#48 QS WORLD UNIVERSITY RANKINGS 2021

Jockey Club College of Veterinary Medicine and Life Sciences
香港城市大學
City University of Hong Kong
in collaboration with Cornell University

OVERVIEW OF AFRICAN SWINE FEVER EPIDEMIOLOGY

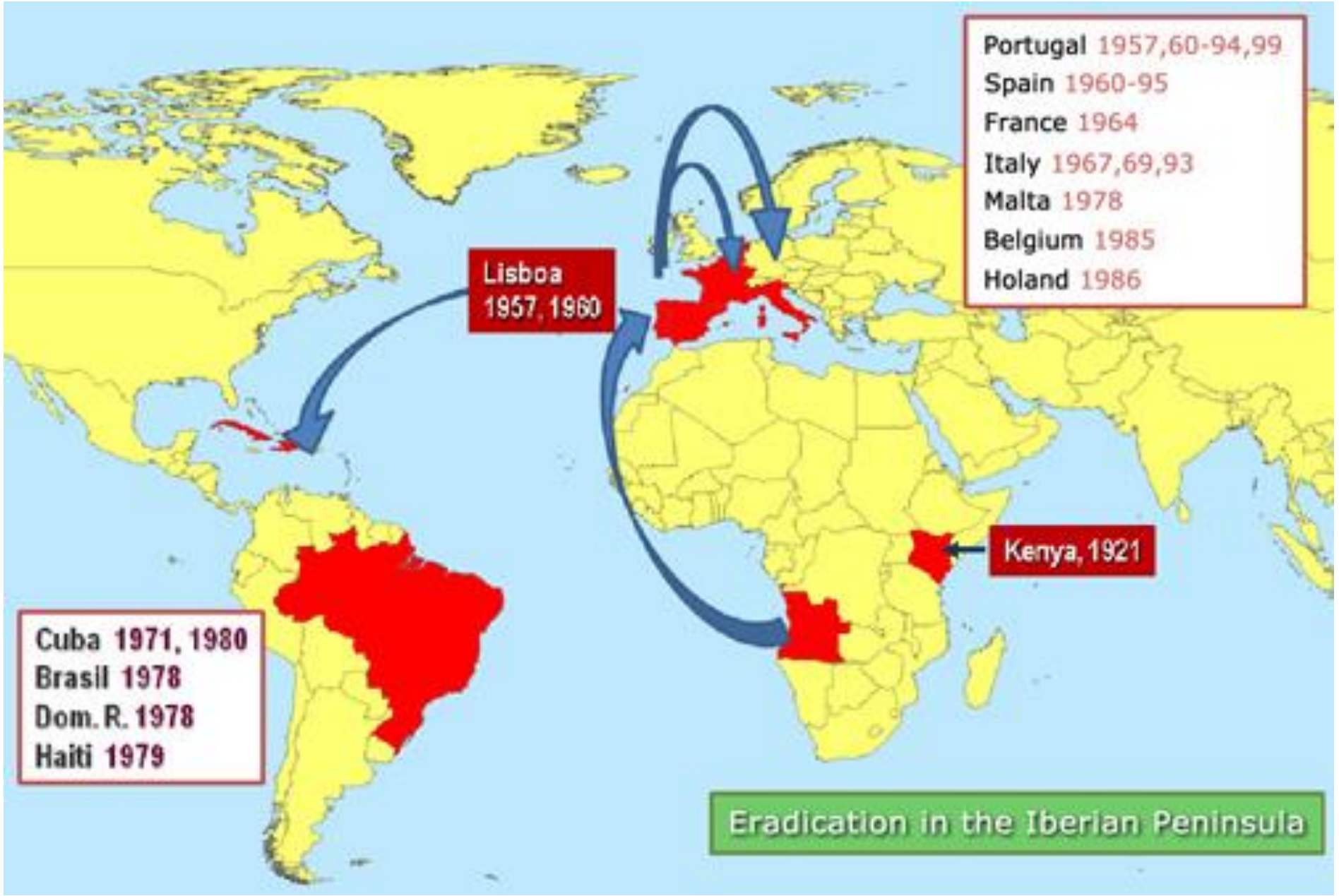
Dirk U. Pfeiffer

Chow Tak Fung Chair Professor of One Health, City University of Hong Kong, Hong Kong, PR China
Professor of Veterinary Epidemiology, Royal Veterinary College, University of London, United Kingdom
Adjunct Professor at China Animal Health and Epidemiology Centre, Qingdao, PR China

QS World University Rankings 2021 Veterinary Science No. 2

Royal Veterinary College University of London

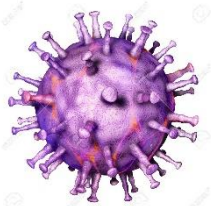
ASF Virus Spread from Africa (1957 – 95)

