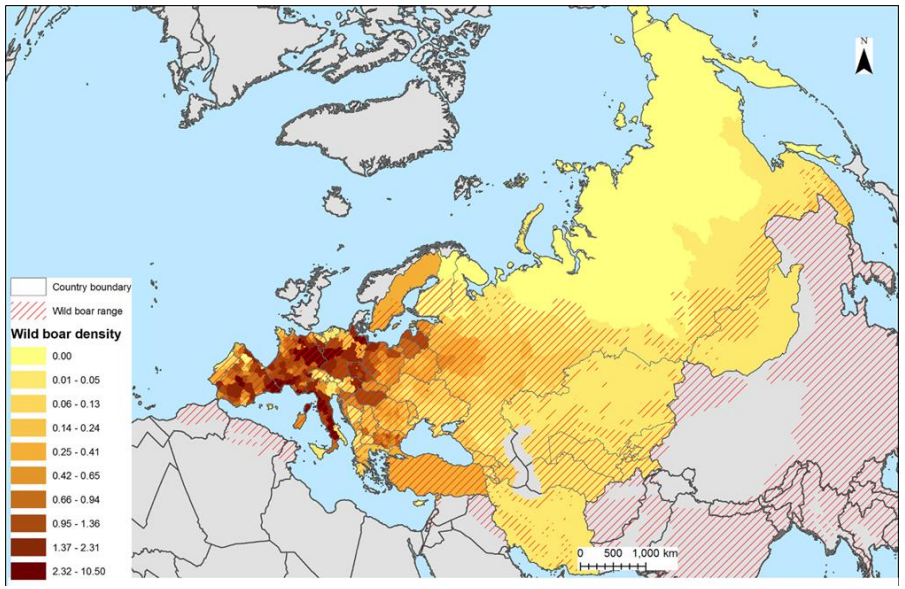

ASF and reservoirs: A moving target

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UMR ASTRE

One Week, Reservoir Worskhope

Bangkok 22-23nNovember 2018

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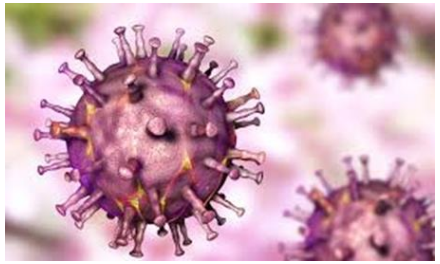
Introduction



African Swine fever

- One of the most severe diseases of pigs
- Results in acute hemorrhagic fever and high mortality (up to 100%)
- Can spread rapidly causing severe economic impact
- **No treatment or vaccine is available**
- Described almost a century ago (Mongomery , 1917).
- However, many gaps of knowledge remain about its natural reservoirs.

