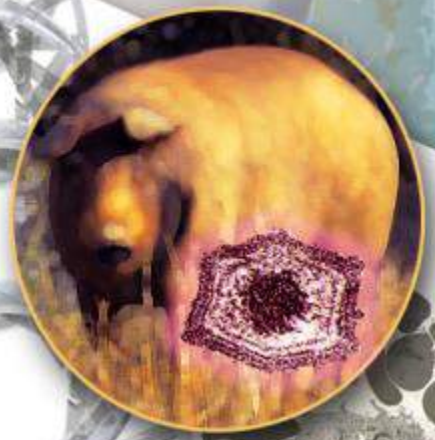


ASF. THE MAIN THREAT OF THE GLOBAL PIG INDUSTRY

Prof. José M. Sánchez- Vizcaíno DVM, Ph.D, Dhc
jmvizcaino@ucm.es
OIE-ASF Reference Laboratory
www.sanidadanimal.info







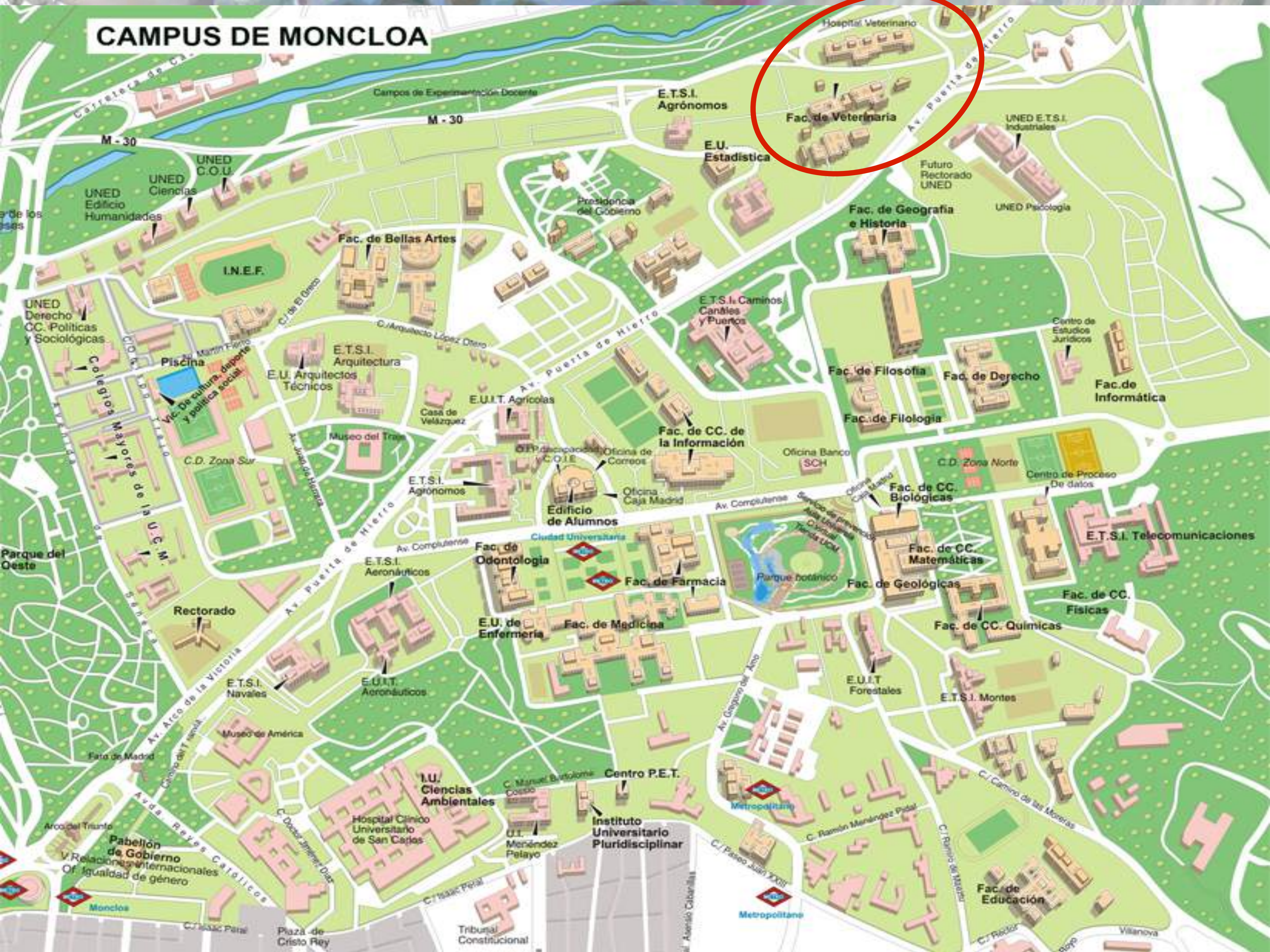


UNIVERSIDAD COMPLUTENSE
MADRID

http://www.ucm.es

SOME INFORMATION

- The Complutense University of Madrid (UCM) is the biggest, oldest (1499) and most complete University in Spain.
- It has 90.000 Students located in two campus.
- With 76 Official Degrees, from four main learning areas: Humanity, Nature and Exact Sciences, Health Sciences and Social Sciences.
- UCM has 20 Faculties, 6 (High Colleges. Universitary Schools) y 184 Departments.
- 9.000 Proffesionals: 6.000 Teachers and researchers, and 3.000 in services and administration.
- Its library, with more than 2 millions of books and more than 40.000 journals, is the biggest of spanish Universities.


CAMPUS DE MONCLOA
Hospital Veterinario
Fac. de Veterinaria
E.T.S.I. Agrónomos
E.U. Estadística
UNED E.T.S.I. Industriales
Futuro Rectorado UNED
UNED Psicología
Campos de Experimentación Docente
M - 30
M - 30
UNED C.O.U.
UNED Ciencias
UNED Edificio Humanidades
Presidencia del Gobierno
Fac. de Geografía e Historia
Fac. de Bellas Artes
I.N.E.F.
UNED Derecho CC. Políticas y Sociológicas
E.T.S.I. Caminos Canales y Puertos
C/Arquitecto López Otero
Av. Puerta de Hierro
Piscina
E.T.S.I. Arquitectura
E.U. Arquitectos Técnicos
Colegios Mayores de la U.C.M.
Vic. De cultura, deporte y política social
Centro de Estudios Jurídicos
Fac. de Filosofía
Fac. de Derecho
Fac. de Informática
E.U.I.T. Agrícolas
Casa de Velázquez
Fac. de Filología
Fac. de CC. de la Información
Museo del Traje
C.D. Zona Sur
Oficina de Correos
C.O.I.E
Oficina Banco SCH
C.D. Zona Norte
Centro de Proceso De datos
E.T.S.I. Agrónomos
Oficina Caja Madrid
Edificio de Alumnos
Av. Complutense
Fac. de CC. Biológicas
E.T.S.I. Telecomunicaciones
Parque del Oeste
Ciudad Universitaria
Fac. de Odontología
E.T.S.I. Aeronáuticos
Fac. de Farmacia
Parque botánico
Fac. de CC. Matemáticas
Fac. de Geológicas
Fac. de CC. Físicas
Rectorado
E.U. de Enfermería
Fac. de Medicina
Fac. de CC. Químicas
E.T.S.I. Navales
E.U.I.T. Aeronáuticos
E.U.I.T Forestales
E.T.S.I. Montes
Av. Arco de la Victoria
Av. Gregorio del Amo
Museo de América
Faro de Madrid
Centro P.E.T.
I.U. Ciencias Ambientales
C/ Camino de las Moreras
Arco del Triunfo
Hospital Clínico Universitario de San Carlos
Metropolitano
C. Ramón Menéndez Pidal
Pabellón de Gobierno
V.Relaciones Internacionales
Of. Igualdad de género
Avda. Reyes Católicos
U.I. Menéndez Pelayo
Instituto Universitario Pluridisciplinar
C/ Paseo Juan XXIII
Fac. de Educación
Moncloa
C/ Isaac Peral
Plaza de Cristo Rey
Tribunal Constitucional
Metropolitano


Galaxia

UNIVERSIDAD COMPLUTENSE
MADRID

COMPLUTENSE UNIVERSITY OF MADRID

FACULTY OF VETERINARY MEDICINE

VISAVET CENTRE

VETERINARY HOSPITAL


FACULTAD DE VETERINARIA
STUDENTS: 1.182
PROFFESOR: 268
78% FEMALE


16 BUILDING
FARM
Dept. animaL PRODUCTION
MAIN BUILDING
Dept. ANIMAL HEALTH
HOSPITAL CLINICS
LECTURE BUILDING A
Dept. ANATOMIA
LECTURE BUILDING B
Dept. BROMATOLOGY
Dept. PHISIOLOGY
Dept. ANIMAL HEALTH
ANIMALS FACILITIES

HOSPITAL AND CLINICS







BSL-3 LABORATORIES

BSL-3 BOXES

MONITORING

- **Video**
- **Environmental conditions**

BSL-2 LABORATORIES

Internarional Reference Laboratories

VISAVET HEALTH SURVEILLANCE CENTRE

UNIVERSIDAD COMPLUTENSE MADRID

www.healthsurveillance.eu

European Union Reference Laboratory for Bovine Tuberculosis

EUROPEAN UNION

EUROPEAN COMMISSION

Commission Regulation (EC) No 737/2008
July 1st, 2008

OIE Reference Laboratory for African Swine Fever

WORLDWIDE

WORLD ORGANISATION FOR ANIMAL HEALTH

January 1st, 2007

OIE Reference Laboratory for African Horse Sickness

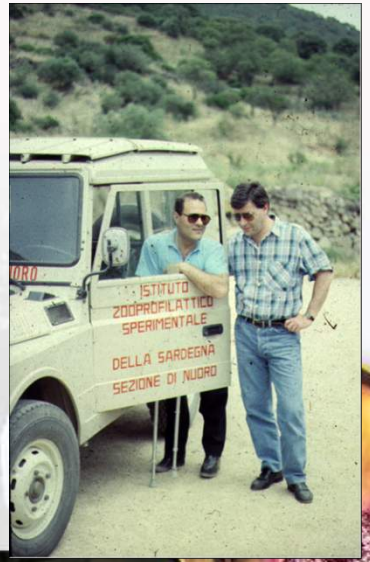
WORLDWIDE

WORLD ORGANISATION FOR ANIMAL HEALTH

January 1st, 2007


CENTRO DE VIGILANCIA SANITARIA VETERINARIA
VISAVET

ASFV: A old friend 1978-



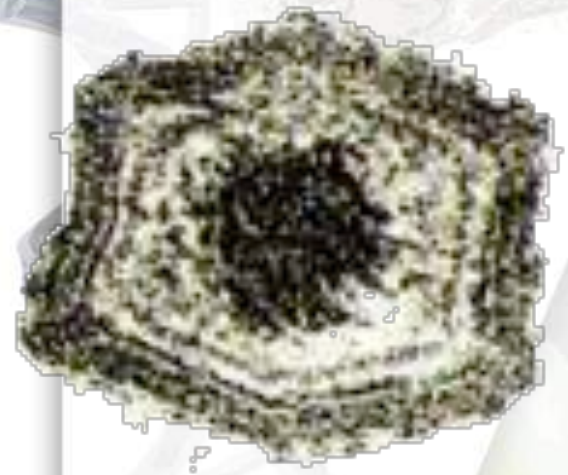
MAIN CONTRIBUTION:
DEVELOPMENT OF DIAGNOSIS TEST & REAGENTS
EPIDEMIOLOGY-CONTROL and ERADICATION MODELS

AGENDA :

- Why is ASF different
- ASF Epidemiological evolution and update
- The risk for the pig industry
- Future Challenges and Control Measures

WHY IS ASF DIFFERENT?

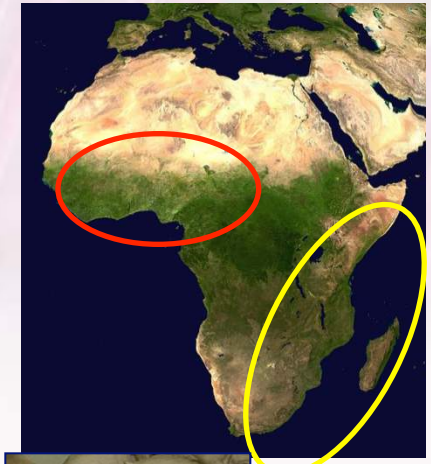
THE VIRUS



THE HOST

NO VACCINE

SCENARIOS



ASF. The most complex disease of swine

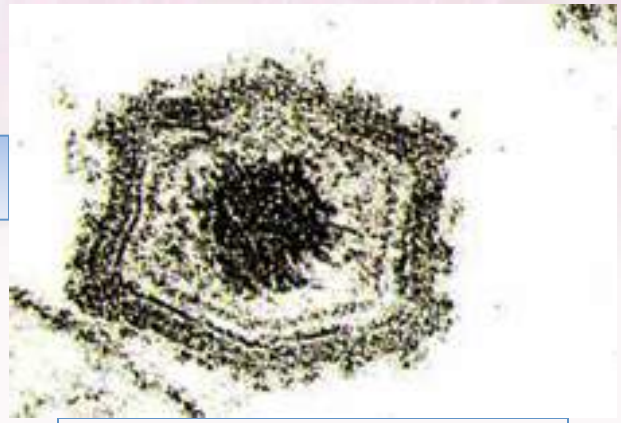
Very complex virus, big syze, large genome: 170-190 kb

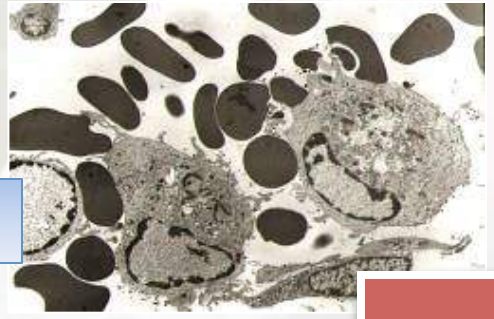
Very complex molecular structure

Genetic variability

Replication in macrophages

NO production of neutralizing antibodies





200 nm
DNA 170 to 190 Kb
More than 100 structural and infection proteins

22 genotypes (VP72)
ONLY TYPE II&I (OUT AFRICA)

Lack of effective vaccine
Lack of a complete protection

ASF VACCINE

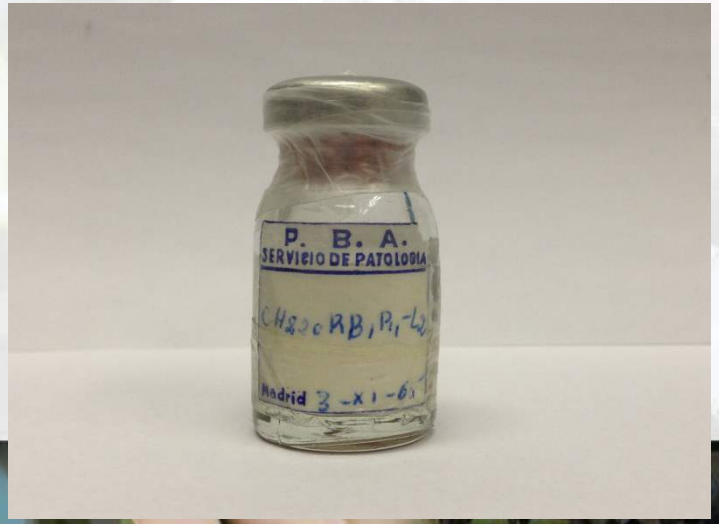
Many trials have been done in the last decades looking for an effective and safe vaccine against ASFV:

1. **INACTIVATED VACCINES** → **Ab response NO PROTECTION**
2. **ATTENUATED VACCINES** → **Ab + cytotoxic specific CD8**

→**PROTECTION** against homologous & heterologous strains BUT

→ **SAFETY PROBLEMS (Virus in tissue)**, No long term studies

ASF VACCINE: Spain1965



ASF VACCINE

3. **SUBUNIT VACCINES** → very poor, **PARTIAL PROTECTION OF DEAD** but SAFE ALTERNATIVE

4. **DNA VACCINES** → **PARTIAL PROTECTION** with some candidates

→ Different expression vectors (plasmids, Bacman…)

→Enhance CD8 response with no Ab protection

ANTIBODIES and CITOTOXIC CD8 (T cells)
ARE RELATED WITH PROTECTION

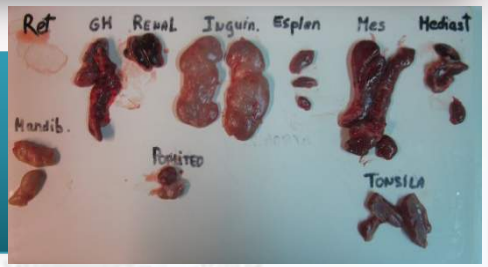
Ab CHRONIC FORMS IN ENDEMIC AREAS

MORE RESEARCH IS NEEDED

Eradication without vaccine is possible but not easy…

DIFFERENT CLINICAL FORMS

In **Africa** → 22 genotypes / Hyper-acute-acute-sub-acute forms
In **East Europe** → genotype II /only acute isolates are circulanting



SYMPTOMS and LESIONS
Only Fever and Dead

Asf infection usually isn't start as an explosive infection

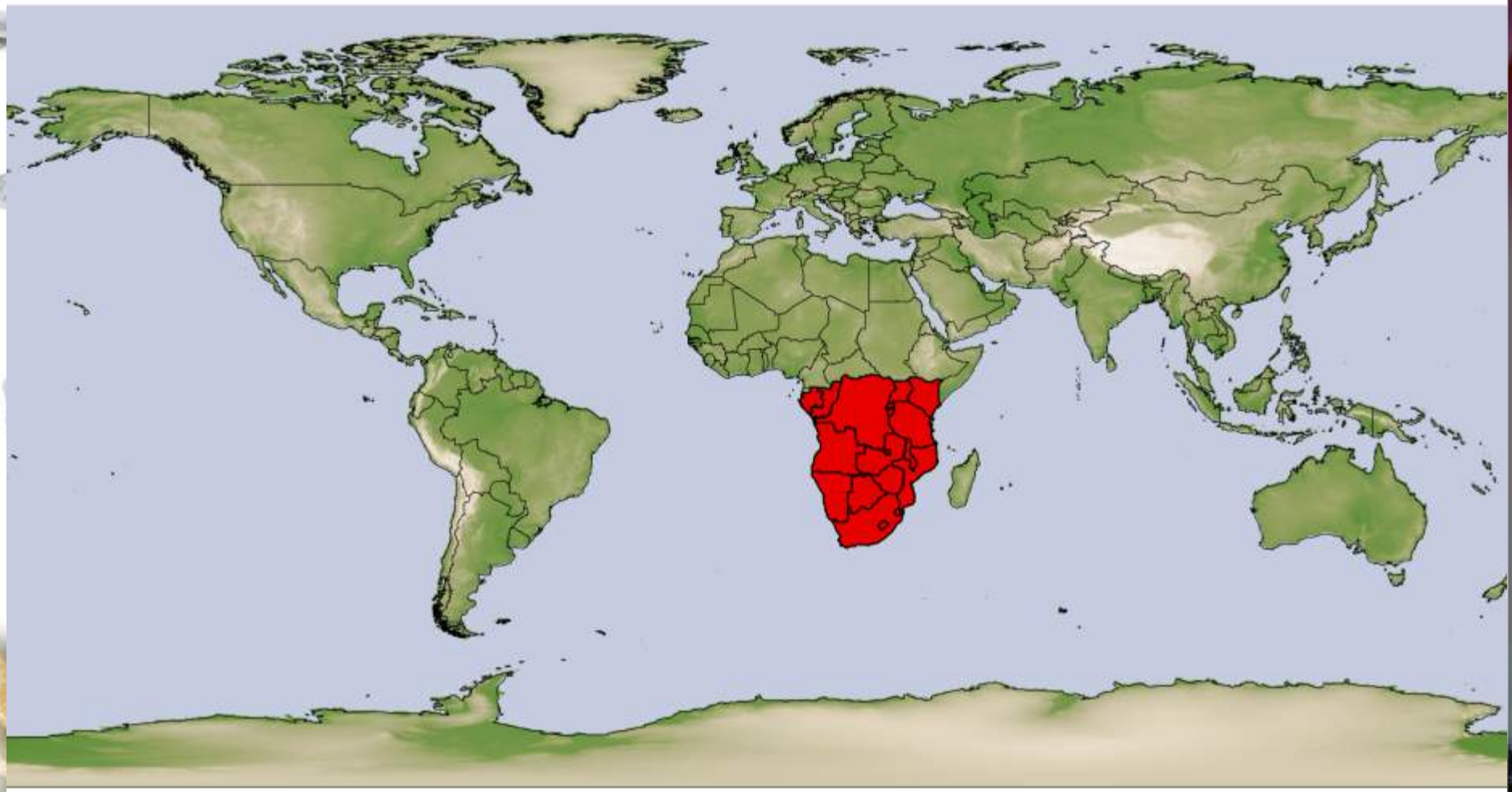
Clinical Signs: Easily Confused with:

- ✓ Classical Swine Fever
- ✓ Erisip
- ✓ Salm
- ✓ Other
- ✓ PDNS

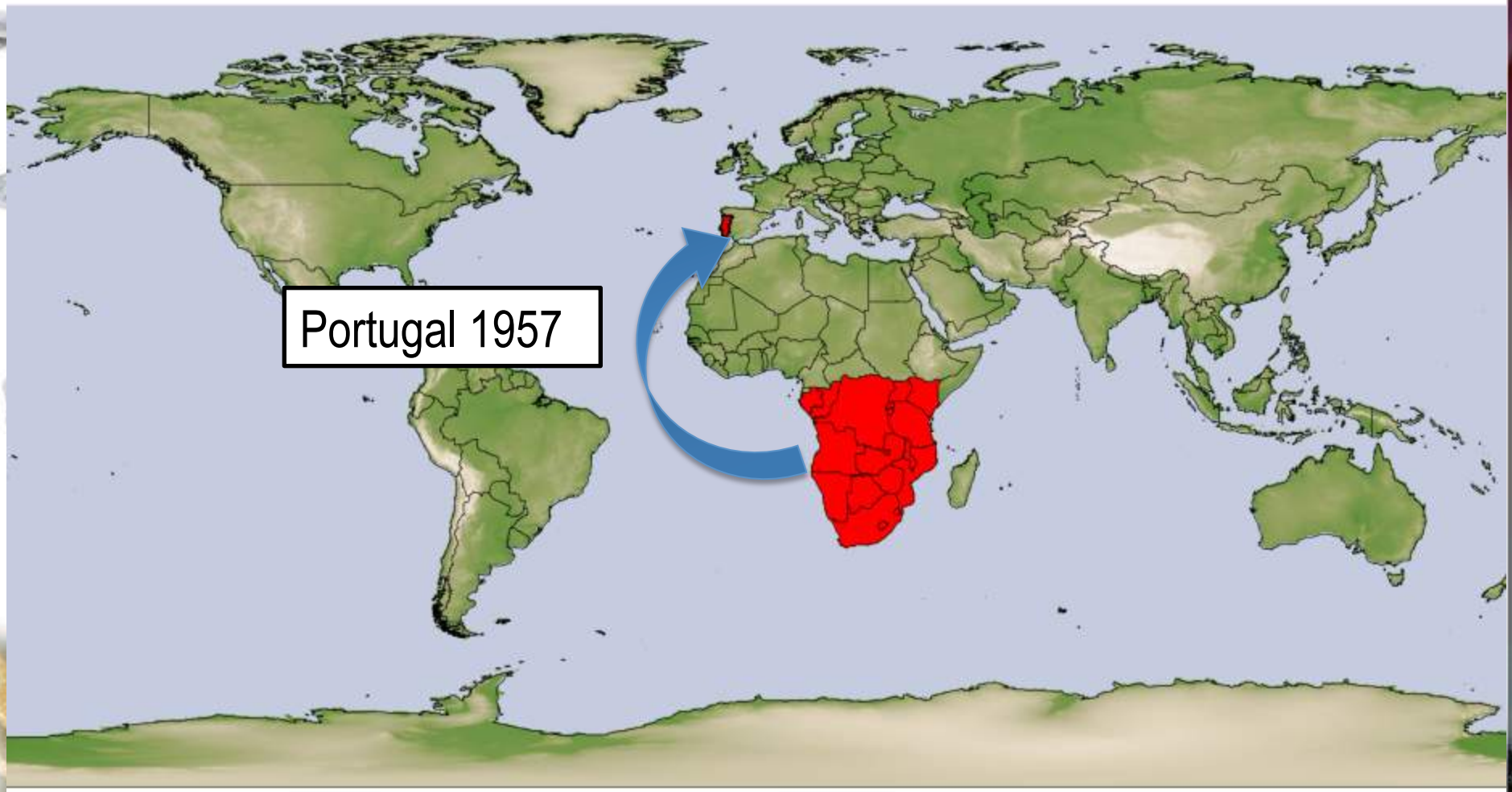
LABORATORY DIAGNOSIS IS NEEDED!!!