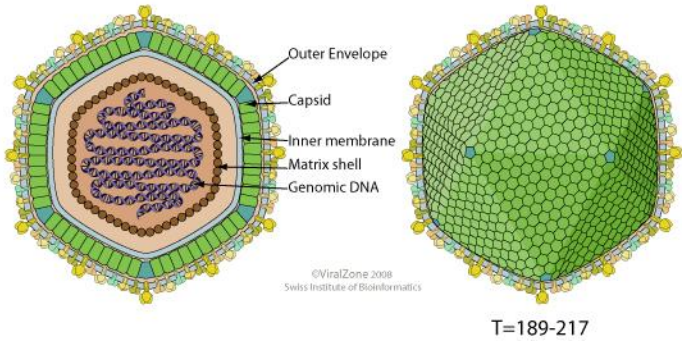


From: Sanchez-Viscaino et al

From Africa to Europe (1998 -2012)

ASF Virus



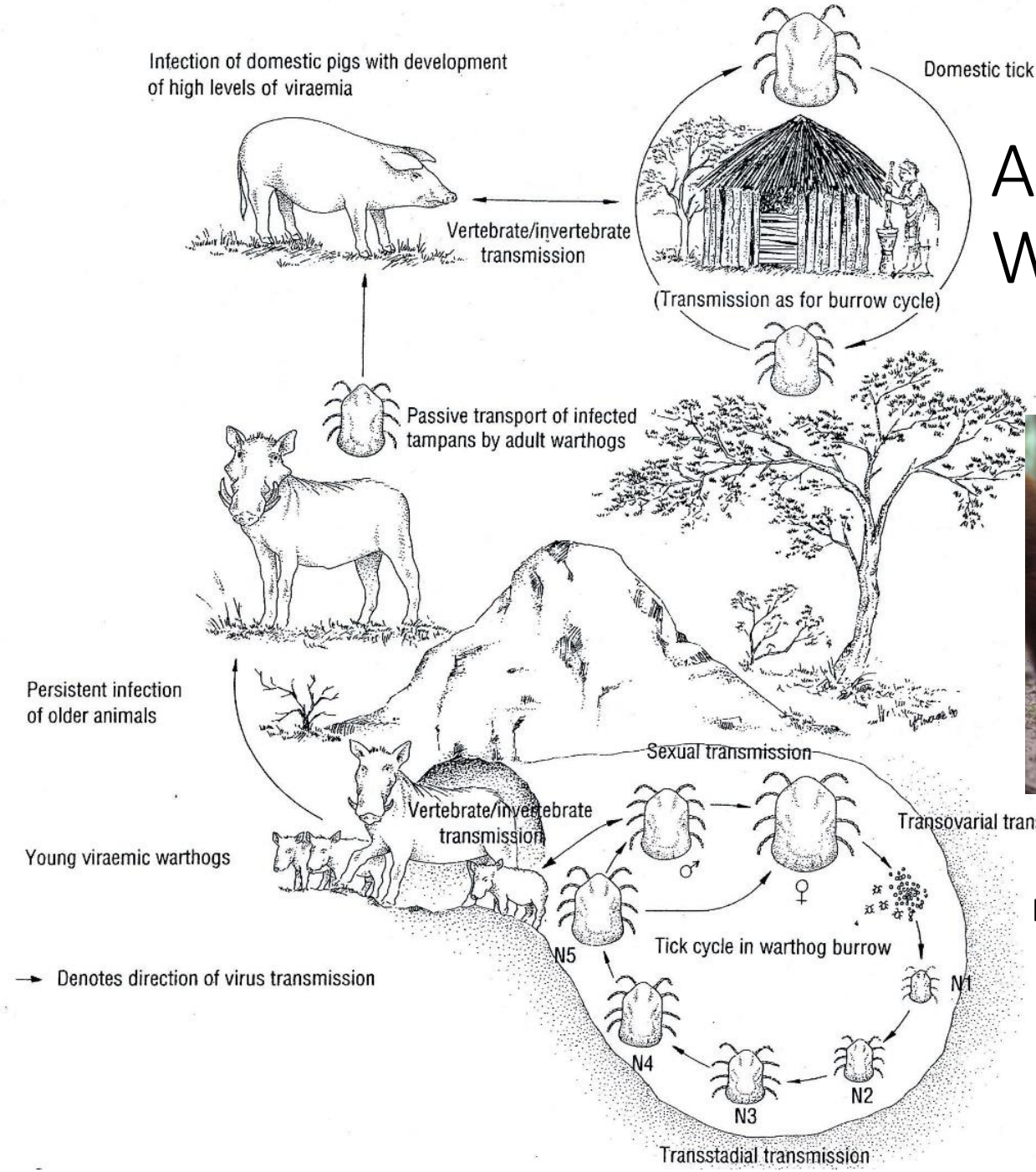


Viralzone®

- large DNA virus, Asfiviridae family [Dixon et al., 2005]
- 22 genotypes
- tenacity [OIE, FAO]

