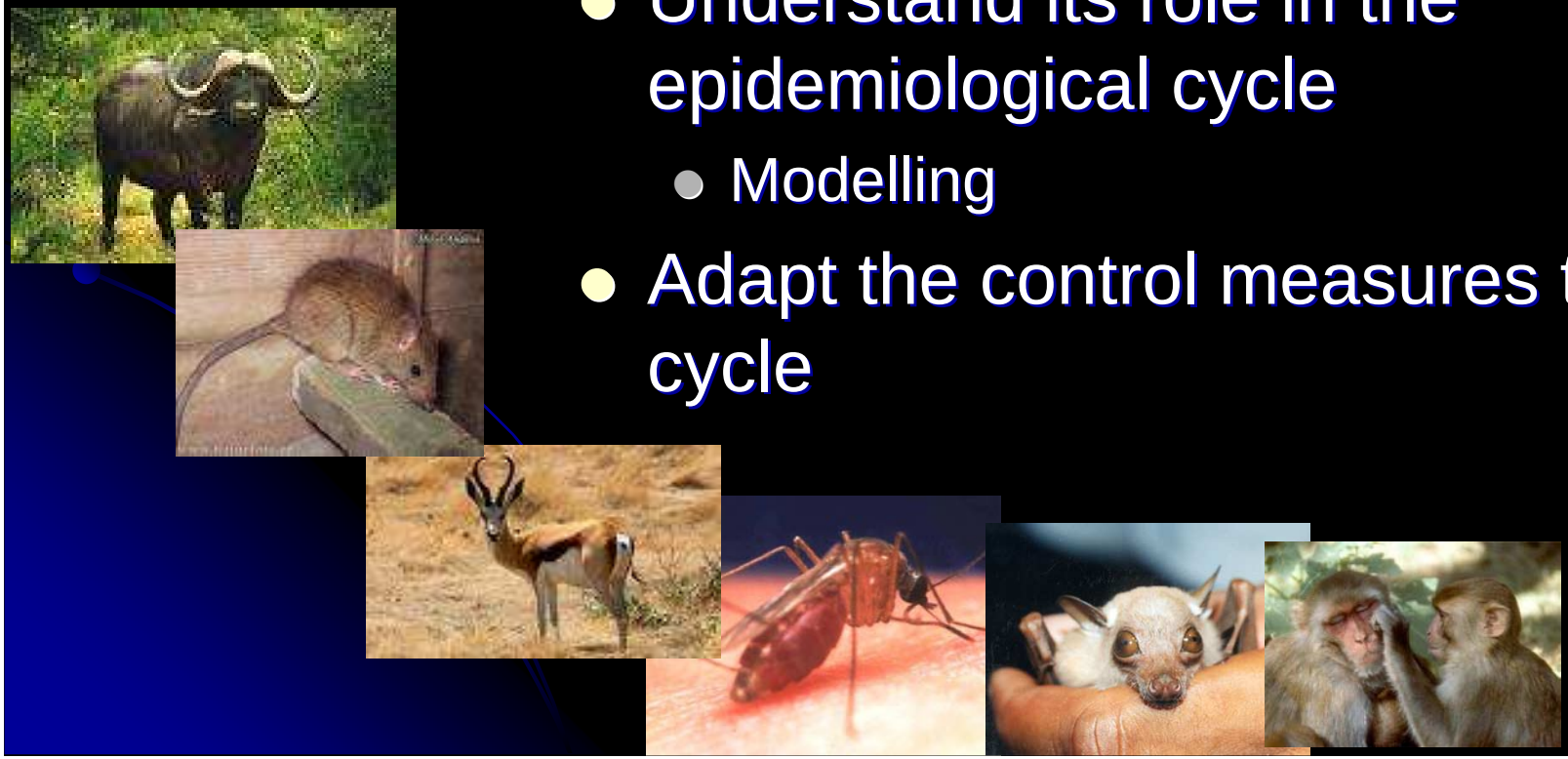
Consequences in terms of control

Given an identified target-reservoir system

- Target control?
  - Ruminant vaccination
- Transmission blocking strategy?
  - Fence and FA
- Reservoir control?
  - Ex: anti rabies fox vaccination

Conclusion

- More questions than answers !
- Identifying the potential reservoir
  - Field studies
  - Experimental studies
- Understand its role in the epidemiological cycle
  - Modelling
- Adapt the control measures to this cycle



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Contributors

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Thank you for attention !!