NON-IDENTICAL TO EXPERIMENTAL CASES

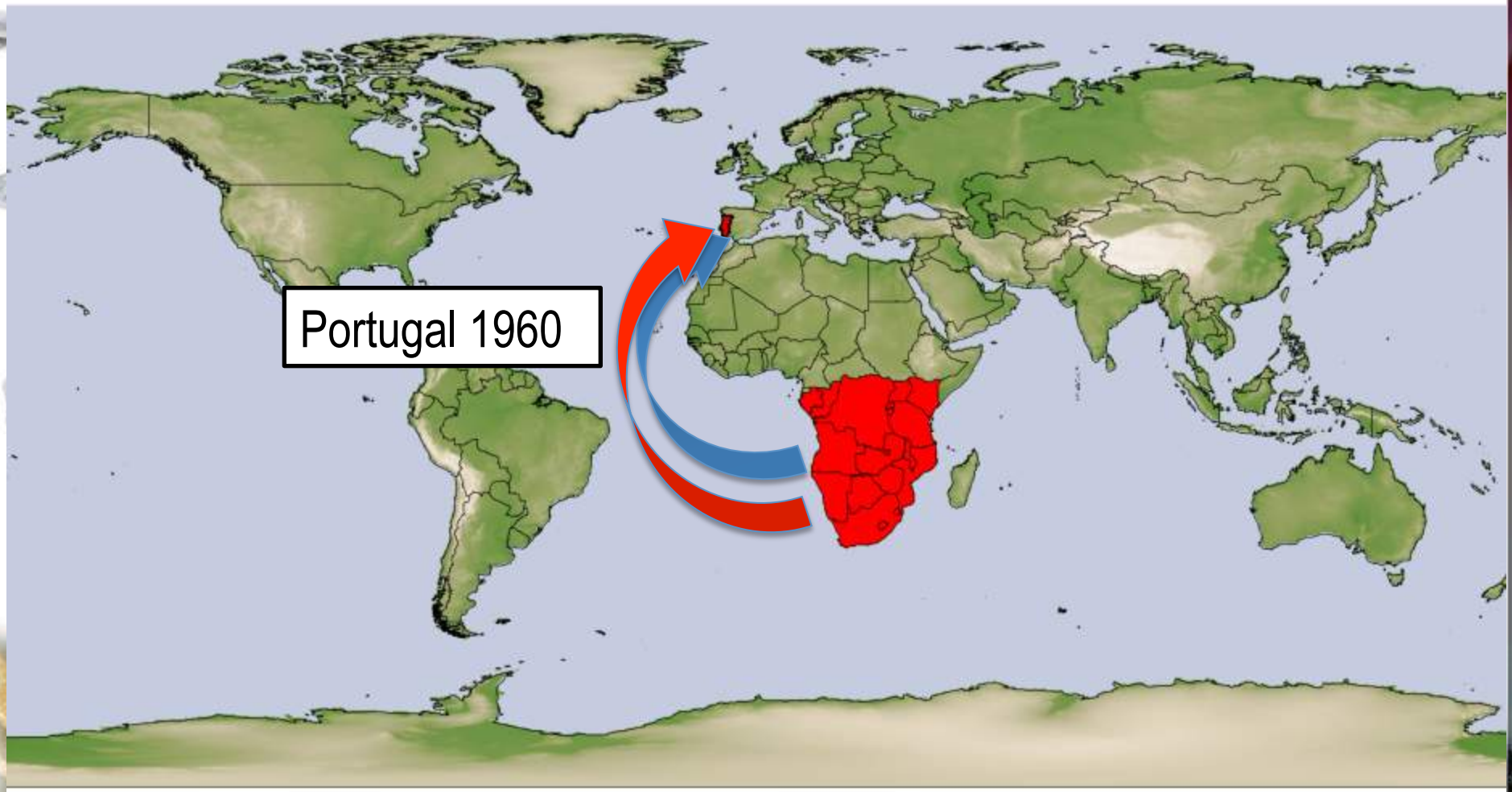
ASF EPIDEMIOLOGY: historical evolution



ASF EPIDEMIOLOGY: historical evolution

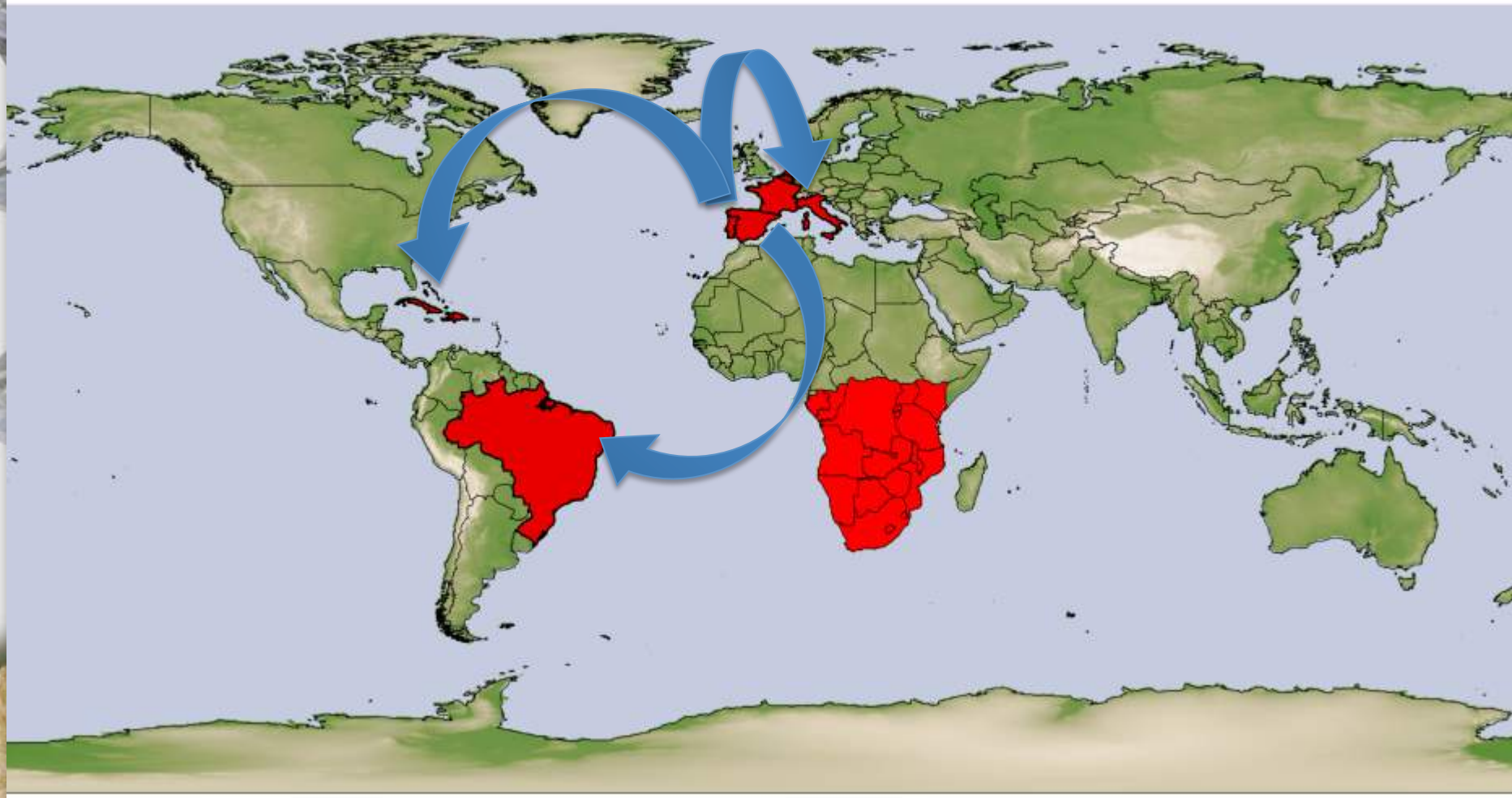


ASF EPIDEMIOLOGY: historical evolution



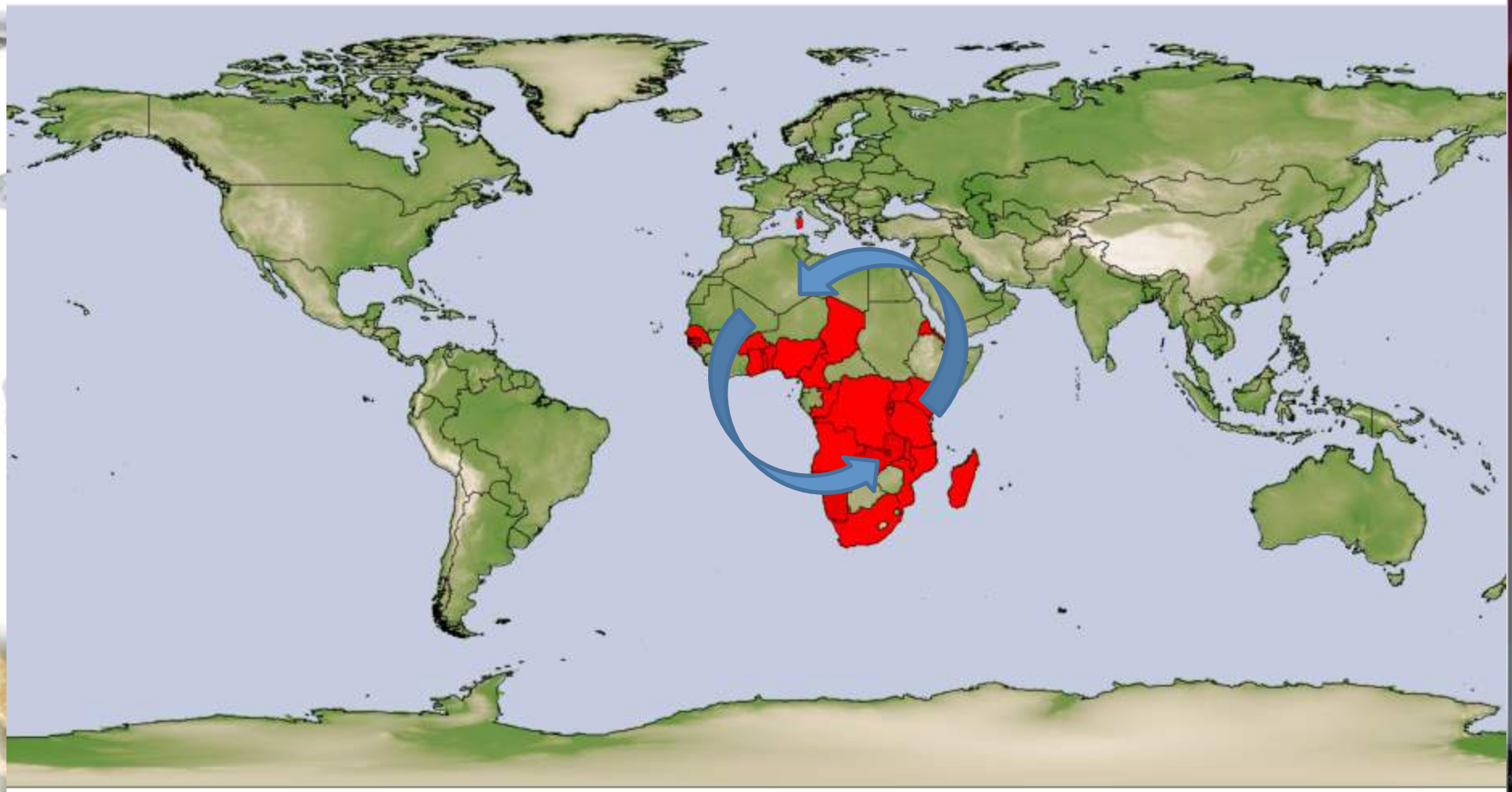
ASF EPIDEMIOLOGY: historical evolution

1960s, 1980s



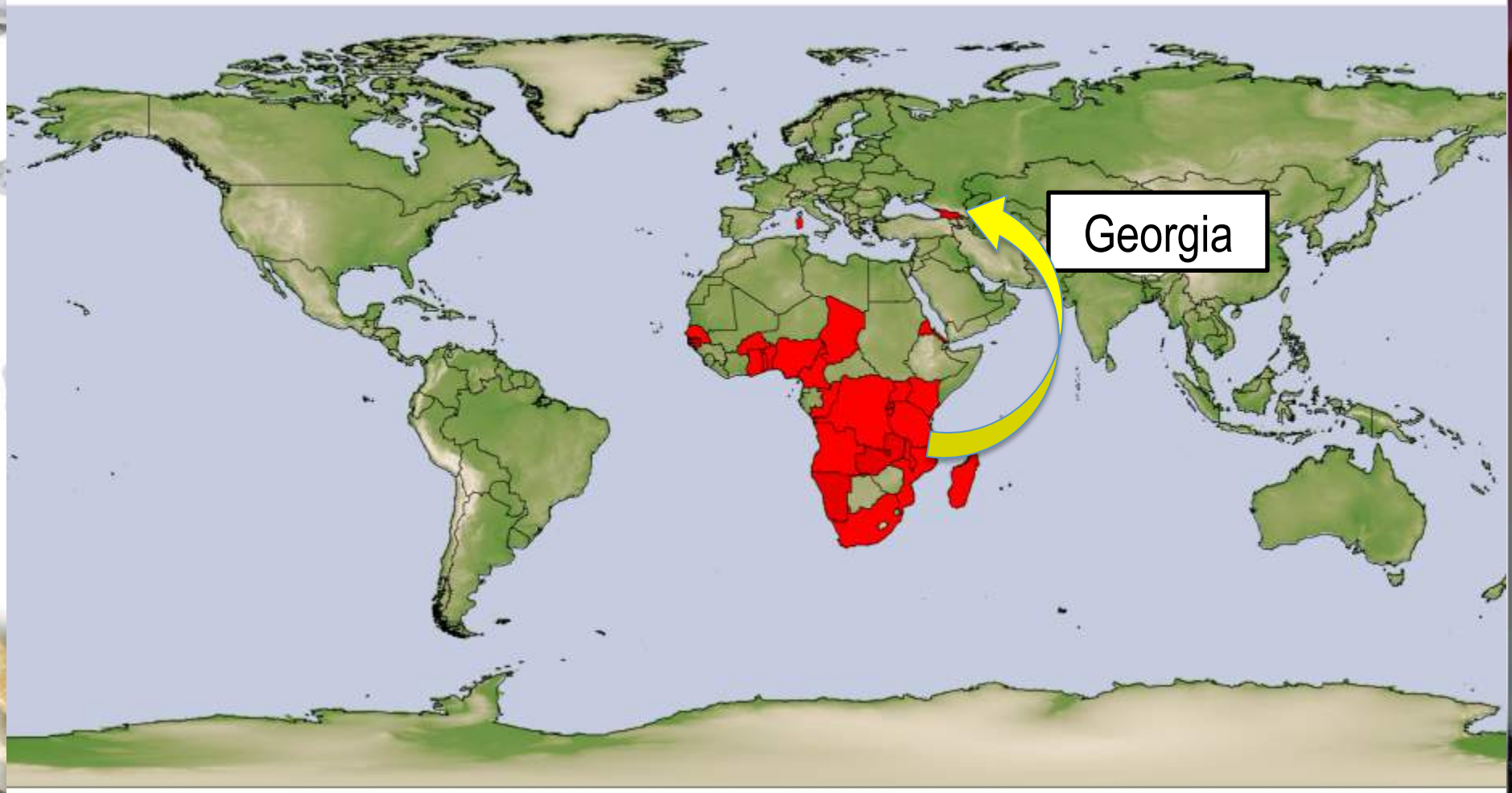
ASF EPIDEMIOLOGY: historical evolution

1990s-2000s African spread



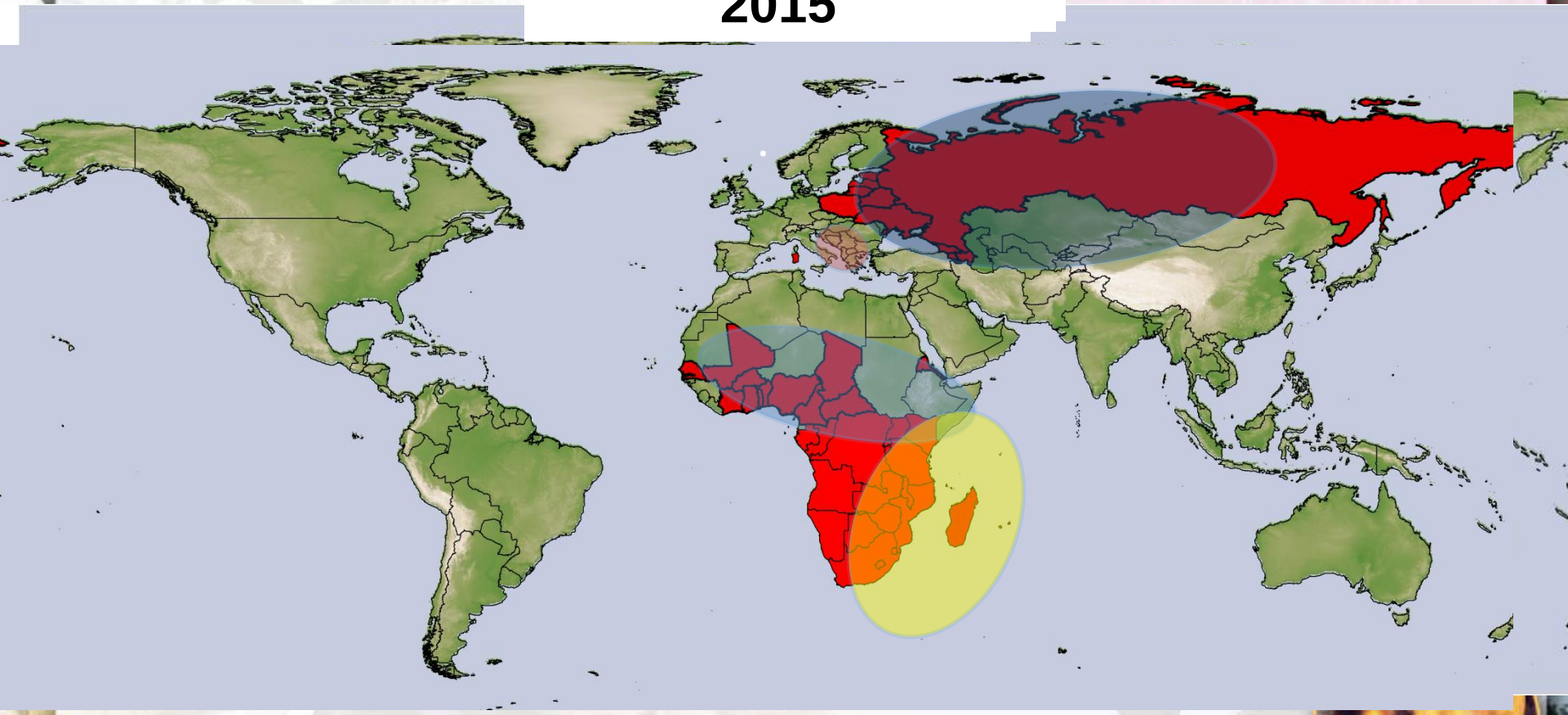
ASF EPIDEMIOLOGY: historical evolution

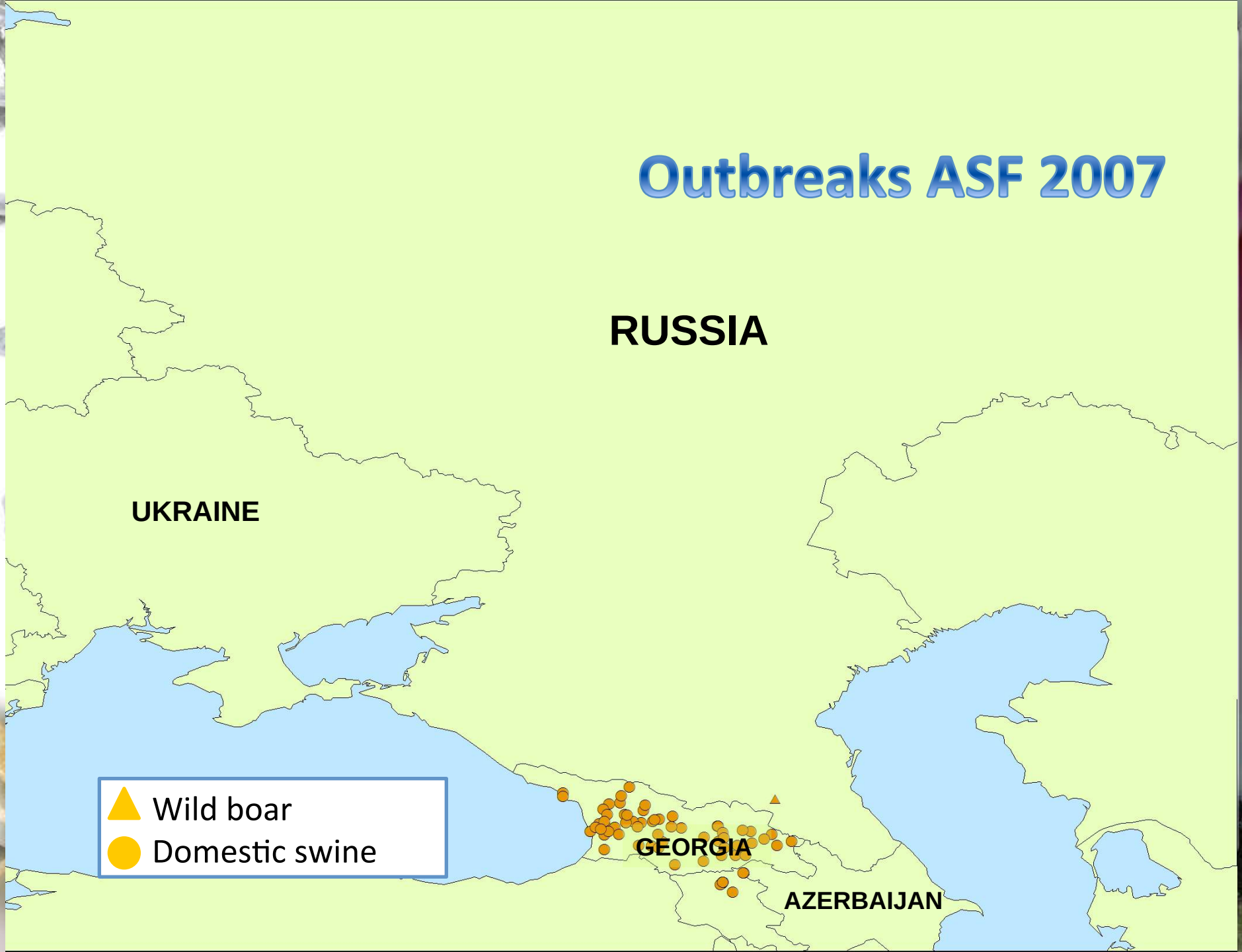
2007

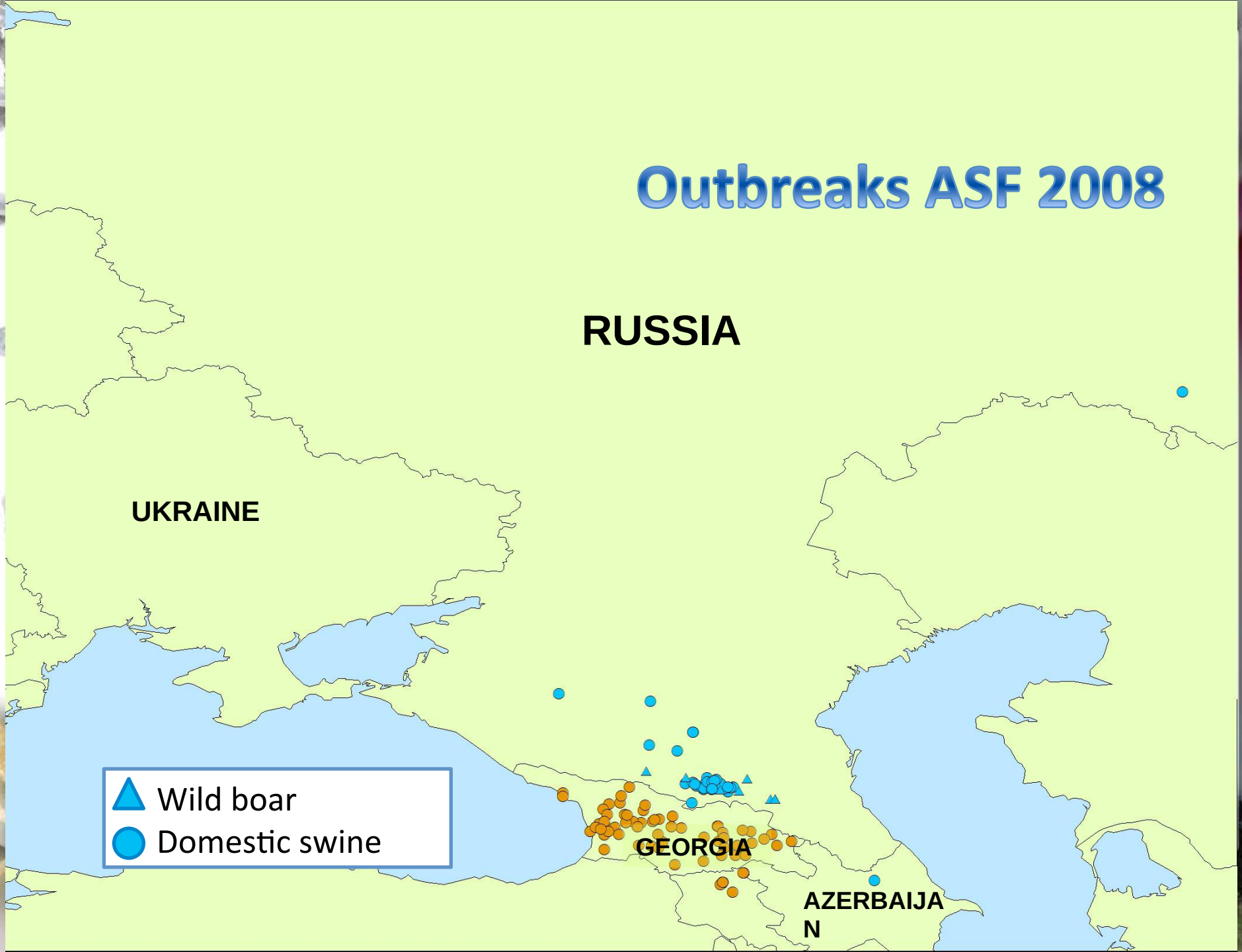


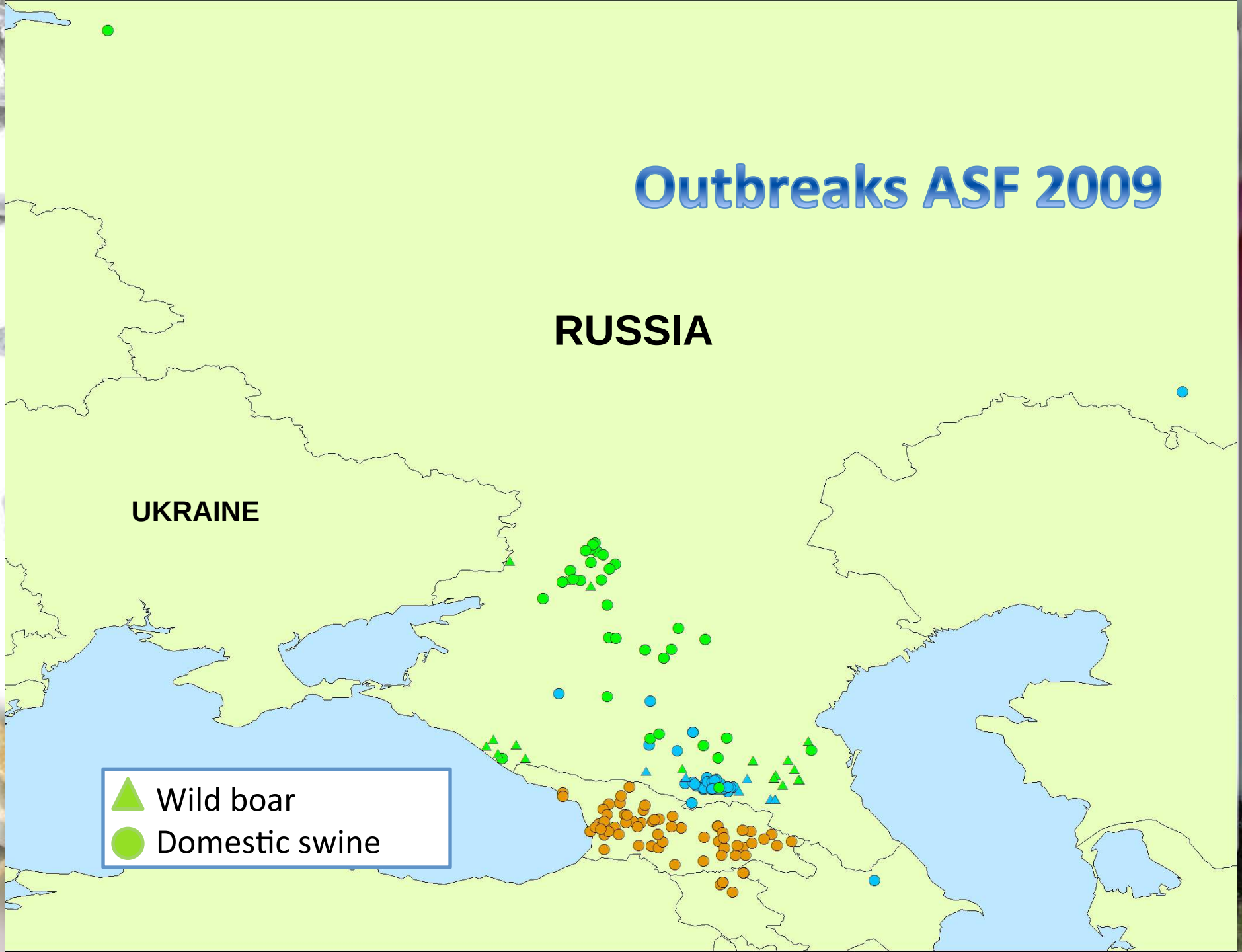
ASF: historical evolution

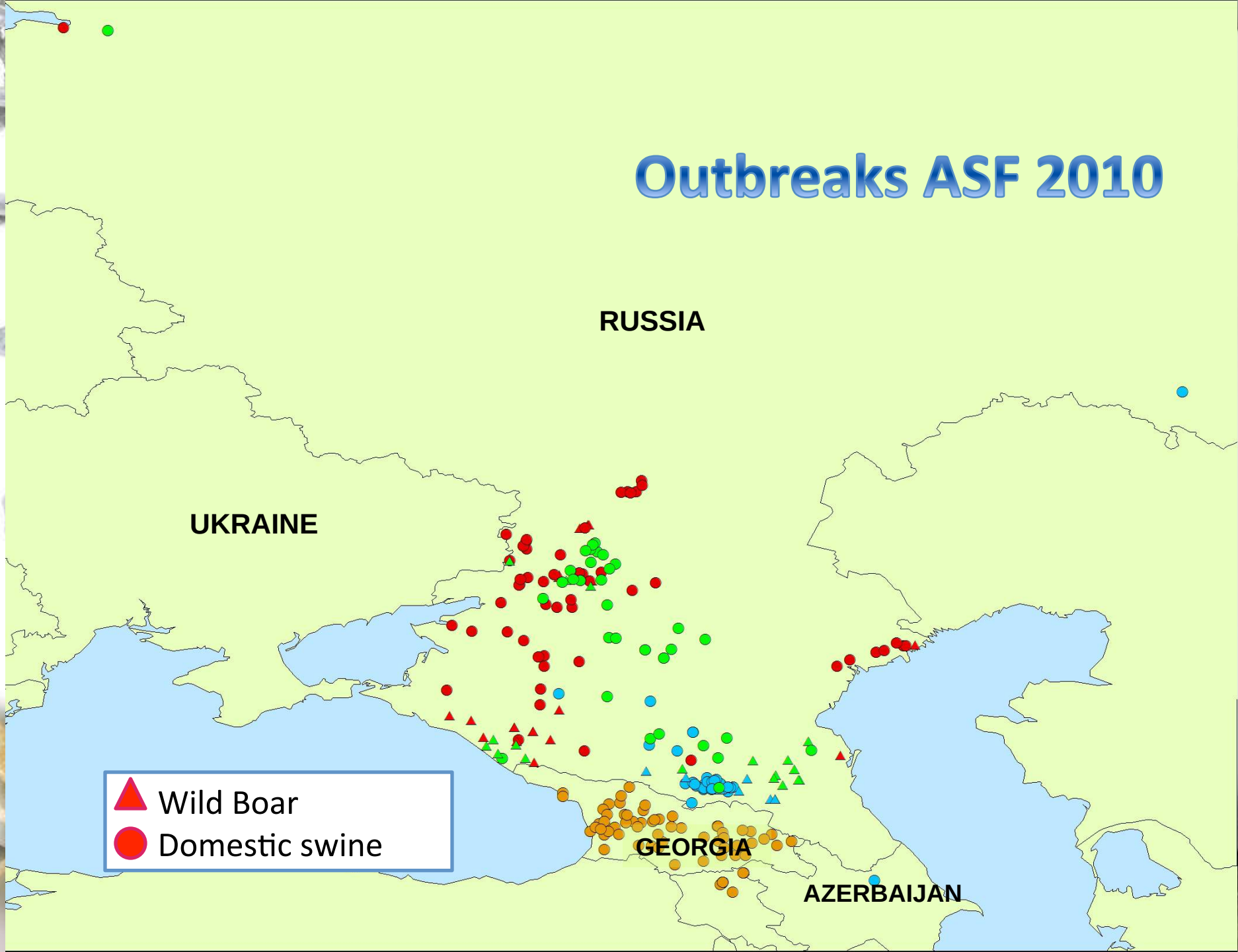
2015

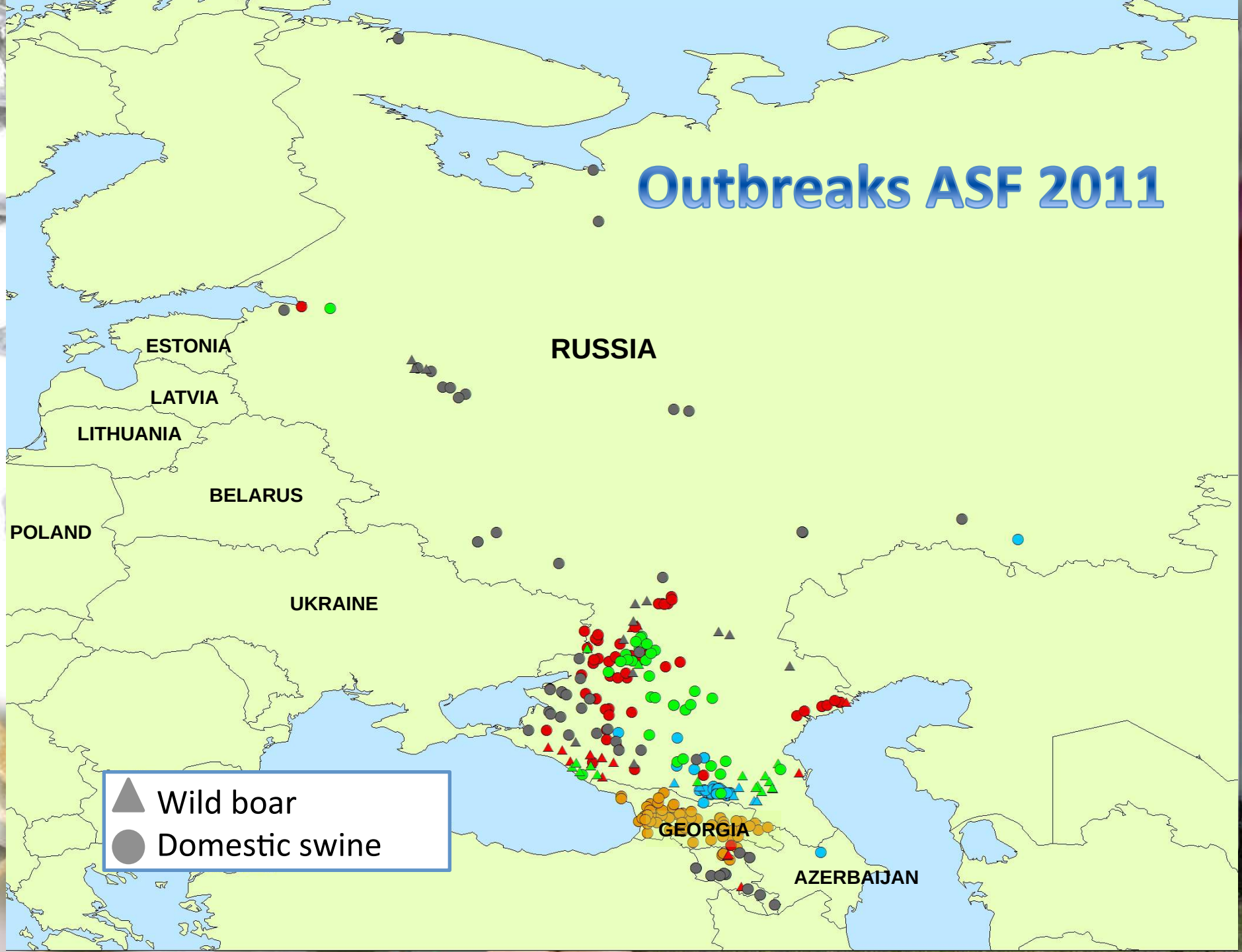


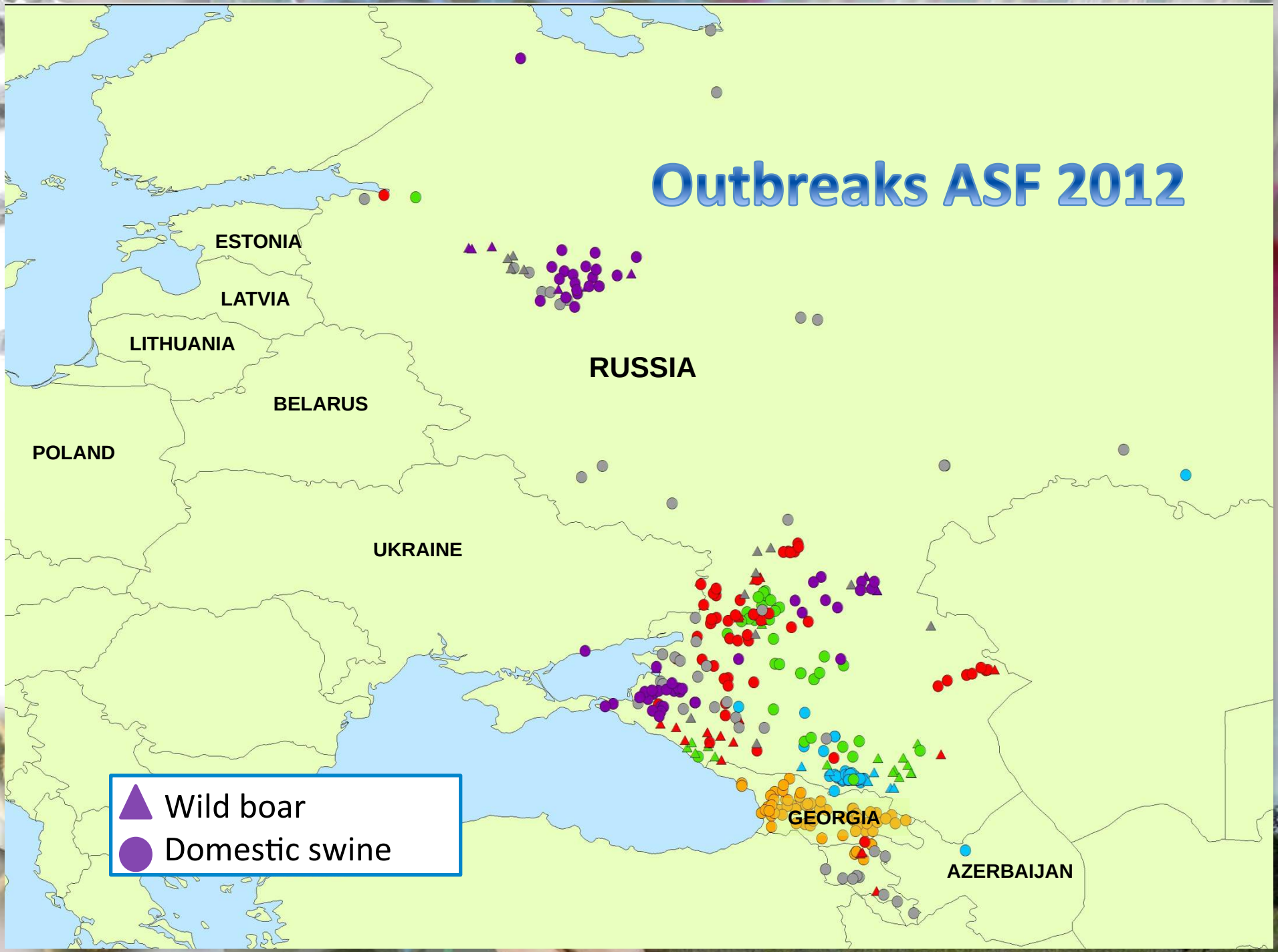