Temperature	Highly resistant to low temperature Heat inactivated by 56°C/70 min; 60°C/20 min
pH	Inactivated by pH <3.9 or >11.5
Chemicals/Disinfectants	Susceptible to ether, chloroform. Inactivated by NaOH (8/1000), chlorine (2.3%), formalin (3/1000), iodine applied during 30 min
Survival	Blood (37°C / 1 month), faeces (11 days), chilled meat (15 weeks), hams and sausages (3 – 6 months)

ASF in African Wild Pigs



Warthog
(*Phacochoerus africanus*)
Subsaharan African grasslands

Bushpig
(*Potamochoerus larvatus*)
East Southern Africa & Madagascar

Red River hog
(*P. porcus*)
Central & West Africa

ASF Vectors

- soft ticks, *Ornithodoros spp.*
  - *O. erraticus* (Spain, Portugal)
  - *O. moubata* (South-Africa, Madagascar)
- transstadial, transovarial and sexual transmission
- live in swine burrows and pens [Oleaga-Perez, 1990]

CIRAD®

Clinical Features of ASF

- highly contagious hemorrhagic disease of swine (pigs, European wild boar, warthogs, American wild pigs)
- no treatment and no vaccine
- morbidity, up to 100%
- mortality between 0 and 100% depending on virus strain, host, dose and exposure route
  - peracute and acute forms
  - incubation period: 3-15 days
  - sudden deaths
  - high fever (40.5 – 42^{O}C)
  - reddening of skin
  - vomiting, diarrhea (sometimes bloody)
  - death within 6 -13 days, or up to 20 days

FAO®

Decreased appetite, listlessness, cyanosis and mobility incoordination

Transmission Dynamics of ASFv in Domestic Pigs - Experiment

Guinat *et al. Veterinary Research* 2014, **45**:93
http://www.veterinaryresearch.org/content/45/1/93

VETERINARY RESEARCH

RESEARCH Open Access

Dynamics of African swine fever virus shedding and excretion in domestic pigs infected by intramuscular inoculation and contact transmission

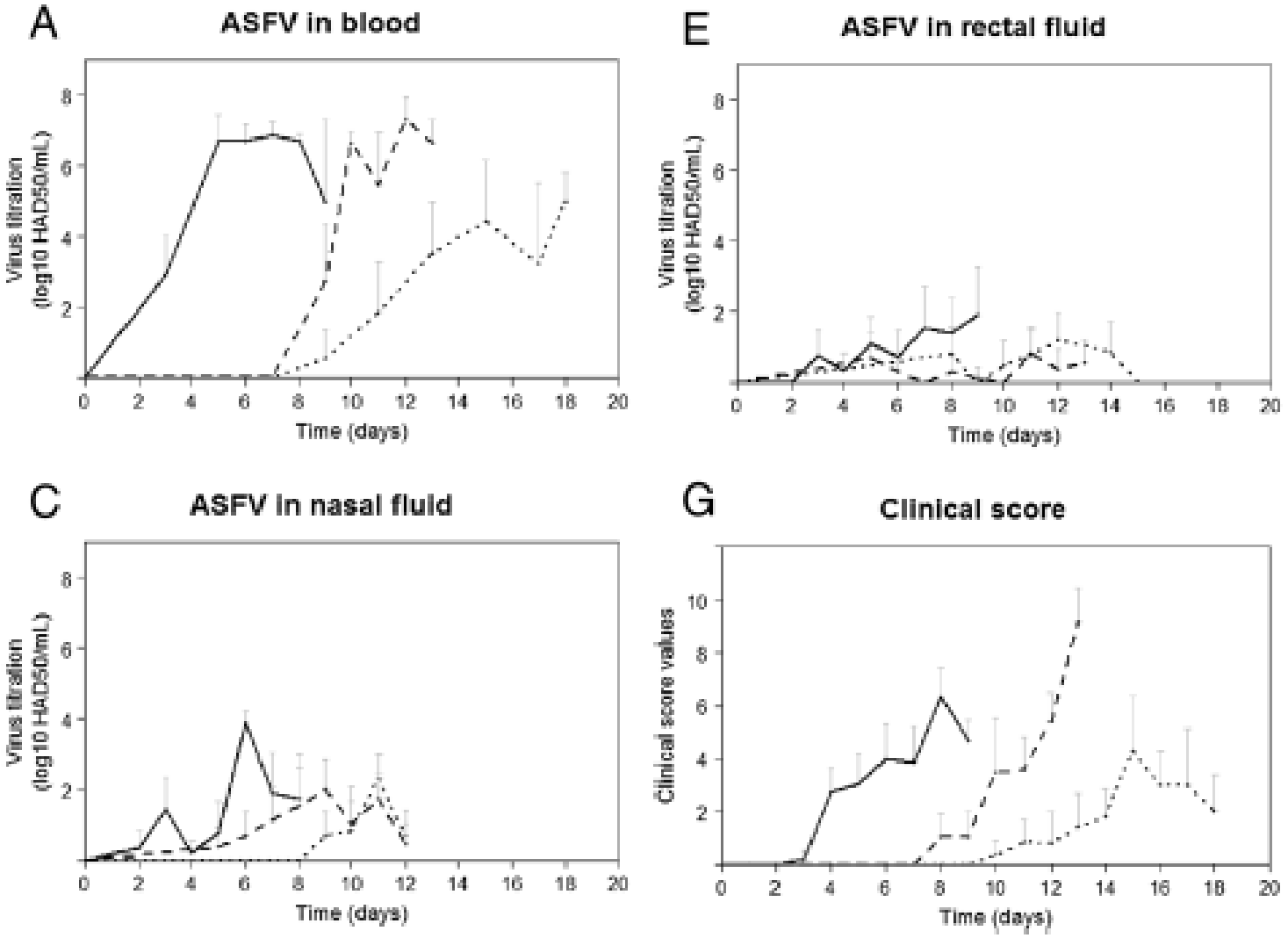
Claire Guinat[1,2*], Ana Luisa Reis[1], Christopher L Netherton[1], Lynnette Goatley[1], Dirk U Pfeiffer[2] and Linda Dixon[1]