The main African reservoir

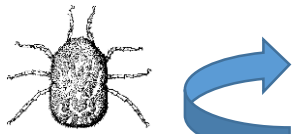
Sylvatic cycle

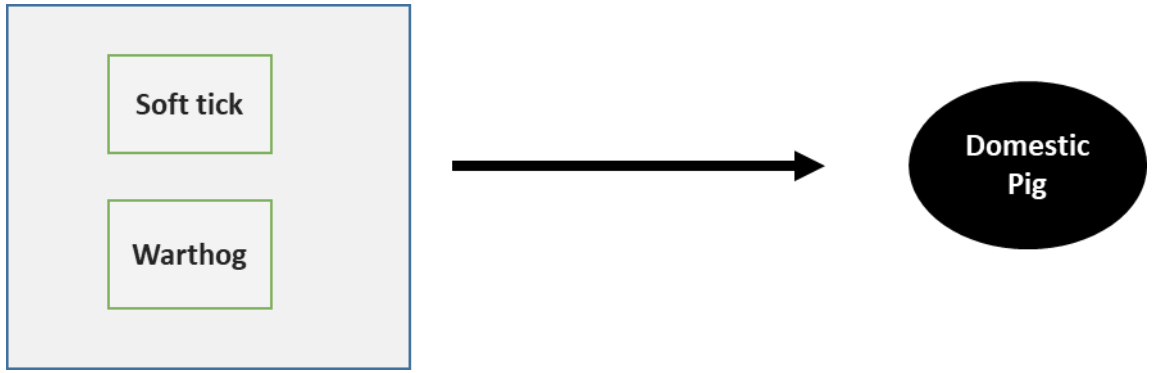
Domestic cycle

The main African reservoir

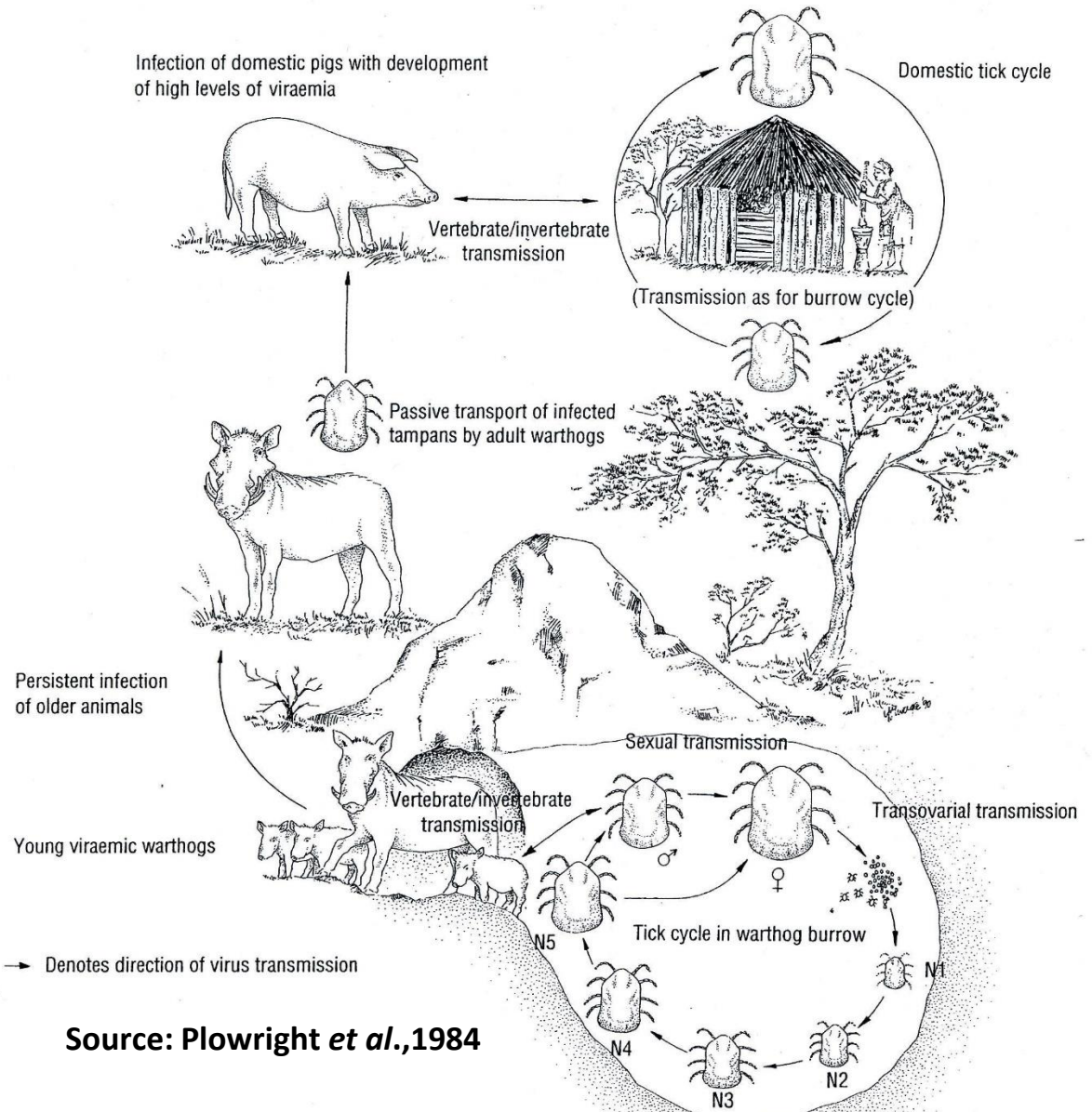
Sylvatic cycle

Domestic cycle





The Warthog-soft tick model



Source: Plowright *et al*.,1984

- Asymptoatic Carriers of ASFV at high prevalences in some areas
- Close relation with Argasid ticks in burrows
- Infection occurs mainly in young animals (viraemia) < 6 months
- At older age, ASFV is localized in lymph nodes
- Horizontal transmission to warthogs or pigs never demonstrated
- Role of Argasid ticks is considered essential in the transmission

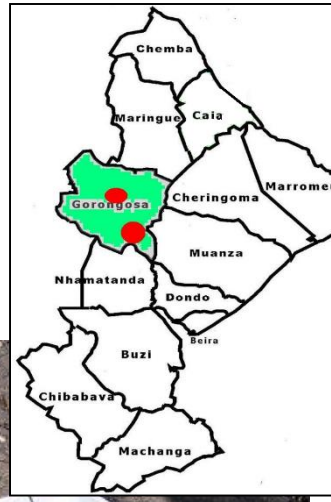
The warthog –soft tick reservoir
Main patterns

Location	ASF prevalence in wild warthogs (% positive)	Frequency of Infested burrows (ASFV rates in burrow ticks)
RSA (Kruger NP)	> 90	55 (1,39)
RSA North Transvaal <Lat 25°	92	44 (5,2)
Tanzania (Serengeti)	100	88 (0,4)
Kenya (Mara, Nairobi)	100	30 (0,44)
Uganda (Ruwenzori)	82	65 (0, 017)

(Plowright, Thompson and Nieser, 1994)

- **High infection** rates of **warthogs**
- High proportion of **burrows infested** with soft ticks
- **Low rates of infected** ticks
- **High diversity of viral strains**

Pattern confirmed in Mozambique
(32 burrows inspected in GNP)



- **90** % of warthog burrows infested with ticks
- 72.4**%** of the 1660 **tick samples infected** ASF virus
- A total **19** unique **isolates**
- **60% closely related** to **Genotype II (**circulating in EU and China)

Transboundary and Emerging Diseases

Transboundary and Emerging Diseases

ORIGINAL ARTICLE

Investigation into the Epidemiology of African Swine Fever Virus at the Wildlife – Domestic Interface of the Gorongosa National Park, Central Mozambique

C. J. Quembo[1,2,3], F. Jori[4,5,6], L. Heath[1], R. Pérez-Sánchez[7] and W. Vosloo[1,2,8]

Received: 14 March 2017
DOI: 10.1111/tbed.12700

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ORIGINAL ARTICLE

Genetic characterization of African swine fever virus isolates from soft ticks at the wildlife/domestic interface in Mozambique and identification of a novel genotype