Outbreaks ASF 2007
RUSSIA
UKRAINE
GEORGIA
AZERBAIJAN
Wild boar
Domestic swine


Outbreaks ASF 2008
RUSSIA
UKRAINE
GEORGIA
AZERBAIJAN
Wild boar
Domestic swine


Outbreaks ASF 2009
RUSSIA
UKRAINE
Wild boar
Domestic swine


Outbreaks ASF 2010
RUSSIA
UKRAINE
GEORGIA
AZERBAIJAN
Wild Boar
Domestic swine


Outbreaks ASF 2011
ESTONIA
RUSSIA
LATVIA
LITHUANIA
BELARUS
POLAND
UKRAINE
GEORGIA
AZERBAIJAN
Wild boar
Domestic swine


Outbreaks ASF 2012
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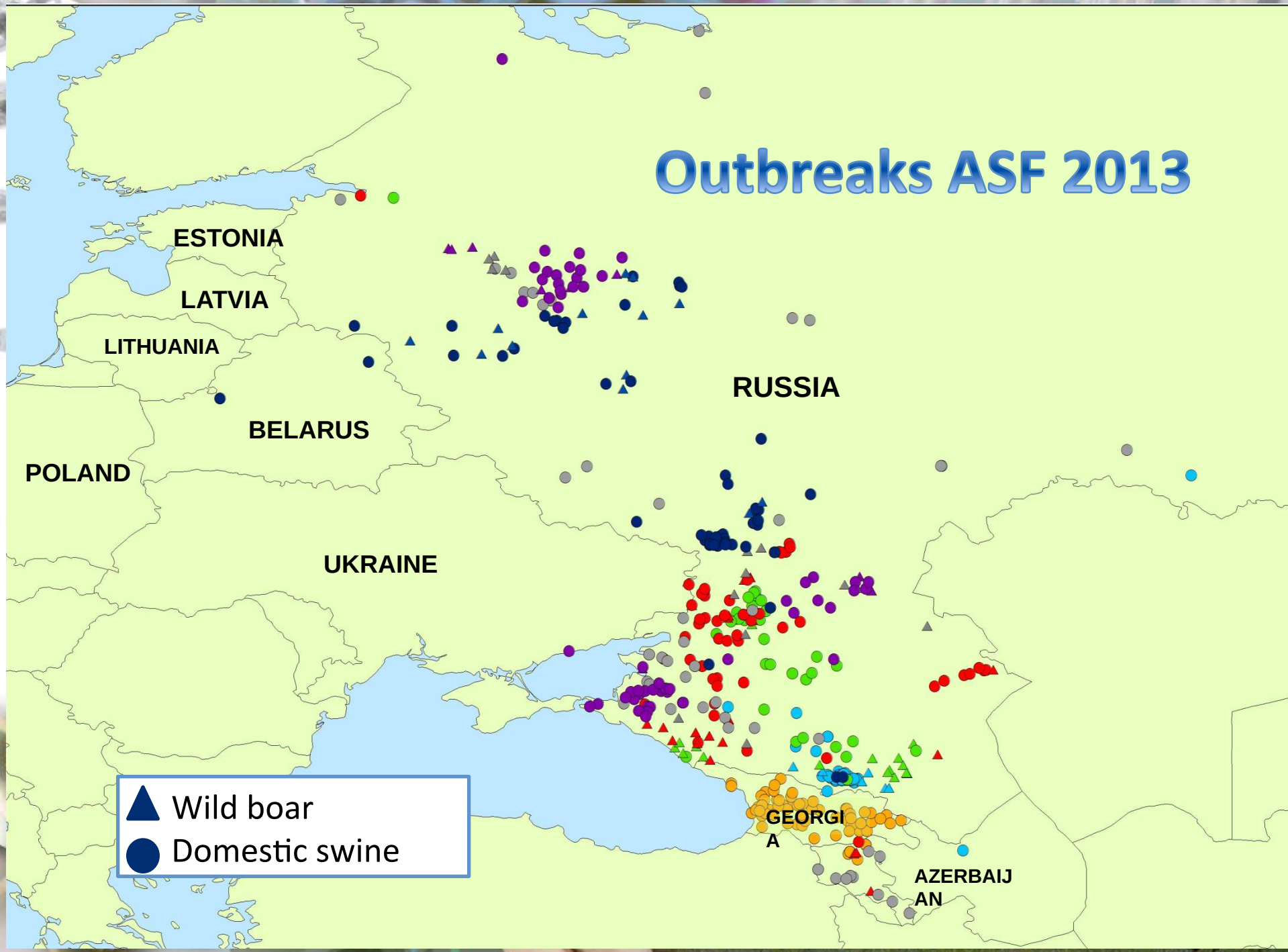
POLAND
UKRAINE
GEORGIA
AZERBAIJAN
Wild boar
Domestic swine


Outbreaks ASF 2013
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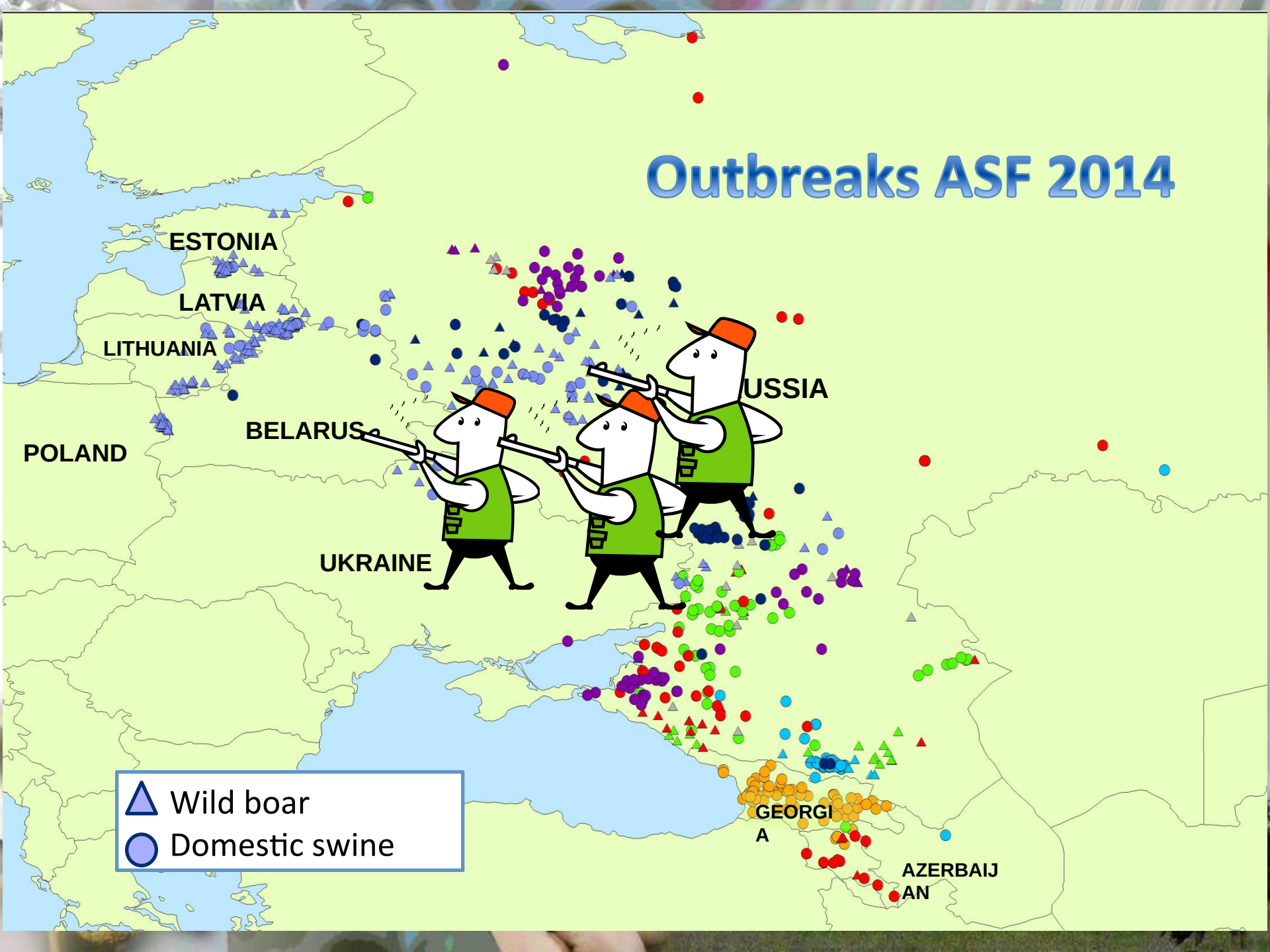
LATVIA
LITHUANIA
RUSSIA
BELARUS
POLAND
UKRAINE
GEORGIA
AZERBAIJAN
Wild boar
Domestic swine