- intramuscular inoculation with Georgia 2007/1 ASFV strain
- within- and between- pen transmission
- euthanasia within max 18 days

Table 1 Experimental infection and transmission results with the Georgia 2007/1 ASFV strain

Room	A	B	C	D
No. inoculated pigs	5	4	4	3
No. within-pen contact pigs	5	4	4	3
No. between-pen contact pigs	0	4	4	0
No. naturally infected pigs	5	8	8	3

ASFv Transmission Experiment in Domestic Pigs – Virus Titration and Clinical Score



- **only 1 pig with positive serology at 12d**

infected intramuscularly (solid line type),
by direct contact (dashed line type)
or by indirect contact (dotted line type).

Guinat *et al. Veterinary Research* 2014, **45**:93
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VETERINARY RESEARCH

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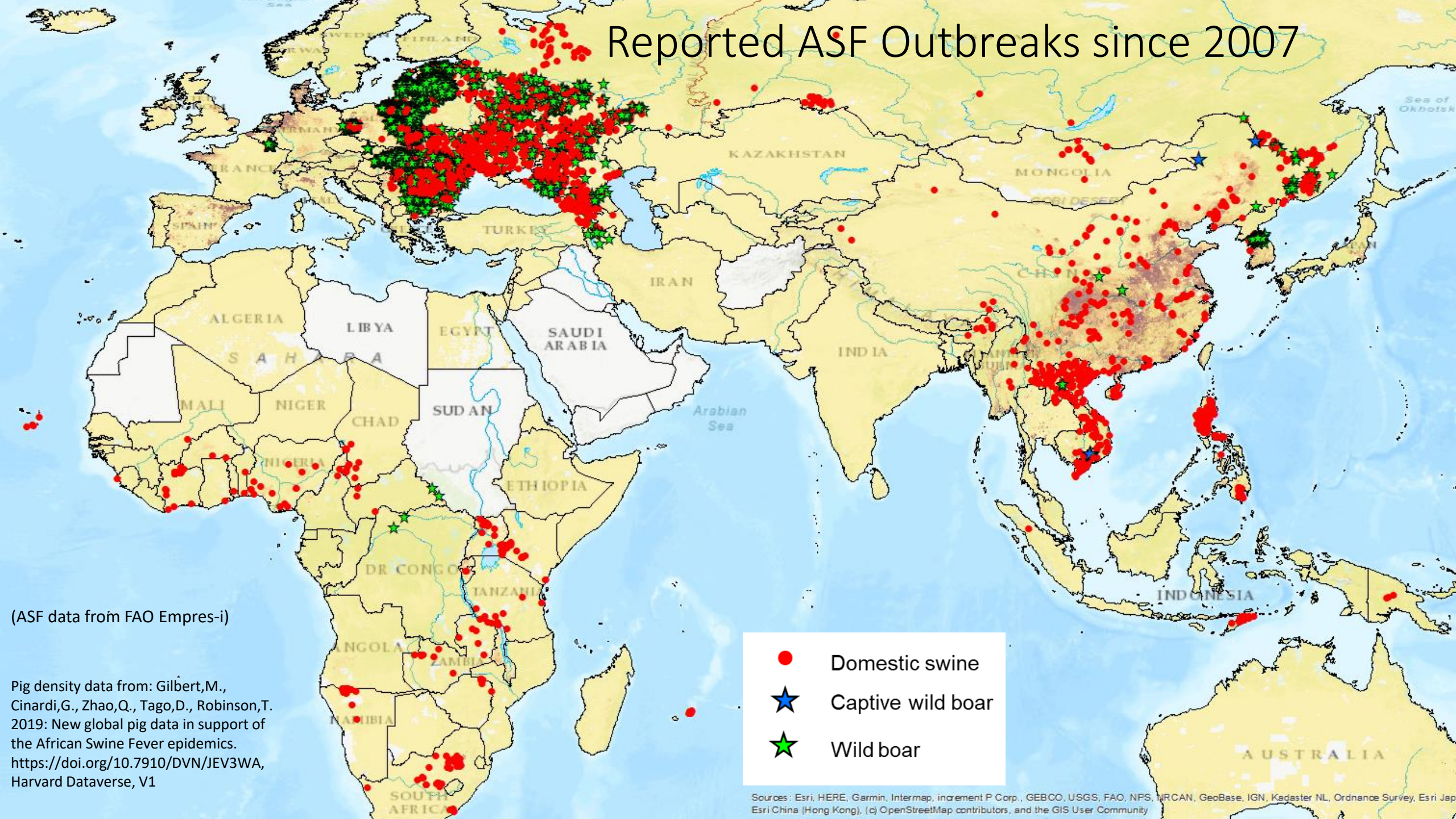
ASFV Dynamics within Infected Pig Herds