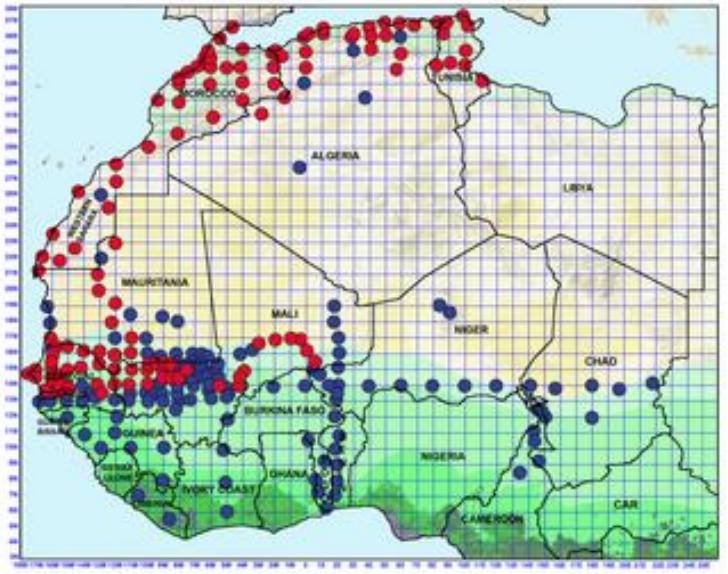
C. J. Quembo[1,2,3] | F. Jori[4,5] | W. Vosloo[1,2,6] | L. Heath[1]

Several exceptions

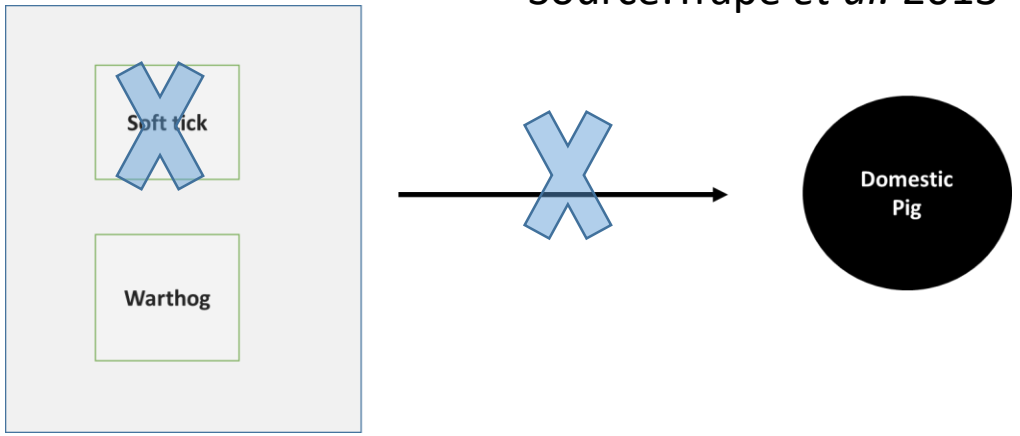
Location	ASF prevalence in wild warthogs (% positive)	Frequency of Infested burrows (ASFV rates in burrow ticks)
RSA North Transvaal>Lat 25°	4	0
RSA (Mkuzi)	4	33 (0,060)
RSA (Umfolozi / Hluhluwe)	0	0 (0)
Kenya (Lolldaiga)	75	0

- Some **variations between** geographically close regions
- **High infection** rates of **warthogs** in the **absence of tick** infested burrows
- **Low infection** rates of warthogs **despite presence of ticks** in burrows
- Wrong sampling design?
- **Many gaps** regarding the **drivers of tick abundance and ecology in burrows**

Exceptions in West Africa



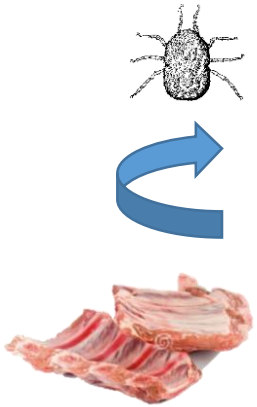
Source:Trape *et al.* 2013



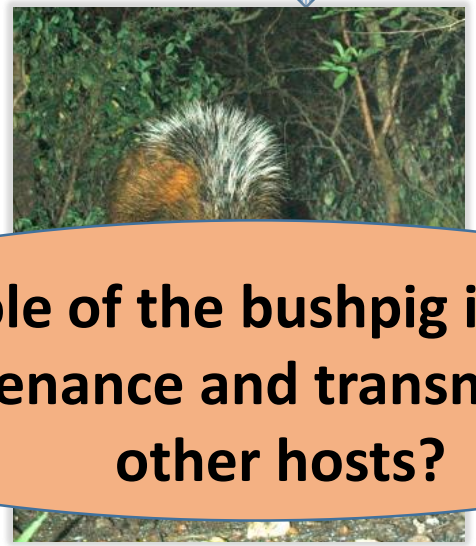
- *Ornithodoros* spp. ticks are not present
- **Warthogs** never been reported **positive** despite presence of virus
- No sylvatic cycle in West Africa
- ASFV is essentially mantianed by a domestic cycle

What about other African wild pigs?

Domestic cycle



Sylvatic cycle



Potamochoerus larvatus

Role of the bushpig in ASF maintenance and transmission to other hosts?

Potamochoerus spp, reservoir of ASF?

Repeted **virus isolation** in wild populations	RSA[1], Kenya[2]
ASFV **Susceptibility**	Yes
Viraemia	30-90 days pi [3]
ASF Symptoms	No[4]
Characteristic Microscopic lesions	Yes[4]
Detection through serology	Rarely demonstrated [3,5]
Horizontal transmission between bushpigs	**Never demonstrated** [3]
Transmission to domestic pigs through direct contact	**Demonstrated [3]**
Infectivity of bushpig carcasses or offal	Unknown
Transmission to ticks	Possible [3,4]
Natural interactions with Argasid ticks	Unknown

1 Masveld, 1963
2 De Tray, 1962
3 Anderson et al., 1998
4 Oura et al., 1998
5 Haresnape et al., 1985

Natural transmission patterns

- Buhspigs and domestic pigs can meet in crops
- Cases of hybridisation are reported
- How often? Whar are the drivers?