Outbreaks ASF 2014
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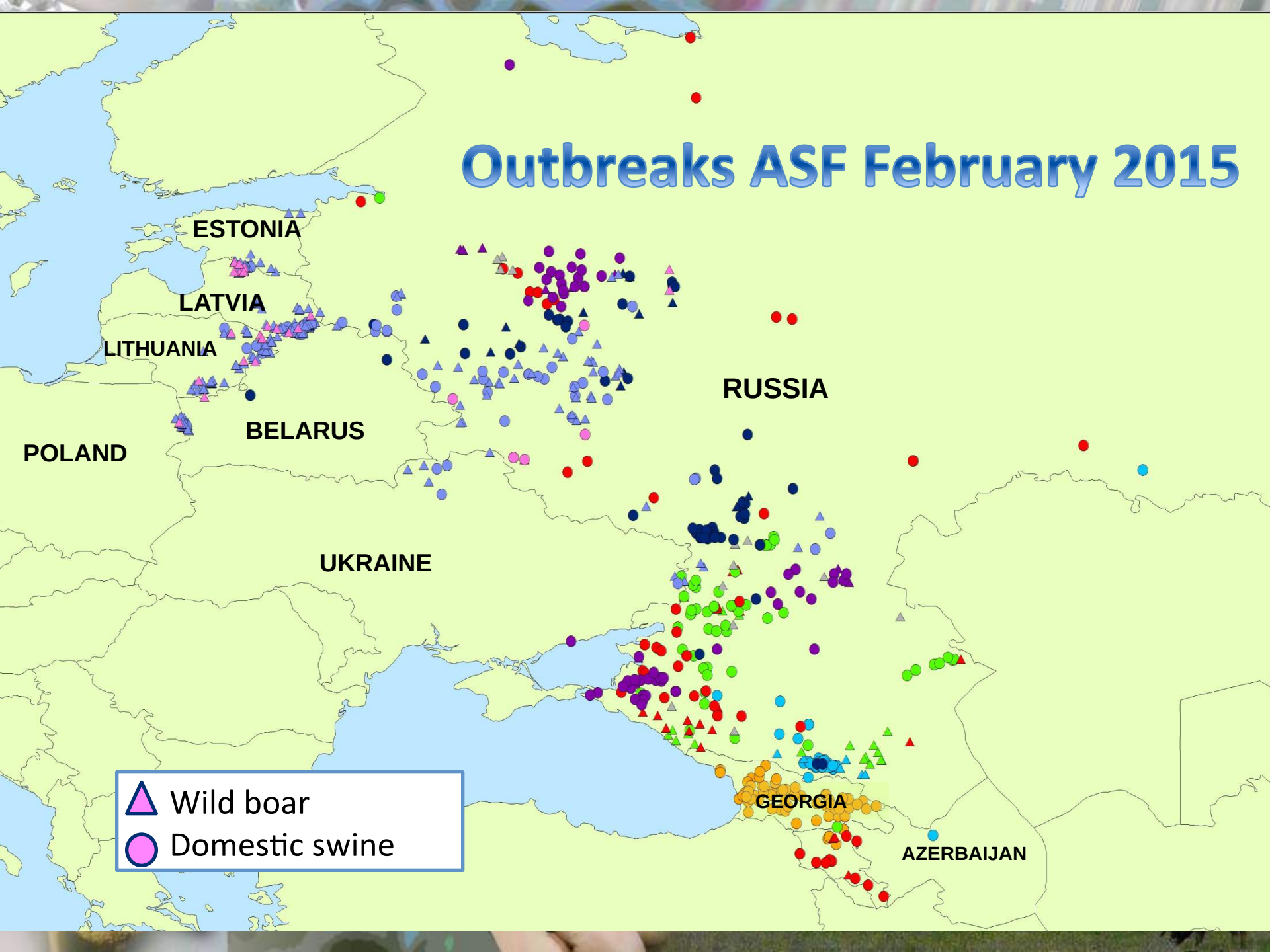
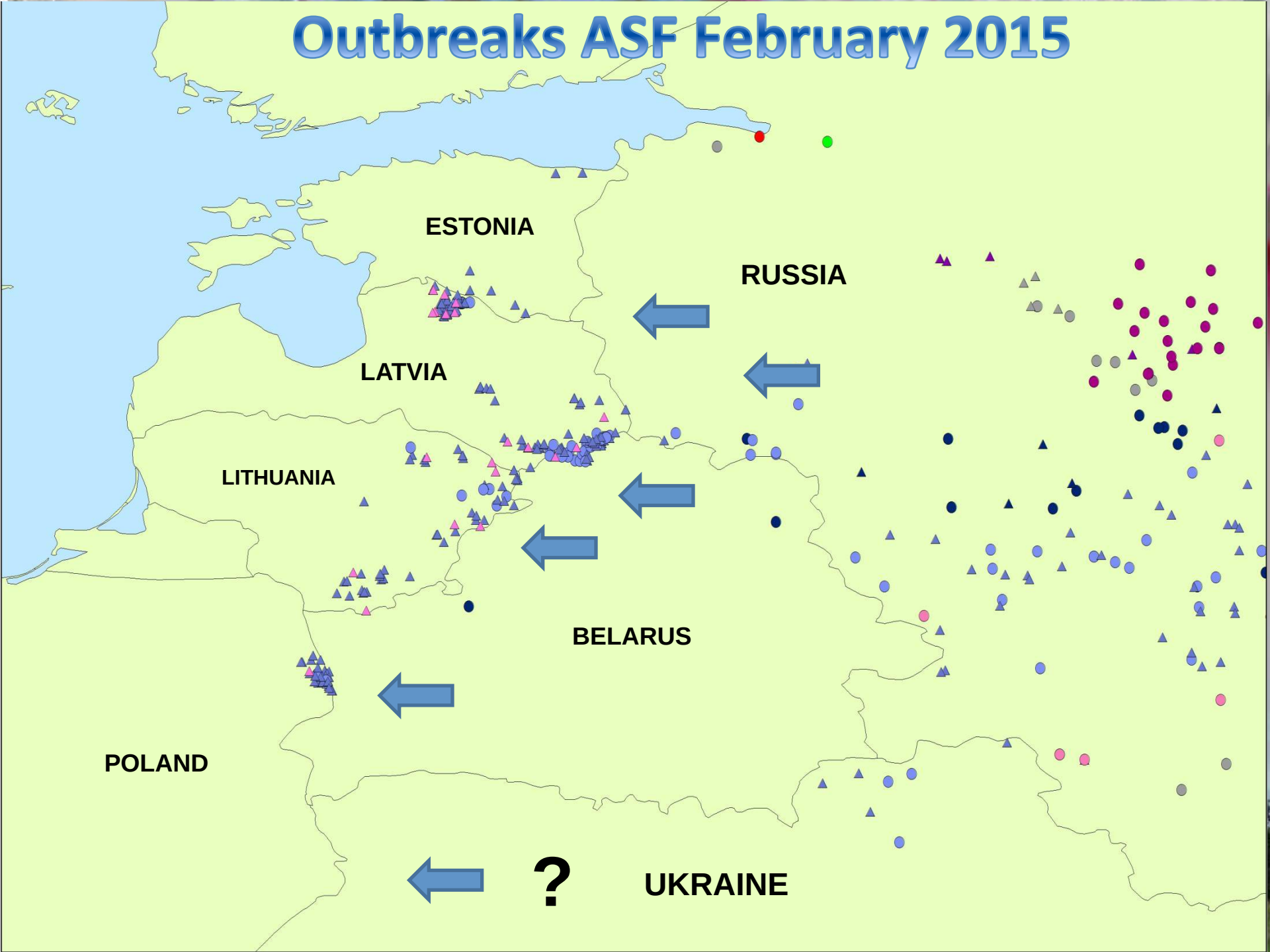
LATVIA
LITHUANIA
POLAND
BELARUS
USSIA
UKRAINE
GEORGI
A
AZERBAIJ
AN
Wild boar
Domestic swine


Outbreaks ASF February 2015
ESTONIA
LATVIA
LITHUANIA
BELARUS
POLAND
RUSSIA
UKRAINE
GEORGIA
AZERBAIJAN
Wild boar
Domestic swine


Outbreaks ASF February 2015
ESTONIA
RUSSIA
LATVIA
LITHUANIA
BELARUS
POLAND
?
UKRAINE

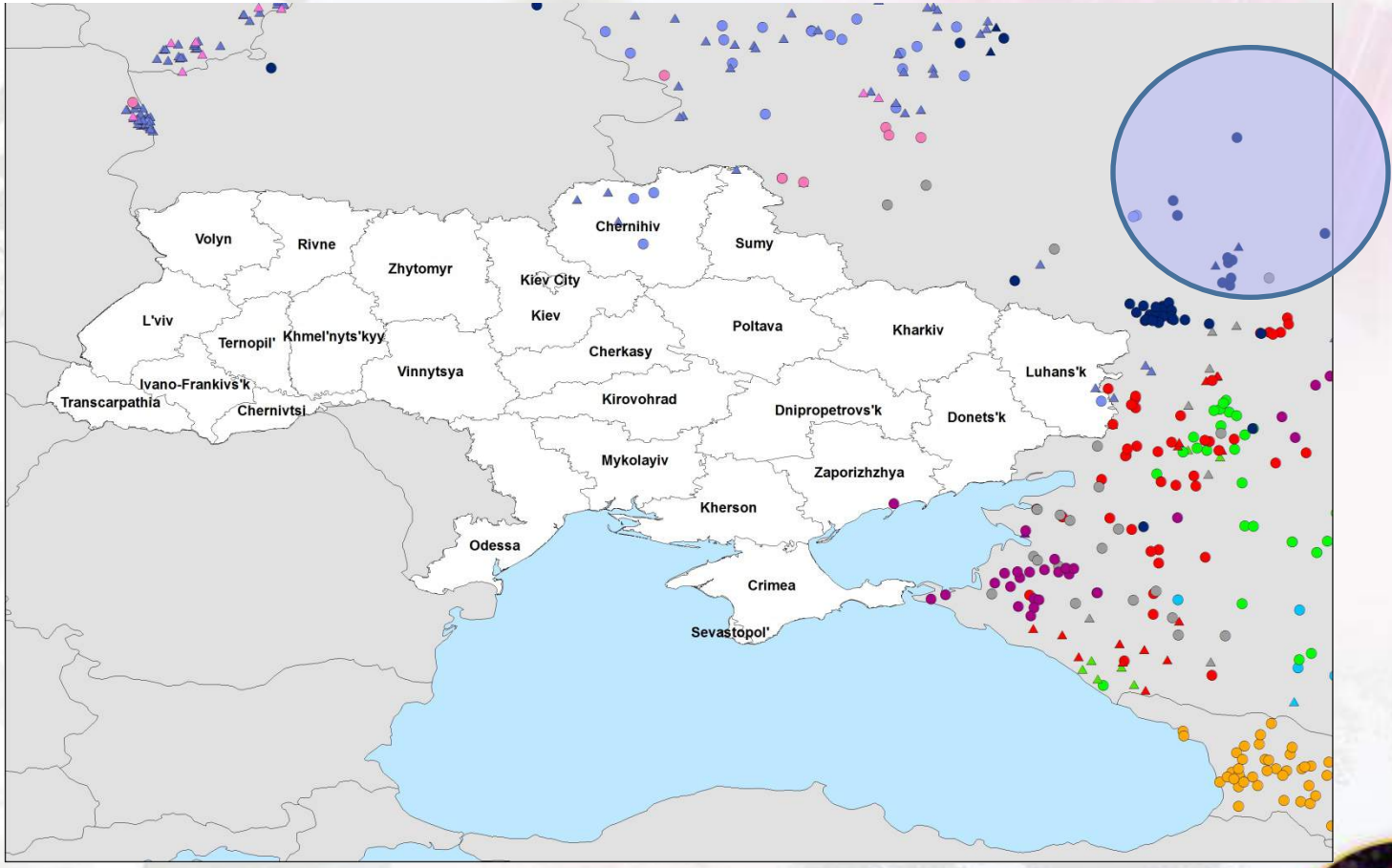
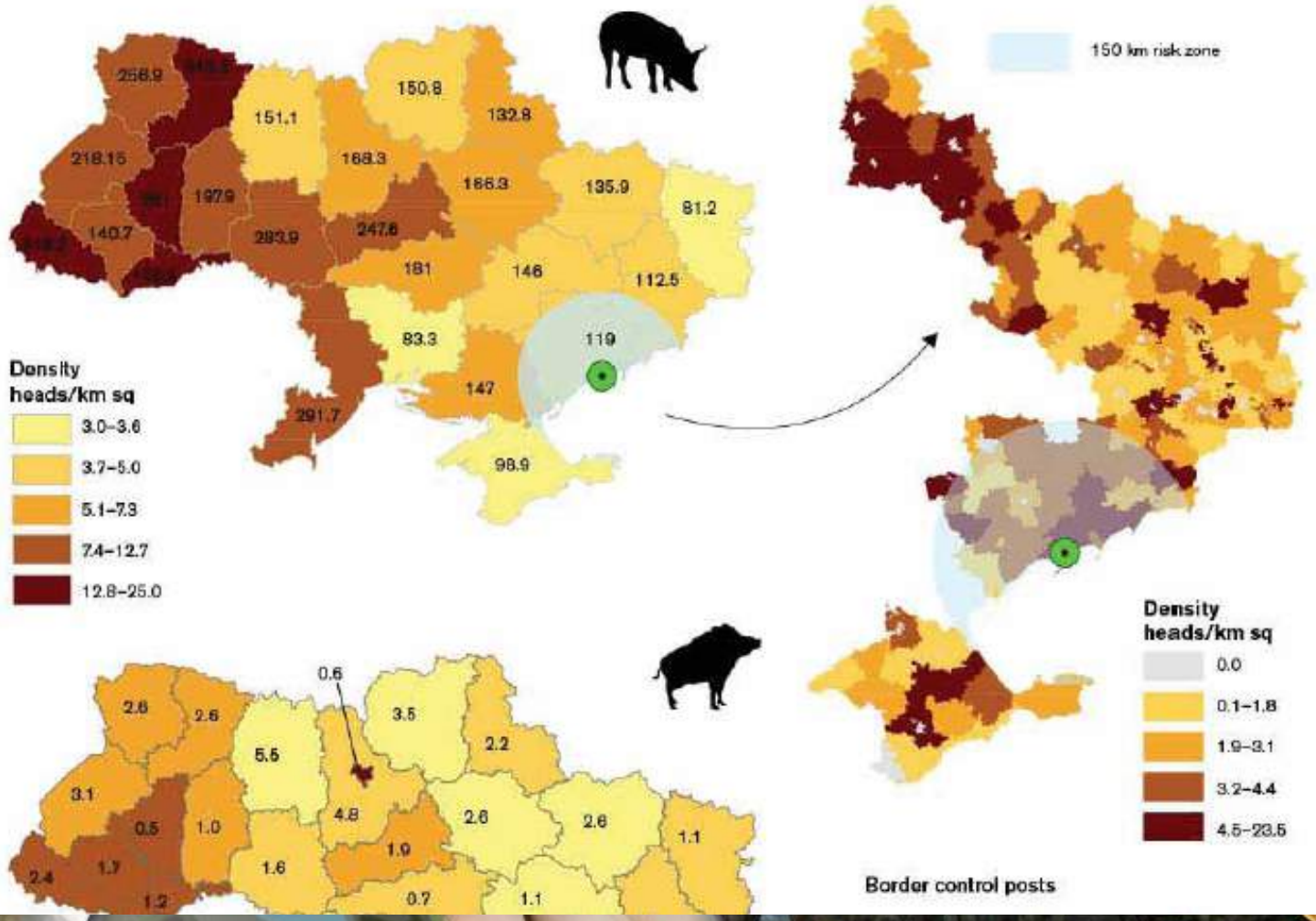

Volyn
Rivne
Zhytomyr
Chernihiv
Sumy
Kiev City
Kiev
L'viv
Ternopil'
Khmel'nyts'kyy
Poltava
Kharkiv
Cherkasy
Vinnytsya
Luhans'k
Ivano-Frankivs'k
Transcarpathia
Chernivtsi
Kirovohrad
Dnipropetrovs'k
Donets'k
Mykolayiv
Zaporizhzhya
Kherson
Odessa
Crimea
Sevastopol'

Figure 9. Distribution of ASF-susceptible populations and location of the most recent virus introduction in Ukraine in 2012.

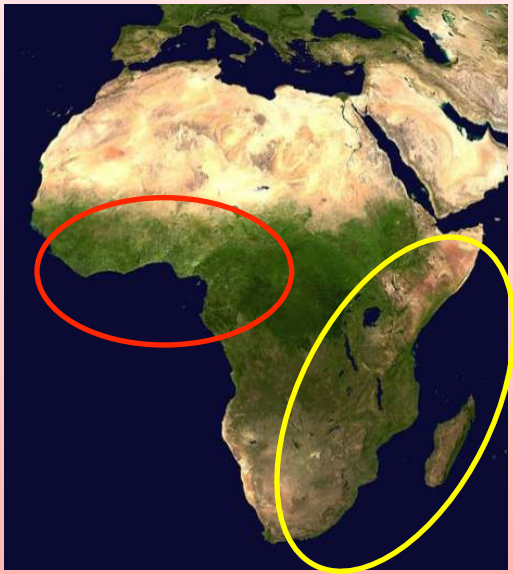
Left side, top to bottom: density of pigs in the LB sector (2011); density and numbers of wild boar (2007); and density of pigs in the HB sector (2011) by Oblast. Figures are population estimates (thousands). Right side, top to bottom: density of pigs at the resolution of the second administrative division level in eastern Ukraine in the LB sector with 150 km risk zone and in the HB sector with border control posts. The two right side maps include the districts and municipalities of Sumy, Kharkiv, Luhansk, Donetzk, Zaporizhzhya and Crimea Autonomous Republic.
Data: National Authorities, 2010. Note that all classification schemes on the maps are different.