- spread of ASFV by pig to pig contact can be slower than other diseases, such as foot-and-mouth disease
- example scenario - assuming 1-2 infected pigs introduced to group
  - initially only those 1-2 pigs die within a few days
    - low likelihood for farmer to notice due to ‘normal’ background pig mortality
  - transmission to susceptible pigs
    - virus shedding may start shortly before clinical signs appear
      - relatively low amounts of virus in faeces and nasal excretions from infected pigs
        - pigs in close contact highly likely to become infected
      - minimal transmission by aerosol
    - carcasses of pigs that died from ASF
      - very high amounts of virus in blood and tissues of affected pigs
        - efficient transmission through contact or consumption of carcases of pigs or wild boar or their products
  - 1-2 weeks until increased mortality occurs
    - increased likelihood for farmer to notice

Adapted from information provided by Pirbright

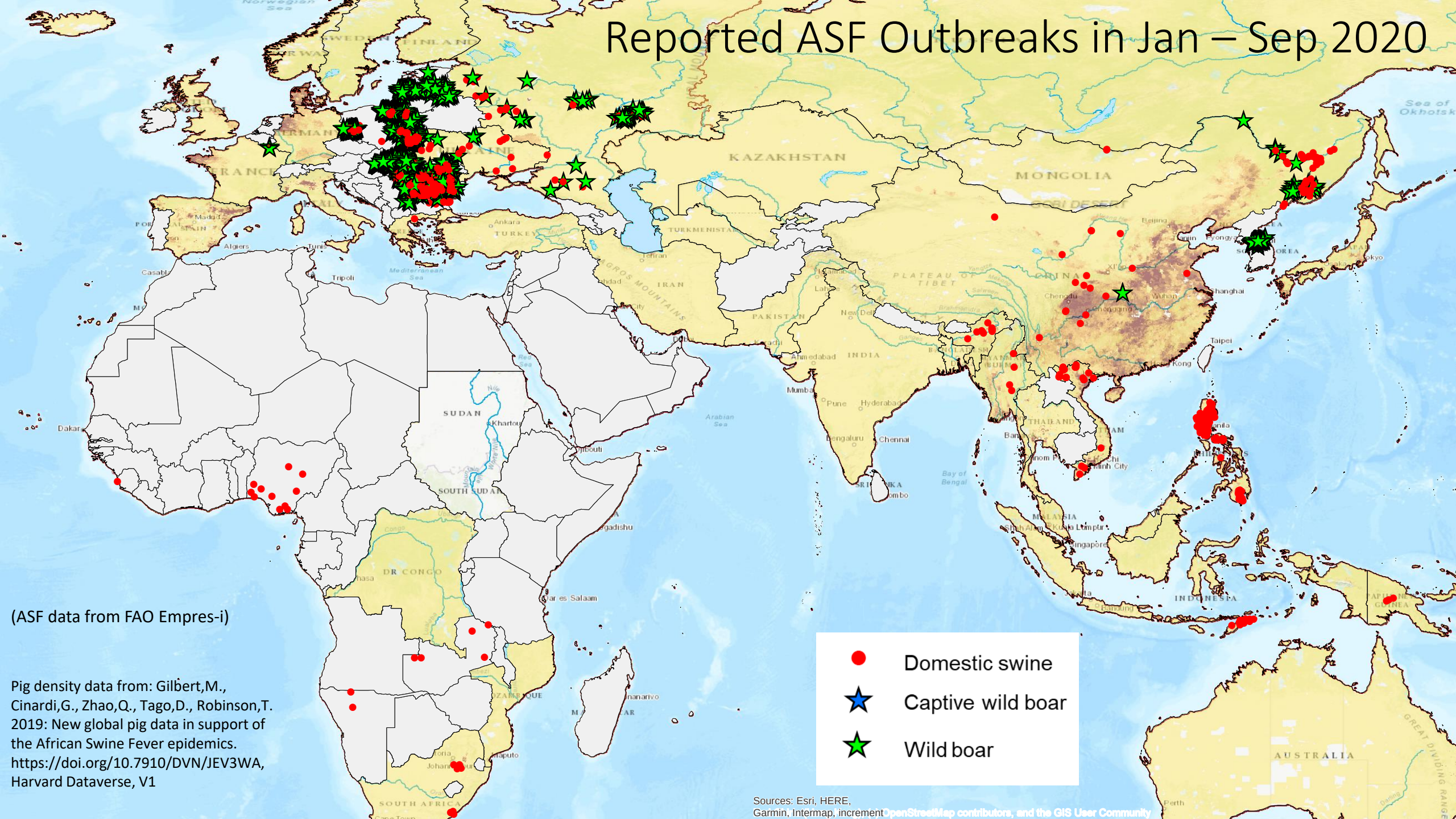
Reported ASF Outbreaks since 2007



(ASF data from FAO Empres-i)

Pig density data from: Gilbert,M., Cinardi,G., Zhao,Q., Tago,D., Robinson,T. 2019: New global pig data in support of the African Swine Fever epidemics. https://doi.org/10.7910/DVN/JEV3WA, Harvard Dataverse, V1

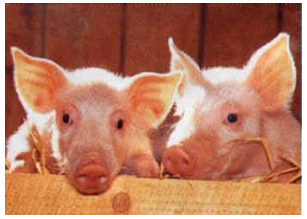
Reported ASF Outbreaks in Jan – Sep 2020



(ASF data from FAO Empres-i)

Pig density data from: Gilbert,M., Cinardi,G., Zhao,Q., Tago,D., Robinson,T. 2019: New global pig data in support of the African Swine Fever epidemics. https://doi.org/10.7910/DVN/JEV3WA, Harvard Dataverse, V1