Comparison of three methods to assess the potential for bushpig-domestic pig interactions at the livestock- wildlife interface in Uganda

Ariane Payne , Peter Ogweng , Alfred Ojok, Eric Marcel, Charles Etter , Emmanuelle Gilot , Charles Masembe , Karl Ståhl and Ferran Jori

frontiers in Veterinary Science

ORIGINAL RESEARCH
published: 14 April 2016
doi: 10.3389/fvets.2016.00031

Wild and Domestic Pig Interactions at the Wildlife–Livestock Interface of Murchison Falls National Park, Uganda, and the Potential Association with African Swine Fever Outbreaks

Esther A. Kukielka[1], Ferran Jori[2,3], Beatriz Martínez-López[1], Erika Chenais[4,5], Charles Masembe[6], David Chavernac[7] and Karl Ståhl[4,5]*

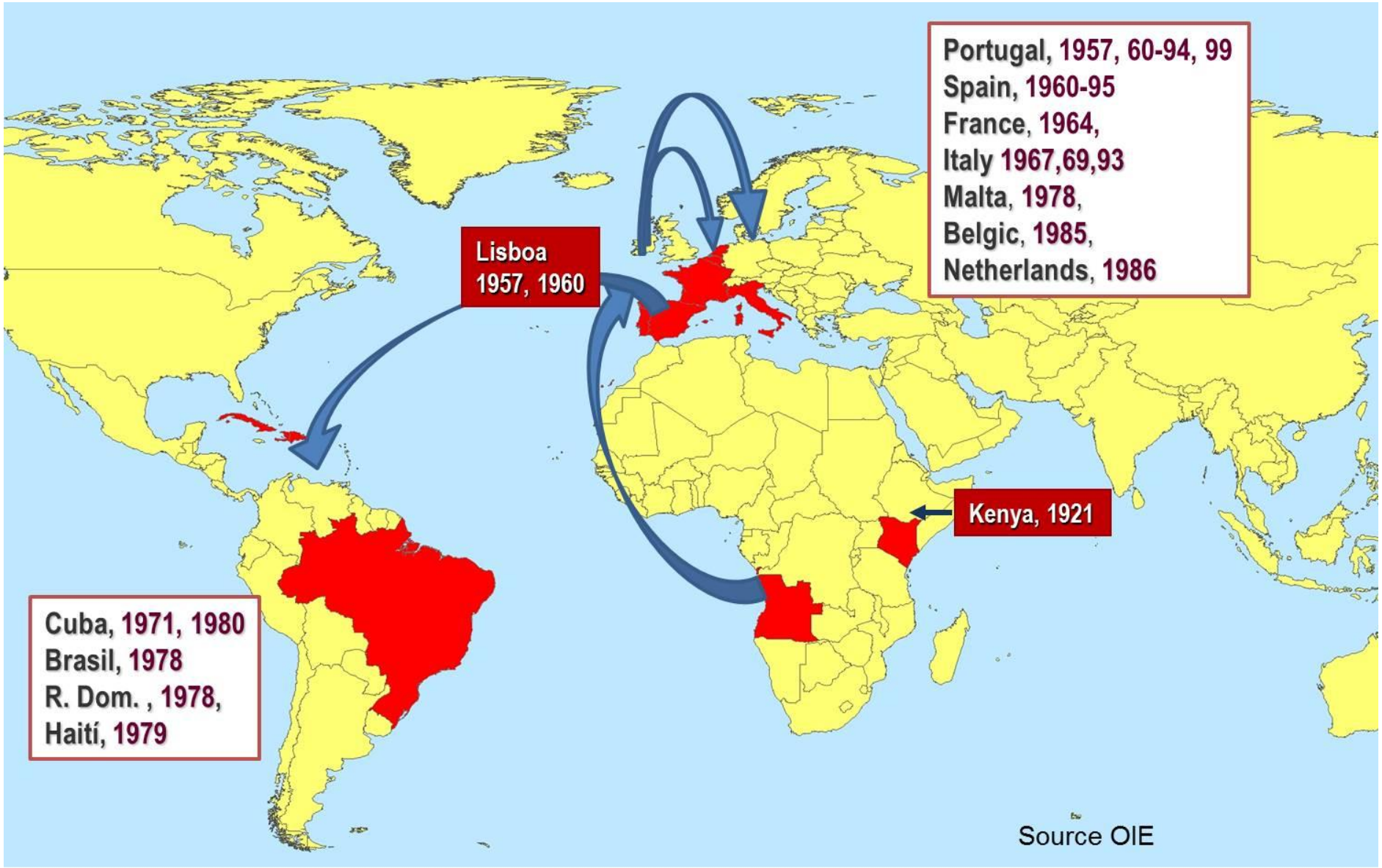
Knowledge of their role as reservoirs




	Warthog	Bushpig	Red river hog	Giant forest hog
Infection	Confirmed	Confirmed	Unknwon	Confirmed
Prevalence	0-100%	Unknown	Unknown	Unknown
Transmission pathways to pigs	Tick warthog dynamics	Unknown	Unknown	Unknown