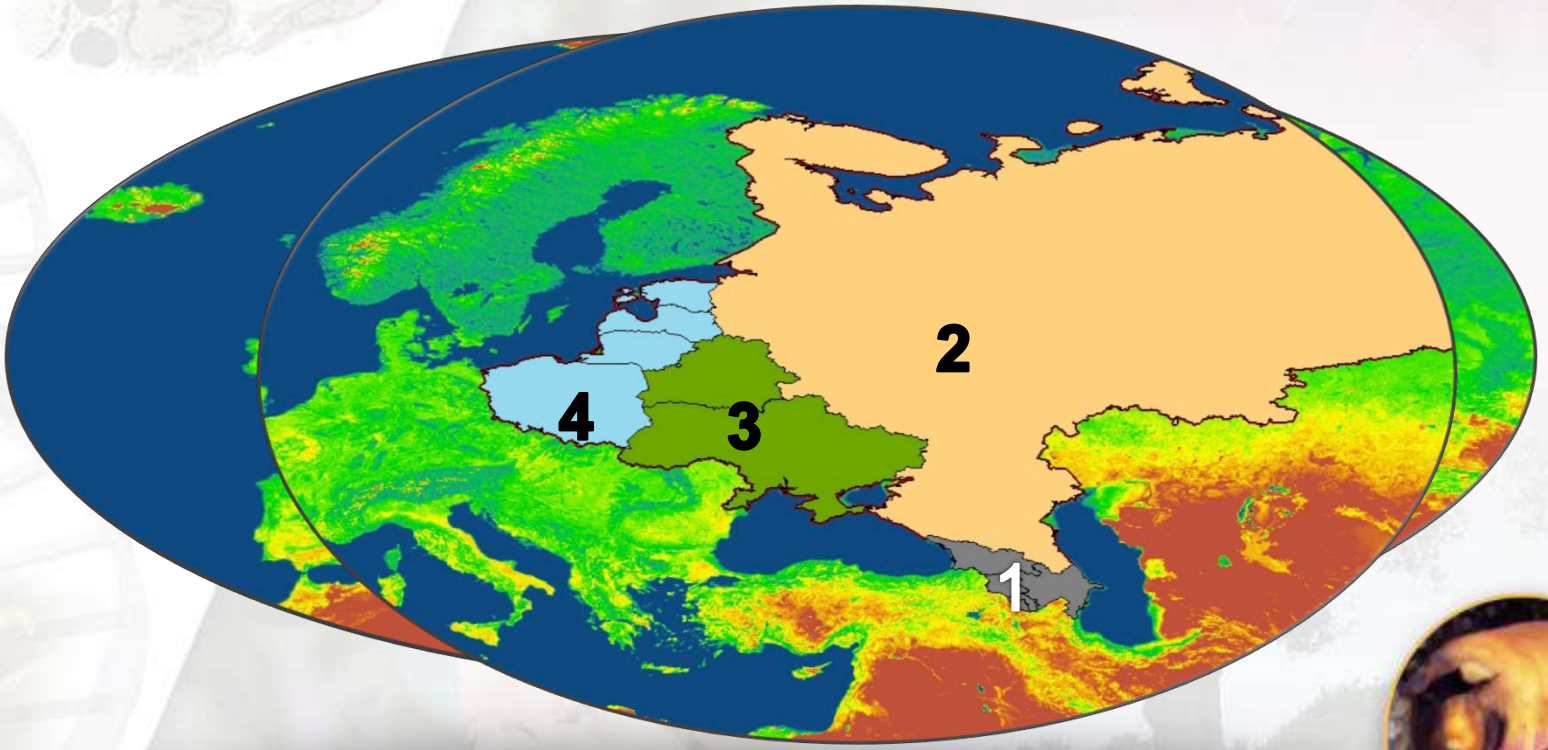
Empres Watch, 28, 2013

Epidemiology of ASF update: The 3 global scenarios

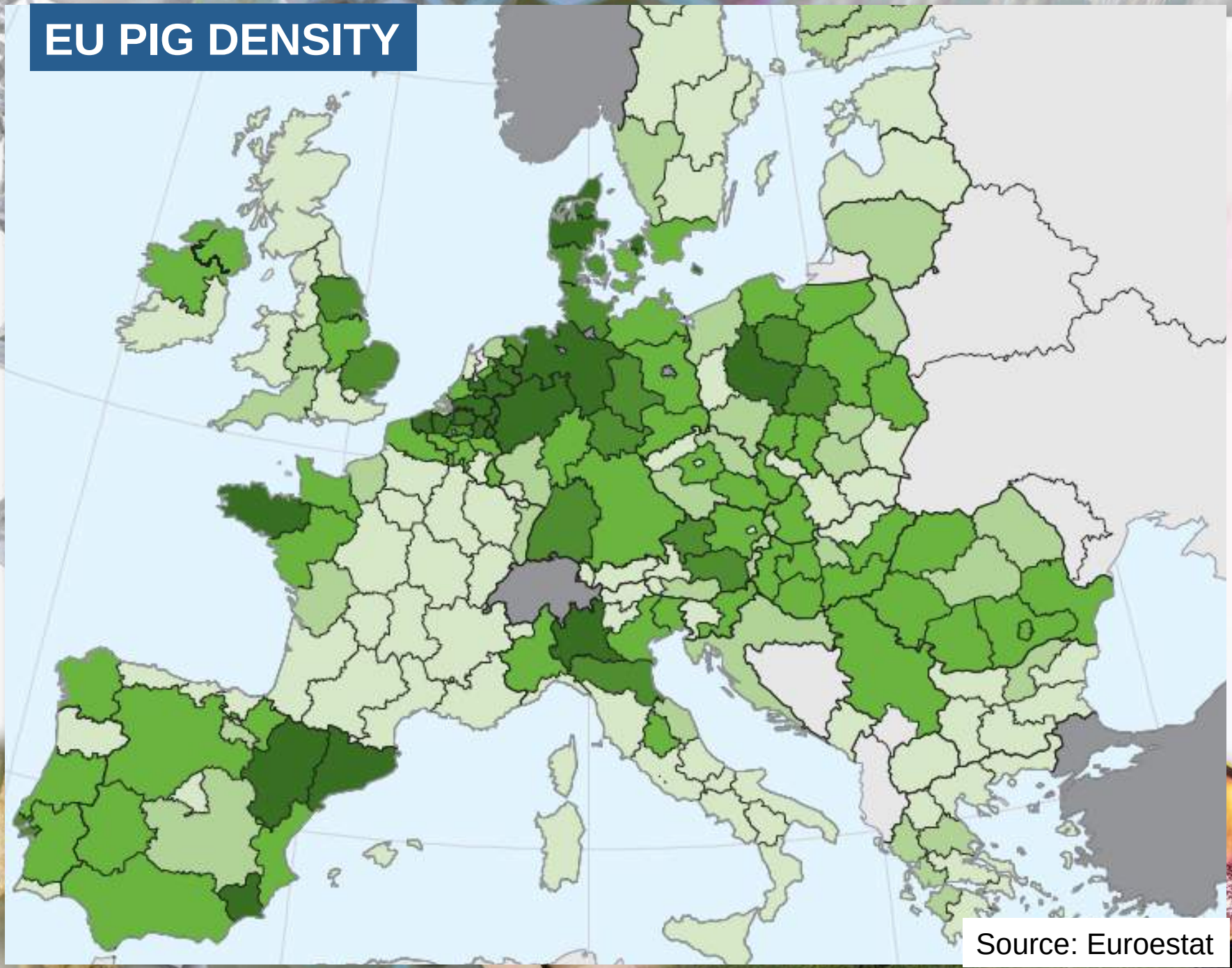
Currently affected:



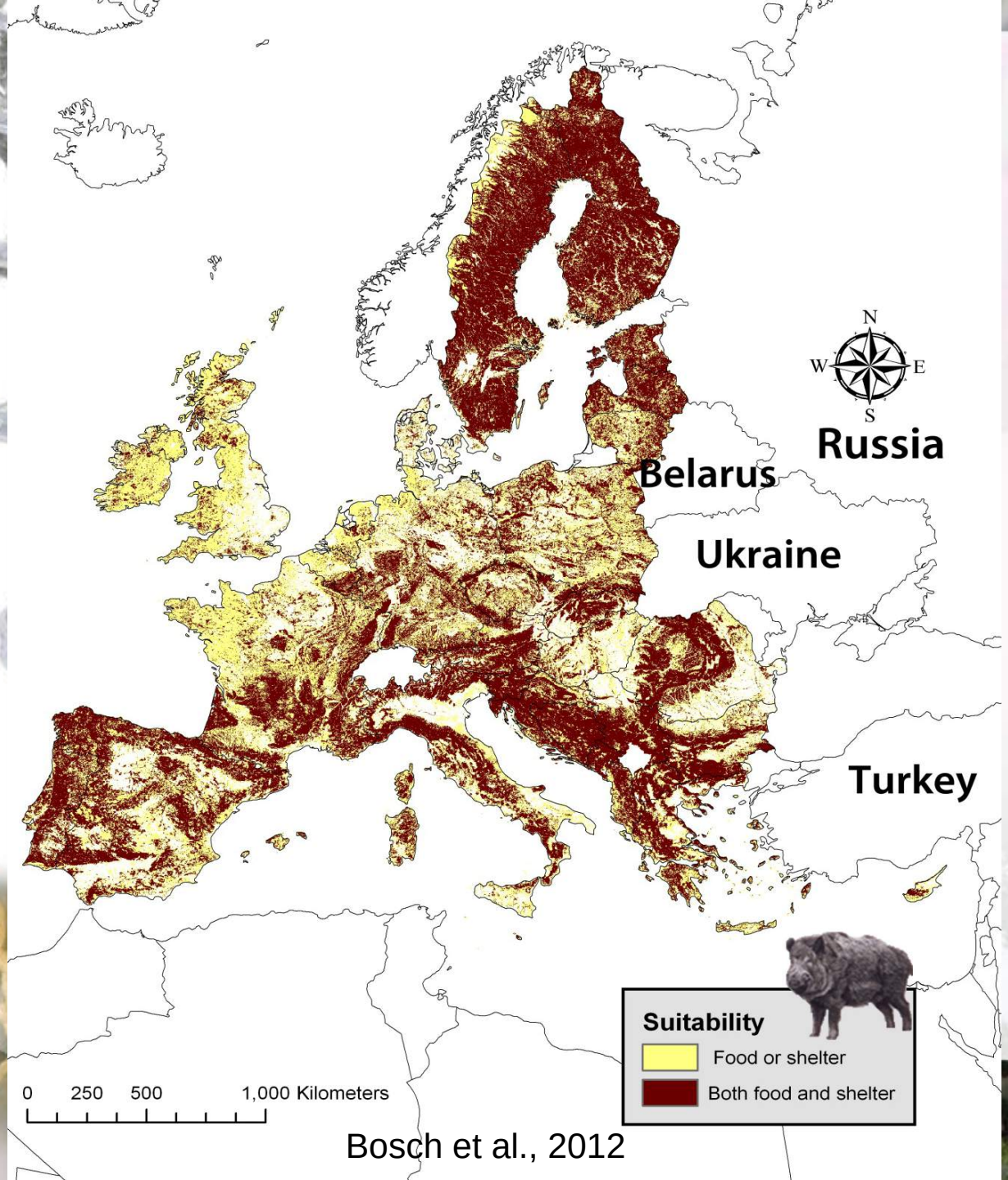
ASF in EUROPE



EU PIG DENSITY



Source: Euroestat



Bosch et al., 2012

WB Distribution and Population Density

Presence of Natural correidors

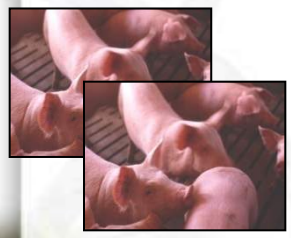
ASF MAIN TRANSMISSION ROUTES

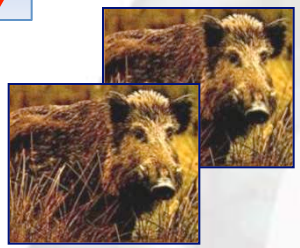
Transmission

Indirect

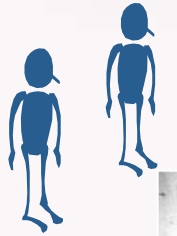
Origin of most outbreaks

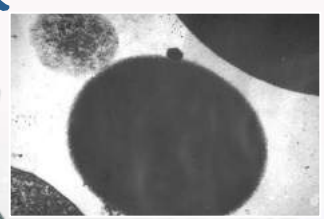
Direct





Biological Vectors

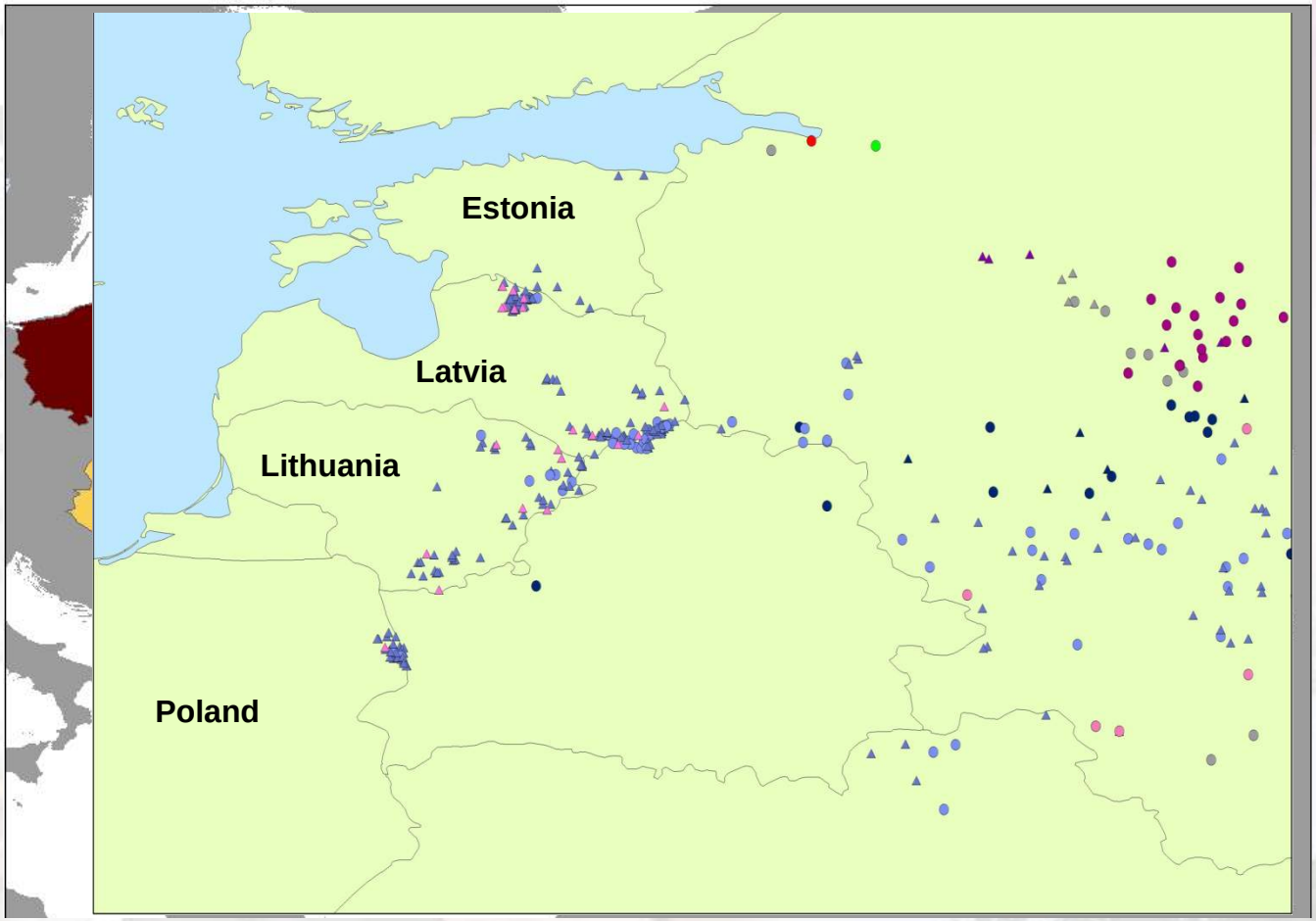




Only influence in Local SPREAD
Outdoor production

Wild boar movements

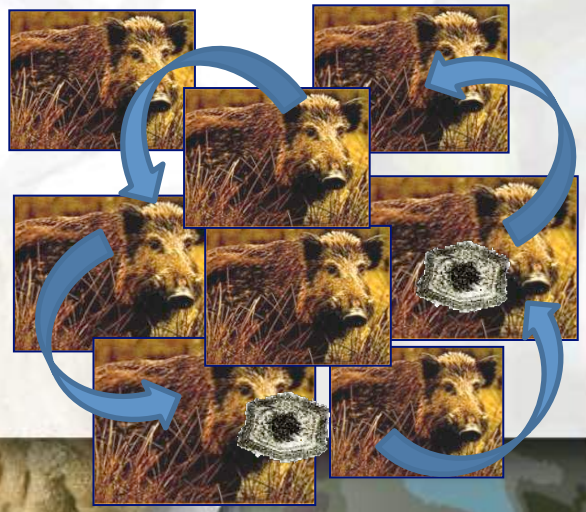
De la Torre et al, 2013

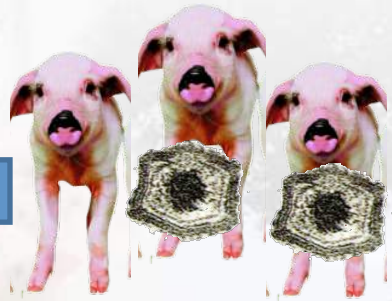


DIRECT TRANSMISSION. THE ROLE OF THE WILD BOAR I

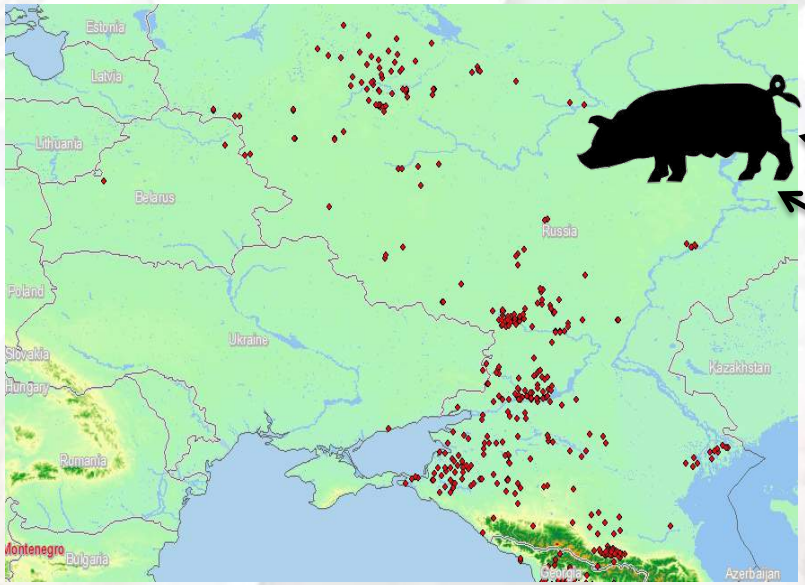
The occurrence of the first case in Russia (2007) and the last cases in Lithuania, Poland and Latvia (OIE, 2014) proved that they could have an **important role in spread.**

Also, the presence of infected domestic pigs potentially in contact with wild boar would facilitate the endemicity