Risk Factors for ASFV Spread



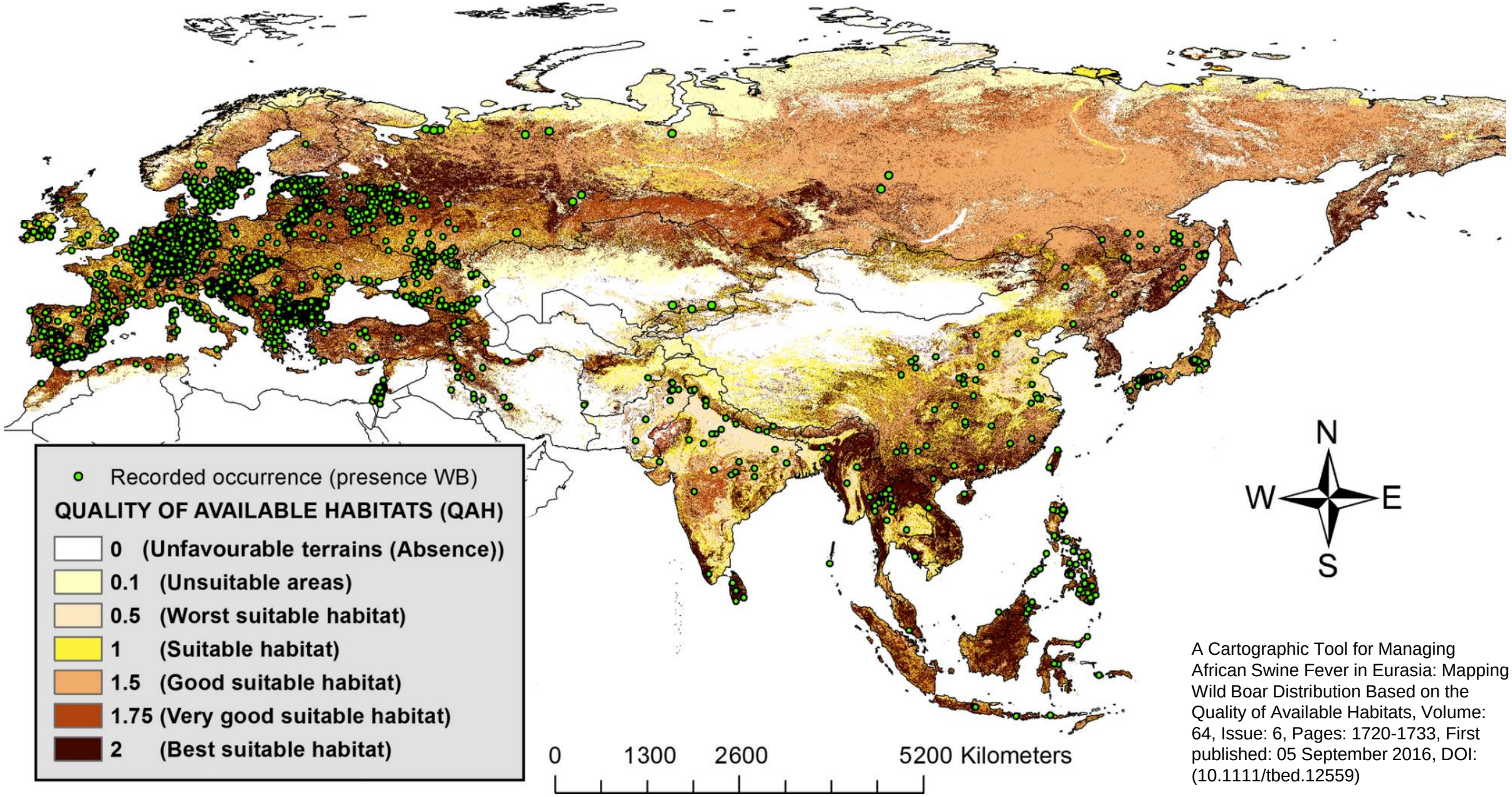
- Domestic pigs

1. pig movement → direct contact
2. pork products (incl. swill feeding)
3. movement of vehicles
4. contamination of feed
5. movement of professionals and associated fomites
6. movement of people and associated fomites
7. pets and pests (mechanical vectors)
8. environmental contamination
9. spill-over into ticks → direct contact