- ❑ Permanent source of virus for other territories
- ❑ Many gap persist

1st incursion in Europe: 1957



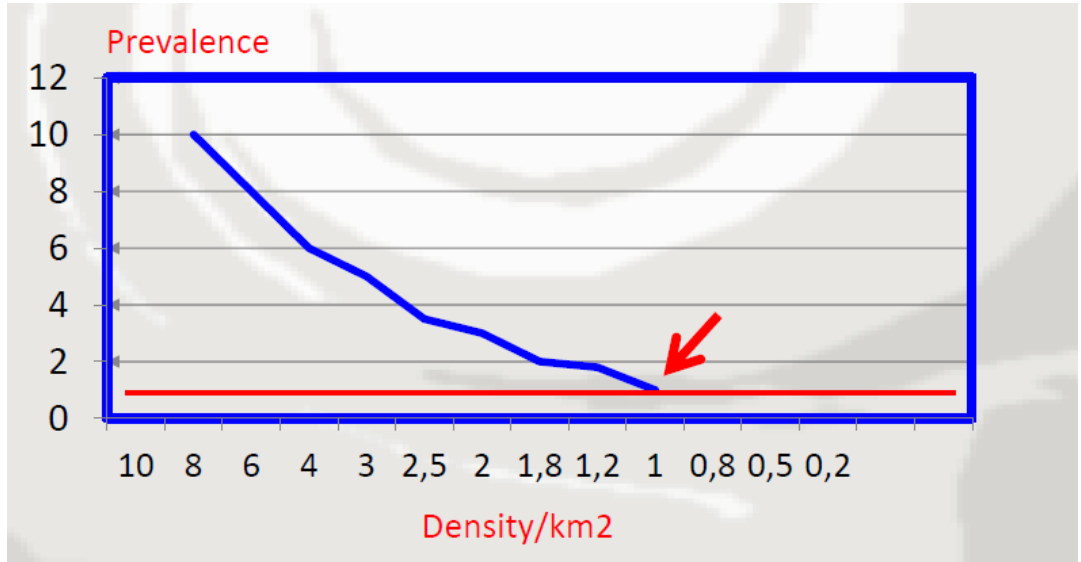
Sus scrofa: What are their role?

- Same species as wild boar
- Seme sensitivity to the virus
- 95% mortality

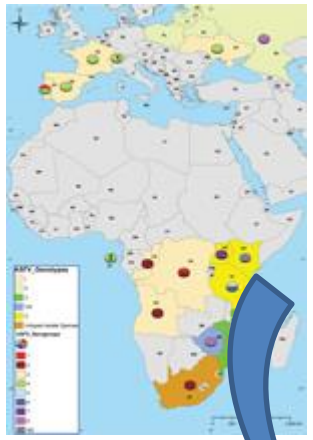
ASF dynamics in wild boar

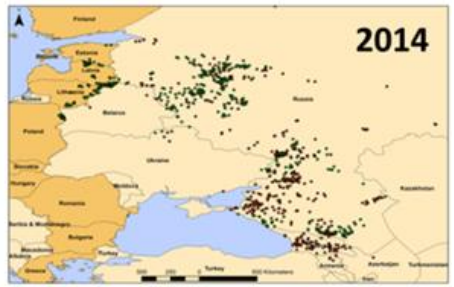
Mediterranean

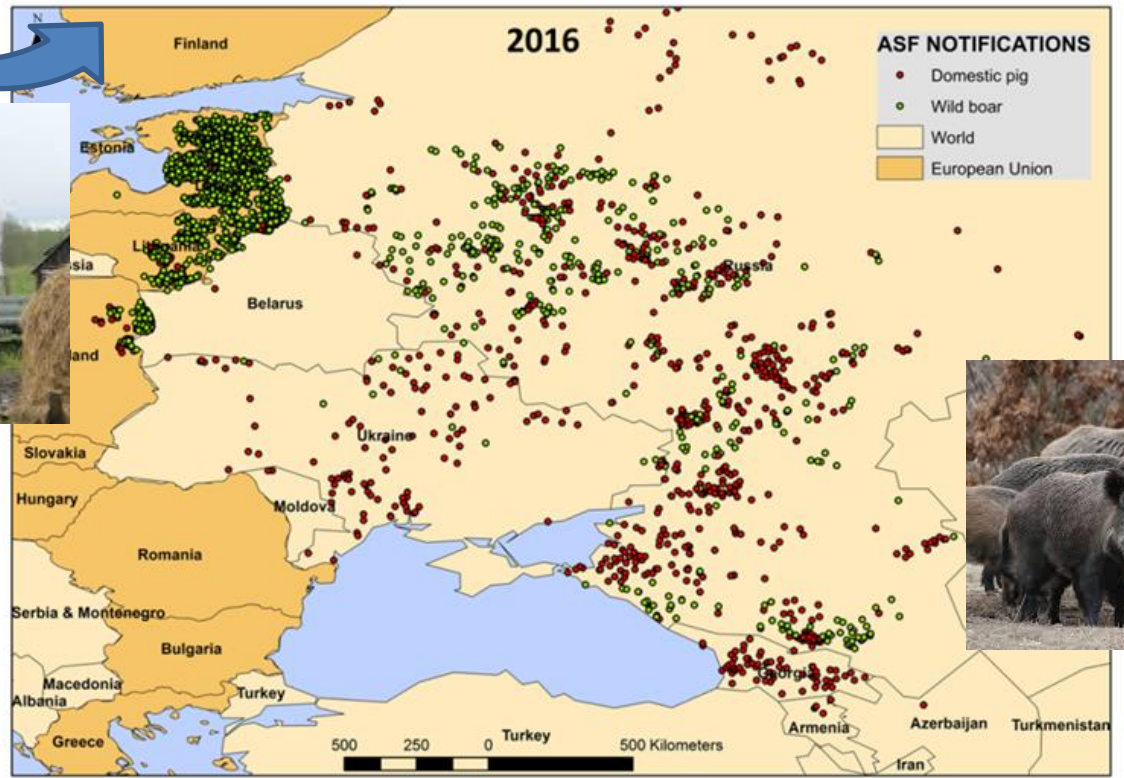
- Wild boars became infected in the Iberian Penisula and Sardinia
- Disease is fatal in 90-95% of wild boars
- In the absence of contacts with infected pigs, disease became self-extinct in WB populations