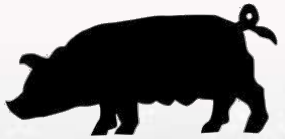


Source of Infection in RF



70 %

29%



67 %

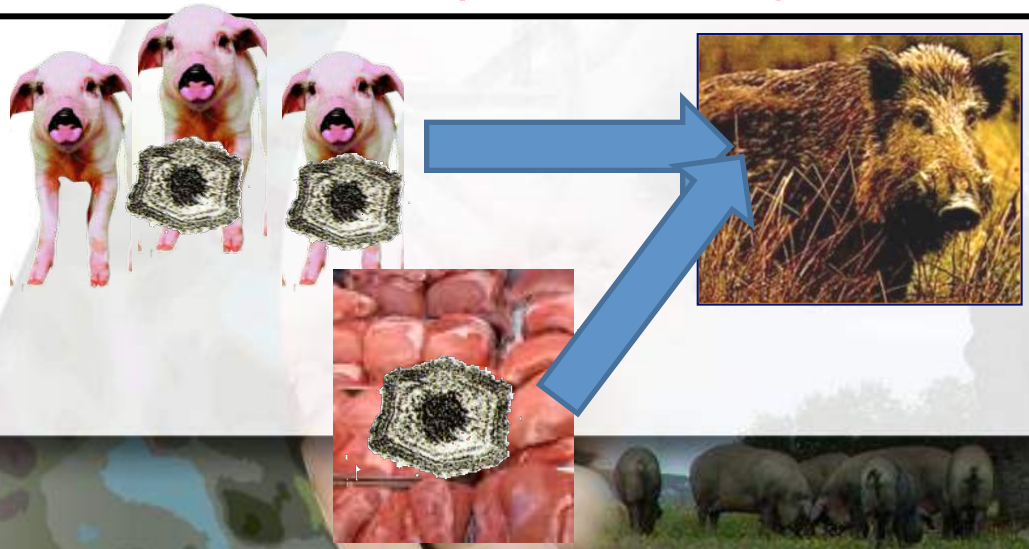
32%

Iglesias et al., 2014

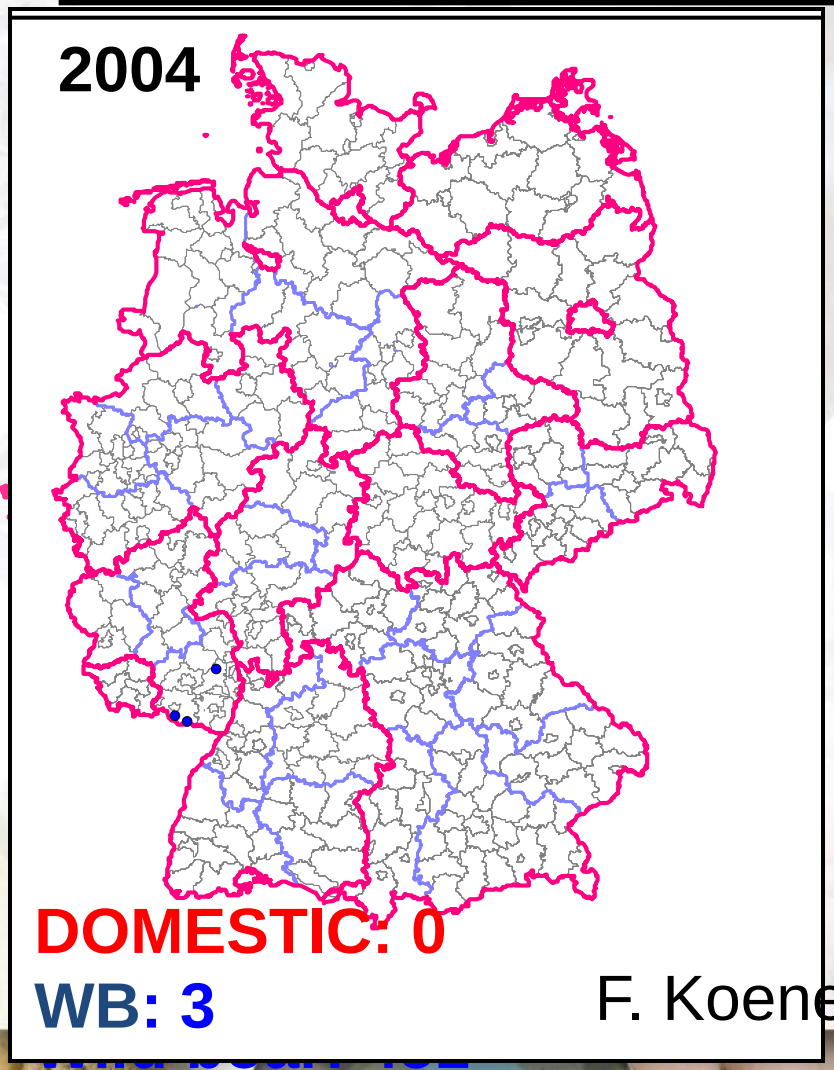
THE ROLE OF THE WILD BOAR II

All the studies performed so far in Europe (Spain and Sardinia) described that the low density wild boar on its own it is not able to mantain the disease without the re-infection from domestic/contaminated products (Laddomada et al., 1994; Manelli et al., 1997, 1998; Mur et al., 2012; Rolesu et al., 2007).

No data are available with high desinty population of wild boar. Some areas of Europe have High Density of WB



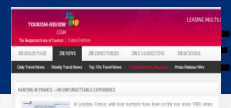
CSF: Oral Vaccine for WB



WILD BOAR HUNTING TOURISM

Belarus

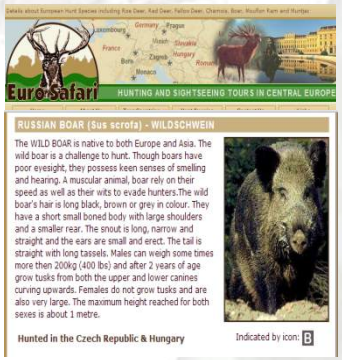
Bulgaria



Germany

Croatia

Czech Rep. + Hungary



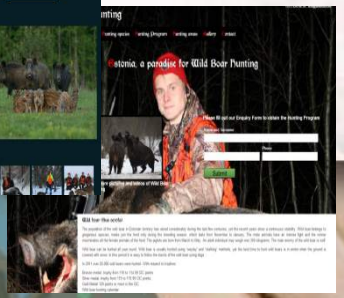
Poland

Hungary

Romania

Czech Rep. + Slovakia

Estonia

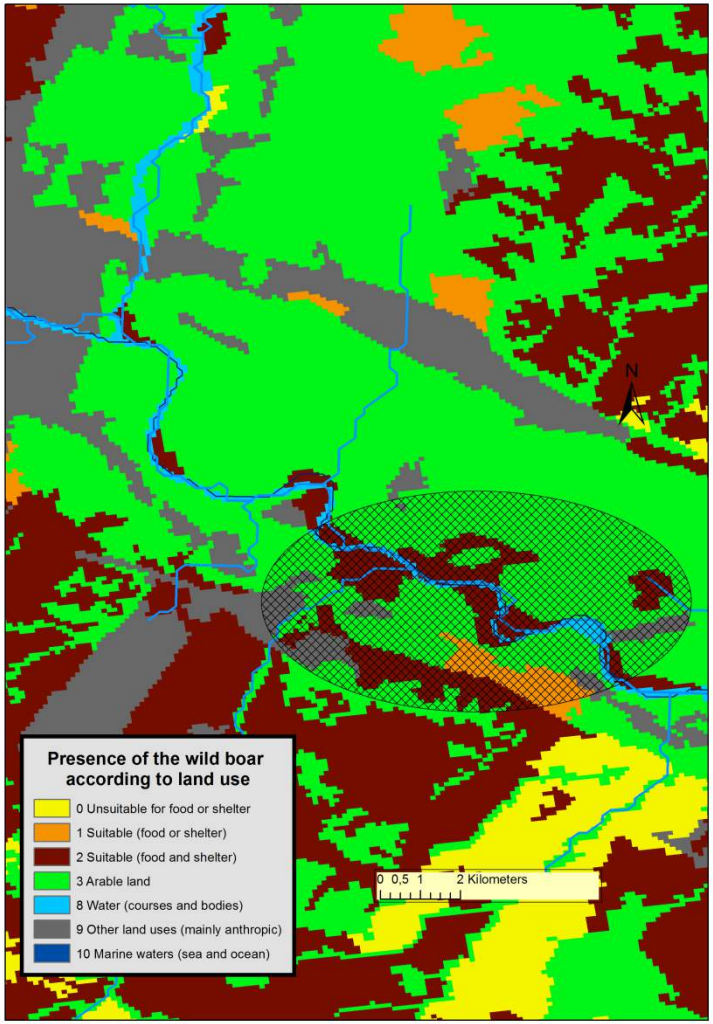


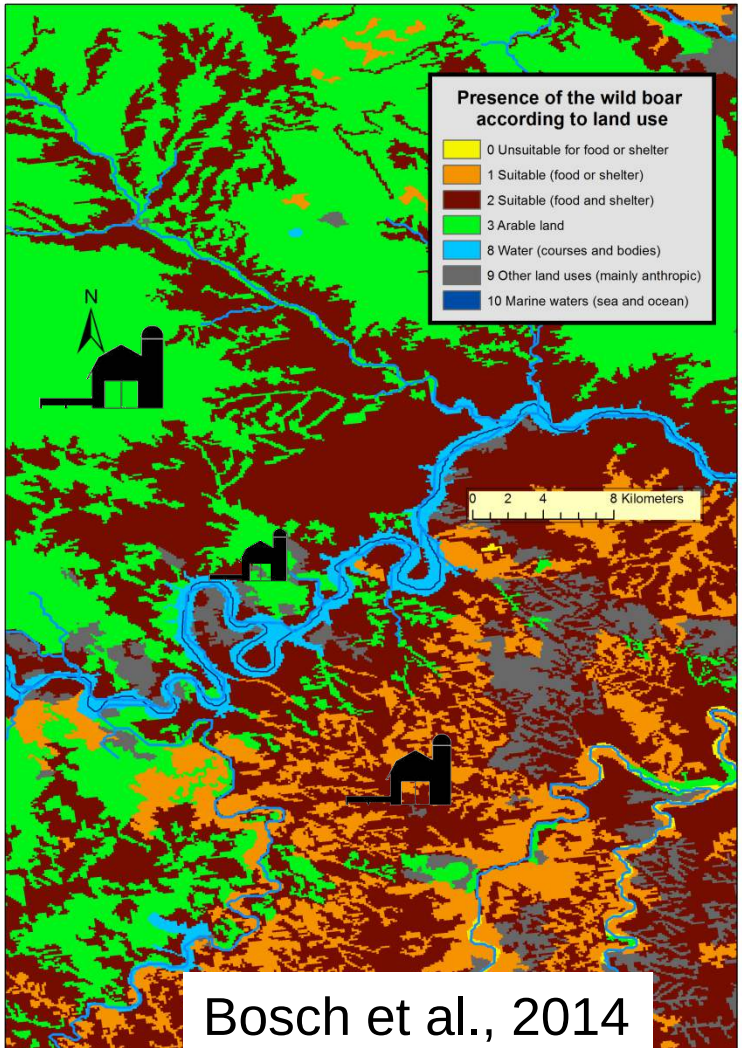
Wild boar management

C. Gortázar, 2014

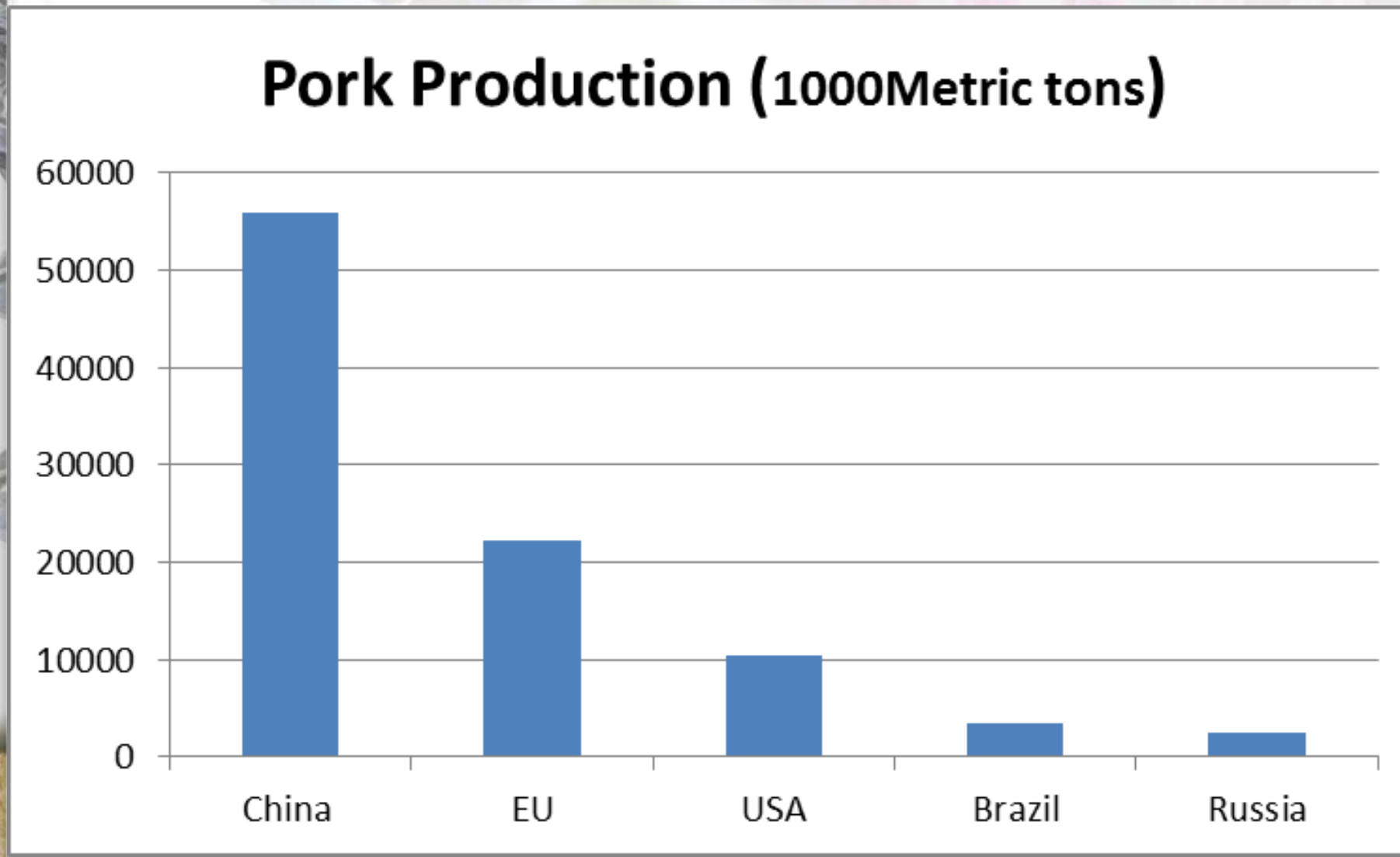
Increase Management Measures are Necessary

- Avoid arable land between suitability areas of WB
- Avoid pig farms in suitability areas of WB

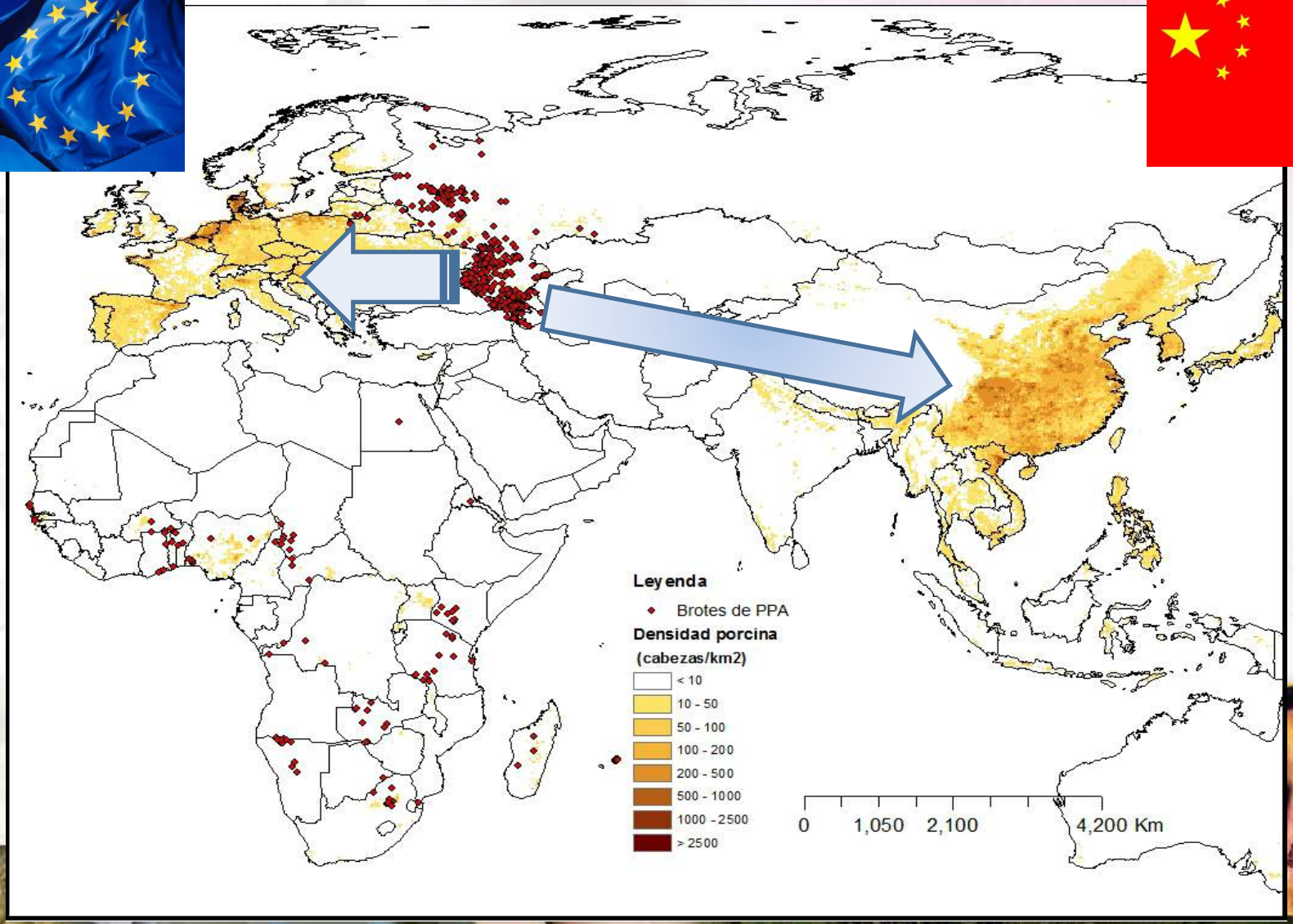




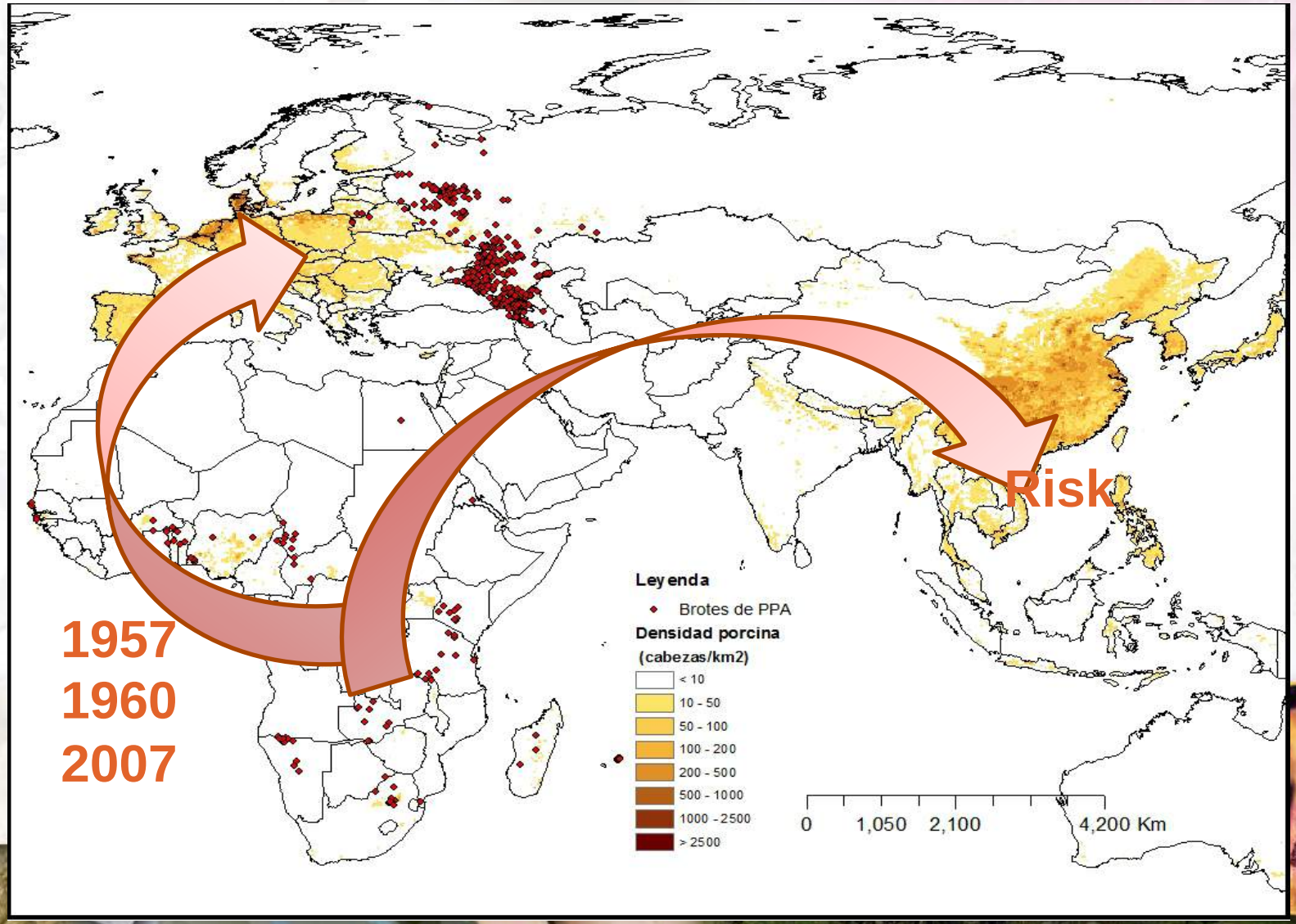
Bosch et al., 2014


Pork Production (1000Metric tons)
60000
50000
40000
30000
20000
10000
0
China
EU
USA
Brazil
Russia