10. spill-over into wild boar → direct or indirect contact

- Wild boar

1. ecology determining the behaviour of wild boar → direct contact between wild boar groups (including scavenging behaviour)
2. contamination of environment
3. hunting practice → between areas
4. spill-over into ticks → direct contact

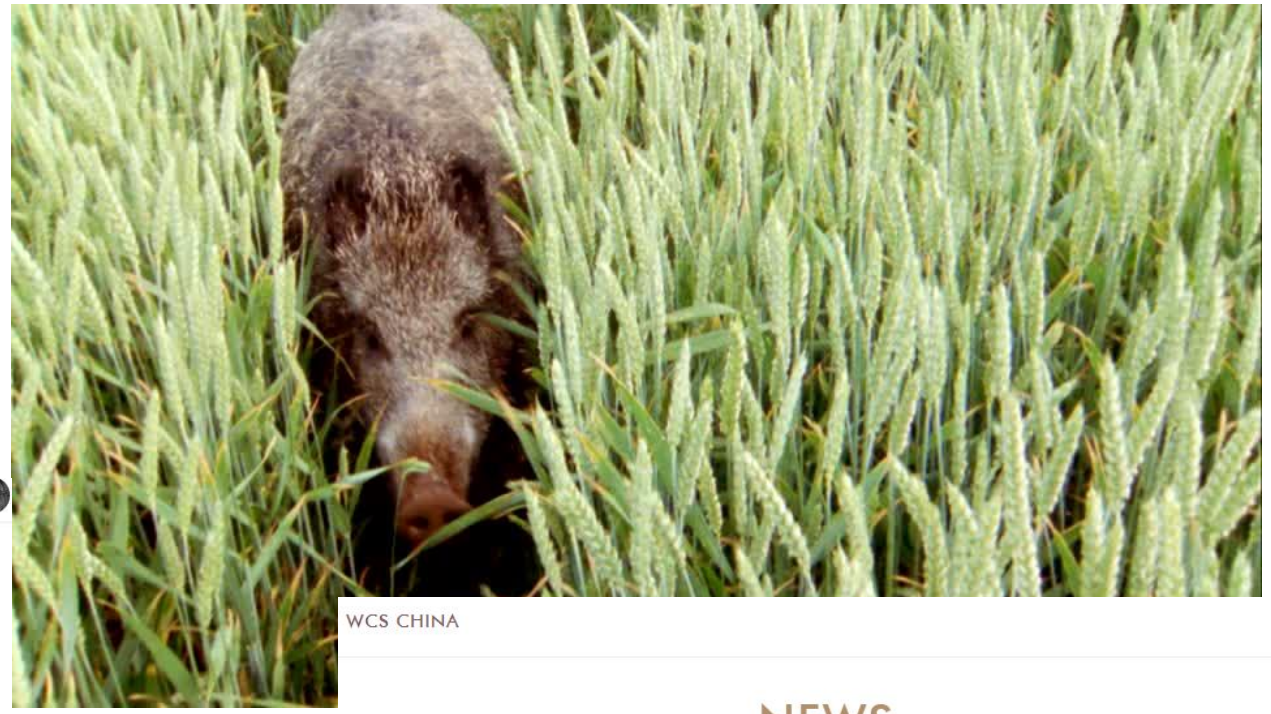
Wild Boar Habitat Suitability in Eurasia