Second incursion: Georgia 2007

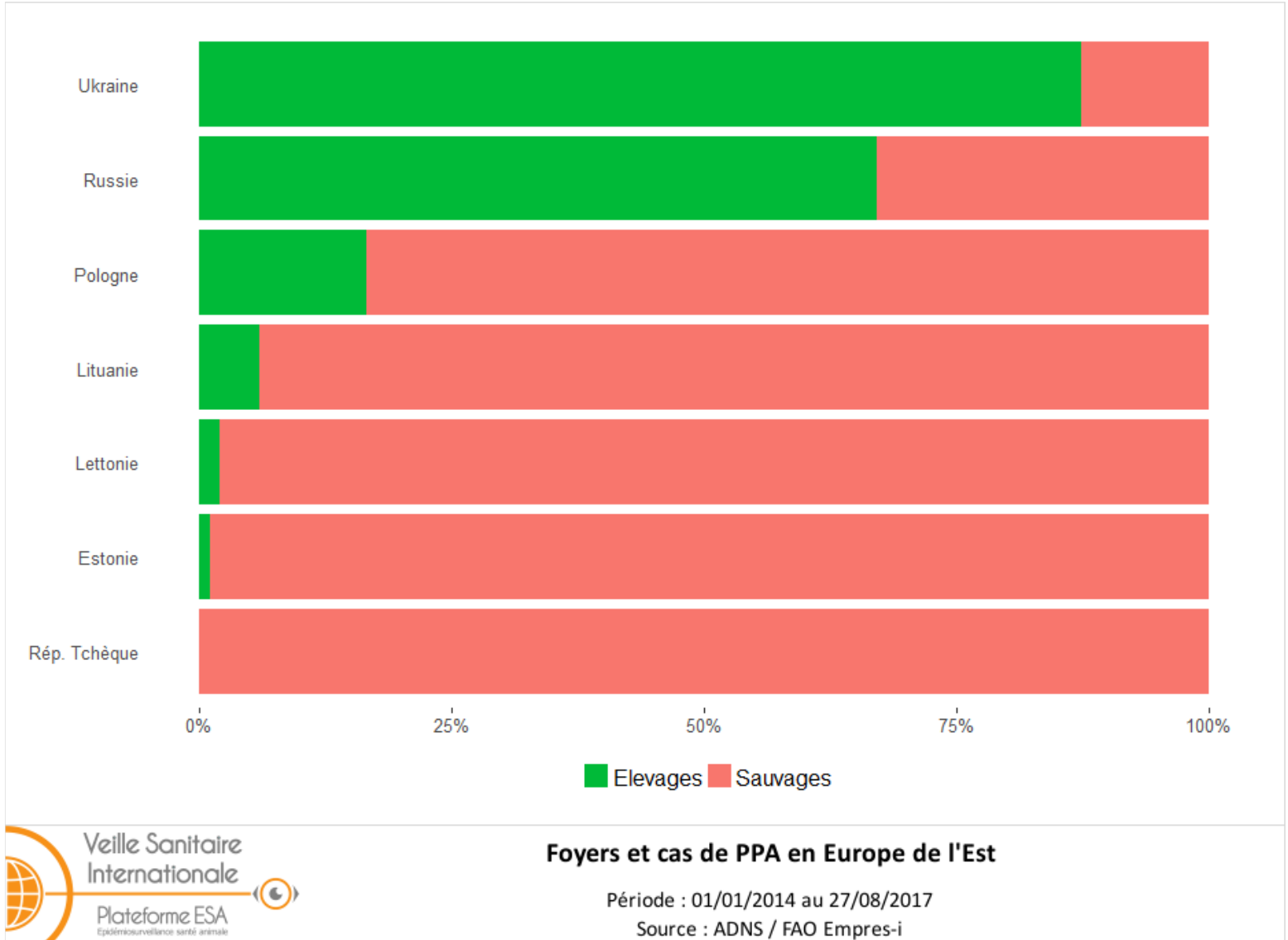






ASF dynamics in wild boar

Eastern Europe



ASF dynamics in wild boar

Eastern Europe

- **Slow spread** of the disease : 1 -2 km/month
- **No self extinction** of the disease in wild boar populations
- Epidemiological picture suggests of maintainance in natural wild boar populations

  - Why are wild boar populations maintaining the virus?

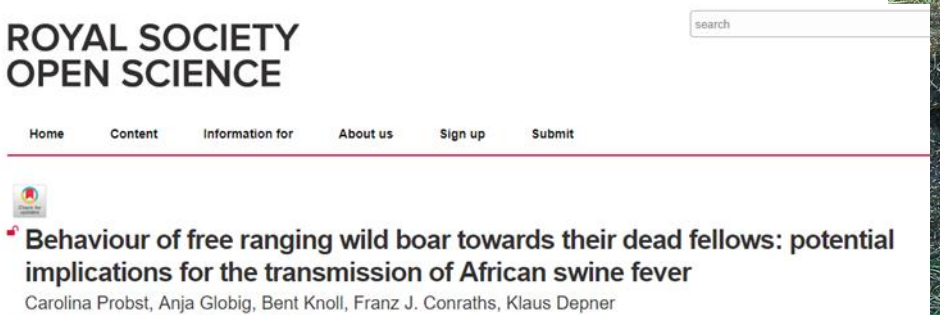
  - What has changed regarding previous observations in Mediterranean countries?