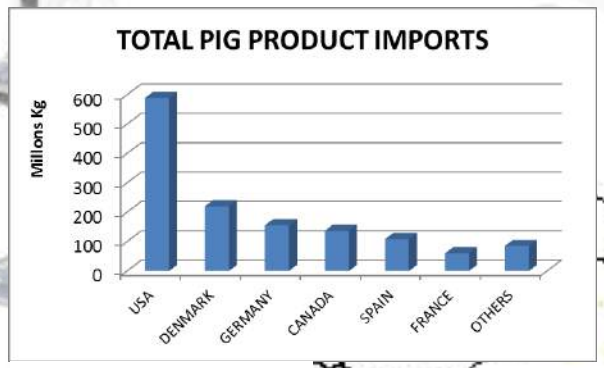
MAIN RISKS


Leyenda
Brotes de PPA
Densidad porcina
(cabezas/km2)
< 10
10 - 50
50 - 100
100 - 200
200 - 500
500 - 1000
1000 - 2500
> 2500
0
1,050
2,100
4,200 Km

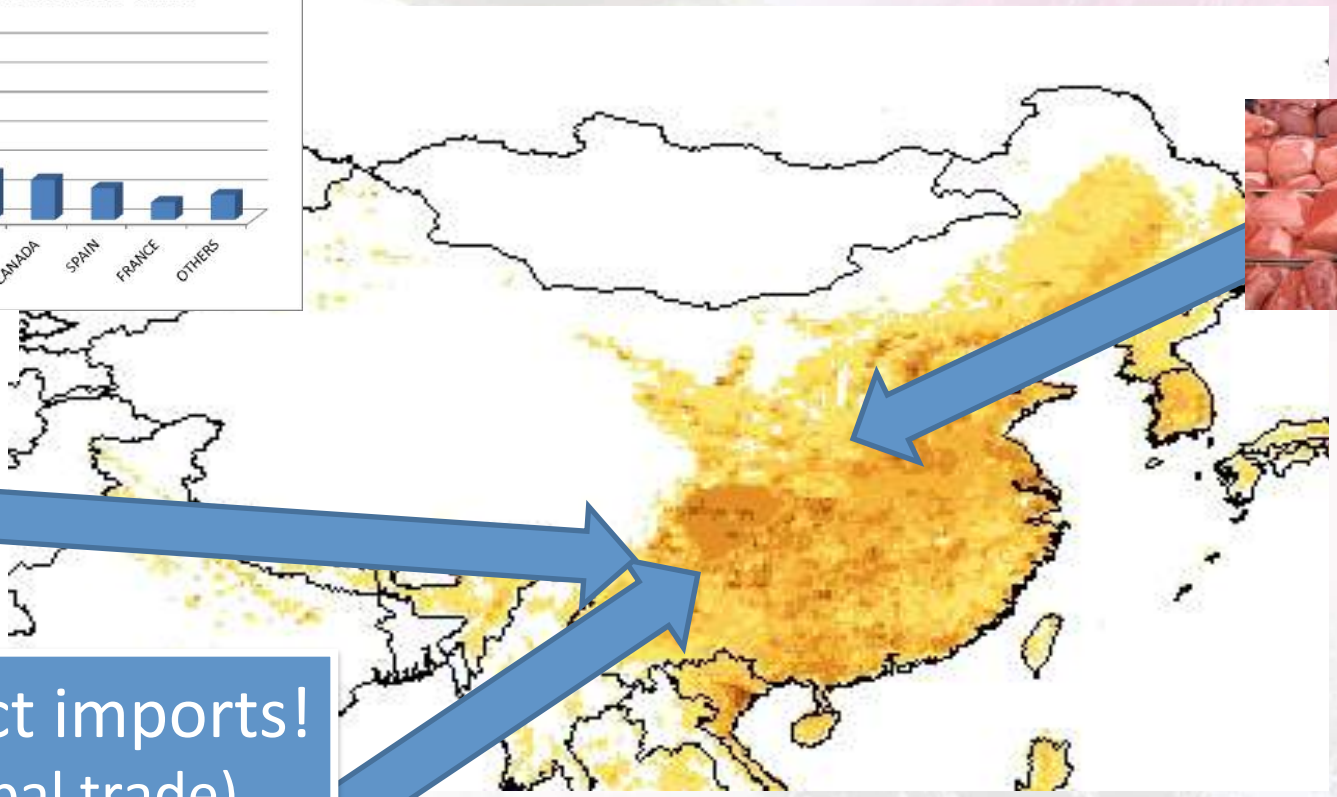
MAIN RISKS FROM AFRICA



EVALUATING THE RISK OF ASFV ENTRY INTO CHINA



Faostat, 2014

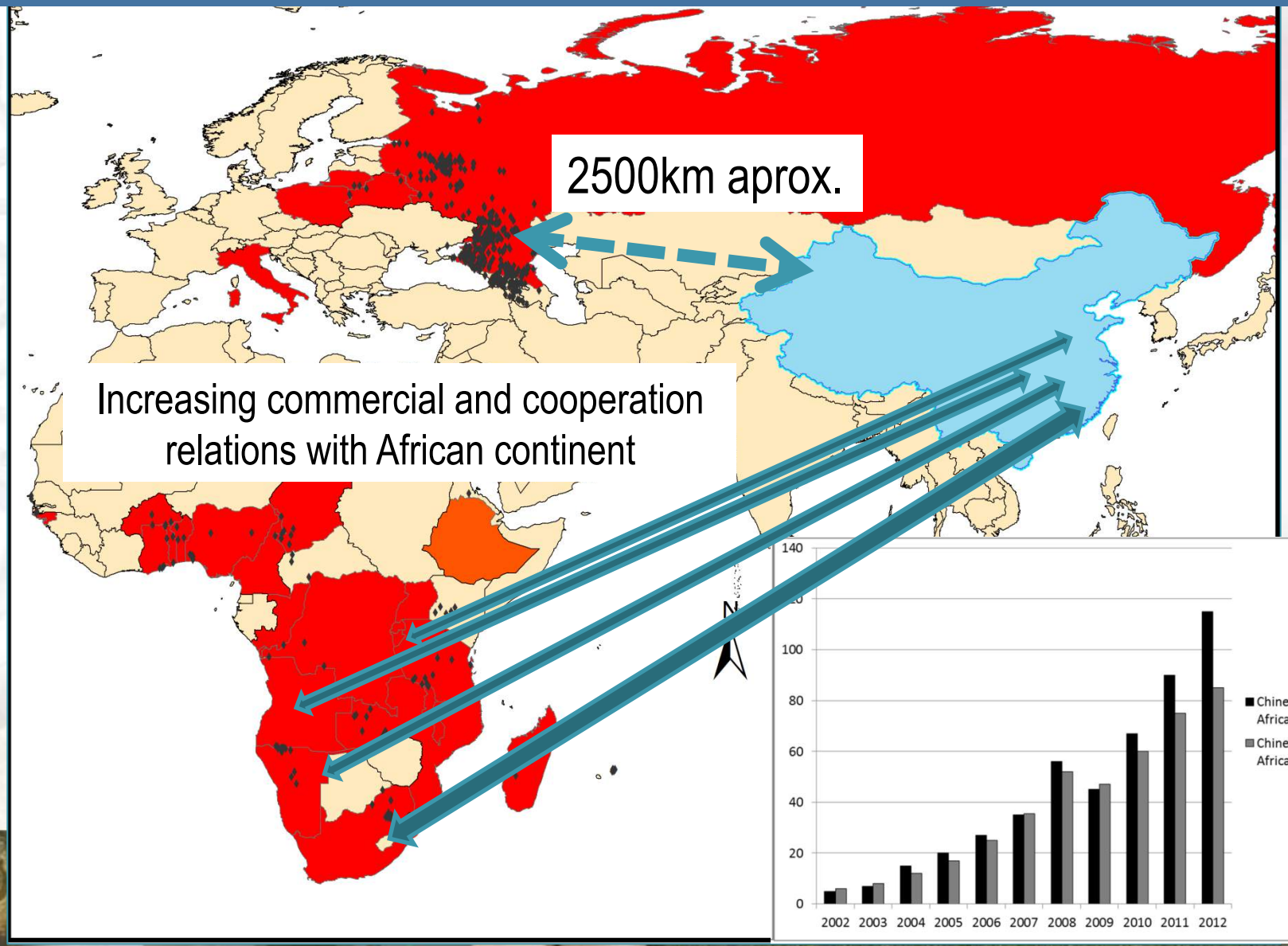


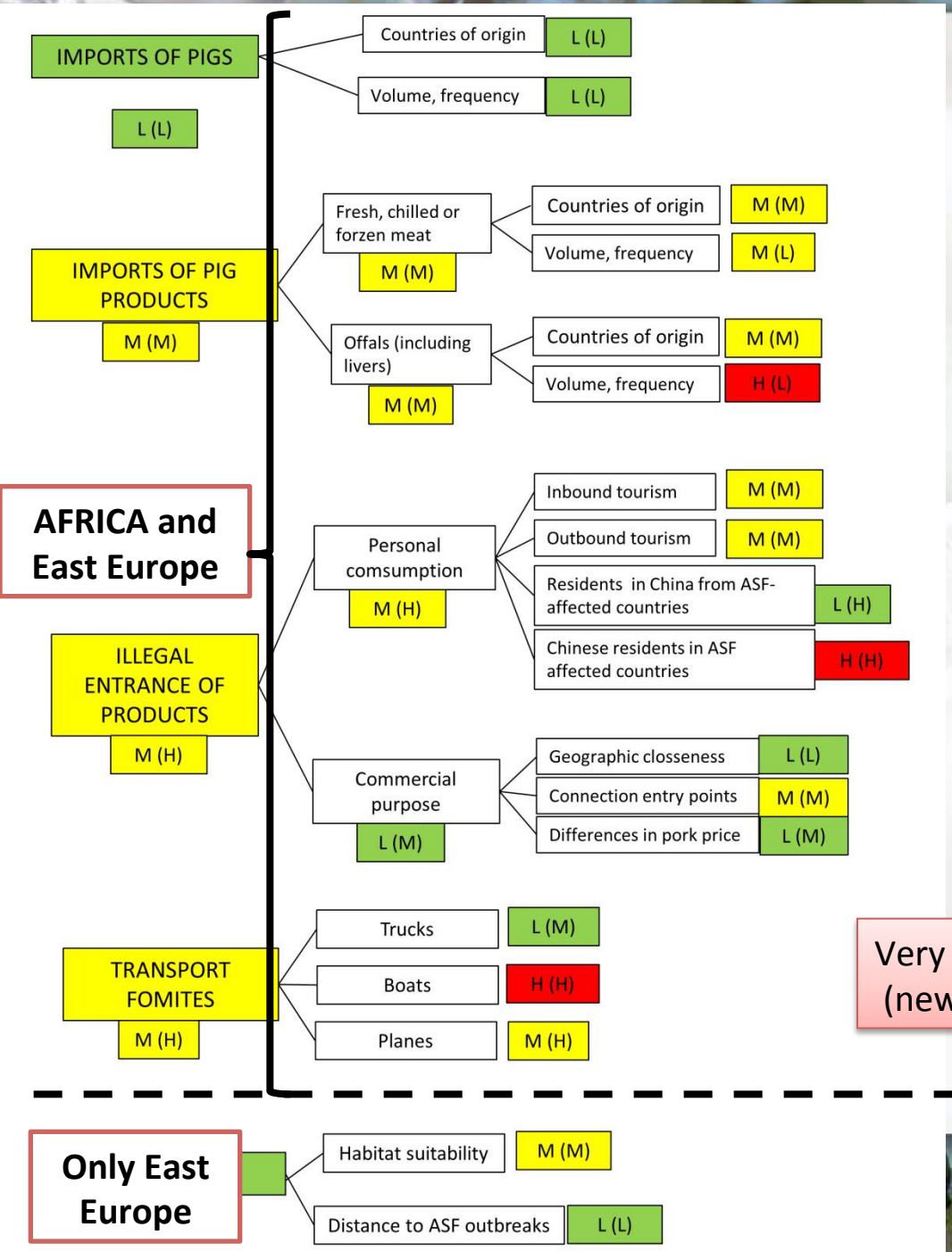
Pig product imports!
(56% global trade)

PIG CENSUS(est.): 472-476millions
PIGS SACRIFIED: 679 millions

Faostat, 2012; OIE, 2012

EVALUATING THE RISK OF ASFV ENTRANCE IN CHINA





840 million of kg of pig offals imported in China in 2012

Specially in Nigeria and South Africa (more than 50.000 residents)

Very strong connections by boat with Africa (new ports under construction)

Mur, et al. 2014

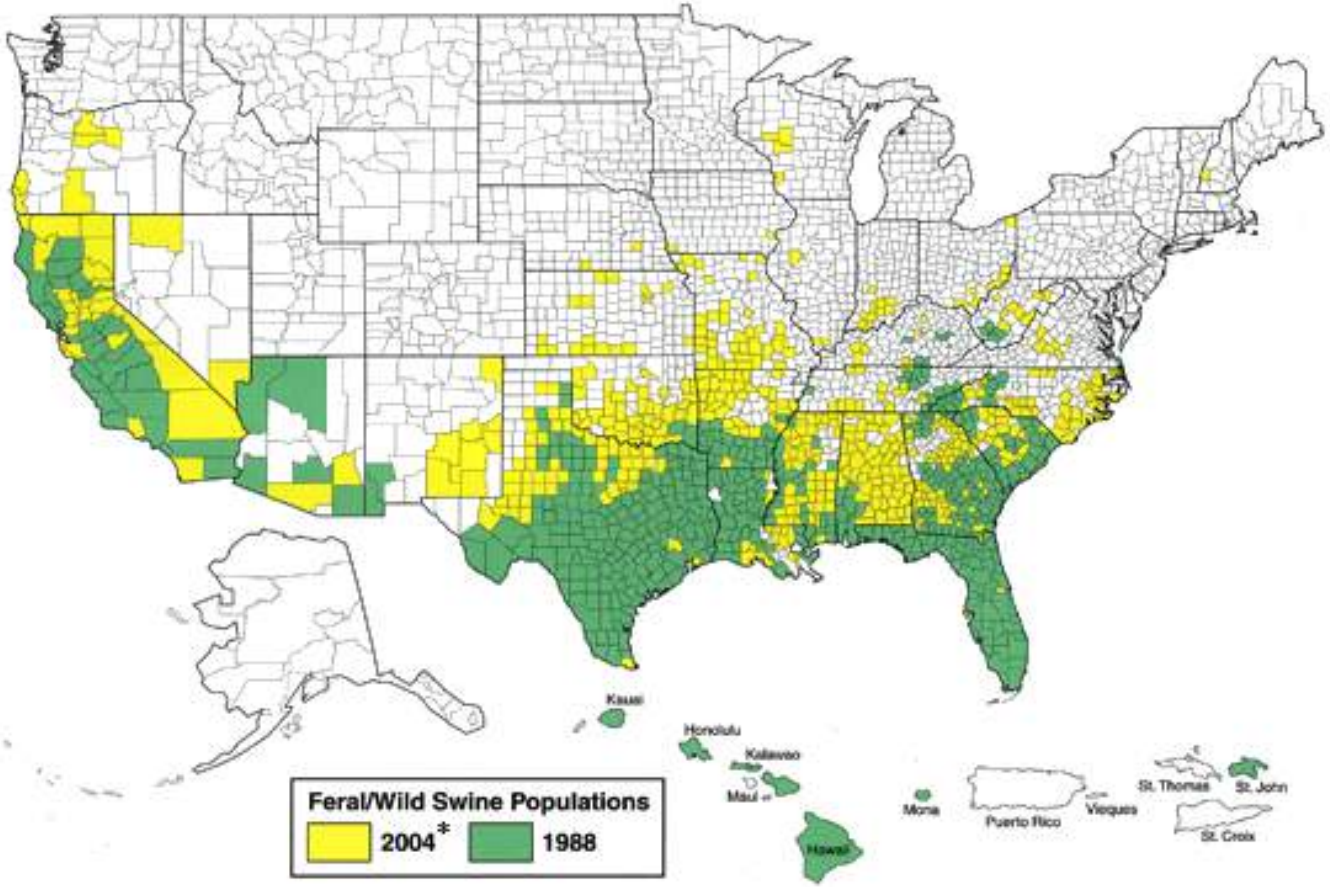
What can we do here ?

Do you think California is in Risk?

1.A Good Early detection system

2. A good contingency plan

Feral swine proliferation, 1988-2004



* Includes all counties reporting feral swine in 1988

Source: United States Department of Agriculture

FIELD IS THE FIRST STEP: EARLY DETECTION

Good Surveillance

COLLABORATION:
ADMINISTRATION– FARMERS – VETS -- HUNTERS

INFORMATION & TRAINING

ASF´ RECIPE

Other ingredients and procedures

EARLY DETECTION

- Be aware of ASF
- ASF knowledge
- Risk factors for your country
- Information about farms: census, location and biosecurity level
- Early field detection by active and passive surveillance
- Animal movements and social network analysis
- Diagnosis program (adequate to the risk)
- Communication between laboratories and field

Thank you very much

Muchas gracias

A WORLD FREE of ASF

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