A Cartographic Tool for Managing African Swine Fever in Eurasia: Mapping Wild Boar Distribution Based on the Quality of Available Habitats, Volume: 64, Issue: 6, Pages: 1720-1733, First published: 05 September 2016, DOI: (10.1111/tbed.12559)

Wild Boar in Urbanised Areas

Wild Boar in Rural Areas



WCS CHINA

South China Morning Post

China / Society

Wild boars destroy farmers' crops at village in northern China

Wild boars destroy farmers' crops in northern China

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2

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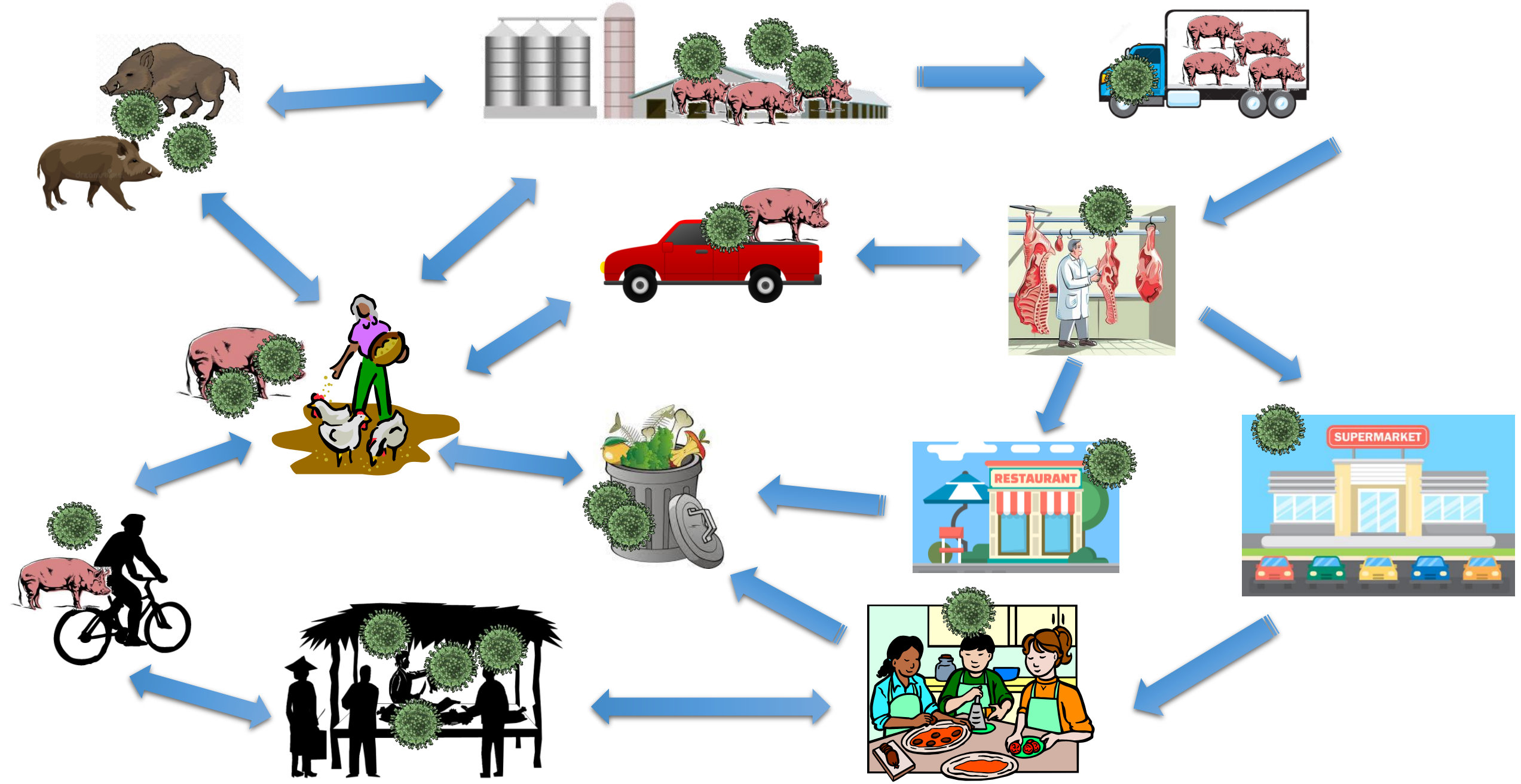
Saving boars or potatoes?

By Ramacandra Wong | December 04, 2013

In Kurt village near Altay city in Xinjiang province, an increasing human-wildlife conflict is threatening the habitat balance. During the past two years farmers have witnessed an increasing frequency of wild boars damaging crops of potatoes in search for food.

Spread of ASF Virus in Food Systems in South, South-East and East Asia



Conclusions

- high tenacity of virus in different matrices, such as blood, faeces, decomposing carcasses and meat
- only affects domestic and wild boar
- clinical progression is slow
- high mortality
- ASFV being maintained within highly complex pork food systems