Role of wild boar carcasses

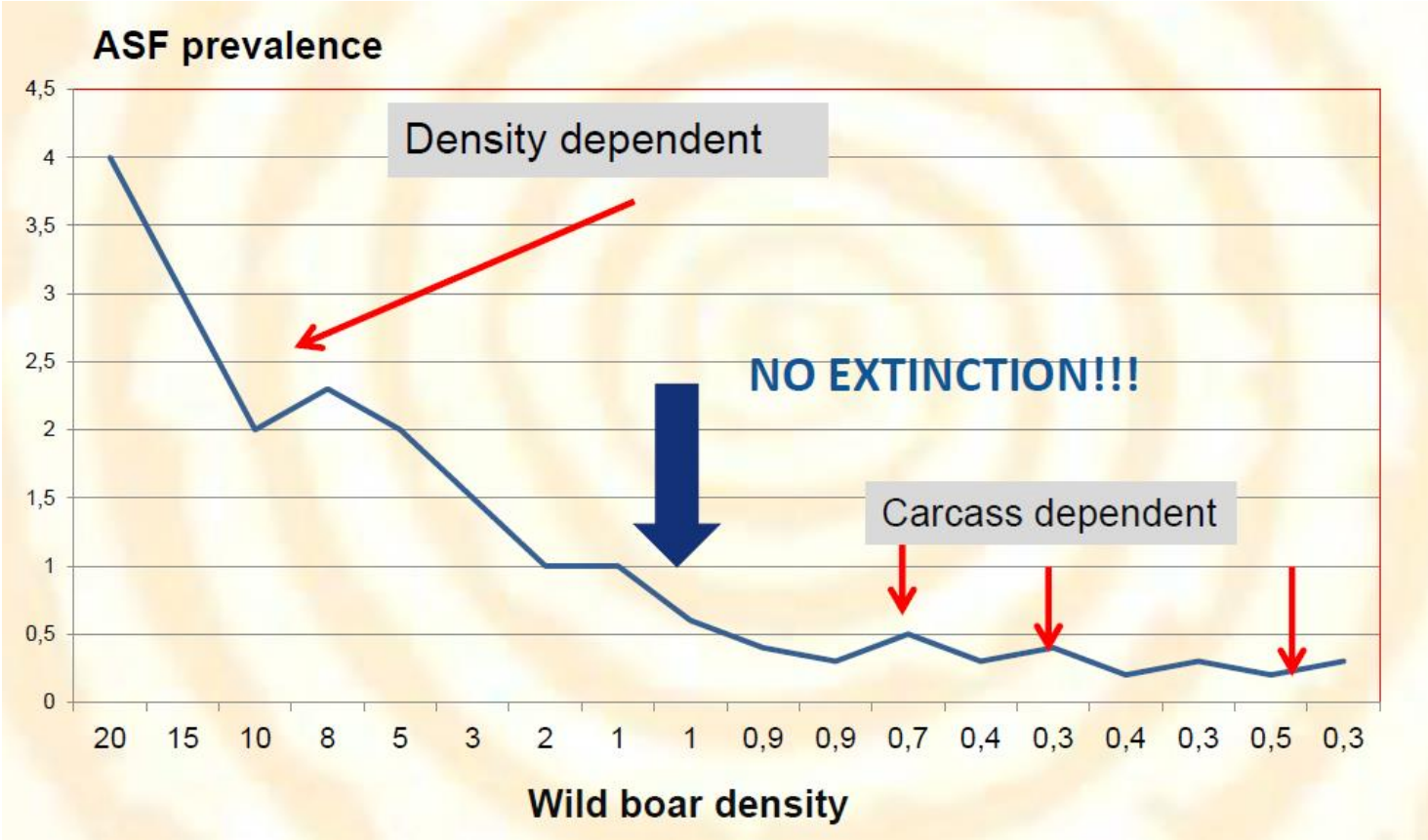
- In Eastern Europe, frozen carcasses of infected dead animals can be maintained during months in the environment.
- ASF virus able to resist for several (3-6) months in an infected tissues
- Can survive long winters and allow re-infection
- Does that mean wild boars are eating their own carcasses?

Study of trophic behaviour

- 288 carcasses monitored by camera traps
- 122 160 pics taken (16 000 with WB)
- 30% visits to carcass led to contacts with dead conspecifics
- No evidence of interspecific scavenging (canibalism)
- But risky contacts with infected carcasses
  - Sniffing
  - Poking
  - Eating larvae from soil
  - Chewing bones



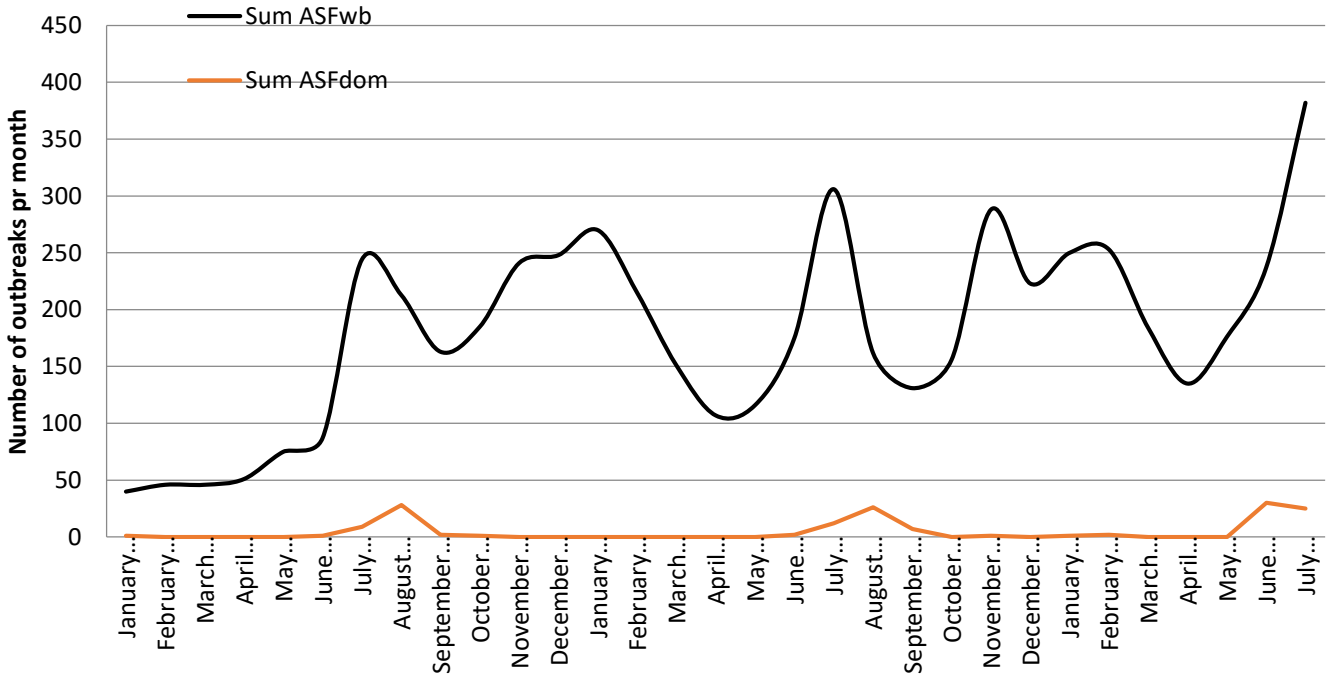
ASF dynamics in wild boar



- Mechanistic modelling of spatio-temporal data ASF cases among WB populations fits with some level of carcass transmission
- But perhaps also other causes?

Potential role of biting flies ?

ASF i wild boars and domestic pigs
in Estonia, Latvia, Lithuania and Poland in 2015-2017



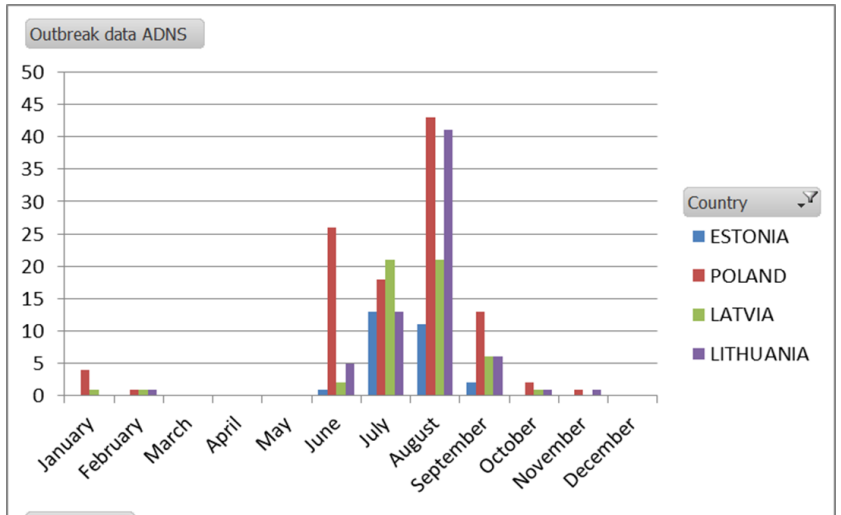
Received: 27 February 2018 | Revised: 1 May 2018 | Accepted: 8 May 2018
DOI: 10.1111/tbed.12918

RAPID COMMUNICATION

WILEY

Infection of pigs with African swine fever virus via ingestion of stable flies (*Stomoxys calcitrans*)

Ann Sofie Olesen[1] | Louise Lohse[1] | Mette Frimodt Hansen[2] | Anette Boklund[2] | Tariq Halasa[2] | Graham J. Belsham[1] | Thomas Bruun Rasmussen[1] | Anette Bøtner[1] | René Bødker[2]

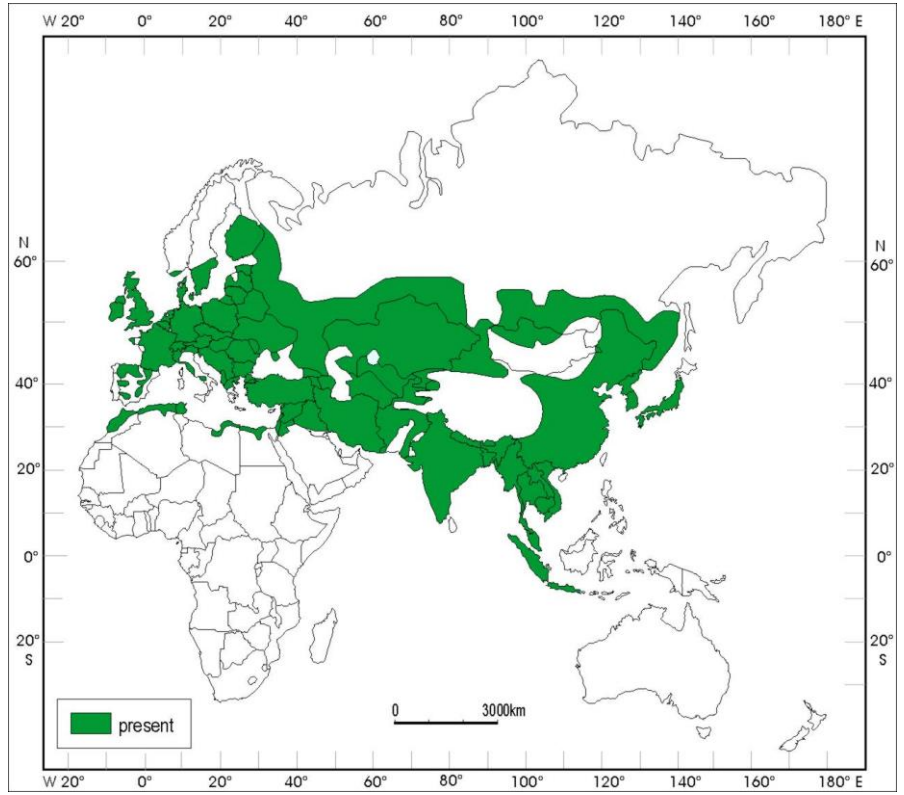


Conclusions

- Many gaps of knwoledge remain in Africa and EU

- Hot topic that will certainly require a lot of attention in the next few years ala over the world (including Asia)

- Wild boar populations are increasing worlwide
  - Challenge for ASF spread in Asia
  - Challenge for the conservation Asian wild suid species ?



Thank you!

That's all Folks!